



Abstracts

November 2021



www.ortopaedi.dk

DOS Bulletin



Udgiver

Dansk Ortopædisk Selskab
Poppelvænget 2
7000 Fredericia

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Næste BULLETIN

Deadline: 31.08.2022
Udkommer: 15.10.2022
Alle indlæg til bulletinen bedes
indsendes i word-format.

Layout & Tryk

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udfyld ansøgningen sammen med
oplysninger om personlige data.

DOS Bestyrelse

Se hele bestyrelsen side 313.

ISSN 0902-8633

Videnskabeligt program

TIME	room: 01+02, ground floor	room: 102+103, 1st floor	room: 202+203, 2nd floor	Auditorium, 1st floor	Falkoner Salen
07:30-08:00					
08:00-08:30					
08:30-09:00					
09:00-09:30	Session 1: Sports Orthopaedics 1 room: 01+02, ground floor <i>Kristoffer W. Barfod & Ole G. Sørensen</i>	Session 2: Hip and Knee room: 102+103, 1st floor <i>Willeke Engel & Peter Bunkum</i>	Session 3: Paediatric Orthopaedics room: 202+203, 2nd floor	UDDU Symposium: Supervision room: Auditorium, 1st floor	
10:00-10:30		<i>Coffee in Exhibition Area</i>			
10:30-11:00	Session 4: Experimental room: 01+02, ground floor <i>Mathias Rünger & Christian Wang</i>	Session 5: Hand and Wrist room: 102+103, 1st floor <i>Malin Stilling & Jerzy Staszny</i>	Session 6: Spine room: 202+203, 2nd floor <i>Søren Mørgen & Simon Telfgaard Slev</i>	Session 7: Hip Fracture room: Auditorium, 1st floor <i>Brorke Vasegå & Rikke Thørmøller</i>	
11:00-11:30					
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18:00-18:30					

TIME	room: 01+02, ground floor	room: 102+103, 1st floor	room: 202+203, 2nd floor	Auditorium, 1st floor	Falkoner Salen
07:30-08:00					
08:00-08:30					
08:30-09:00					
09:00-09:30					
09:30-10:00	Session 8: Foot and Ankle room: 01+02, ground floor <i>Ellen H. Petersen & Jens K. Johansen</i>	Session 9: Tumor and Infection room: 102+103, 1st floor <i>Michael Benitzén & Michaela Skovlund</i>	Session 10: Sport Orthopaedics 2 room: 202+203, 2nd floor <i>Lars Konradsen & Birger Mygind Knudsen</i>	UDDU: Meet the experts Uddannelseslæger: Distal radius fracture room: 204+205, 2nd floor	
10:00-10:30					
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TIME	room: 01+02, ground floor	room: 102+103, 1st floor	room: 202+203, 2nd floor	Auditorium, 1st floor	Falkoner Salen
07:30-08:00					
08:00-08:30					
08:30-09:00					
09:00-09:30	Session 15: Trauma room: 01+02, ground floor <i>Michael Erik & Peter Engstberg</i>	Session 16: Shoulder and Elbow room: 102+103, 1st floor <i>Steen Lind & Poul Sandberg Olsen</i>	Symposium: Fast-track hip and knee arthroplasty room: 202+203, 2nd floor	Symposium: The digital revolution - the future orthopaedic surgeon room: Auditorium, 1st floor	
10:00-10:30					
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15:00-15:30					

Indhold

Dagsprogram

Torsdag d. 18. november	5
Fredag d. 19. november	7
Lørdag d. 20. november	9
Videnskabelige sessioner	10
Abstracts	64

Videnskabeligt Program

Torsdag, den 18. november 2021

		Lokale	Etage
09:00 – 10:30	Session 1 (<i>Sports Orthopaedics</i>)	01+02	stueplan
	Session 2 (<i>Hip and Knee</i>)	102+103	1.sal
	Session 3 (<i>Paediatrics</i>)	202+203	2.sal
	Symposium (UDDU):	Auditorium	1.sal
	What is supervision – and how is it done?		
10:30 – 11:00	Kaffe i udstillingen		
11:00 – 12:00	Session 4 (<i>Experimental</i>)	01+02	stueplan
	Session 5 (<i>Hand and Wrist</i>)	102+103	1.sal
	Session 6 (<i>Spine</i>)	202+203	2.sal
	Session 7 (<i>Hip Fracture</i>)	Auditorium	1.sal
	Forum for UAO	105	1.sal
12:00 – 13:00	Lunch Symposium	Auditorium	1.sal
	DePuy Synthes, Johnson & Johnson:		
	TFN-ADVANCED TM Proximal Femoral		
	Nailing System		
	<i>Prof. Christian Kammerlander, Østrig</i>		
12:00 – 13:00	Frokost i udstillingen		
13:00 – 14:30	Møder i fagområderne		
	Dansk Selskab for Hofte- og		
	Knæalloplastik (DSHK)	01+02	1.sal
	Dansk Selskab for Skulder- og		
	Albuekirurgi (DSSAK)	102	1.sal
	Dansk Ortopædisk Traumeselskab (DOT)	Auditorium	1.sal
	Dansk Selskab for Håndkirurgi (DSH)	203	2.sal
	Dansk Selskab for Artrioskopi og		
	Sportstraumatologi (SAKS)	202	2.sal
	Dansk Fod- og ankelkirurgisk		
	selskab (DFAS)	104	1.sal

Torsdag, den 18. november 2021, *fortsat*

		Lokale	Etage
13:00 – 14:30	Møder i fagområderne, <i>fortsat</i>		
	Dansk Børneortopædisk Selskab (DPOS)	103	1.sal
	Dansk Onkologi/knogle og bløddelstumorer (DSG)	204	2.sal
	Dansk Selskab for Ortopædisk Infektionskirurgi (DSOI)	107	1.sal
	Forum for Ledende Overlæger	105	1.sal
14:30 – 15:00	Kaffe i udstillingen		
15:00 – 17:30	Møder i fagområderne (fortsat)		
	Ryginteressegruppen	106	1.sal
	DSSAK og DOT Symposium: <i>Proximale humerusfrakturer</i>	Auditorium	1.sal
17:30 – 18:30	Velkomst og Posterwalk 1-14	Foyeren	stueplan
17.30 – 19.30	Yngre Ortopædkirurger Danmark (YODA)	01	stueplan
18:00 – 20:00	Danske Ortopæders Organisation (DOO)	02	stueplan

Videnskabeligt Program

Fredag d. 19. november 2021

		Lokale	Etage
07:30 – 09:30	Generalforsamling i DOS inkl. let morgenbuffet	Auditorium	1.sal
09:30 – 10:30	Session 8 (<i>Foot and Ankle</i>)	01+02	stueplan
	Session 9 (<i>Tumor and Infection</i>)	102+103	1.sal
	Session 10 (<i>Sport Orthopaedics 2</i>)	202+203	2.sal
	Meet the Experts (UDDU) <i>for uddannelseslæger:</i> "Distale radiusfrakturer hos voksne"	204+205	2.sal
	<i>for speciallæger:</i> "Suprakondylære humerusfrak. hos børn"	104+105	1.sal
10:30 – 11:00	Kaffe i udstillingen		
11:00 – 11:30	DOS Donations + Celebration of new specialists	Auditorium	1.sal
11:30 – 12:30	DOS Honorary Lecture – DOS historie 1995-2020 <i>Bjarne Møller-Madsen og Steen Bach Christensen</i>	Auditorium	1.sal
12:30 – 13:30	Frokost i udstillingen		
12:30 – 13:30	Lunch Symposium Smith & Nephew: New trends in fracture management <i>Ilija Ban, Søren Kring, Hvidovre</i>	01+02	stueplan
13:30 – 15:00	Session 11 (<i>Hip</i>)	01+02	stueplan
	Session 12 (<i>YODA Best Papers</i>)	102+103	1.sal
	Session 13 (<i>Knee</i>)	202+203	2.sal

Fredag d. 19. november 2021, fortsat

	Lokale	Etage
13:30 – 15:00 Workshop (DOT): <i>Extern fixation</i>	107	1.sal
Workshop (UDDU): <i>Kompetencevurdering</i>	204+205	2.sal
Symposium (Kvalitetsudvalget): <i>Lærings- og kvalitetsteams (LKT)</i>	Auditorium	1.sal
15:00 – 15:30 <i>Kaffe i udstillingen</i>		
15:30 – 16:30 Professorforelæsninger: <i>Prof. Maiken Stilling</i> <i>Prof. Bo Sanderhoff Olsen</i> <i>Prof. Jens Lauritsen</i> <i>Prof. Anders Odgaard</i> <i>Prof. Mikkel Ø. Andersen</i>	Auditorium	1.sal
16:30 – 18:00 Session 14: (DOS Best Papers)	Auditorium	1.sal
18:30 – 19:00 Fællesfotografering Velkomst ved DOS formand	Hotelloobby	stueplan
19:00 – 02:00 <i>Kongresmiddag</i>	1.sal	
Prisuddelinger: YODA Best Paper, Den Gyldne YODA DOS Best Paper, DOS Best Poster 1+2, DOS Best PhD, DOS Best Published Paper, DOS Fellowship		

Videnskabeligt Program

Lørdag d. 20. november 2021

		Lokale	Etage
09:00 – 10:30	Session 15 (<i>Trauma</i>)	01+02	stueplan
	Session 16 (<i>Shoulder and Elbow</i>)	102+103	1.sal
	Symposium: FAST-TRACK hofte- og knæalloplastik	202+203	2.sal
	Symposium: The digital revolution - the future orthopaedic surgeon	Auditorium	1.sal
10:30 – 11:00	Kaffe i udstillingen		
11:00 – 12:00	Guildal Lecture: <i>Prof. Fares Haddad</i>	Auditorium	1.sal
12:00 – 12:30	Donations: <i>Guildal Foundation</i>	Auditorium	1.sal
12:30 – 13:30	Frokost i udstillingen		
13:30 – 15:00	DOS Battle (<i>Videnskabeligt Udvalg</i>)	Auditorium	1.sal
15:00 – 15:30	Kaffe i udstillingen		

Videnskabeligt program

- Session 1: Sports Orthopaedics I
- Session 2: Hip and Knee
- Session 3: Paediatric Orthopaedics
- Session 4: Experimental
- Session 5: Hand and Wrist
- Session 6: Spine
- Session 7: Hip Fractures

Poster walk 1-14

- Session 8: Foot and Ankle
- Session 9: Tumor and Infection
- Session 10: Sport Orthopaedics II
- Session 11: Hip
- Session 12: YODA Best Papers
- Session 13: Knee
- Session 14: DOS Best Papers

- Session 15: Trauma
- Session 16: Shoulder and Elbow

Session 1 (Sports Orthopaedics)

09:00 – 10:30

Lokale: 01+02

1. Questionable measurement properties of Pedi-IKDC – a questionnaire for children with ACL injury. A study of structural validity and reliability

Christian Fugl Hansen, Maria Østergaard Madsen, Martin Rathcke, Susan Warming, Martin Lind, Peter Faunø, Michael Rindom Krogsgaard, Karl Bang Christensen

2. Should recreational badminton players land like a pro? – a possible strategy to protect the Achilles tendon from rupture

Niels Christian Kaldau, Niels Nedergaard, Per Hölmich, Jesper Bencke

3. The effect of targeted exercise on knee muscle strength and function in participants with persistent hamstring deficiency following ACL reconstruction – a randomized controlled trial.

Bo Bregenhof, Per Aagaard, Nis Nissen, Mark Creaby, Jonas Bloch Thorlund, Carsten Jensen, Trine Torfig, Anders Holsgaard-Larsen

4. Quadriceps tendon and hamstring tendon autografts for anterior cruciate ligament reconstruction yield equally high rates of graft failure, revision ACLR or re-operation at two years follow up. A registry study with review of 475 patients

Malte Schmücker, Jørgen Haraszuk, Per Hölmich, Kristoffer W. Barfod

5. The influence of graft choice on knee muscle strength following anterior cruciate ligament reconstruction: A systematic review and meta-analysis.

Bo Bregenhof, Anders Holsgaard-Larsen, Jonas Bloch Thorlund, Carsten Jensen, Maria Thorning, Per Aagaard, Nis Nissen, Carsten Bogh Juhl

6. Using deep learning to diagnose knee injuries on magnetic resonance images: current potential and limitations

Nicolai Sandau, Stig Brorson

7. Secondary Surgeries 20 years after surgical and non-surgical treatment of ACL rupture: A population-based cohort study

Pernille Melbye, Per Hviid Gundtoft, Teodor Lien-Iversen, Daniel Barklin Morgan, Jens Christian Pörneki, Bjarke Viberg

8. Eighty Percent Survival of Condyle Resurfacing Implants in the Knee After 10 years. A Nation-Wide Cohort Study on 379 procedures from the Danish Knee Arthroplasty Registry

Bjørn Børsøe Christensen, Anders El-Galaly, Jens Ole Laursen, Martin Lind, Bjørn Christensen

9. Validity of sports-related diagnosis codes in the Danish National Patient Register

Markus Gadeberg, Allan Cramer, Per Hölmich, Kristoffer Barfod

10. Surgical conversion rate and patient-reported outcome after treatment with a physiotherapy-led progressive exercise program plus a PCL support brace in patients with an acute injury of the posterior cruciate ligament

Randi Gram Rasmussen, Julie Sandell Jacobsen, Birgitte Blaabjerg, Torsten Grønbech Nielsen, Lene Miller Lindberg, Martin Lind

Session 2 (Hip and Knee)

09:00 - 10:30

Lokale: 102+103

11. 7 novel risk loci suggest differences in genetic associations between surgically and non-surgically treated hip osteoarthritis

Cecilie Henkel, Unnur Styrkársdóttir, Ole B. Pedersen, Kári Stefánsson, Anders Troelsen

12. Development of a new diagnostic algorithm identifying all cases of dislocation after primary THA – Based on 31,762 THAs from the Danish Hip Arthroplasty Register

Lars Lykke Hermansen, Bjarke Viberg, Søren Overgaard

13. Migration pattern of cemented Exeter Short Stem in Dorr type A femurs - A prospective radiostereometry study with 2-year follow-up

Tobias Dahl Vind, Peter Bo Jørgensen, Dovydas Vainorius, Stig Storgaard Jakobsen, Kjeld Søballe, Maiken Stilling

14. Do hip precautions after posterior approach total hip arthroplasty reduce the incidence of early postoperative dislocation or influence other patient-important outcomes: A systematic review and meta-analysis from a Danish Clinical Practice Guideline

Christoffer Bruun Korfitsen, Inger Mechlenburg, Jane Schwartz Leonhardt, Lone Ramer Mikkelsen, Søren Overgaard

15. No increase in postoperative contacts with the health care system following outpatient total hip and knee arthroplasty

Christian Emil Husted, Henrik Husted, Christian Skovgaard Nielsen, Mette Mikkelsen, Anders Troelsen, Kirill Gromov

16. Genetic associations of knee osteoarthritis vary with the need for surgical treatment: insights from 2 large-scale genome-wide meta-analyses

Cecilie Henkel, Unnur Styrkársdóttir, Ole B. Pedersen, Kári Stefánsson, Anders Troelsen

17. Two - year survival rate and functional outcome for the Persona Total Knee Arthroplasty

Laugé Bundvad, Mette Mikkelsen, Lina H. Ingelsrud, Christian S. Nielsen, Kirill Gromov, Anders Troelsen

18. Preoperative Oxford Knee Score predicts long term results in Total Knee Replacements

Henriette Appel Holm, Per Wagner Kristensen, Lasse Enkebølle Rasmussen

19. Fast-track revision knee arthroplasty. A multicenter cohort study on 1439 elective aseptic major component revision knee arthroplasties

Martin Lindberg-Larsen, Pelle Baggesgaard Petersen, Yasemin Corap, Kirill Gromov, Christoffer Calov Jørgensen, Henrik Kehlet

20. Influence of Body Mass Index and age on day of surgery discharge, prolonged admission and 90-day readmission after fast-track unicompartmental knee arthroplasty

Christian Bredgaard Jensen, Anders Troelsen, Christoffer Calov Jørgensen, Henrik Kehlet, Kirill Gromov

Session 3 (Paediatrics)

09:00 - 10:30

Lokale: 202-203

21. Does lower extremity passive range of motion associate with gross motor capacity or gross motor performance in children and adolescents with cerebral palsy? A cross-sectional study

Christina Esmann Fonvig, Jens Troelsen , Anders Holsgaard-Larsen

22. Controlled rotation of long bones by guided growth – A proof of concept study of a novel plate in cadavers

Abood Ahmed A., Hellfritzsch Michel B., Møller-Madsen Bjarne, Brüel Annemarie, Westersø Thomas S., Vedel-Smith Nikolaj K., Rahbek Ole , Rölffing Jan D.

23. Evaluation of somatosensory profiles in children and adolescents with cerebral palsy and chronic pain by quantitative sensory testing

Johanne Jørgensen, Mads Werner, Josephine Michelsen, Christian Wong

24. Seasonal variation in children's fractures: A population-based study of 20,654 pediatric fractures.

Rønnov Lund Anja, Lauritsen Jens Martin, Færgemann Christian

25. Ankle contractures are frequent among children with cerebral palsy and associated with lower gross motor function and degree of spasticity

Lærke Hartvig Krarup, Pia Kjær Kristensen, Louise Strand, Sofie Langbo Bredtoft, Inger Mechlenburg, Kirsten Nordbye-Nielsen

26. Epidemiology and incidence of paediatric orthopaedic trauma workload during the COVID-19 pandemic—A multicenter cohort study of 3171 patients

Morten Kjerri Rasmussen, Peter Larsen, Jan Duedal Rölffing, Bertram Lahn Kirkegaard, Rikke Thorninger, Rasmus Elsøe,

27. Positive predictive values in clinical screening for developmental dysplasia of the hip

Hans-Christen Husum, Arash Gaffari, Laura Rytøft, Jens Svendsson, Søren Harving, Søren Kold, Ole Rahbek

28. What is the association between MRI and radiography in measuring femoral head migration?

Hans-Christen Husum, Michel Bach Hellfritzsche, Mads Henriksen, Kirsten Skjaerbaek Duch, Martin Gottliebsen, Ole Rahbek

29. Correlation of clinical tests and patient-reported measures in adolescents with Osgood Schlatter: a cross-sectional study

Kasper Krommes, Kristian Thorborg, Per Hölmich

30. Measuring effects on pain and quality of life after Dysport® injection in children with cerebral palsy

Jospehine Michelsen, christian wong

Session 4 (Experimental)

11:00 - 12:00

Lokale: 01+02

31. Vancomycin bone and tissue concentrations following tibial intraosseous administration – evaluated in a porcine model

Josephine Olsen Kipp, Pelle Hanberg, Josefine Slater, Line Møller Nielsen, Stig Storgaard Jakobsen, Maiken Stilling, Mats Bue

32. Sampling of the myotendinous junction – how can we do it?

Jens Rithamer Jakobsen, Peter Schjerling, Michael Kjaer, Abigail Mackey, Michael Rindom Krogsgaard

33. Double-dose cefuroxime concentrations in bone, synovial fluid of the knee joint and subcutaneous adipose tissue—A randomised porcine microdialysis study

Andrea René Jørgensen, Pelle Hanberg, Mats Bue, Maja Brøgger Thomassen, Pedersen Jørgensen, Maiken Stilling

34. Heterogenous cefuroxime penetration to the anterior and posterior column of the spine – An experimental porcine study

Magnus A. Hvistendahl, Mats Bue, Pelle Hanberg, Alexander Emil Kaspersen, Maiken Stilling, Kristian Høy

35. Timing of Antimicrobial Prophylaxis and Tourniquet inflation - A Randomized Controlled Microdialysis Study

Pelle Hanberg, Mats Bue, Kristina Öbrink-Hansen, Maja Thomassen, Kjeld Søballe, Maiken Stilling

36. Evaluation of single-dose cefuroxime concentrations in the spinal cord, cerebrospinal fluid and epidural space in relation to spine surgery – an experimental porcine study

Alexander Emil Kaspersen, Pelle Emil Hanberg, Magnus A. Hvistendahl, Mats Bue, Kristian Høy, Maiken Stilling

37. Mesenchymal Stem Cell Extracellular Vesicles as Adjuvant to Bone Marrow Stimulation in Chondral Defect Repair in a Minipig Model

Kris Tvillum Chadwick Hede, Bjørn Borsøe Christensen, Morten Lykke Olesen, Jesper Skovhus Thomsen, Casper Bindzus Foldager, Wei Seong Toh, Sai Kiang Lim, Martin Carøe Lind

Session 5 (Hand and Wrist)

11:00 - 12:00

Lokale: 102-103

38. Volar locking plate fixation of distal radius fractures and associated complications. A retrospective study of 599 patients with a mean follow-up of 2.5 years

Michelle Fog Andersen, Marcus Landgren, Linnea Bøgeskov Schmidt, Galal Hassani

39. High early implant removal- and subluxation incidence after Amandys interposition arthroplasty for radio-carpal osteoarthritis

Robert Gvozdenovic, Lars Vadstrup

40. Fixation of combined TFCC foveal and capsular injury by modified ulnar tunnel technique – a feasible solution?

Sabine Simonsen, Robert Gvozdenovic

41. The Minimal Clinically Important Difference of the Shortened Disability of the Arm, Shoulder, and Hand Questionnaire for Patients with Thumb CMC Arthritis

Rasmus Wejnold Jørgensen, Marc Randall Kristensen Nyring

42. 1 & 2 Column Fusion – a solution for the SLAC or SNAC Wrist; case series of 43 consecutive patients

Lars Solgård, Robert Gvozdenovic

43. Arthroscopic vs. Open Bone Grafting in the treatment of Scaphoid Nonunion; case control study.

Robert Gvozdenovic, Dejan Susic

44. 2-year results after Maia® thumb total carpometacarpal arthroplasty.

Anders Lorentsen Jens Chr. Werlinrud

Session 6 (Spine)

11:00 - 12:00

Lokale: 202-203

45. Inter-variability in radiographic parameter and general evaluation of a low dose fluoroscopic technique in patients with idiopathic scoliosis.

christian wong, Jens Adriansen, Jytte Jeppsen, Andreas Balslev-Clausen

46. Are Modic changes associated with health-related quality of life after discectomy - a study on 620 patients with two-year follow-up

Bendix Tom, Ohrt-Nissen Søren , Paulsen Rune , Andreasen Andreas , Støttrup Chrstian, Brorson Stig , Carreon Leah Y. , Andersen Mikkel Østerheden

47. Serum Metal Ion Levels in Adolescent Idiopathic Scoliosis (AIS) Patients 25 years after treated with Harrington Rod Instrumentation or Bracing

Simon Thorbjørn Sørensen, Anne Vibeke Schmedes, Mikkel Østerheden Andersen, Leah Carreon, Ane Simony

48. Interbody fusion does not influence development of lumbar compensatory mechanisms 10 year after lumbar fusion

Kristian Høy, Kamilla Troung, Mads Henriksen, Thomas Andersen

49. Clinical and patient-reported outcome after posterolateral - versus transforaminal lumbar interbody fusion - A matched cohort study on 422 patients with two-year follow-up

Søren Ohrt-Nissen, Leah Carreon, Mikkel O Andersen, Peter M Udby

50. Comparison of interventions for lumbar disc herniation: a systematic review with network meta-analysis

Kresten Wendell Rickers, Peter Heide Pedersen, Torben Tvedebrink, Søren Eiskjær

51. The clinical significance of the Modic changes grading score

Peter Udby, Signe Elmoose, Mikkel Østerheden Andersen, Leah Carreon

Session 7 (Hip Fracture)

11:00 - 12:00

Lokale: Auditorium

52. Feasibility and preliminary effect of strength training, nutritional supplement and anabolic steroids in rehabilitation of patients with hip fracture: A randomized controlled pilot trial (HIP-SAP1 trial)

Signe Hulsbæk, Thomas Bandhom, Ilija Ban, Nicolai Bang Foss, Jens-Erik Beck Jensen, Henrik Kehlet, Morten Tange Kristensen

53. Comorbidity and quality of in-hospital care for hip fracture patients

Christine Krogsgaard Schrøder, Thomas Johannesson Hjelholt, Morten Madsen, Alma Becic Pedersen, Pia Kjær Kristensen

54. Comorbidity in patients with hip fracture; current trends in prevalence and association with 30-day mortality – a population-based cohort study – A population-based cohort study

Pia Kjær Kristensen, Thomas Johannesson Hjeltholt, Alma Becic Pedersen

55. Loss of pre-fracture basic mobility status at hospital discharge for hip fracture is associated with 30-day post-discharge risk of infections – A four-year nationwide cohort study of 23,309 Danish patients.

Jeppe Vesterager, Morten Tange Kristensen, Alma Becic Pedersen

56. The incidence of hip fractures, amongst elderly aged 70+, continues to decrease.

Tine Nymark, Niels Dieter Röck, Jens Lauritsen

57. Development and Validation of a Model for Predicting Mortality in Patients with Hip Fracture: Population-Based Cohort Study

Thomas Hjelholt, Søren Johnsen, Peter Brynningsen, Jakob Knudsen, Daniel Prieto-Alhambra, Alma Pedersen

58. Quality of in-hospital care and postoperative complications and mortality among hip fracture patients with Parkinson's disease.

Peter Nguyen, Thomas Johannesson Hjelholt, Alma Becic Pedersen

Session 8 (Foot and Ankle)

09:30 - 10:30

Lokale: 01+02

59. No clinically relevant difference between operative and non-operative treatment in tendon elongation measured with the Achilles tendon resting angle (ATRA) 1 year after acute Achilles tendon rupture

Ebrahim Rahdi, Allan Cramer, Maria Swennergren Hansen, Håkon Sandholdt, Per Hölmich, Kristoffer Weisskirchner Barfod

60. Acute Achilles tendon rupture – Investigation of a genetic contribution to the etiology. A registry study from the Danish Twin Registry.

Allan Cramer, Kristoffer Weisskirchner Barfod, Per Hölmich, Kaare Christensen, Dorte Almind Pedersen

61. Estimation of Patient Acceptable Symptom State (PASS) and Treatment Failure (TF) threshold values for the Achilles tendon Total Rupture Score (ATRS) at 6 months, 1 year, and 2 years after acute Achilles tendon rupture.

Allan Cramer, Lina Holm Ingelsrud, Maria Swennergren Hansen, Per Hölmich, Kristoffer Weisskirchner Barfod

62. Patient reported outcome measures for ankle instability. An analysis of 17 existing questionnaires.

Christian Fugl Hansen, Kenneth Chukwuemeka Obionu, Jonathan Comins, Michael Rindom Krogsgaard

63. Heel-rise Height (HRH) shows better capability than Achilles tendon resting angle (ATRA) in reflecting patient limitations and return to previous activities one year after acute Achilles tendon rupture.

Allan Cramer, Maria Swennergren Hansen, Per Hölmich, Kristoffer Weisskirchner Barfod

64. Mid-term results after treatment of complex talus osteochondral defects with HemiCAP implantation.

Jens K. Johansen, Kim H. Andersen, Mostafa Benyahia, Peter Bro-Rasmussen, Lars B. Ebskov

65. The Effect of a Single Hyaluronic Acid Injection in Ankle Arthritis - a Prospective Cohort Study.

Christopher Jantzen, Lars B. Ebskov, Kim H. Andersen, Mostafa Benyahia, Peter Bro-Rasmussen, Jens K. Johansen

Session 9 (Tumor and Infection)

09:30 - 10:30

Lokale: 102-103

66. The effect of sole gentamicin loaded bio-composite treatment following limited or extensive debridement of osteomyelitis lesions in a porcine model

Sophie Amalie Blirup-Plum, Thomas Bjarnsholt, Henrik Elvang Jensen, Kasper N Kragh, Bent Aalbæk, Hans Gottlieb, Mats Bue, Louise Kruse Jensen

67. A scheduled operation day might reduce early surgical failures within 30 days after major dysvascular lower limb amputation A single-center 2-year prospective cohort study of 163 patients compared with a historical control group of 165 patients

Martha Ella T L M Ignatiussen, Poul Pedersen, Morten Grove Thomsen, Gitte Holm, Morten Tange Kristensen

68. Development and comparison of one-year survival models in patients with primary bone sarcomas. External validation of a Bayesian belief ne

Christina Holm, Clare F. Grazal, Mathias Raedkjaer, Thomas Baad-Hansen, Rajpal Nandra, Robert Grimer, Jonathan Agner Forsberg, Michael Moerk Petersen, Michala Skovlund Sørensen,

69. Quantitative measurements of adaptive bone remodeling around the Cemented Zimmer® Segmental stem after tumor resection arthroplasty using dual-energy X-ray absorptiometry.

Christina Holm, Peter Horstmann, Michala Skovlund Sørensen, Karen Dyreborg, Michael Mørk Petersen

70. Clinically relevant reductions in physical function in patients undergoing resection and reconstruction surgery with tumour prostheses due to bone sarcoma

Linda Fernandes, Christina Holm, Allan Villadsen, Michala Skovlund Sørensen, Mette Kreutzfeldt Zebis, Michael Mørk Petersen

71. Challenges in the orthopedic nursing of tumor patients receiving a tumor prosthesis in the lower extremities

Marina Golemac, Müjgan Yilmaz, Michael Mørk Petersen

72. Ewing's sarcoma of the calcaneus treated by limb sparing surgery with calcanectomy and reconstruction with a composite of an allograft and a vascularized osteocutaneous fibula graft

Michael Mørk Petersen, Lisa Toft Jensen, Christian Bonde, Werner Herbert Hettwer

Session 10 (Sport Orthopaedics 2)

09:30 - 10:30

Lokale: 202-203

73. Acetabular retroversion does not affect outcome in primary hip arthroscopy for femoral-acetabular impingement. Data from the Danish Hip Arthroscopy Registry.

Christian Dippmann, Vokert Siersma, Søren Overgaard, Michael Rindom Krogsgaard,

74. Six-weeks of intensive rehearsals for the Swan Lake ballet shows structural changes of the Achilles tendons in dancers

Charlotte Anker-Petersen, Birgit Juul-Kristensen, Jarrod Antflick, Henrik Aagaard, Christopher Myers, Anders Ploug Boesen, Eleanor Boyle, Per Hölmich, Kristian Thorborg

75. Is hip impingement frequent in world junior elite badminton players and is it correlated with ROM?

Niels Christian Kaldau, Stewart Kerr, Steve McCaig, Per Hölmich

76. Hip arthroscopy trends: Bony morphologies, cartilage injuries, post-operative outcomes, and surgical rates – an overview of 5294 hip arthroscopies performed from 2012 to 2020

Lasse Ishøj, Kristian Thorborg, Otto Kraemer, Bent Lund, Bjarne Mygind-Klavsen, Per Hölmich

77. Five year follow up of the HAFAL-cohort – outcome after hip arthroscopic surgery in patients with femoroacetabular impingement syndrome

Signe Kierkegaard, Inger Mechlenburg, Ulrik Dalgas, Bent Lund

78. Are 5-Year Hip Arthroscopy Outcomes Associated with Hip Morphology and Cartilage Status in Patients with Femoroacetabular Impingement Syndrome? - A National Registry Study with HAGOS Outcomes in 281 patients

Camilla Richter, Lasse Ishøj, Otto Kraemer, Per Hölmich, Kristian Thorborg

79. Stratified care in hip arthroscopy – can we predict unsuccessful outcomes? Development and temporal validation of multivariable prediction models

Lasse Ishøj, Kristian Thorborg, Thomas Kallemose, Joanne Kemp, Michael Reiman, Per Hölmich

Session 11 (Hip)

13:30 - 15:00

Lokale: 01+02

80. Migration of the uncemented Echo Bi-Metric and Bi-Metric THA stems: a randomized controlled RSA-study involving 62 patients with 24-months follow-up

Karen Dyreborg, Mikkel R. Andersen, Nikolaj Winther, Søren Solgaard, Gunnar Flivik, Michael Mørk Petersen

81. Patient-reported outcome after dislocation of primary total hip arthroplasties – a cross-sectional matched case-control study derived from the Danish Hip Arthroplasty Register

Lars Lykke Hermansen, Bjarke Viberg, Søren Overgaard

82. Revision risk of total hip arthroplasty with vitamin E doped liners: Results from The Danish Hip Arthroplasty Register

Kristian Kjærgaard, Claus Varnum, Ming Ding, Søren Overgaard

83. Outcomes of surgical hip abductor tendon repair with one-year follow-up. Our initial experience.

Marie Bagger Bohn, Bent Lund, Kasper Spoorendonk, Jeppe Lange

84. Does choice of bearings influence the survival of cementless stemmed total hip arthroplasty in the patient between 20 and 54 years? A comparison of metal-on-metal, ceramic-on-ceramic and metal-on-highly-crosslinked-polyethylene bearings from the NARA

Rasmus Tyrsted Mikkelsen, Søren Overgaard, Alma Becic Pedersen, Johan Kärrholm, Ola Rolfson, Anne Marie Fenstad, Ove Furnes, Geir Hallan, Keijo Mäkelä, Antti Eskelinen, Claus Varnum

85. No difference for changes in BMD between two different cement-less hip stem designs 2 years after THA

Karen Dyreborg, Søren Solgaard, Michael Skettrup, Michael Mørk Petersen

86. Risk factors for dislocation and re-revision after first-time revision total hip arthroplasty due to recurrent dislocation – a study from the Danish Hip Arthroplasty Register

Lars Lykke Hermansen, Bjarke Viberg, Søren Overgaard

87. The impact of socioeconomic status on the 30- and 90-day risk of infections after a total hip arthroplasty

Nina M. Edwards, Claus Varnum, Søren Overgaard, Rob G. H. H. Nelissen, Alma B. Pedersen

88. Dislocation rate of Dual Mobility Cup in 2711 THAs with up to ten years follow-up

Katrine Hvidt, , Katrine Væsel Wade, Niels Harry Krarup, Marianne Toft Vestermark

89. Socioeconomic status and use of analgesic drugs before and after primary total hip arthroplasty: A population based cohort on 103,209 patient undergoing primary total hip arthroplasty during 1996-2018

André Nis Klenø, Martin Bækgaard Stisen, Nina Mckinnon Edwards, Inger Mechlenburg, Alma Becic Pedersen

Session 12 (YODA Best Papers)

13:30 - 15:00

Lokale: 102-103

90. Strength of fixation in non-metallic vs. metallic tension band wiring of patella fractures - A human cadaveric biomechanical study

Jonas Adjal, Asger Haugaard*+, Liv Vesterby*, Huda Ibrahim Muhudin^, Kevser Sert^, Morten Grove Thomsen*, Peter Toft Tengberg*, Ilija Ban*, Søren Ohrt-Nissen*+*

91. Weight-based cefuroxime dosing provides comparable orthopedic target tissue concentrations between weight groups - A microdialysis porcine study

Sara K. Tøstesen, Pelle Hanberg, Mats Bue, Theis M. Thillemann, Thomas Falstie-Jensen, Mikkel Tøttrup, Martin B. Knudsen, Maiken Stilling

92. Electrical impedance correlates with radiographic bone healing in rabbits

Laura Amalie Rytøft, Markus Winther Frost, Ole Rahbek, Ming Shen, Kirsten Duch, Søren Kold

93. Reduced risk of skin tears when treating Dupuytren's disease with collagenase and band-aid: A prospective cohort study

Nana Brøndel, Jan Carstensen, Jannik Hansen, Anas Saaid, Kristoffer Borbjerg Hare

94. Superior survival and local control following particle therapy in chordomas

Christian Kveller, Skov Simon Toftgaard, Høy Kristian, Bünger Cody

Session 13 (Knee)

13:30 - 15:00

Lokale: 202-203

95. Can one exercise per day keep surgery away? A randomized dose-response trial of coordinated home-based knee-extensor exercise in patients eligible for knee replacement (the QUADX-1 trial).

Rasmus Husted, Anders Troelsen, Henrik Husted, Birk Grønfeldt, Kristian Thorborg, Thomas Kallemose, Michael Rathleff, Thomas Bandholm

96. Comparison of cementless double-peg, cemented single-peg and cemented double-peg femoral component migration after medial Oxford unicompartmental knee replacement – A 5-year randomized RSA study.

Sebastian Breddam Mosegaard, Frank Madsen, Anders Odgaard, Per Wagner Kristensen, Kjeld Søballe, Maiken Stilling

97. Circumstances for optimized medial Unicompartmental Knee Arthroplasty outcome. Learning from 20 years of propensity score matched registry data.

Mette Mikkelsen, Andrew Price, Alma Pedersen, Kirill Gromov, Anders Troelsen

98. Length of Stay and 90-Day Readmission/Complication Rates in Unicompartmental Versus Total Knee Arthroplasty: A propensity-score-matched study of 10,494 procedure performed in a fast-track setup.

Christian Bredgaard Jensen, Pelle Baggesgaard Petersen, Christoffer Calov Jørgensen, Henrik Kehlet, Anders Troelsen, Kirill Gromov

99. Prosthesis survivorship after revision knee arthroplasty performed on the indications; “pain without loosening” versus “aseptic loosening” – a Danish nationwide study

Kristine B. Arndt, Henrik M. Schrøder, Anders Troelsen, Martin Lindberg-Larsen

100. Tibia component under-sizing is related to high degrees of migration in cementless TKA. – 111 patients RSA data for cementless tibia components, blinded x-ray assessments and two years follow-up.

Mikkel Rathnach Andersen, Winther Nikolaj, Lind Thomas, Henrik Morville Schrøder, Gunnar Flivik, Michael Mørk Petersen

101. Does changes in Unicompartmental Knee Arthroplasty practice pattern influence reasons for revision? A study of 9639 cases from the Danish Knee Arthroplasty Register.

Mette Mikkelsen, Lasse Enkebølle Rasmussen, Andrew Price, Alma Pedersen, Kirill Gromov, Anders Troelsen

102. In- and outpatient supervised rehabilitation regime vs. self-management instruction following unicompartmental knee arthroplasty – a pilot study in two cohorts

Adam Omari, Lina Holm Ingelsrud, Thomas Quaade Bandholm, Susanne Irene Lentz, Anders Troelsen, Kirill Gromov

103. Patients with knee osteoarthritis can be divided in subgroups based on tibiofemoral joint kinematic clustering of gait – An exploratory and dynamic radiostereometric study

Emil Toft Petersen, Søren Rytter, Daan Koppens, Jesper Dalsgaard, Torben Bæk Hansen, Nis Elbrønd Larsen, Michael Skipper Andersen, Maiken Stilling

104. Is use of tourniquet associated to increased risk of venous thromboembolism after fast-track total knee arthroplasty? – a prospective multicentre cohort study of 16,267 procedures

Pelle Baggesgaard Petersen, Mette Mikkelsen, Christoffer Calov Jørgensen, Anders Troelsen, Andreas Kappel, Henrik Kehlet, Kirill Gromov

Session 14: (DOS Best Papers)

16:30 - 18:00

Lokale: Auditorium

105. Biomechanical comparison of tension band wiring and all-suture fixation in transverse olecranon fractures

Liv Vesterby, Asger Haugaard, Jonas Adjal, Huda Ibrahim Muhudin, Kevser Sert, Morten Grove Thomsen, Peter Toft Tengberg, Ilija Ban, Søren Ohrt-Nissen

106. Moxifloxacin Concentrations in the Knee Joint, Tibial Bone, and Soft Tissue when combined with Rifampicin: A randomized porcine microdialysis study

Josefine Slater, Maiken Stilling, Pelle Hanberg, Mathias A.F Bendtsen, Andrea Jørgensen, Kjeld Søballe, Nis Pedersen Jørgensen, Mats Bue

107. Normal values of dynamic Distal Radioulnar Joint kinematics: evaluated with a new technique using Automated Radiostereometric analysis

Janni Kjærgaard Thillemann: , Sepp de Raedt, Emil Toft Petersen, Katriina Bøcker Puhakka, Torben Bæk Hansen, Maiken Stilling

108. Effects of Tourniquet Inflation on Peri- and Postoperative Cefuroxime Concentrations in Bone and Tissue

Pelle Hanberg, Mats Bue, Jesper Kabel, Andrea René Jørgensen, Christian Jessen, Kjeld Søballe, Maiken Stilling

109. Does the use of tourniquet increase the risk of venous thromboembolism following Total Knee Arthroplasty? - A pseudorandomized study of 19,804 patients from the Danish Knee Arthroplasty Registry

Anders El-Galaly, Anette Tarp Hansen, Andreas Kappel

110. COMBINED ANTERIOR CRUCIATE LIGAMENT REVISION WITH RECONSTRUCTION OF THE ANTERO-LATERAL LIGAMENT DOES NOT IMPROVE OUTCOME AT 2-YEAR FOLLOW-UP COMPARED TO ISOLATED ACL REVISION; A RANDOMIZED CONTROLLED TRIAL.

Ole Gade Sørensen, Torsten Nielsen, Lars Konradsen, Bjarne Mygind-Klavsen, Susanne Schaarup, Peter Faunø, Michael Krogsaard, Martin Lind

111. An enhanced interdisciplinary discharge program can lower readmissions for hip fracture patients in nursing home facilities

Bjarke Viberg, Erlandsen Claville Lars, Røhl Andersen Lis, Lisbeth Fredholm, Dorte Dall-Hansen, Heidi Grejsen

Session 15 (Trauma)

09:00 - 10:30

Lokale: 01+02

112. Completeness and validity of the Danish Fracture Database

Anders Bo Rønnegaard, Per Hviid Gundtoft, Peter Toft Tengberg, Bjarke Viberg

113. Patient-related risk factors for nonunion following surgically managed, traumatic, diaphyseal fractures: A systematic review and meta-analysis

Signe Steenstrup, Niels Martin Jensen, Per Gundtoft, Søren Kold, Robert Zura, Bjarke Viberg

114. Complications of Fitbone and Precice intramedullary bone lengthening nails: a systematic review with 782 patients

Markus Frost, Ole Rahbek, Jens Trærup, Adriano Ceccotti, Søren Kold

115. Radiographs of 366 removed limb lengthening nails reveal differences in bone abnormalities between different nail types: FITBONE, PRECICE and STRYDE.

Markus Winther Frost 1, Christopher Iobst 2, Jan Duedal Rölving 3, Ole Rahbek 1, Anirejuoritse Bafor 2, Molly Duncan 2, Søren Kold 1

116. The quality of tension band wiring for olecranon fractures is related to complications. A multicentre cohort study

Kia Cirkeline Møller Hansen, Mustafa Mahamoud, Stefan Jensen, Bjarke Viberg

117. Injuries among Motorcycle riders – did imposed legislation for young riders modify the age and severity composition of patients seen at the A&E department in Odense University Hospital from 2003–2020?

Henriette Nelsson, Niels Dieter Röck, Jens Lauritsen

118. Risk of Reoperation in Simple Ankle Fracture Surgery when Comparing Locking Plate with Non-Locking Plate

Gudrun Holm Jacobsen, Mads Holm Gude, Bjarke Løvbjerg Viberg, Per Hviid Gundtoft

119. The Positive Predictive Value of Ankle Fracture Diagnoses and Surgical Procedure Codes in the Danish National Patient Registry

Per Hviid Gundtoft, Frederik Borup Danielsson, Michael Houliind Larsen, Simon Oksbjerg Mortensen, Yasemin Corup, Nicholas Bonde, Michael Brix, Jeppe Barckman, Mads Terndrup, Bjarke Viberg

120. The First COVID Lockdown's Impact on the Number, Distribution and Severity of Hand Injuries at an Accident and Emergency Department.

Emil Ainsworth Jochumsen, Søren Larsen, Jens Lauritsen

121. Physical function, Quality of life and complications following a distal intra-articular tibia fracture; External Fixation (EF) or Open Reduction Internal Fixation (ORIF); A prospective cohort/observational study

Julie Erichsen, Frank Damborg, Morten Schultz-Larsen, Carsten Jensen, Bjarke Viberg

Session 16 (Shoulder and Elbow)

09:00 - 10:30

Lokale: 102-103

122. Short-term patient-reported outcome of stemless total shoulder arthroplasty for osteoarthritis is similar to that of stemmed total shoulder arthroplasty: a study from the Danish Shoulder Arthroplasty Registry.

Zaid Issa, Stig Brorson, Jeppe Vejlgaard Rasmussen

123. Terminology and diagnostic criteria used in clinical studies investigating subacromial impingement syndrome: A scoping review

Adam Witten, Karen Mikkelsen, Thomas Wagenblast Mayntzhusen, Mikkel Bek Clausen, Kristian Thorborg, Per Hölmich, Kristoffer Weisskirchner Barfod

124. The epidemiology of acute acromioclavicular dislocations in an urban population. A prospective cohort study investigating the capital region of Denmark

Kristine Bramsen Haugaard, Klaus Bak, Per Hölmich, Kristoffer Seem, Kristoffer Weisskirchner Barfod

125. Low methodological quality and conflicting conclusions of meta-analyses comparing operative and non-operative treatments for proximal humeral fractures

Nicolai Sandau, Peter Buxbom, Asbjørn Hróbjartsson, Ian A Harris, Stig Brorson

127. Less than half of patients in secondary care adheres to clinical guidelines for subacromial pain syndrome and have acceptable symptoms after treatment: A Danish nationwide cohort study of 3306 patients

Clausen Mikkel Bek, Merrild Mikas, Pedersen Mads, Holm Kika, Andersen Lars, Zebis Mette, Jakobsen Thomas, Thorborg Kristian

128. Superior Capsular Reconstruction. Preliminary results after one year in 10 patients

Jørgen Friis, Tim Houbo Petersen

129. Is bone mineral density and body mass index associated with the morphology of fractures of the proximal humerus: a descriptive study of 56 consecutive cases classified according to the Neer and the AO system

Sabine Simonsen, Mette Friberg Hitz, Søren Ohrt-Nissen, Stig Brorson

130. Management of olecranon fractures prior to modern surgery (1750–1850): an illustrated historical review

Tara Padtoft, Stig Brorson

131. Minimal clinically important differences (MCID) for the Western Ontario Osteoarthritis of the Shoulder Index (WOOS) and the Oxford Shoulder Score (OSS)

Marc Randall Kristensen Nyring, Bo Sanderhoff Olsen, Alexander Amundsen, Jeppe Vejlgaard Rasmussen

Velkomst og Posterwalk 1-14

17:30 – 18:30

Poster Walk 1:

Experimental and tumor

132. Manipulating the journal impact factor? A study of journal self-citations

Dorte Drongstrup, Søren Overgaard, David Minguillo

134. What is so special about the myotendinous junction ?– a RNA-sequencing study

Jens Rithamer Jakobsen, Peter Schjerling, Michael Kjaer, Abigail Mackey, Michael Rindom Krogsgaard

135. A new gold standard to measure the surface area of the myotendinous junction in humans

Jens Rithamer Jakobsen, Jens Hannibal, Mackey Abigail , Michael Rindom Krogsgaard

136. Wear of osteoarthritic femoral head against a HipCap implant in a hip simulator

Anthony Fraisse, Steffen Rasmussen, Sune Lund Spørring , Jes Bruun Lauritzen

253. Work ability and physical activities in patients with tumour prosthesis in hip or knee following bone sarcoma. A cross-sectional study comparing patients with healthy controls.

Linda Fernandes, Allan Villadsen, Christina Holm, Michala Skovlund Sørensen, Mette Kreutzfeldt Zebis, Lars Louis Andersen, Michael Mørk Petersen

Poster Walk 2: Foot and ankle

137. Foot and Ankle Ability Measure (FAAM): Danish dual-panel translation, cultural adaptation and assessment of construct validity by Rasch analysis.

Kenneth C. Obionu, Michael R. Krosgaard, Christian F. Hansen, Jonathan D. Comins

138. Intermittent Hypoxic Therapy for Treatment of Musculoskeletal Chronic Pain – a Consecutive Cohort

Frederikke Oxenvad Schultz, Stine Rytter Christensen, Brian Elmengaard, Casper Bindzus Foldager

139. Benefits and harms of exercise therapy for patients with diabetic foot ulcers: A systematic review

Thomas Vedste Aagaard, Sahar Moeni, Søren Thorgaard Skou, Ulla Riis Madsen, Stig Brorson

140. Fast-track Total Ankle Replacement – Is it safe?

Christopher Jantzen, Lars B. Ebskov, Kim H. Andersen, Mostafa Benyahia, Peter Bro-Rasmussen, Jens K. Johansen

141. Symptomatic cyst formation under the Scandinavian Total Ankle Replacement (STAR) talar component treated with allogenic bone graft and subtalar arthrodesis

Kristian Brink Behrndtz, Kristian Kibak Nielsen, Frank Skydsgaard Linde

142. Irreducible chronic metatarsophalangeal luxation in patients with rheumatic arthritis treated by resection arthroplasty of the small metatarsal heads

Jorgen Baas, Nina Dyrberg Lorenten, Frank Dyrberg Lorenten, Sundstrup Claus, Kristian Kibak Nielsen

143. Feasibility of early progressive resistance exercises for acute Achilles tendon rupture

Marianne Christensen, Karin Grävare Silbernagel, Jennifer A Zellers, Michael Skovdal Rathleff, Inge Lunding Kjær

144. Long-term prognosis of individuals with plantar heel pain

Marianne Christensen, Inge Lunding Kjær, Henrik Riel, JL Olesen, Karl Landorf, Matthew Cotchett, Michael Skovdal Rathleff

Poster Walk 3: Hip arthroplasty 1

145. The feasibility and acceptability of a six-month progressive exercise therapy and patient education intervention for patients with hip dysplasia ineligible for periacetabular osteotomy

Julie Sandell Jacobsen, Thorborg Kristian, Dorthe Sørensen, Stig Storgaard Jakobsen, Rasmus Oestergaard Nielsen, Lisa Gregersen Oestergaard, Kjeld Søballe, Inger Mechlenburg

146. Increased anterior pelvic tilt in patients with acetabular retroversion compared to the general population: A radiographic and prevalence study

Anders Falk Brekke, Anders Holsgaard-Larsen, Trine Torfing, Stig Sonne-Holm, Søren Overgaard

147. A home-based exercise and activity modification program in patients with acetabular retroversion and excessive anterior pelvic tilt - a feasibility and intervention study

Anders Falk Brekke, Søren Overgaard, Bo Mussmann, Erik Poulsen, Anders Holsgaard-Larsen

148. Are improvements in pain and hip function after primary or revision hip replacement related to markers of socioeconomic status?

Martin Bækgaard Stisen, Andre Nis Klenø, Julie Sandell Jacobsen, Matthew DL O'Connell, Salma Ayis, Catherine Sackley, Alma Becic Pedersen, Inger Mechlenburg

149. Impact of socioeconomic status on the 90- and 365-day rate of revision and mortality after total hip arthroplasty: A cohort study based on 103,901 THA patients from national health registers

Nina M. Edwards, Claus Varum, Søren Overgaard, Alma B. Pedersen

150. Validity of Perioperative Visual Estimation of Acetabular Fragment Correction in Periacetabular Osteotomies

Casper Bindzus Foldager, Kjeld Søballe, Jakobsen Stig Storgaard

151. Resistance training with low-loads and concurrent partial blood flow restriction (BFR) combined with patient education in females suffering from gluteal tendinopathy: A feasibility study

Mathias Høgsholt, Stian Langgård Jørgensen, Nanna Rolving, Inger Mechlenburg, Lisa Cecilie Urup Reimer, Marie Bagger Bohn

152. Gluteal-related lateral hip pain; - a painful condition with poor subjective outcomes

Marie Bagger Bohn, Bent Lund, Kasper Spoorendonk, Jeppe Lange

154. Does daily physical activity differ between patients with femoro-acetabular impingement syndrome and patients with hip dysplasia?

Lisa Reimer, Signe Kierkegaard, Inger Mechlenburg, Julie Jacobsen

155. Carriages of *S. aureus* among arthroplasty surgeons and relation to prosthetic joint infections using MALDI-TOF MS

Kathrine Rasch, Claus Østergaard, Lasse Enkebølle Rasmussen, Per Kjærsgaard-Andersen, Jens Kjølseth Møller, Claus Varnum

Poster Walk 4: Hip arthroplasty 2

153. Revision Arthroplasty with use of a Total Femur Replacement

Nikolaj Winther, Martin Kirkegaard, Erik Kragegaard, Anders Odgaard, Mørk Petersen Michael

156. Reoperation rates for the Dual Mobility Cup in Total Hip Arthroplasty

Katrine Wade,

157. Evaluation of Magnetic resonance images from 120 patients presenting with lateral hip pain from 2016 to 2020 – no signs of the infamous trochanteric bursitis.

Marie Bagger Bohn, Claus Tvedsøe, Bent Lund, Jeppe Lange

158. Custom-made Triflanged Implants In Reconstruction Of Severe Acetabular Bone Loss With Pelvic Discontinuity After Total Hip Arthroplasty 40 cases with 2-11 Years follow-up

Nikolaj winther, Jens Styrrup, Sebastian Winther, Michael Mørk Petersen

159. Introduction of a new treatment algorithm reduces the number of periprosthetic femoral fractures (PFF) following primary THA in elderly females

Adam Omari, Christian Skovgaard Nielsen, Henrik Husted, Kristian Stahl Otte, Anders Troelsen, Kirill Gromov

160. Revision total hip arthroplasty in patients with extensive proximal femoral bone loss using distal fixated modular femoral components.

Sebastian winther, Naima Elsayed , Karen Dyreborg , Elinborg Mortensen, Michael Mørk Petersen, Nikolaj winther

161. Physical capacity among patients treated with periacetabular osteotomy for hip dysplasia: preliminary results from a cross-sectional study

Sally Oppendieck Andersen (1,2), Lasse Ishøi (1), Anke Ninija Karabanov (3), Jesper Bencke (2), Per Hölmich (1)

162. Patient and public involvement in the Danish PROHIP trial: A thematic exploration of key stakeholder input, experiences, and perceptions.

Thomas Frydendal, Kristine Sloth Thomsen, Inger Mechlenburg, Lone Ramer Mikkelsen, Søren Overgaard, Kim Gordon Ingwersen, Corrie Myburgh

163. Exercise as Medicine During the Course of Hip Osteoarthritis

Troels Kjeldsen, Inger Mechlenburg, Lisa Cecilie Urup Reimer, Thomas Frydendal, Ulrik Dalgas

164. 3D-boneprint service in hospital

- for preoperative planning and assessment of bone loss revision in hip arthroplasty

Mikkel Rathnach Andersen, Mathias Willadsen Brejnø, Michael Skettrup

Poster Walk 5: Knee arthroplasty

165. Bone remodeling and implant migration of uncemented femoral and cemented asymmetrical tibial components in total knee arthroplasty DXA and RSA evaluation with 2-year follow-up

Müjgan Yilmaz, Christina Holm, Thomas Lind, Gunnar Flivik, Michael Mørk Petersen

166. The effect of obesity on Patient Reported Outcome Measures after Unicompartmental Knee Arthroplasty

Anders Bagge, Christian Bredgaard Jensen, Mette Mikkelsen, Kirill Gromov, Christian Skovgaard Nielsen, Anders Troelsen

167. No-fault compensation after primary total knee replacement in Danish hospitals 2005-2017

Nissa Khan, Kim Lyngby Mikkelsen, Michael Mørk Petersen, Henrik Morville Schrøder

168. Consequences for pre-operative pain and function when postponing elective knee and hip arthroplasty due to the coronavirus pandemic

Lasse Harris, Lina Ingelsrud, Kirill Gromov, Christian Nielsen, Thue Ørsnes, Anders Troelsen

169. CHARACTERISTICS OF PATIENTS REQUIRING EARLY TOTAL KNEE REPLACEMENT AFTER SURGICALLY TREATED LATERAL TIBIAL PLATEAU FRACTURES

Liselotte Hansen, Rasmus Elsoe, Peter Larsen

170. Patient safety in distal femoral resection knee arthroplasty for non-tumor indications. A consecutive case series of 41 patients.

Yasemin Corap, Michael Brix, Claus Emmeluth, Martin Lindberg-Larsen

171. Preoperative and postoperative high-sensitivity troponin T in fast-track hip and knee arthroplasty

Christian Bredgaard Jensen, Anders Troelsen, Henrik Kehlet, Nicolai Bang Foss, Kirill Gromov

172. Mega-prosthetic joint replacement of the distal femur in non-tumor cases.

Ulrik Kragegaard Knudsen, Martin Kirkegaard, Kurt Skovgaard, Christina Holm, Anders Odgaard, Michael M. Petersen, Nikolaj S. Winther Winther

173. Are nerve blocks necessary for enhanced recovery after hip and knee replacement?

Christoffer Jørgensen, Pelle Petersen, Louise Daugbjerg, Thomas Jakobsen, Kirill Gromov, Claus Varnum, Andersen Mikkel, Henrik Palm, Henrik Kehlet,

174. Microvascular free flap coverage of complex soft tissue defects after revision total knee arthroplasty

Nizar Hamrouni, Jens H. Højvig, Ulrik K. Knudsen, Kurt K. Skovgaard, Anders Odgaard, Lisa T Jensen, Christian T Bonde

Poster Walk 6: Pediatrics 1

175. Fracture rates in Danish children with CP

Jakob Bie Granild-Jensen, Alma Becic Pedersen, Eskild Bendix Kristiansen, Esben Thyssen Vestergaard, Bente Langdahl, Charlotte Søndergaard, Stense Farholt, Gija Rackauskaite, Bjarne Møller-Madsen

176. Performance of lower limb peripheral nerve blocks among different orthopedic sub-specialties. A single institution experience in 246 patients.

Arash Ghaffari, Marlene Jørgensen, Helle Rømer, Maibrit Sørensen, Søren Kold, Ole Rahbek, Jannie Bisgaard

178. Complex regional pain syndrome (CRPS) in children – treatment with peripheral nerve catheter

*Soeren Bodetker *, Louise * Klingenberg, Billy Kristensen **, Lens Svendsen #, Ellen Koefoed ##, Mai Pedersen ##*

179. Aggravating activities for adolescents with Osgood Schlatter: a cross-sectional study

Kasper Krommes, Kristian Thorborg, Per Hölmich,

180. Morphology of the knee joint after tension-band plating

Hvidberg Emma J., Rölving Jan D. , Møller-Madsen Bjarne , Abood Ahmed A.

181. Functional outcome of clubfeet treated with the Ponseti Method

Line Ellen Juul Sørensen, Emma Melhus Ericson, Søren Ege Qvist, Vilhelm Engell

182. Self-reported characteristics of adolescents with longstanding Osgood Schlatter from specialized care: cross-sectional study

Kasper Krommes, Kristian Thorborg, Per Hölmich,

185. Usual care for Osgood Schlatter: A mixed-methods study to understand what caretakers are delivering and patients are receiving

Kasper Krommes, Kristian Thorborg, Per Hölmich,

Poster Walk 7: Pediatrics 2

183. Quality of reduction and K-wire fixation in pediatric lateral humeral condyle fractures

Morten Jon Andersen

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Abstracts

Questionable measurement properties of Pedi-IKDC – a questionnaire for children with ACL injury. A study of structural validity and reliability

1.

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Background: The paediatric version of IKDC (Pedi-IKDC) is the most frequently used PROM to evaluate treatment effects in children with ACL injuries. It consists of two subscales, symptoms and sports, but all raw scores are aggregated. It is the primary outcome in two large scale initiatives for the treatment of children with ACL deficiency: the European “Paediatric ACL Monitoring Initiative” (PAMI), and the North American “Pediatric ACL: Understanding Treatment Options” (PLUTO). However, Pedi-IKDC has only been subject to validity assessments with classical test theory models, and not modern test theory (MTT) models, which are preferable.

Aim: To study the structural validity and reliability of the questionnaire Pedi-IKDC in a cohort of children aged 9–15 with an ACL injury, using MTT models Rasch analysis and confirmatory factor analysis (CFA).

Materials and Methods: Data were collected prospectively before surgery and at 1-year follow-up from a nationwide cohort of 535 children with an ACL injury, treated with epiphyseal sparing reconstruction at either Aarhus or Bispebjerg University Hospitals. We evaluated the fit of a CFA model, adjusting models where possible, and confirmed results using Rasch analysis for each subscale and for the aggregated score.

Results: Neither of the subscales of Pedi-IKDC showed acceptable fit to the CFA model. Rasch analysis confirmed the results. It was possible to adjust the subscales, and a much better fit for the symptoms scale was achieved, yet the adjusted sports scale fitted the CFA model only slightly better. Reliability could not be reported due to inadequate model fit.

Interpretation / Conclusion: Pedi-IKDC does not exhibit adequate measurement properties (structural validity) for children with ACL- injury in its current form. Considering that the questionnaire also possesses a low degree of content validity for these children, data obtained by Pedi-IKDC should be interpreted with great caution. Future research should look at (i) why the Pedi- IKDC does not work well, (ii) whether a revised version with better measurement properties can be suggested, and (iii) what the consequences for the measurement of clinical change might be.

Should recreational badminton players land like a pro? – a possible strategy to protect the Achilles tendon from rupture

2.

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Background: Achilles tendon (AT) rupture is common among recreational male badminton players. Observations indicate that AT ruptures often occur in the transition from landing to forward acceleration following a forehand stroke on the rear court. It is an observation that many recreational players use a different landing technique from elite players, and the hypothesis is that this result in higher AT forces and increased risk of sustaining an AT rupture

Aim: To investigate if recreational players load the AT more when they use their original landing technique compared to an adapted landing technique used by elite players

Materials and Methods: Ten recreational male badminton players (age: 28.1 ± 6.3 years., height: 182.7 ± 5.9 cm, weight: 79.7 ± 10.5 kg) attended a single test session, where they performed 5 forehand rear court strokes with their usual technique jumping straight backwards with their landing foot in a neutral position, and 5 forehand strokes adopting the technique of elite players landing with the rear foot perpendicular to the direction of movement. AT force, of the landing leg opposite to the players' racket arm, was calculated from 3D motion analysis. Paired t-test was used to evaluate differences between the two jump conditions for the recreational group, with an alpha level at 0.05

Results: The players landed with significantly more externally rotated foot in the adjusted landings (78.2 ± 10.0 degrees, $p < 0.001$) vs. the original landings (22.4 ± 21 degrees) without compromising performance parameters such as jump height and forward velocity. The peak AT force was reduced in the adjusted landings (50.1 ± 14.2 N/kg, 3960 ± 1181 N, $p = 0.005$) vs. the original landings (67.7 ± 18.9 N/kg, 5278 ± 1227 N) with Cohen's d effect size of 1.17

Interpretation / Conclusion: The loading of the AT was markedly reduced from the original landing technique of the recreational players when mimicking the elite players landing technique with higher external rotation of the foot, despite no change in the functional performance parameters. These findings indicate that recreational players may reduce the high loads on their AT by adopting the landing technique of elite players, and potentially reduce the risk of sustaining an AT rupture

The effect of targeted exercise on knee muscle strength and function in participants with persistent hamstring deficiency following ACL reconstruction – a randomized controlled trial.

3.

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Background: The ACL remain one of the most injured ligaments of the knee, and usually involve ACL reconstruction (ACLR) with autograft harvesting. Common techniques involve using hamstring (HS) tendon autograft harvesting, and nine to twelve months of rehabilitation is typically needed before returning to sport. Despite rehabilitation, risk of reduced muscle strength is highly pronounced and persistent deficits in maximal knee flexor muscle strength have previously been reported.

Aim: To investigate the effect of targeted exercise on knee-muscle strength and joint function in ACLR participants with persistent hamstring muscle deficiency 12–24 months post-surgery.

Materials and Methods: A prospective, superiority, randomized controlled trial with parallel groups, balanced randomization (1:1) and blinded outcome assessment (level of evidence: II). Participants with ACLR (hamstring autograft) and persistent hamstring muscle deficiency were recruited 1–2 years post-surgery and randomised to either 12-weeks supervised progressive strength and neuromuscular training (SNG), or home-based, weightbearing low-intensity exercises (CON). Primary outcome was between-group change in maximal isometric knee flexor muscle strength at 12-weeks follow-up. Secondary outcomes included measures of objective strength and subjective function.

Results: Fifty-one participants (45% women, 27 ± 6 years) were randomized, with data from 88% of participants being available at 12-weeks follow-up. A superior effect in knee flexor muscle strength (0.18 Nm/kg [95% CI 0.07 ; 0.29] $p = 0.002$) for SNG versus CON was observed. Furthermore, secondary between-group effects emerged in favour of SNG: KOOS Pain (4.56 [95% CI 0.43 ; 8.69] $p = 0.031$) and KOOS activity of Daily Living Function (4.71 [95% CI 1.20 ; 8.22] $p = 0.010$). No superior between-group effects were observed for other measures of objective strength and subjective function.

Interpretation / Conclusion: Twelve weeks of supervised progressive strength training in ACLR participants with persistent knee muscle deficiency demonstrated superior effects on knee flexor muscle strength and joint function compared with homebased exercise. However, it may be questioned whether observed benefits are clinically meaningful.

Quadriceps tendon and hamstring tendon autografts for anterior cruciate ligament reconstruction yield equally high rates of graft failure, revision ACLR or re-operation at two years follow up. A registry study with review of 475 patients

4.

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Background: It has been indicated that anterior cruciate ligament reconstruction (ACLR) with quadriceps tendon (QT) graft has a higher risk of revision compared to hamstring tendon (HT) graft.

Aim: To investigate if ACLR with QT had higher risk of graft failure, revision ACLR or re- operation compared to HT in a high-volume center. We hypothesized that there would be no between group difference.

Materials and Methods: This was a registry study with review of medical records. Our study cohort consist of patients with primary ACLR using either QT or HT performed at Copenhagen University Hospital Hvidovre from January 2015 to December 2018. The cohort was identified from the Danish Knee Ligament Recon- struction Registry and linked to the Danish National Patient Registry to identify all hospital contacts post-ACLR. The outcome variables were graft failure (re-rupture or >3mm side difference in A-P laxity), revision ACLR, re-operation due to cyclops, re- operation due to meniscal injury and re-operation due to any reason. Also, A-P laxity and pivot-shift were assessed at 1 year. Using Kaplan-Meier estimates, the rates of events were evaluated at 2 years and comparison performed with Cox regression analysis.

Results: 475 subjects (HT=252, QT=223) were included. The risk of graft failure at 2 years was 9.4% for QT and 11.1% for HT ($p = .46$). Respectively, the risk of revision ACLR was 2.3% and 1.6% ($p = .66$), the risk of re- operation due to cyclops was 5.0% and 2.4% ($p = .13$), and the risk of re-operation due to meniscal injury was 4.3% and 7.1% ($p = .16$). The risk of re-operation due to any reason was 20.5% and 23.6% ($p = .37$). At 1-year follow-up A-P laxity was 1.4 mm for QT and 1.5 mm for HT ($p = .35$), and the proportion of patients with a positive pivot- shift was 29% for both groups.

Interpretation / Conclusion: QT and HT yield similar rates of graft failure, revision ACLR and re-operation at two years follow-up after ACLR. Graft failure was found in 9-11%. QT showed a non- statistically trend of higher risk for re- operation due to cyclops, and HT a non- statistically trend of higher risk for re- operation due to meniscal injury.

The influence of graft choice on knee muscle strength following anterior cruciate ligament reconstruction: A systematic review and meta-analysis.

5.

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Background: Regaining adequate quadriceps and hamstrings muscle strength after Anterior Cruciate Ligament Reconstruction (ACLR) is important, as leg muscle strength, after ACLR is positively associated with functional performance.

Aim: We conducted a Systematic review and meta-analysis to investigate differences in knee extensor and flexor muscle strength following ACLR with quadriceps tendon/bone-patellar tendon-bone (QT/BPTB) vs. hamstring (HS) grafts.

Materials and Methods: We searched the electronic databases MEDLINE, EMBASE and CENTRAL for Randomized Controlled Trials (RCTs) comparing muscle strength after ACLR with QT/BPTB vs. HS graft. Differences in muscle strength between graft types and limb asymmetry index (LSI) at 6, 12, 24 and 48+ months postoperatively were combined in a random effects meta-analysis. Risk of bias was assessed using RoB2.

Results: Twenty-seven RCTs were included, of which eighteen were judged as having a high risk of bias. The differences in knee extensor muscle strength between ACLR patients allocated to QT/BPTB vs. HS grafts were (in favor of the HS graft) 9.7% (95% CI: 7.0; 12.4) at 6 months and 5.2% (95% CI: 2.7; 7.8) at 12 months, resolving over time to 1.2% (95% CI: -0.9; 3.2) at 24 months and 2.2% (95% CI: -1.0; 5.4;) at 48+ months. The differences in knee flexor strength between graft types were (in favor of QT/BPTB grafts) 6.2% (95% CI: 2.9; 9.5) at 6 months post-surgery and 7.7% (95% CI: 4.2; 11.2) at 12 months, resolving to 2.2% (95% CI: -1.7; 6.0) at 24 months and 5.1% (95% CI: -1.4; 11.6) at 48+ months post-surgery. Between-graft difference in knee extension LSI was in favor of HS graft at 12 months (4.9% [95% CI: 0.1; 9.8; $p = 0.04$]). Notably, no difference in LSI of knee flexion between grafts were observed.

Interpretation / Conclusion: Graft-specific differences in knee extensor and flexor strength were observed postoperatively. Differences in knee extensor strength LSI in favor of HS grafts were found, but no difference in knee flexor strength LSI. Loss of muscle strength after ACLR appeared to depend on graft choice, underlining the importance of site-specific postoperative rehabilitation.

Using deep learning to diagnose knee injuries on magnetic resonance images: current potential and limitations

6.

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Background: Magnetic resonance imaging (MRI) is the primary image modality for diagnosing soft tissue knee injuries. Correct interpretation of knee MRI can be time-consuming. Deep learning assisted diagnosis in knee MRI has shown potential for improving diagnostic speed and accuracy, but the results have been inconsistent. Recent advances in deep learning methods have resulted in improvements in both performance and interpretation for other medical image diagnosis tasks.

Aim: We aim to study these advances and develop a deep learning model capable of diagnosing anterior cruciate ligament (ACL) and meniscal tears in knee MRI.

Materials and Methods: We used the MRNet dataset consisting of 1250 knee MRI scans from Stanford University Medical Center. Each case has been labeled with the presence or absence of an ACL tear and/or meniscal tear as diagnosed by a radiologist. The dataset is split into a training set (1130 cases) and a validation set (120 cases). We developed a deep learning model based on the EfficientNet architecture and trained it on the training set. The trained model was then used to diagnose the scans in the validation set. Using the diagnostic labels as gold- standard we calculated the sensitivity and specificity. We calculated the area under the receiver operating characteristic curve (ROC) as an overall measure of performance. Lastly, we used Gradient-weighted Class Activation Mapping to visualize which regions of each scan the model used for diagnosis.

Results: The model achieved ROC (95% CI) values of 0.99 (0.97 – 1) for ACL tears and 0.88 (0.82 – 0.94) for meniscal tears. The average ROC was 0.93, the currently highest reported for the MRNet dataset. The sensitivity (95% CI) was 0.87 (0.76 – 0.94) for ACL tears and 0.83 (0.7 – 0.91) for meniscal tears. The specificity (95 CI) was 0.94 (0.85 – 0.98) for ACL tears and 0.76 (0.65 – 0.85) for meniscal tears . The sensitivity and specificity is comparable to previously reported values achieved by trained radiologists on the MRNet dataset.

Interpretation / Conclusion: Our findings indicate that deep learning has the potential to aid radiologists and orthopedic surgeons when diagnosing ACL and meniscal tears in knee MRI.

Secondary Surgeries 20 years after surgical and non-surgical treatment of ACL rupture: A population-based cohort study

7.

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Background: Studies with less than 10 years of follow-up have demonstrated no difference between surgical and non-surgical treatment after an anterior cruciate ligament (ACL) rupture; however, long-term effects remain unclear.

Aim: The aim of this study was to compare the risk of long-term secondary surgical procedures after primary surgical and non-surgical treatment for ACL ruptures.

Materials and Methods: Patients aged 18–35, registered in the Danish National Patient Registry with an ACL rupture between January 1, 1996 and December 31, 2000 were included with approximately 20 years follow-up. The surgically treated group was defined as receiving an ACL reconstruction within 1 year after diagnosis. Major secondary surgical procedures were defined as subsequent ACL surgeries (reconstruction/revision), arthroplasty, deep infection, arthrodesis, or amputation. Minor secondary surgical procedures were defined as meniscal surgery, synovectomy, and manipulation under anaesthesia (MUA). Multivariate regression analysis was performed to assess relative risk (RR), adjusted for age and sex. The results are reported with 95% confidence intervals.

Results: In total, 7,539 patients had an ACL rupture; 1,970 patients were surgically treated. There were 63% males and a mean age of 25 years (24.9–25.1) with no clinically relevant difference between groups. In the surgical group, 5.9% of patients underwent major secondary surgeries compared to 6.1% in the non-surgical group, yielding an adjusted RR of 1.05 (0.85;1.30). The majority (88%) had only one major secondary surgery with no difference between the groups ($p=0.171$). 44% underwent minor secondary surgeries in the surgical group compared to 49% in the non-surgical group, yielding an adjusted RR of 1.29 (1.20;1.39). For both groups, the majority of the minor reoperations were meniscal surgeries (71%). A total of 37% had more than 1 minor secondary procedure with no difference between the groups ($p=0.381$).

Interpretation / Conclusion: No significant differences in the rate of major secondary surgical procedures between surgically and non-surgically treated ACL patients, the non-surgical group was associated with a higher risk of minor secondary surgeries.

Eighty Percent Survival of Condyle Resurfacing Implants in the Knee After 10 years. A Nation-Wide Cohort Study on 379 procedures from the Danish Knee Arthroplasty Registry

8.

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Background: Focal cartilage injuries are debilitating and difficult to treat. Biological cartilage repair procedures are used for patients younger than 40 years, and knee arthroplasties are generally reserved for patients older than 60. Condyle resurfacing implants are well suited for patients in this treatment gap.

Aim: The objective was to investigate the 10-year survival of condyle resurfacing implants in the Danish Knee Arthroplasty Registry.

Materials and Methods: In this retrospective cohort study, patients treated condyle resurfacing implants were followed longitudinally in the Danish Knee Arthroplasty Registry from 1997 to 2020. The primary endpoint was revision surgery. The survival of the condyle resurfacing implants was analyzed by Kaplan Meier method.

Results: 379 condylar implant procedures were retrieved from the Danish Knee Arthroplasty Registry. The mean age and weight of patients were 50 years (SD: 11) and 84 kg (SD: 17). The indications for surgery were: Secondary osteoarthritis (42%), primary osteoarthritis (32%) and osteochondral lesions (20%). Within the follow-up period, 70 (19%) of the implants were revised to arthroplasties. The 1-, 5- and 10-year revision free survival estimation was 0.95 (95% CI: 0.93–0.97), 0.84 (95% CI: 0.80–0.88) and 0.80 (95% CI: 0.75–0.84). The median time to revision was 2 years.

Interpretation / Conclusion: The 10-year revision free survival rate for condyle resurfacing implants was 80%. Based on the revision rates, this treatment offers a viable alternative to biological cartilage repair methods in middle-aged patients with focal cartilage pathology. Improved patient selection could further improve the implant survival rate. Further studies are needed to investigate this treatment method.

Validity of sports-related diagnosis codes in the Danish National Patient Register

9.

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Background: The diagnosis codes for sports injuries in the Danish National Patient Register (DNPR) are frequently used for research, however the validity is unknown.

Aim: The aim was to investigate the validity of diagnosis codes for some of the most common sports related injuries: acute Achilles tendon rupture (DS86.0A), Achilles tendinitis (DM76.6), rupture of anterior cruciate ligament of the knee (ACL) (DS83.5E), dislocation of the patella (DS83.0), traumatic tear of the meniscus (DS83.2) and degenerative meniscal lesion (DM23.2).

Materials and Methods: The study was performed as a registry study in the DNPR. For each diagnosis code, patient records from Copenhagen University Hospital Hvidovre were retrieved from January 1st to December 31st 2017. We considered a positive predictive value (PPV) of 80% or higher to be satisfying.

Results: The population consisted of 85 patients registered with the diagnosis code for acute Achilles tendon rupture, 65 patients with Achilles tendinitis, 73 patients with ACL rupture, 100 patients with dislocation of the patella, 100 patients with traumatic tear of the meniscus, and 100 patients with degenerative meniscal lesion. For acute Achilles tendon rupture the PPV was 98% (95% CI: 92%–100%), for Achilles tendinitis 85% (95% CI: 74%–92%), for ACL rupture 96% (95% CI: 88%–99%) and for dislocation of the patella 96% (95% CI: 90%–99%). Depending on the definition of the diagnoses, the PPVs were 56%–72% for traumatic tear of the meniscus and 53%–77% for degenerative meniscal lesion.

Interpretation / Conclusion: This study documented an acceptable validity allowing for epidemiological research of the diagnosis codes for acute Achilles tendon rupture, Achilles tendinitis, ACL rupture and dislocation of the patella. The diagnosis codes for traumatic tear of the meniscus and degenerative meniscal lesion showed a lower validity, and thus caution should be taken when using these codes.

Surgical conversion rate and patient-reported outcome after treatment with a physiotherapy-led progressive exercise program plus a PCL support brace in patients with an acute injury of the posterior cruciate ligament

10.

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Background: PCL injuries can be treated surgically or with progressive exercises in combination with a PCL support brace. However, larger prospective studies reporting outcome of exercise-related treatment are lacking.

Aim: We aimed to investigate changes in patient-reported and functional outcome of a physiotherapy-led progressive exercise program plus a PCL support brace in patients with an acute injury of the PCL over a 24-months follow-up. Furthermore, to report conversion to surgical reconstruction.

Materials and Methods: In a prospective case-series study, 50 patients were treated with a PCL support brace for 12 weeks and underwent a 16-week physiotherapy-led progressive exercise program. Changes in patient-reported outcome was investigated with the International Knee Documentation Committee Subjective Knee Form (IKDC-SKF) from baseline to 1 and 2 years. Furthermore changes in isometric knee flexion and extension strength was measured from 16 weeks to 1 year. Mean changes were analyzed with a mixed effect model with patients as a random factor and time as a fixed factor.

Results: Seven patients (14 %) converted to PCL reconstruction resulting in 43 patients for 1-year follow-up that completed the combined brace and rehabilitation treatment. Of the patients converting to reconstruction, two patients had an isolated ligament injury and five patients had dislocation of the knee. The IKDC-SKF score at baseline was 35 (SD 9.7) and at 2 years 62 (SD 15). Isometric knee flexion strength of the injured knee increased statistically significantly from 0.93 (SD 0.36) Nm/kg to 1.1 (SD 0.36) Nm/kg, corresponding to an increase of 17%. In contrary isometric knee extension strength of the injured knee did not change (0.10 (-0.022-0.21) Nm/kg, $p=0.107$).

Interpretation / Conclusion: Treatment resulted in a 14% conversion rate to surgical treatment. The treatment demonstrated clinically relevant improvements in patient-reported outcome and an improvement of 17% in flexor strength. Consequently, limited need for conversion to surgical treatment, clinically relevant improvements in subjective outcome and strength after PCL support brace treatment and a progressive exercise program can be expected in patients with an acute PCL injury.

7 novel risk loci suggest differences in genetic associations between surgically and non-surgically treated hip osteoarthritis

11.

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Background: The broad disease spectrum of osteoarthritis (OA) ranges from mild symptoms to debilitating joint destruction, ultimately demanding joint replacement. Though numerous studies have determined a substantial genetic contribution to OA development, it is uncertain whether genetic factors determine disease progression—and thereby the need for surgical intervention.

Aim: Our aim was to explore whether genetic associations for hip OA differ between patients treated surgically and non-surgically, respectively.

Materials and Methods: We performed 2 large-scale genome-wide association studies (GWAS) in each of 3 cohorts from Denmark, Iceland, and the United Kingdom. In each cohort, we identified primary hip OA cases (without known injuries or other joint diseases) and assigned them to either a surgical (hOA-S) or non-surgical (hOA-NS) case group. The case groups were individually compared with a healthy control group without any OA diagnoses, and these GWAS results were then combined in 2 treatment-specific fixed-effects inverse variance meta-analyses. Genotyping in the Danish and Icelandic cohorts was done using Illumina Infinium Global Screening Array, and Affymetrix Axiom arrays were used in the British cohort. Variants with high-quality imputation (>0.8) in all 3 cohorts were included in the meta-analyses. Using a weighted Holm-Bonferroni method, we determined statistical significance at a variant class-specific familywise error rate of 0.05.

Results: 38,068 cases were included in the 2 meta-analyses, representing 20,221 surgical and 17,847 non-surgical hip OA patients. We identified 34 significant associations, of which 7 were novel (on chromosomes 3, 5, 16, 17 and 21). All 7 markers were significant in hOA-S ($p \leq 7.01 \times 10^{-8}$) and nonsignificant in hOA-NS (1 marker with $p=0.04$, 6 with $p \geq 0.11$). Additionally, 2 of the replicated significant markers in hOA-S had $p > 0.05$ in hOA-NS.

Interpretation / Conclusion: Our findings include 7 novel risk loci for hip OA that all show differences in genetic associations between surgically and non-surgically treated hip OA patients. On this basis, we suggest that the genetic associations of hip OA vary with the need for joint replacement.

Development of a new diagnostic algorithm identifying all cases of dislocation after primary THA – Based on 31,762 THAs from the Danish Hip Arthroplasty Register

12.

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Background: Dislocation of total hip arthroplasties (THA) leads to poorer quality of life for the patients, but since dislocations are often treated with closed reduction, they are traditionally not registered in orthopedic arthroplasty registers worldwide.

Aim: This study aimed to create an algorithm designed to identify cases of dislocations of THAs with high sensitivity (SN), specificity (SP), and positive predictive value (PPV) based on codes from the Danish National Patient Register (DNPR).

Materials and Methods: All patients (n=31,762) with primary osteoarthritis undergoing THA from 01.01.2010 to 31.12.2014 were included from the Danish Hip Arthroplasty Register (DHR). We extracted available data for every hospital contact in the DNPR during a two-year follow-up period, both admissions to orthopaedic and non-orthopaedic departments and outpatient emergency room contacts. We conducted a nationwide review of 5,096 patient files to register all dislocations and applied codes. We designed the algorithm using a stepwise approach by adding codes in each step to continuously increase SN, while at the same time keeping the SP and PPV high.

Results: We identified 1,890 hip dislocations among 1,094 of the included 31,762 THAs. More than 70 different diagnoses and 55 procedural codes were coupled to the hospital contacts with dislocation. A combination of the correct codes (DT840+KNFH20) yielded a SN of 62.7% and a PPV of 97.9%. Adding alternative and often applied codes in three steps (DS730, KNFH(20;21;22;00;02)) increased the SN to 91.3%, while the PPV was kept at 93.3%. An additional step (DT840 alone, acute admissions) increased SN to 95.4% but at the expense of an unacceptable decrease in the PPV to 81.8%. A minor effort in reviewing 0.3– 1% of patient files could raise the PPV to 96.6% in the last two steps. SP was, in all steps, greater than 99%.

Interpretation / Conclusion: The developed algorithm demonstrated a SN of 91.3% and a PPV at 93.3% for identifying dislocations, which we consider acceptable. Higher SN is possible but at the expense of drastically lowering the PPV and are not feasible for register studies. In perspective, this kind of algorithm may be used in Danish quality registers.

Migration pattern of cemented Exeter Short Stem in Dorr type A femurs – A prospective radiostereometry study with 2-year follow-up

13.

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Background: The Exeter short stem is 25 mm shorter than the standard length v40 Exeter stem (Stryker) and intended for use in a narrow femoral diaphysis.

Aim: The purpose of the study was to evaluate the migration pattern of the cemented Exeter short stem.

Materials and Methods: In a prospective single-center cohort study, 23 patients (21 female) mean age 78 (range 70–89) with hip osteoarthritis and Dorr Type A femurs were included. Preoperative DXA was used to group patients into normal (> -1) and low (< -1) T-score. Components were the collarless polished double-tapered Exeter short stem type N°1 L125. Patients were followed for two years with model-based RSA (stem migration), regular hip radiographs (stem position and cementation quality), Oxford Hip Score (OHS) and VAS pain.

Results: At two-years follow-up, the stems subsided 1.48 mm (CI95 1.69; 1.26) and retroverted 0.45° (CI95 0.01; 0.88). From 12 to 24 months, stem subsidence was 0.18 mm (CI95 0.1; 0.25) ($p=0.001$) and retroversion was -0.04° (CI95 -0.27; 0.18) ($p=0.70$). T-score and stem subsidence correlated ($\rho=0.48$; $p=0.025$) and patients with normal T-score ($n=7$) had 0.42 mm (CI95 -0.01; 0.85) less subsidence as compared to patients with low T-score ($n=15$) ($p=0.054$). Stems in varus position ($n=10$) subsided 1.7 mm (CI95% 1.35; 2.05) compared to 1.33 mm (CI95% 1.05; 1.60) for stems in neutral position ($n=13$) ($p=0.07$). Postoperative cementation quality did not influence stem migration. OHS improved to 40.7 (CI95 36.8; 44.7) and VAS pain at rest and activity decreased to 5mm and 10mm, respectively ($p<0.001$).

Interpretation / Conclusion: The migration pattern of the cemented ESS was similar to reports for the cemented standard length Exeter stem. Low preoperative T-score and varus stem-position showed a tendency for higher stem migration and should be studied as risk factors for failure in larger studies of cemented polished stems.

Do hip precautions after posterior approach total hip arthroplasty reduce the incidence of early postoperative dislocation or influence other patient-important outcomes: A systematic review and meta-analysis from a Danish Clinical Practice Guideline

14.

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Background: Hip precautions are routinely prescribed to decrease dislocation rates after total hip arthroplasty (THA) using a posterior approach.

Aim: The purpose of this systematic review was to determine whether hip precautions influence early recovery after THA.

Materials and Methods: Randomised and non-randomised controlled trials comparing postoperative precautions after THA with minimal or no precautions were included. MEDLINE, EMBASE, PEDRO and Cinahl were searched in March 2016 and updated in June 2020. Screening of eligible studies, data extraction and risk of bias assessment were conducted by two reviewers. Critical outcome were hip dislocations three months post-THA. Important outcomes included late hip dislocation, patient-reported function, functional performance, reoperation, pain, health-related quality of life, and return to work. Inverse variance random effects and Mantel-Haenszel fixed-effects meta-analyses were performed to synthesise the results. A guideline panel used the Grading of Recommendations Assessment and Evaluation (GRADE) approach to rate the certainty of evidence. The Protocol was registered at the Danish Health Authority website.

Results: Two randomised and four non-randomised trials, including 3,778 participants, were included. There was low certainty of evidence for no difference in risk of dislocation within three months after THA following hip precautions compared to no or minimal precautions (risk ratio: 1.38, 95% CI: 0.73–2.59), low certainty of evidence for a small effect on patient-reported function favouring no or minimal precautions (risk ratio: 1.54, 95% CI: 1.18–2.02), and very low certainty of evidence for a small effect on functional performance favouring no or minimal precautions (risk ratio: 0.64, 95% CI: 0.48–0.85). Moderate, low, and very low certainty of evidence was found for no difference on any other important outcomes.

Interpretation / Conclusion: Precautions will possibly not reduce the risk of dislocation. Both patient-reported function and functional performance were slightly better with no or minimal precautions. Recommendation: Do not routinely instruct patients in hip precautions after posterior approach THA because there is possibly no effect on the risk of hip dislocations.

No increase in postoperative contacts with the health care system following outpatient total hip and knee arthroplasty

15.

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Background: Discharge on the day of surgery (DDOS) after total hip arthroplasty (THA) and total knee arthroplasty (TKA) has been shown to be safe in selected patients. Concerns have been that discharging patients on the day of surgery (DOS) could lead to an increased burden on other parts of the health care system when compared to patients not discharged on the DOS (nDDOS).

Aim: To investigate whether discharging patients on the day of surgery (DOS) after THA and TKA leads to increased contacts with the primary care sector or other departments within the secondary care sector.

Materials and Methods: Prospective data on 261 consecutive patients scheduled for outpatient THA (n=135) and TKA (n=126) were collected as part of a previous cohort study. 33% of THA patients and 37% of TKA patients were discharged on the DOS. Readmissions within 3 months after surgery were recorded. Contacts with the discharging department, other departments, and primary care physicians within 3 weeks were registered.

Results: No statistically significant differences were found when comparing DDOS patients and patients not discharged on the DOS (nDDOS) with regards to readmissions, physical contacts with the discharging department, and contacts with other departments as well as general practitioners. THA DDOS patients had significantly fewer contacts with the discharging department by telephone than THA nDDOS patients. TKA DDOS patients had significantly more contacts with the discharging department by telephone than TKA nDDOS patients.

Interpretation / Conclusion: Patients discharged on the DOS following THA or TKA generally have similar postoperative contacts with the health care system when compared to patients not discharged on the DOS.

Genetic associations of knee osteoarthritis vary with the need for surgical treatment: insights from 2 large-scale genome-wide meta-analyses

16.

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Background: Osteoarthritis (OA) is a multifactorial disease with a genetic contribution of up to 50% and around 100 known genetic risk loci. Despite the apparent differences in personal and socio-economic consequences between different grades of OA, it is unknown whether disease severity, and thereby the need for surgical treatment, is determined by genetic factors.

Aim: We aimed to investigate whether genetic associations for knee OA differ between patients who received surgical treatment (kOA-S) and patients who did not (kOA-NS).

Materials and Methods: We defined cases as patients with primary knee OA and no known injuries or other joint diseases. As controls, we included healthy persons without any OA diagnoses. In each of 3 large cohorts from Denmark, Iceland and the United Kingdom, we performed 2 treatment-specific genome-wide association studies (knee OA vs healthy controls), which we subsequently joined in 2 fixed-effects inverse variance meta-analyses for kOA-S and kOA-NS, respectively. The Danish and Icelandic cohorts were genotyped using Illumina Infinium Global Screening Array, and Affymetrix Axiom arrays were used in the British cohort. Imputation was performed, and variants with imputation quality >0.8 in all 3 cohorts were included in the meta-analyses. Statistical significance was set at a familywise error rate of 0.05 (variant class-specific) determined by a weighted Holm-Bonferroni method.

Results: The 2 meta-analyses included 61,151 knee OA cases, of which 22,525 were surgical and 38,626 were non-surgical. We identified 17 significant markers, including 3 novel ones (located on chromosomes 2 and 3). The 3 novel markers were all statistically significant in kOA-S ($p \leq 3.06 \times 10^{-9}$) and undoubtedly non-significant in kOA-NS ($p \geq 0.27$) —a pattern also seen in 2 of the replicated markers. 1 marker was only significant in the nonsurgical group (kOA-NS $p = 1.19 \times 10^{-13}$ vs kOA-S $p = 0.0047$).

Interpretation / Conclusion: We have identified 3 novel markers for knee OA, all of which indicate a difference in genetic associations between surgically and non-surgically treated knee OA—a difference which we also found in 3 replicated markers. In conclusion, our findings suggest that the genetic associations of knee OA vary with the course of treatment.

Two - year survival rate and functional outcome for the Persona Total Knee Arthroplasty

17.

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Background: The Personalized Knee System (Zimmer, Warsaw, IN, USA) is a new Total Knee Arthroplasty (TKA) design. This non-designer study's primary motivation was internal quality assessment as part of implementing the Persona TKA at our institution.

Aim: We aimed to examine implant safety and patient self-reported pain and function by determining two- year survival rate and patient-reported outcome measures (PROMs). The secondary objective was to examine the proportions of patients achieving postoperative PROM scores that reflected a patient acceptable symptom state (PASS) and a change exceeding the minimal important change (MIC).

Materials and Methods: We included 568 patients (643 knees) operated with the Persona TKA at one institution between December 2015 and May 2019. We calculated the implant survival rate using the Kaplan-Meier analysis. Patients answered the PROMs; the Oxford Knee Score (OKS) and the Forgotten Joint Score (FJS) preoperatively, and at three months, one year, and two years postoperatively. Changes in PROM scores were analyzed with paired t-tests. We used previously published cut- off values to examine the proportions of patients achieving 2-year postoperative PROM scores that reflected a PASS (OKS 30 points) and a change exceeding the MIC (OKS 8 points and FJS 14 points).

Results: 18 patients had 19 primary revisions resulting in a Kaplan-Meier estimated 2-year survival rate of 0.96. The group achieved a median increase in the OKS from 22.33 preoperatively to 38.16 two years after surgery ($p < 0.001$). 75% surpassed the PASS value, and 72% achieved the MIC. The group achieved a mean increase in the FJS from 16.09 preoperatively to 57.54 two years after surgery ($p < 0.001$), and 76% achieved the MIC.

Interpretation / Conclusion: The two-year survival rate for the Persona TKA were comparable to other established TKA designs, and both PROMs increased significantly. Furthermore, approximately three-fourths of the patients in our study had postoperative PROM scores that reflected well-being and a change score considered important by the average patient.

Preoperative Oxford Knee Score predicts long term results in Total Knee Replacements

18.

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Background: Up to 20 % of all patients having a TKR are less satisfied. Predicting long term outcome would be of key importance in meeting patients' expectations. expectations.

Aim: The aim is to investigate whether preop Oxford Knee Score (OKS), can predict long term results for TKR patients.

Materials and Methods: OKS was collected in a prospective cohort study (preop, 1-5 and 10 years) in 200 consecutive patients with primary osteoarthritis, operated during 2006-9 with the Vanguard TKR. The change in OKS was determined for each patient. The patients were divided in thirds depending on their preop OKS: Lower (OKS < 21, Middle (22 < OKS < 27), High (OKS > 27). Differences between groups were measured by Anova, followed by Tukeys Multiple Comparison post hoc analysis. Similarly, 1 year results were divided in 3 groups, Lower (patients with OKS < 40), Middle (41 < OKS < 44), high (OKS > 45), to determine if 1 year results predicts long term results. Odds-ratio was measured using Babbitt Pike and Chi-square test.

Results: 91 females (average age 64.68, range 36-82, BMI = 29.88, range 21-47) and 109 males (average age 66.58, range 46-85, BMI = 29.18 range 19-43) were included. At 10 years, 46/200 (23%) was lost to follow-up (38 dead, 8 for other reasons), 12 were revised. Mean OKS increased from 23.15 points to a maximum of 44.84 points at 5 years with a small decline to 43.58 points at 10 years. Median change over 10 years was dependent of preop OKS, since preop OKS < 21 changed 25.92 points; 22 < preop OKS < 27 changed 19.94 points, and preop OKS > 27 changed 14.78 points ($p < 0.001$ between the 3 groups). At 10 years, comparing patients with high and low preop OKS showed an odds ratio = 3.054 ($p = 0.009$) for an OKS above 45 for patients with a high preop OKS. Patients with an OKS > 45 at 1 year had significantly higher OKS at 10 year than the patients with an OKS < 45 at 1 year ($p = 0.0036$)

Interpretation / Conclusion: The increase in OKS depends on the preop score, with the highest gain for patients with the lowest preop score. Patients with a low preop OKS have significantly lower chance of getting an excellent long term result. Overall, preop OKS somehow predicts long term results and if known, may aid in bridging patient expectations with outcome. outcome.

Fast-track revision knee arthroplasty. A multicenter cohort study on 1439 elective aseptic major component revision knee arthroplasties

19.

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Background: Limited data exist on fast-track protocols in relation to revision knee arthroplasty.

Aim: The aim of this study was to report length of stay (LOS), risk of LOS > 5 days and readmission ≤ 90 days after revision knee arthroplasty in centers with a well-established fast-track protocol in both primary and revision surgery.

Materials and Methods: An observational cohort study from the Centre for Fast-track Hip and Knee Replacement and the Danish Knee Arthroplasty Register. We included elective aseptic major component revision knee arthroplasties consecutively from 6 dedicated fast-track centers from 2010 to 2018.

Results: 1439 revision knee arthroplasties were analyzed, including 900 total revisions, 171 large partial revisions (revision of either femoral or tibia component) and 368 revisions of unicompartmental knee arthroplasty (UKA) to total knee arthroplasty (TKA). Mean age was 65 years (SD 10.9) and 66% were females. Mean LOS was 3.7 days (SD 3.9) in the study period, but decreased to 2.4 days (SD 1.3) in 2018. Risk factors for LOS > 5 days was ≥ 1 previous revision, use of walking aid, BMI > 35, ages < 50, 70–79 and ≥ 80 years, whereas revision of UKA to TKA and large partial revision were negatively associated. The 90-day readmission and mortality risk was 9.1% and 0.5%. Cardiac disease and use of walking aid were associated with increased risk of readmission ≤ 90 days.

Interpretation / Conclusion: Elective aseptic major component revision knee arthroplasty using similar fast-track protocols as in primary TKA is safe with short and decreasing LOS.

Influence of Body Mass Index and age on day of surgery discharge, prolonged admission and 90-day readmission after fast-track unicompartmental knee arthroplasty

20.

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Background: The indications for unicompartmental knee arthroplasty (UKA) have become more liberal. As such UKA surgery is performed in age and Body Mass Index (BMI) extremes. While the influence of these patient characteristics on length of stay (LOS) and readmission in total knee arthroplasty surgery is well documented, the same evidence in UKA is lacking.

Aim: This study aims to investigate the effect of BMI and age on day of surgery (DOS) discharge, prolonged admission and 90-day readmission after UKA surgery.

Materials and Methods: This study included 3897 UKA patients with complete data on BMI between 2010–2018 from 8 fast-track arthroplasty centres. Patients were divided into 5 BMI (kg/m²) groups according to the World Health Organization. Patients were also divided into 5 age groups. Differences between BMI and age groups in DOS-discharge (LOS=0 days), prolonged admission (LOS>2 days), 90-day readmission was investigated using chi squared analysis and mixed effect models adjusted for patient characteristics and comorbidity using surgical centre as a random effect.

Results: Within the cohort median BMI was 28.1 (IQR=25.4–31.5), mean age was 66.2 years (SD=9.4), and median LOS was 1 day (IQR=0–1). Most patients were overweight (43%) and aged between 61–70 years (37%). DOS-discharge was achieved in 25.5% of patients with no significant differences between BMI groups. DOS-discharge was less likely in UKA patients aged >70 years (Age 71–80; odds ratio (OR) = 0.71 [0.58 – 0.88], p= 0.002. Age > 80; OR = 0.18 [0.10 – 0.34], p<0.001) compared to patients aged 61–70 years. Prolonged admission occurred in 7.5% of patients but was not affected by BMI or age in the adjusted analysis. 90-day readmission was more likely in very obese patients (OR = 1.86 [1.12 – 3.10], p= 0.017) and patients aged 71–80 (OR = 1.54 [1.12 – 2.13], p=0.008) compared to patients with normal BMI and age 61–70 years, respectively.

Interpretation / Conclusion: Age above 70 years decreased the likelihood of DOS-discharge after UKA surgery, while BMI did not affect DOS-discharge. BMI and age did not affect prolonged admission. High BMI and advanced age increased the likelihood of 90-day readmission. This should be considered as a part of the shared decision-making process.

Does lower extremity passive range of motion associate with gross motor capacity or gross motor performance in children and adolescents with cerebral palsy? A cross-sectional study

21.

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Background: Cerebral palsy (CP) is the most common motor disability in childhood, affecting 2 per 1000 live births. In the Nordic countries, findings from standardized clinical examinations are registered in the national clinical quality database; Cerebral Palsy Follow-Up Program (CPUP). The CPUP uses a traffic light system, with red/yellow/green thresholds for passive range of motion (ROM), as an easy-to-understand interpretation of the measurement, and to guide decisions about future examinations and interventions. However, the threshold values are arbitrary, and serve primarily as a pragmatic indication.

Aim: The aim of this study is to test the hypothesis that ROM values in the lower extremity are positively associated to gross motor capacity and gross motor performance in children and adolescents with independent gait, and that gross motor capacity and gross motor performance scores differ between CPUP's traffic light ROM thresholds

Materials and Methods: A retrospective cross-sectional analysis of CPUP data, including 841 children and adolescents aged 8-15 years, at a Gross Motor Function Classification System level I-III. Continuous and categorical analysis between 10 ROM measures from the lower extremity versus gross motor capacity (Gross Motor Function Measure), and gross motor performance (Functional Mobility Scale (FMS 5m, 50, 500m)) were assessed using regression analysis with an alpha level of 0.01.

Results: No positive association between ROM versus gross motor capacity ($p=0.82-0.94$), or between ROM versus gross motor performance ($p=0.13-0.99$), was observed. No categorical differences between CPUP's traffic light ROM thresholds were identified except for hip abduction (FMS 50m ($R^2=0.60$, $p=0.001$), (FMS 500m ($R^2=0.56$, $p=0.001$)) and the popliteal angle (FMS 500m ($R^2=0.56$, $p=0.006$)).

Interpretation / Conclusion: Opposed to our hypothesis, the findings suggest that the degree of lower extremity ROM does not associate with the child's gross motor capacity or gross motor performance. The results suggest that ROM, and categorical traffic light threshold values used in the CPUP, are of limited clinical value in assessing overall gross motor capacity and gross motor performance.

Controlled rotation of long bones by guided growth – 22. A proof of concept study of a novel plate in cadavers

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Background: Rotational deformities in children are currently treated by osteotomy, acute correction and fixation. This procedure is associated with substantial pain and hospitalisation. Hence, a patented novel plate design has been developed to accurately correct rotational deformities by guided growth in children.

Aim: To evaluate the mechanical ability and precision of the novel plate in femoral rotation.

Materials and Methods: Twelve cadaverous femora of six adults (right = 6, left = 6) underwent an osteotomy at the level of the physeal scar and the plates were inserted on each side of the distal femur. Growth was simulated by manual axial distraction of the bone segments. The femur was stabilized using a unilateral external fixator. Femoral torsion was assessed with CT and with an electric goniometer before and after distraction. The obtained rotation was compared with the predicted rotation based on the dimension of the plate and the bone.

Results: All femora were rotated as intended. The mean obtained rotation was 26.3 degrees and the mean predicted rotation was 28.2 degrees ($p > 0.82$). Mean axial distraction was 19.5 mm (CI 95% 17.7 – 21.3).

Interpretation / Conclusion: The predicted rotation of the femora was similar to the obtained values on CT and by goniometer. This suggests a potential for controlled rotation of the femur based on the circumference of the bone and plate dimensions which occurs simultaneously with axial distraction. Studies in large animal models are needed and planned.

Evaluation of somatosensory profiles in children and adolescents with cerebral palsy and chronic pain by quantitative sensory testing

23.

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Background: Chronic pain in children and adolescents with cerebral palsy (CP) is a partly overlooked and undertreated clinical problem, while being a major determinant for quality of life.

Aim: To better understand the underlying pain mechanisms, we investigated the somatosensory profiles of children and adolescents with and without CP, and chronic pain, with quantitative sensory testing (QST).

Materials and Methods: This prospective cross-sectional, explorative study investigated 51 subjects; 25 with CP (9 with chronic pain [CP-P], 16 without [CP-NP]), and 26 without CP (14 with chronic pain [non-CP-P], 12 without [controls]). All subjects were recruited from the outpatient orthopedic clinic. The subjects had their reaction time tested prior to the QST. The QST included assessments of warmth (WDT), cool (CDT), mechanical (MDT) and vibration (VDT) detection thresholds; heat (HPT), pressure (PPT), and mechanical (MPT) pain thresholds; and tests of wind-up (WUR), dynamic mechanical allodynia (DMA) and conditioned pain modulation (CPM).

Results: There were no statistical differences in QST results between subjects with CP-P and CP-NP. Reaction times were longer in subjects with CP compared to subjects without CP ($P=0.010$). Subjects with CP demonstrated hypoesthesia in WDT ($P=0.031$) and CDT ($P=0.029$), with a trend for mechanical hypoesthesia in MDT ($P=0.052$), and no difference in HPT compared to controls. When rating pain during HPT-assessment, more subjects with CP rated the pain intensity as high (13/25 vs. 2/12, $P=0.008$), and in WUR, fewer subjects with CP registered increasing pain over time (6/25 vs. 7/12, $P=0.041$), compared to controls. Subjects in the non-CP-P group demonstrated hypoesthesia in WDT ($P=0.008$) and HPT ($P=0.021$), and more subjects rated the pain intensity as high (9/14 vs. 2/12, $P=0.014$), compared to controls. Regarding the rest of the QST variables, no significant differences were shown.

Interpretation / Conclusion: The somatosensory profiles of subjects with CP demonstrated similarities regardless of the pain phenotype; thermal and mechanical hypoesthesia and decreasing pain in responses to WUR. Further sensory studies are warranted examining the pathophysiological mechanism of pain in children and adolescents with CP.

Seasonal variation in children's fractures: A population-based study of 20,654 pediatric fractures.

24.

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Background: Pediatric fractures are common. A Scandinavian reported a fracture life- time risk (0–14 years) of 42 % in boys and 27 % in girls. The fracture incidence varies with the seasons. Most studies have showed an increase in spring or summer. Other studies have showed an increase in the winter. Few previous Scandinavian studies have described the seasonal variation in pediatric fractures.

Aim: The aim of the study was to describe the seasonal variation in the incidence rate of pediatric fractures 1996–2019 in a Danish population.

Materials and Methods: We extracted data from the existing emergency department register at Odense University Hospital 1996– 2019. We included all radiologic confirmed fractures in children aged 0–14 years living in the Odense Municipality at the time of fracture. Seasonal and monthly incidence rates were calculated using population counts stratified by age, gender, and fracture site.

Results: Overall, 20,654 fractures were included. Boys accounted for 11,818 (57 %) of the fractures. The median was 9 years. We found a significant increase in the incidence rate in spring and summer, except for a drop in July. For boys the incidence rate ranged from 206 (95 % C.I.: 192–222) in December to 404 (95 % C.I.: 382–426) per 10,000 person-years in June. For girls the incidence ranged from 156 (95 % C.I.: 142–170) in December to 317 (95 % C.I.: 298–337) in May. Fractures were more frequent in the upper extremities and were up to 6 times more frequent in the epiphysis and metaphysis than on the shafts. All fracture sites showed significant variation with a peak in spring and summer except for July, and lowest incidence in the winter.

Interpretation / Conclusion: The present study showed seasonal variation in pediatric fractures with a peak in the spring and summer and a drop in July. The results correspond with the increased physical activity in the spring and summer. The low incidence in July corresponds with low sport activities due to summer vacation and travel abroad. This study gives useful information for coordinating the optimal medical resources at the hospitals and for planning preventive campaigns.

Ankle contractures are frequent among children with cerebral palsy and associated with lower gross motor function and degree of spasticity

25.

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Background: Cerebral Palsy (CP) is the most common chronic motor disability in childhood. Studies report that muscle contractures, limiting joint range of motion (ROM), are a common secondary condition in children with CP. Contractures may contribute to reduce functional capacity and limit overall skills considerably, causing limitations to activity and participation restrictions. Prevention of ankle contractures is especially important among children with CP since adequate ROM in the ankle joint is essential to ankle dorsiflexion, and thereby to maintain the ability to walk. Reduced ROM in the lower limbs, including ankle contractures, might negatively affect gross motor development, which is related to quality of life, including physically well-being.

Aim: To estimate yearly prevalence of ankle contractures among children with cerebral palsy. Moreover, to investigate whether age, gross motor function or spasticity are associated with ankle contracture.

Materials and Methods: We examined yearly prevalence of ankle contractures among 933 children based on data from a national clinical quality database from 2012 to 2019. We used the Gross Motor Function Classification System (GMFCS) and the Modified Ashworth Scale (MAS) to assess gross motor function and spasticity in the plantar flexors. Ankle contracture was defined as dorsiflexion with an extended knee equal to or below 0 degrees. Associations between age, GMFCS, spasticity and ankle contractures were analysed using multivariable regression and presented as odds ratios (OR) with 95% confidence intervals (95%CI).

Results: The prevalence of ankle contracture was 32% and did not change with calendar year. GMFCS IV–V compared to I–III (40.6% vs. 28.9%, OR = 1.5 (95%CI: 1.07– 2.11) and MAS 2–4 compared to 0 (44.6% vs. 24.4%, OR = 2.5 (95%CI: 1.59–3.91) were associated with a higher prevalence of ankle contracture. Age was not associated with ankle contracture.

Interpretation / Conclusion: Ankle contractures are frequent among children with CP. Lower gross motor function and severe spasticity were associated with ankle contracture.

Epidemiology and incidence of paediatric orthopaedic trauma workload during the COVID-19 pandemic—A multicenter cohort study of 3171 patients

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Background: A danish national lockdown was issued on the 11th of March 2020 including closure of schools and cessation of sports. Therefore a reduction in paediatric injuries was expected. Although current literature investigates the frequencies of paediatric injuries during the COVID-19 pandemic, no overview of the pandemic's consequences on population-based incidences of paediatric injuries and related trauma mechanisms is available.

Aim: To examine the consequences of the national lockdown and political initiatives during the first surge of the COVID-19 pandemic expressed by changes in incidences of musculoskeletal paediatric injuries at the emergency departments across multiple hospitals.

Materials and Methods: The study design was a retrospective cohort study investigating the incidence of paediatric musculoskeletal injuries in patients aged 0–15 years. A 'pandemic' cohort was established from 16 March 2020 to 21 April 2020, where all institutions including day care and schools were closed. A 'pre-pandemic' cohort was established from the same period in 2019 for comparison. Included were all patients admitted at the emergency departments with paediatric musculoskeletal injuries identified by a relevant musculoskeletal ICD-10 diagnosis (DSxxx), concussions (DZ033D), or burns (DT2xx). Clinical information about diagnosis, age, gender, date, and mode of injury was obtained.

Results: The 'pre-pandemic' cohort consisted of 2101 patients, and the 'pandemic' cohort consisted of 1070 patients, indicating a decrease of paediatric musculoskeletal injuries of 51% during the COVID-19 pandemic. The overall incidence of paediatric injury in the 'pre-pandemic' cohort was 10,460/100,000/year. In the 'pandemic' cohort, the overall incidence was 5,344/100,000/year, indicating a twofold decrease in paediatric emergency patients during the COVID19 pandemic.

Interpretation / Conclusion: The overall incidence rate for paediatric injury in the 'pre-pandemic' cohort was 10,460/100,000 persons/year. The overall incidence rate decreased to 5,344/100,000 persons/year in the 'pandemic' cohort. A resource re-allocation to help serve the COVID-19 patients might be possible without reducing the level of care for injury-related paediatric patients.

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Background: The Danish selective screening programme for developmental dysplasia of the hip (DDH) is based on clinical examinations and screening for risk factors of all newborns. Studies have shown a low positive predictive value (PPV) of clinical hip examinations performed by a heterogenic group of screeners in the United Kingdom. As no true definition of DDH exists, the PPV is difficult to assess.

Aim: To establish the positive predictive value (PPV) of clinical hip examinations performed by referrers in the Danish screening programme for Developmental Dysplasia of the Hip (DDH) utilising three definitions of true positive DDH diagnosis.

Materials and Methods: We retrospectively identified 290 children (169 female) referred during a four-year period to the orthopaedic outpatient clinic at our institution with a positive clinical hip examination. We calculated PPV for clinical hip examinations across three definitions of a true positive clinical hip examination for all referrers and subgroups consisting of general practitioners, midwives and paediatricians. The PPV for clinical hip examinations was calculated for paediatric orthopaedic surgeons, who were blinded to the results of ultrasound examination, using one of the three definitions.

Results: PPV of clinical hip examinations for all referrers were 5.4%, 3.6% and 1.8% with the definition of a true positive DDH diagnosis defined as clinical instability found by orthopaedic surgeon, ultrasound classification \geq Graf IIc or both definitions combined, respectively. PPV of clinical hip examinations performed by orthopaedic surgeons was 33.3% with a true positive clinical examination defined as an ultrasound classification \geq Graf IIc.

Interpretation / Conclusion: In this first review of results from the Danish screening programme for DDH, we conclude that the positive predictive value of clinical hip examinations made by referrers in the Danish screening programme for DDH is low. As clinical examinations are a critical part of the selective screening for DDH, this study demonstrates a need for focused training of screeners in clinical hip examinations to improve the screening of DDH in Denmark.

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Background: Conventional pelvic radiographs are traditionally used for assessing femoral head migration in residual acetabular dysplasia (RAD). Knowledge of the importance of cartilaginous structures in this condition has led to increased use of magnetic resonance imaging (MRI) in assessing both osseous and cartilaginous structures of the pediatric hip.

Aim: Therefore, we assessed the relationship between migration percentages (MP) found in MRI and conventional radiographs. Secondly, we analyzed the reliability of MP in MRI and radiographs.

Materials and Methods: We retrospectively identified a consecutive series of 16 patients (2 male, mean age 5 years (2 to 8 years)), examined for RAD during a period of 2½ years. Four raters performed blinded repeated measurements of osseous migration percentage (MP), cartilaginous migration percentage (CMP), in MRI and radiographs. Pelvic rotation and tilt indices were measured in radiographs to account for influence of pelvic positioning. Bland Altman (BA) plots and intraclass correlation coefficients (ICC) were calculated for agreement and reliability.

Results: BA plots for MP(R) and MP(MRI) produced a mean difference of 6.4 Limits of agreement (-11 to 24) with higher disagreements at low average MP values. Mean MP(R) differed from mean MP(MRI) (17% versus 23%, $P < 0.001$) MP(R) had the best interrater reliability with an ICC of 0.92 (0.86–0.96), compared to MP(MRI) and CMP with ICC values of 0.61 (0.45–0.70) and 0.52 (0.26–0.69), respectively. Intrarater reliability for MP(R), MP(MRI) and CMP all had ICC values above 0.75 and did not differ statistically significantly. Differences in MP(MRI) and MP(R) showed no correlation to pelvic rotation index, pelvic tilt index or interval between radiograph and MRI exams.

Interpretation / Conclusion: Pelvic radiographs underestimated MP when compared to pelvic MRI. These results should prompt the clinician to consider which image modality to use when assessing RAD cases. We propose CMP as a new imaging measurement, and conclude that it has good intrarater reliability but moderate interrater reliability. Measurement of MP in radiographs and MRI had mediocre to excellent reliability.

Correlation of clinical tests and patient-reported measures in adolescents with Osgood Schlatter: a cross-sectional study

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Background: A common knee complaint during adolescence is Osgood Schlatter (OS). As research into OS is only just emerging, little is known on how findings from clinical tests correlates with self-reported measures.

Aim: To capture how clinical tests correlates with self-reported factors in OS patients.

Materials and Methods: Adolescent OS patients from a specialized orthopedic clinic completed patient-reported surveys within 6 domains (dependent outcome variables) on pain (maximal numerical pain rating past week and past 24 hours, KOOS child 'pain', EQ-D5-Y-4), mental health (EQ-D5-Y-5), kinesiophobia (Tampa Scale), quality of life (KOOS child 'QoL'), sports function (KOOS child 'sport/rec'), self-rated health (EQ-D5-Y-VAS), and underwent a test battery of knee function containing 5 tests (independent predictor variables). For continuous variables correlations were computed using Pearsons r , and Spearman's rank for non-continuous variables.

Results: Thirty-three patients (age 13.5 ± 1.7 years, symptom-duration 23.6 ± 16.1 months) participated. Lower normalized isometric knee extension strength (Nm/kg) correlated with self-reported pain (past 24 hours, $r=0.595$; EQ-D5-Y-4, $r=0.509$), and satisfaction with sport participation level ($r=0.430$). Decreased pressure-pain threshold at the tibial tubercle correlated with other pain measures, and level of kinesiophobia ($r=0.447$). Higher pain evoked from the Anterior Knee Pain Provocation Test correlated with other pain measures, problems with sports participation ($r=0.548$), and QoL ($r=0.396$). Pain during maximal isometric knee extension correlated with other pain measures, problems with sports participation ($r=0.600$), mental health ($r=0.411$), and QoL ($r=0.593$). Knee extensor flexibility was not associated with any self-reported measures ($p>0.05$). No tests were associated with self-rated health ($p>0.05$).

Interpretation / Conclusion: There is moderate to strong correlation between clinical test results and self-reported measures of pain, mental health, QoL, sports function, and self-rated health. This can help clinicians to more easily gauge an understanding of potentially affected self-reported factors, based of a few clinical measures.

Measuring effects on pain and quality of life after Dysport® injection in children with cerebral palsy

30.

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Background: Studies have shown that 30–70 % of children with cerebral palsy (CP) experience chronic pain. This is closely interrelated to poor quality of life. Despite this, pain is an overlooked and undertreated clinical problem. The effect of Botulinum toxin injections has been used to diminish spasticity but not on pain.

Aim: The aim was to examine the analgesic effect of a single intramuscular injection of botulinum toxin A (Dysport) in the most painful muscles of the lower extremities.

Materials and Methods: In this study, we examined 25 children with spastic CP, age 5–17, GMFCS I–V. The most painful muscles during passive range of motion (pROM) were the targets for treatment. The children had to have at least moderate muscle pain ($r\text{-FLACC} \geq 4$) at inclusion to be enrolled in the study. Pain levels were measured before and at 4, 12 and 28 weeks after a single injection cycle of abobotulinum toxin (Dysport). The localized pain was evaluated by $r\text{-FLACC}$ during pROM. The effect on daily pain was evaluated by the Paediatric Pain Profile (PPP). The effect on clinically relevant problems was evaluated by individual SMART goals using the goal attainment scale and quality of life by the CPChild.

Results: A significant pain reduction was observed 4, 12 and 28 weeks post-treatment for localized muscle pain ($p < 0.001$ at 4 weeks) and the impact on daily activities/pain intensity were significantly reduced after 4 and 12 weeks, but not 24 weeks. For daily pain, a significant analgesic effect was seen at all timepoints ($p = 0.003$ at 4 weeks). Moreover, a clinically meaningful effect was seen since almost all participants achieving their therapeutic SMART goals at all timepoints ($p < 0.001$ at 4 weeks). Quality of life was significantly improved at 4 weeks, but not at 12 and 24 weeks. Adverse effects of soreness and temporary muscle weakness were observed in 8 incidences.

Interpretation / Conclusion: Even though botulinum toxins, such as Dysport, have been utilized for spasticity modulation in children with CP, it also appears to have a significant analgesic effect, when muscle pain is targeted. Moreover, the localized pain reduction seems to have a positive effect on activities of daily living, level of daily pain, SMART goals, and quality of life.

Vancomycin bone and tissue concentrations following tibial intraosseous administration – evaluated in a porcine model

31.

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Background: Systemic perioperative vancomycin may not provide sufficient prophylactic target-site concentrations in the prevention of prosthetic joint infections. Intraosseous vancomycin potentially provides high target-site concentrations.

Aim: The objective of the present study was to evaluate the local bone and tissue concentrations following tibial intraosseous vancomycin administration in a porcine model.

Materials and Methods: Eight pigs received 500 mg diluted vancomycin (50 mg/mL) through an intraosseous cannula into the proximal tibial cancellous bone. Microdialysis was applied for sampling of vancomycin concentrations in adjacent tibial cancellous bone, in cortical bone, in the intramedullary canal of the diaphysis, in the synovial fluid of the knee joint, and in the subcutaneous tissue. Plasma samples were obtained as a systemic reference. Samples were collected for 12 hours.

Results: High vancomycin concentrations were found in the tibial cancellous bone with a mean peak drug concentration of 1,236 (range 28–5,295) µg/mL, which remained high throughout the sampling period. The mean (standard deviation) peak drug concentration in plasma was 19 (2) µg/mL, which was obtained immediately after administration. Peak drug concentration, time to peak drug concentration, and area under the concentration–time curve were within the same range in the intramedullary canal, the synovial fluid of the knee, and the subcutaneous tissue.

Interpretation / Conclusion: Tibial intraosseous administration of vancomycin provided high concentrations in tibial cancellous bone throughout a 12-hour period but with an unpredictable and wide range of peak concentration. The systemic absorption was high and immediate, thus mirroring an intravenous administration. Low mean concentrations were found in all the remaining compartments.

Sampling of the myotendinous junction – how can we do it?

32.

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Background: The myotendinous junction (MTJ) is the region where strain injuries most often occur. Clinically, the risk for these injuries can be reduced through specific resistance training. This positive effect may be caused by changes in the concentration of structural proteins, leading to a strengthening of the MTJ. However, specific knowledge about the effect on the structure and tissue composition of the MTJ of resistance exercise is sparse. In order to study changes in protein content or gene expression at the MTJ it is necessary to isolate MTJ from the skeletal muscle and tendon to avoid that results from different tissues are mixed.

Aim: We aimed to develop a method to divide a sample taken from the MTJ into its three components: muscle, tendon and MTJ.

Materials and Methods: Samples were collected from the superficial digitorum flexor muscle from 20 horses and frozen routinely for immunohistochemistry. In frozen form each specimen was manually sliced parallel to MTJ into 10 µm thick sections and sampled for further processing. By controlling every 20th section visually it was noted whether the section contained muscle, MTJ or tendon. RT-PCR was performed on the collected sections identifying mRNA targets regularly used in the study of skeletal muscle and tendon. A Principle Component Analysis (PCA) and a t- distributed stochastic neighboring plot (t-SNE) were made on all the results to evaluate how well the different tissue regions had been isolated.

Results: It was possible visually to group the samples according to the three tissues. The t-SNE plot confirmed that the MTJ samples grouped specifically and were very similar in relation to their expression of the mRNA targets.

Interpretation / Conclusion: It was possible by this method to divide a specimen from the MTJ into muscle-, tendon- and MTJ-tissue. It is a cheap and specific method which is useful in studies looking into changes introduced at the MTJ following resistance exercise and experimental set- ups.

Double-dose cefuroxime concentrations in bone, synovial fluid of the knee joint and subcutaneous adipose tissue—A randomised porcine microdialysis study

33.

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Background: Surgical site infection is a severe complication to orthopaedic surgery, which can prolong admission and increase cost. Optimal perioperative antimicrobial prophylactic treatment is a key factor in preventing surgically related infections.

Aim: This study evaluated target tissue concentrations of double dose cefuroxime administered intravenously as either one 15 min infusion of 3,000 mg (Group 1) or two single 15 min infusions of 1,500 mg administered 4 h apart (Group 2).

Materials and Methods: Sixteen pigs were randomised into two groups of eight. Cortical and cancellous bone, synovial fluid of the knee joint and subcutaneous adipose tissue concentrations were measured based on sampling via microdialysis. Plasma samples were collected as a reference. Comparison of the groups was based on time with concentrations above relevant minimal inhibitory concentrations (fT>MIC) of 4 µg/mL.

Results: The mean time fT>MIC (4 µg/mL) across compartments was longer for Group 2 (280–394 min) than for Group 1 (207–253 min) ($p<0.01$). Cortical bone showed a tendency towards longer fT>MIC (4 µg/mL) in Group 2 (280 min) than in Group 1 (207 min) ($p=0.053$). Within 50 min after administration, the mean concentration of 4 µg/mL was reached in all compartments for both groups. The mean concentrations decreased below 4 µg/mL after approximately 4 h (Group 1) and 3 h (Group 2) from initiation of administration (time zero).

Interpretation / Conclusion: During an 8 h interval, double-dose cefuroxime administered as $2 \times 1,500$ mg with a 4 h interval provides longer time above MIC breakpoint for *Staphylococcus aureus* (4 µg/mL) than a single bolus of 3,000 mg cefuroxime. To maintain sufficient tissue concentrations during longer surgeries, re-administration of cefuroxime (1,500 mg) should be considered 3 h after the first administration.

Heterogenous cefuroxime penetration to the anterior and posterior column of the spine – An experimental porcine study

34.

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Background: Postoperative infection following spine surgery can have devastating complications. Perioperative antibiotic prophylaxis plays a key role in lowering the risk of acquiring an infection. The antibiotic target tissue concentrations should, as a minimum, exceed relevant minimal inhibitory concentrations (MIC) for the duration of the surgery in all exposed tissues. Previous studies have primarily measured antibiotic concentrations in the anterior column (AC) of the spine, however the majority of spine surgeries are performed in the posterior column (PC) of the spine.

Aim: The objective of this study was to compare the perioperative tissue concentrations of cefuroxime in the AC and PC in posterior open lumbar spine surgery.

Materials and Methods: Posterior open lumbar spine surgery was conducted on 8 female pigs. Microdialysis catheters were placed for sampling in the AC (vertebral body) and PC (posterior arch) within the same vertebrae (L5). Cefuroxime (1.5 g) was administered intravenously over 10 min and microdialysates and plasma samples were continuously obtained over 8 hours. Cefuroxime concentrations were quantified by Ultra High-Performance Liquid Chromatography. The primary endpoint was time above cefuroxime clinical breakpoint MIC for *Staphylococcus Aureus* ($T > \text{MIC}$ ($4 \mu\text{g/mL}$)).

Results: Mean $T > \text{MIC}$ ($4 \mu\text{g/mL}$) [95%CI] were 104 [85–123], 93 [73–112] and 123 min [104–142] in the AC, PC and plasma, respectively. Tissue penetration ($\text{AUC}_{\text{tissue}}/\text{AUC}_{\text{plasma}}$) [95%CI] was incomplete for both the AC (0.53 [0.42 – 0.64]) and PC (0.36 [0.25–0.47]) with the lowest penetration to the PC ($p=0.048$). Area under the concentration-time curve from 0 to last measured value ($\text{AUC}_{0-\text{last}}$) was higher in the AC compared with the PC ($p=0.05$).

Interpretation / Conclusion: Cefuroxime penetrated heterogeneously within the same vertebrae, but the $T > \text{MIC}$ were comparable between the anterior and posterior column. The mean cefuroxime concentrations decreased below $4 \mu\text{g/mL}$ after 93 min (PC) and 104 min (AC) after a single dose administration. This is shorter than the duration of most spine surgeries, and therefore alternative dosing regimens should be considered in posterior open lumbar spine surgeries lasting more than 90 min.

Timing of Antimicrobial Prophylaxis and Tourniquet Inflation – A Randomized Controlled Microdialysis Study

35.

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Background: Tourniquet is widely used in extremity surgery. In order to prevent surgical site infection, correct timing of antimicrobial prophylaxis and tourniquet inflation is important.

Aim: The objective of this study was to evaluate cefuroxime subcutaneous tissue and calcaneal cancellous bone concentration during three clinically relevant tourniquet application scenarios.

Materials and Methods: Twenty-four female pigs were included. Microdialysis catheters were placed for sampling of cefuroxime concentrations bilaterally in subcutaneous tissue and calcaneal cancellous bone, and a tourniquet cuff was applied on a randomly picked leg of each pig. Subsequently, the pigs were randomized into three groups to receive 1.5 g of cefuroxime by intravenous injection 15 min prior to tourniquet inflation (Group A), 45 min prior to tourniquet inflation (Group B), and at the tourniquet release (Group C). The tourniquet duration was 90 min in all groups. Dialysates and venous blood samples were collected eight-hours postcefuroxime administration. The primary endpoint was time above cefuroxime clinical breakpoint MIC for *Staphylococcus aureus* ($T > \text{MIC}$ ($4 \mu\text{g/mL}$)).

Results: Cefuroxime concentrations were maintained above the $4 \mu\text{g/mL}$ in subcutaneous tissue and calcaneal cancellous bone throughout the 90 min tourniquet duration in Group A and B. Cefuroxime administration at tourniquet release (Group C) resulted in concentrations above $4 \mu\text{g/mL}$ for a minimum of 3.5 hours in the tissues on the tourniquet side. There were no significant differences in the $T > \text{MIC}$ ($4 \mu\text{g/mL}$) in subcutaneous tissue or calcaneal cancellous bone between the three groups.

Interpretation / Conclusion: Administration of cefuroxime (1.5 g) in the 15–45 min window prior to tourniquet inflation resulted in sufficient calcaneal cancellous bone and subcutaneous tissue concentrations throughout the 90 min tourniquet application. If the target is to maintain postoperative cefuroxime concentrations above relevant MIC values, our results suggest that a second dose of cefuroxime should be administered at tourniquet release.

Evaluation of single-dose cefuroxime concentrations in the spinal cord, cerebrospinal fluid and epidural space in relation to spine surgery – an experimental porcine study

36.

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Background: Cefuroxime is used as surgical prophylaxis of intra- and extradural infections in relation to spine surgery. Bacterial eradication requires target tissue concentrations of cefuroxime above minimum inhibitory concentrations (MICs) of relevant pathogens for a sufficient amount of time. Microdialysis can continuously sample local antibiotic tissue concentrations in vivo and measure cefuroxime concentrations in intra- and extradural tissues.

Aim: To quantify concentrations of cefuroxime in intradural (spinal cord, cerebrospinal fluid) and extradural (epidural space) compartments in the lumbar spine of a porcine model using microdialysis.

Materials and Methods: Eight female pigs were anaesthetised and laminectomised at L3–4 by a posterior open surgical approach. Microdialysis catheters were placed for sampling in the spinal cord, cerebrospinal fluid, and epidural space. Cefuroxime (1500 mg) was administered intravenously over 10 minutes. Microdialysates and plasma were obtained continuously over 8 hours. Cefuroxime concentrations were determined by ultra-high performance liquid chromatography. The primary endpoint was time above cefuroxime clinical breakpoint MIC for *Staphylococcus aureus* ($T > \text{MIC}$ of 4 $\mu\text{g/ml}$), and was compared between compartments using mixed effect-models and post hoc pairwise *t*-tests.

Results: Mean $T > \text{MIC}$ (4 $\mu\text{g/ml}$) with 95% confidence interval (CI) were 58 (15–102), 0 (0–0), 115 (85–145), and 123 (106–141) minutes in spinal cord, cerebrospinal fluid, epidural space, and plasma, respectively. Tissue penetration ($\text{AUC}_{\text{tissue}}/\text{AUC}_{\text{plasma}}$) with 95% CI were 0.32 (0.13–0.51), 0.09 (0.03–0.15), and 0.63 (0.43–0.83) for spinal cord, cerebrospinal fluid, and epidural space, respectively. $T > \text{MIC}$ (4 $\mu\text{g/ml}$) as well as tissue penetration were lower for the intradural compartments compared to the extradural.

Interpretation / Conclusion: Cefuroxime concentrations and $T > \text{MIC}$ (4 $\mu\text{g/ml}$) were lower in intradural compartments compared to extradural, suggesting a compromising effect of the blood–brain barrier. In terms of $T > \text{MIC}$, single-dose cefuroxime (1500 mg) is inadequate for surgical prophylaxis of intradural infections, but adequate for surgical prophylaxis of extradural infections in spine surgery lasting a maximum 85 minutes.

Mesenchymal Stem Cell Extracellular Vesicles as Adjuvant to Bone Marrow Stimulation in Chondral Defect Repair in a Minipig Model

37.

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Background: Recently several bone marrow stimulation enhancement treatments have been developed to improve the cartilage repair after bone marrow stimulation.

Aim: The aim of the study was to evaluate the effects of mesenchymal stem cell- extracellular vesicles (MSC-EVs) on chondrocyte proliferation in vitro and on cartilage repair in vivo following bone marrow stimulation (BMS) of focal chondral defects of the knee.

Materials and Methods: Six adult Göttingen minipigs received two chondral defects in each knee. The pigs were randomized to treatment with either BMS combined with MSC-EVs or BMS combined with phosphate-buffered saline (PBS). Intra-articular injections MSC-EVs or PBS were performed immediately after closure of the surgical incisions, and at 2 and 4 weeks post-operatively. Repair was evaluated after 6 months with gross examination, histology, histomorphometry, immunohistochemistry, and micro-computed tomography (μ CT) analysis of the trabecular bone beneath the defect.

Results: Defects treated with MSC-EVs had more bone in the cartilage defect area than the PBS-treated defects (7.9% vs. 1.5%, $p = 0.02$). Less than one percent of the repair tissue in both groups was hyaline cartilage. ICRS II histological scoring showed that defects treated with MSC-EVs scored lower on "matrix staining" (20.8 vs. 50.0, $p = 0.03$), "cell morphology" (35.4 vs. 53.8, $p = 0.04$), and "overall assessment" (30.8 vs. 52.9, $p = 0.03$). Consistently, defects treated with MSC-EVs had lower collagen II and higher collagen I areal deposition. Defects treated with MSC-EVs had subchondral bone with significantly higher tissue mineral densities than PBS-treated defects (860 mg HA/cm³ vs. 838 mg HA/cm³, $p = 0.02$).

Interpretation / Conclusion: Intra-articular injections of MSC-EVs in conjunction with BMS led to osseous ingrowth that impaired optimal cartilage repair, while enhancing subchondral bone healing.

Volar locking plate fixation of distal radius fractures and associated complications. A retrospective study of 599 patients with a mean follow-up of 2.5 years **38.**

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Background: In displaced and non-reducible distal radius fractures (DRF), open reduction and internal fixation with volar locking plates (VLP) has become the gold standard. Despite good outcome, surgery is not without complications.

Aim: To evaluate the incidence of postoperative complications after surgical treatment of DRFs with the use of VLPs.

Materials and Methods: We retrospectively reviewed the medical records of all consecutive patients treated with VLP (2.4-mm LCP, Synthes) for a DRF between January 2016 and December 2018 at Hvidovre Hospital. The data were extracted and assessed regarding surgeon experience, secondary surgery and complications. The radiographs were evaluated in according to fracture type (AO/OTA classification), volar plate positioning (Soong grade) and dorsal screw prominence.

Results: A total of 603 DRFs treated with VLP fixation in 599 patients (472 females and 127 males) were included and reviewed. Mean follow-up was 2.5 (range 1 to 4) years after primary surgery. The mean age was 61 years (range 19–93). Fractures were classified as AO 23-A (29.4%), 23-B (19.1%) and 23-C (51.6%). The overall complication rate was 11.1% (67 cases), with 8.3% major (n=50) and 2.8% minor (n=17) complications. The most common complications were those related to metal hardware leading to removal (3.6%), mainly due to intraarticular screw (1.5%) and pain/reduced ROM (1.5%). Other complications were mal-reduction/loss of reduction (2.2%), carpal tunnel syndrome (1.8%), transient neurapraxia (1.7%) and tendon complications, i.e. tenosynovitis (0.5%)/ruptures (0.5%). Secondary revision surgery was performed in 9.5% (57 procedures). No statistical significant differences in complication rates were found in regard to the patient's age ($p = 0.136$), the fracture according to AO/OTA type ($p = 0.360$) or surgeon experience ($p = 0.171$).

Interpretation / Conclusion: The incidence of postoperative complications in DRFs is low after surgical treatment with VLP fixation, suggesting it is a safe and efficient treatment. However, secondary surgery does occur due to complications. Consequently, it is imperative that the surgeon is aware of the risks and difficulties related to the procedure.

High early implant removal- and subluxation incidence after Amandys interposition arthroplasty for radio-carpal osteoarthritis

39.

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Background: Recently, Amandys, a novel pyrocarbon interposition arthroplasty has been introduced as alternative for the treatment of wrist osteoarthritis. This method's spacer concept does not require extensive carpal bone removal, thus not burning any bridges towards possibility of Total Wrist Arthroplasty.

Aim: According to national regulations for new implants for surgical use, the aim of this study was to report the results of this implant with special focus on safety and early survival.

Materials and Methods: From March 2018 until September 2019, thirteen patients were operated with Amandys implant. There were nine women, four men, aged 42 – 85 years (mean, 63.8 year), at the time of the surgery. Six of thirteen patients had prior surgery to the involved wrist. Pre-operatively, and at the follow-ups, pain was assessed on visual analogue scale (VAS), range of motion measures were collected for the wrist, and grip strength was assessed. q-DASH scores and pre- and postoperative radiographic series were obtained.

Results: Mean follow-up was 21 months (range 16 – 29 months). No patients were lost for follow-up, one died. Four out of thirteen patients experienced implant removal, caused by heavy pain, early after surgical treatment (30 %). All patients were revised with Remotion Total Wrist Arthroplasty, one five months postoperatively, two twelve months after implant surgery, one after seventeen months. Furthermore, three more patients were re-operated, two caused by palmar luxation of the implant, one caused by 90° rotation of the implant. These implants were exchanged with another Amandys implant of different size, combined with capsular strengthening and further bone-socket remodeling procedures. Six remaining patients showed uneventful postoperative course and an acceptable clinical and functional result.

Interpretation / Conclusion: Despite potential benefits in providing a spacer function, without extensive bone removal, the question remains to be answered, if Amandys implant represent an alternative to other surgical solutions. Painful Instability caused by capsular issues and bone-socket preparation seems to be major problems at some patients. If the usage of this implant is planned, extreme caution is warranted.

Fixation of combined TFCC foveal and capsular injury by modified ulnar tunnel technique – a feasible solution?

40.

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Background: Methods for fixation of TFCC injuries vary depending on the type of injury. Different suturing techniques (outside-in, inside-out, all-inside) have been introduced for the capsular injuries (Atzei Class 1). Similarly, different techniques (anchors, trans- osseous sutures, ulnar tunnel) are used for the foveal injuries (Atzei class 3). Solutions for fixation of the combined lesions (Atzei Class 2) have been sparsely investigated.

Aim: The aim of the study was to evaluate the feasibility of the modified ulnar tunnel technique in treating combined TFCC lesions through same 3,2 mm bony canal in ulna, as used for foveal injuries.

Materials and Methods: Between June 2018 and May 2020, 20 patients, underwent surgery in which both components of the injury were sutured, using the all-inside technique for the capsular injury and usual technique for the foveal fixation, through the same ulnar tunnel. All patients had ulnar-sided wrist pain and mild to moderate instability of the distal radioulnar joint (DRUJ). Diagnosis was finally established intraoperatively by the positive hook- and trampoline tests and by visualization of the capsular tear. Full weight-bearing activities were allowed at 3 months. Prospective evaluation included assessment of pain (VAS score), grip strength, range of motion and q-DASH score.

Results: No complications related to surgery occurred. 18 out of 20 patients were eligible for the minimum 12 months follow-up, mean follow-up thirteen months [6–33]. All patients achieved stability of the DRUJ. Mean preoperative VAS score (rest/activity) decreased from 32 and 67 to 6 and 32 postoperatively ($p<0.05$). Grip strength and range of motion did not change, while q- DASH score improved from 52 preoperatively to 25 postoperatively ($p<0.05$). Two patients sustained new wrist trauma and were both successfully re- operated. One patient experienced tenderness caused by cyst occurrence after Push-lock anchors and was treated surgically with curettage, 18 months after TFCC surgery.

Interpretation / Conclusion: Arthroscopic TFCC fixation of combined, capsular and foveal tear by modified ulnar tunnel technique is feasible, showing promising results on the short follow-up. Longer follow-up study is needed.

The Minimal Clinically Important Difference of the Shortened Disability of the Arm, Shoulder, and Hand Questionnaire for Patients with Thumb CMC Arthritis

41.

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Background: The Quick Disability of the Arm, Shoulder and Hand questionnaire (Quick-DASH) is a shortened outcome measure focused on the function of the upper extremity. Evaluating the effect of orthopedic treatment through change in patient reported outcomes requires an understanding of the minimal clinically important difference (MCID).

Aim: The aim of this study was to report the MCID for patients receiving surgical treatment for thumb carpometacarpal joint osteoarthritis (CMC OA).

Materials and Methods: We prospectively analyzed 315 patients receiving surgical treatment for thumb CMC OA. Patients were seen before and 6 months following surgery. We used an anchor-based method and calculated the MCID based on the receiver operating characteristic (ROC) curve.

Results: The MCID of Quick-DASH was estimated to be 18 points. The area under the ROC curve was 0.82, indicating a satisfactory accuracy.

Interpretation / Conclusion: In conclusion, we have calculated the MCID of the Quick-DASH in a population of patients with thumb CMC OA receiving surgical treatment using an anchor-based approach.

1 & 2 Column Fusion – a solution for the SLAC or SNAC Wrist; case series of 43 consecutive patients

42.

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Background: One or Two Column Fusion (1CF, 2CF) has been introduced as an alternative to Four Corner Fusion (4CF).

Aim: The rationale behind is needing less bone grafting and consequently improving the union.

Materials and Methods: From August 2014 to January 2020, 43 consecutive patients, 13 women, with a 58.5 year of age (mean) (range 35–76), has been treated for SLAC/SNAC wrist. In 33 cases the surgery was performed as 2CF, in 10 as 1CF. Os triquetrum has been removed in 5 cases. The union was determined by CT-scan or X-ray follow-up studies, and clinically. The assessments of pain (VAS score 0–100), range of motion (ROM), grip strength, and Disabilities of the Arm, Shoulder and Hand (quick-DASH) Score were prospectively included.

Results: All 43 patients were available for the follow-up, at mean 24.2 months (range 12 – 48). All patients but two achieved union at a mean of 10.8 weeks (range 5 – 25 weeks). Pain diminished from 62 (mean), preoperatively to 10 (mean), postoperatively ($p < 0,05$). Grip strength decreased, however, from 31 KgF (mean) to 26 KgF (mean). qDASH improved from 45 to 10 (mean), before, and after the surgery ($p < 0,05$), ROM of 69 °/31 ° (mean) was recorded for total dorso-volar/radio-ulnar flexions, respectively. One pt. united after re-operation. Two patients were converted to total wrist fusion(TWF), one to Total Wrist Arthroplasty (TWA).

Interpretation / Conclusion: 1 & 2CF showed significant improvement in pain and function, with minimal impairment of the grip strength on the short-term follow-up. A union rate of 95% and an acceptable complication rate was achieved, without fusing all carpals.

Arthroscopic vs. Open Bone Grafting in the treatment of Scaphoid Nonunion; case control study.

43.

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Background: Scaphoid nonunion is a challenging condition with an incidence of approximately 10%, even when the treatment has been given, while the prevalence among nontreated patients remains unknown. This condition, when left untreated causes pain, functional impairment, wrist osteoarthritis and ultimately, the collapse of the entire wrist. Comparative results between operative techniques are sparse.

Aim: The research question of this study is whether the arthroscopic bone grafting can provide faster union compared to traditional, open grafting technique, in the treatment of scaphoid nonunion.

Materials and Methods: Patients operated by either open bone-grafting method (O; n=49) or arthroscopically assisted bone-grafting method (A; n=22) from 2008 – 2020. Demographically, groups were similar concerning risk factors, such as localization at proximal pole, humpback deformity, inclusive larger dislocations and number of cases with > 6 months nonunion presence. Union time and union rate after surgery was assessed. Patients are assessed clinically and radiographically and/or by CT scan at the follow-up on the 6th – 8th postoperative week. Immobilization continues for intervals of 4 – 6 weeks until union become radiologically and clinically evident. The main criteria for union are the presence of bridging bone trabecula on > 50% of scaphoid-axis CT reconstruction scans and clinical examination.

Results: The mean follow-up was 12,6 months (range 6 – 32 months). Patients treated in A group achieved statistically significant faster union after surgery for scaphoid nonunion than patients treated in O group with a difference in mean of 37.15 (37 days), (p -value= 0.0035). Mean and 95% Confidence Interval [CI] for union time were 54.94 [44.20–65.68] and 92.09 [69.73 – 114.46] days for A and O group, respectively. SD was 22.27 / 70.86 for Arthroscopic and Open group, respectively. Seven patients in the Open group did not achieved union (14%), while only one (5%) from Arthroscopic Group failed to present union at the follow-up ($p<0.05$).

Interpretation / Conclusion: Arthroscopically assisted Bone Grafting, for the treatment of Scaphoid Nonunion showed significantly higher union rate and faster union time, compared to Open Bone Grafting.

2-year results after Maia® thumb total carpometacarpal arthroplasty.

44.

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Background: The classical treatment of advanced thumb basal joint arthritis in patients, who have failed conservative measures, is trapeziectomy or interposition arthroplasty. Particularly in young and high demand patients, results from these procedures can be unpredictable. In search for better results, various implants have been attempted, including interpositional implants with no bony fixation as well as hemiarthroplasties and total joint replacement. Recent prosthetic designs have improved implant survival.

Aim: This prospective study aims to evaluate patient satisfaction, implant failure and rate of revision at 2-year follow-up.

Materials and Methods: From January 2016 to March 2021 we inserted 200 Maia® Dual Mobility (DM- TMC) arthroplasties at Odense University Hospital. The indication for surgery is unacceptable pain, radiologic thumb CMC-arthritis, and exhausted conservative measures. All patients are evaluated at follow-up. We have evaluated 80 implants in 70 patients at 2-year follow-up.

Results: Patient satisfaction (n=80) at 2-year follow-up Very satisfied: 86% (n=69) Satisfied: 6% (n=5) Neither satisfied nor dissatisfied: 4% (n=3) A little dissatisfied: 1% (n=1) Dissatisfied: 3% (n=2, same patient) DASH-score 35 (SD 16) pre-op, 12 (SD 18) at 2-year follow-up (n=60). Mean procedure duration: 56 min (90th percentile 45–75 min), Mean age 54 year (IQ-range 50–58year), 73% of patients were female, 62% of procedures performed on the left side. 6 arthroplasties were revised, 4 due to trapezial osteophytes, 1 due to dislocation, 1 due to unexplainable pain.

Interpretation / Conclusion: The Maia® DM-TMC arthroplasty show promising results after 2 years follow-up. The most common cause of revision was trapezial osteophytes. Removal of osteophytes may alleviate this problem. One patient (n=2) was dissatisfied with the result of the procedures in both left and right hand, due to excessive pain. During the follow-up period, she was diagnosed with fibromyalgia.

Inter-variability in radiographic parameter and general evaluation of a low dose fluoroscopic technique in patients with idiopathic scoliosis.

45.

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Background: Adolescent idiopathic scoliosis (AIS) is a frequent occurring spinal disorder in an adolescent female. Serial radiographs are used to monitor for progression but have a potential radiation-induced oncogenic effect. We examined a low-dose fluoroscopic technique (LFT) to perform radiographs of AIS with an inherently lower risk for malignancy.

Aim: The present study aimed to compare the LFT with traditional radiographs for scoliosis (ORT), to see if LFT is adequate for clinical radiographic evaluation of AIS as well as having a lower radiation dose.

Materials and Methods: Image quality was evaluated using a pediatric trunk phantom for LFT and ORT. We measured primary physical characteristics for image quality evaluation of noise, contrast, spatial resolution, SNR and CNR. Three independent raters evaluated the quality of the image by observer-based methods of ICS and VGAS of 25 phantom images. Radiation doses were evaluated by DAP measurements. Two raters performed measurements of 6 radiographic parameters once and separately for 342 LFT images of 136 patients with AIS.

Results: The average noise and contrast were approximately 15-fold higher for the LFT. The SNR and CNR were similar. Evaluating the 25 images of the phantom, the overall ICS and VGAS were 3-fold higher for ORT compared to LFT for L3 and similar for Th6. For the clinical radiographs, the average measurement of CA was 16.4 degrees (dg) with a standard deviation of 12 dg. The absolute average difference (MAD) was 1.67 dg. The standard error of the mean of CA was 2.72 dg for the ORT and 2.69 dg for the LFT. ICC for CA (0.852) was almost perfect, but for the other radiographic parameters fair or worse. For radiation dose, the average DAP for the LFT was 8-fold lower than for ORT.

Interpretation / Conclusion: In conclusion, the LFT are reliable for CA measurements, thus being useful for follow-up evaluation of scoliosis progression as in a clinical setting. LFT is not adequate for appreciating the pathology of the spinal skeletal structures, thus not useful for the initial evaluation of AIS. Even though the image quality is lower for LFT than ORT, the merits are the marked less radiation and lowered malignancy risk, thus following the principles of ALARA.

Are Modic changes associated with health-related quality of life after discectomy – a study on 620 patients with two-year follow-up

46.

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Background: Previous studies have failed to show a clinically significant association between Modic changes (MCs) and patient-reported outcomes (PRO's) after lumbar discectomy

Aim: To assess whether MCs are associated with health- related quality of life, long-term physical disability, back- or leg pain after discectomy

Materials and Methods: Data from the Danish National Spine Registry on patients undergoing first-time lumbar discectomy at a single institution from 2014-17 with an accessible preoperative lumbar MRI, complete pre-operative and two-year follow-up questionnaires were obtained. PRO's including ODI, EQ-5D, VAS back and leg pain, and patient satisfaction were collected. Patients were stratified based on the presence (+MC) or absence (-MC) of MCs on the preoperative MRI.

Results: Of 620 patients included, MCs were present in 270 patients (47%). Of these, MC type 1 (MC-1) was present in 70 (25%) and MC type 2 (MC-2) in 210 (75%) patients. Preoperative data for ODI, EQ-5D, VAS-BP, and VAS-LP were comparable for the +MC and -MC groups. Both groups had a statistically significant improvement in PRO's from baseline compared to two-year follow-up ($p < 0.001$). At two- year follow-up, both groups had improved with no significant difference between them in regards to ODI (15.5 vs. 17.2, $p = 0.208$); EQ-5D (0.75 vs. 0.72, $p = 0.167$); VAS-BP (27.1 vs. 28.3, $p = 0.617$); VAS-LP (26.8 vs. 25.0, $p = 0.446$) and patient satisfaction (74% vs. 76%, $p = 0.878$).

Interpretation / Conclusion: MCs were not found to be associated with health- related quality of life, disability, back- or leg pain, or patient satisfaction two years after lumbar discectomy.

Serum Metal Ion Levels in Adolescent Idiopathic Scoliosis (AIS) Patients 25 years after treated with Harrington Rod Instrumentation or Bracing

47.

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Background: Surgical instrumentation in children with adolescent idiopathic scoliosis (AIS) is performed early in life and the implants are left in situ for the rest of the patient's life. Concern has been raised regarding persistent elevated levels of serum metal ions, but only a few studies on the topic have been published.

Aim: The aim of this study was to compare the levels of serum metal ions in patients with AIS treated with either Harrington Rod Instrumentation or Bracing.

Materials and Methods: AIS patients treated with Boston brace (BB) or posterior spinal fusion with Harrington rod instrumentation (HR) from 1983 to 1990 were requested to return to clinic. One hundred fifty-nine (73 %) of 219 patients were available for follow-up of whom 115 agreed to have a blood draw.

Results: The proportion of patients who agreed to have a blood draw were similar in the BB (48 of 100, 48 %) and HR (67 of 115, 60 %, $p = 0.085$) groups. None of the surgical patients had their implants removed. Mean age at follow-up (BB: 43.2 yrs vs HR: 43.5 yrs, $p = 0.566$) and mean length of follow up (BB: 26.5 yrs vs HR: 24.5 yrs). Mean Chromium serum levels were similar between the BB (2.7 nmol/L) and the HR (2.9 nmol/L, $p = 0.827$). Mean Cobalt serum levels were also similar between the BB (2.6 nmol/L) and the HR (2.8 nmol/L, $p = 0.200$).

Interpretation / Conclusion: Serum metal ions were similar in AIS patients treated with bracing or Harrington Rod instrumentation 25 years after initiation of treatment.

Interbody fusion does not influence development of lumbar compensatory mechanisms 10 year after lumbar fusion

48.

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Background: Restoration of lumbar lordosis in lumbar spine surgery is thought to be associated with better postoperative outcomes. Various inter- body fusion techniques can theoretical help to change and correct sagittal balance. Pelvic plays a central role in sagittal balance. The Three key pelvic parameters are pelvic incidence (PI), pelvic tilt (PT), and sacral slope (SS). The last 2 can change due to compensatory mechanism. Decrease in SS is posed to increase risk of adjacent segment degeneration (ASD)

Aim: To assess radiographic signs of degenerative changes and compensatory mechanisms after lumbar fusion at 10 year follow-up and their relation to outcome comparing posterolateral instrumented fusion (PLF) to Transforaminal interbody lumbar fusion (TLIF) in a RCT

Materials and Methods: 100 pat. enrolled in a RCT between TLIF and PLF had standing lumbar radiographs analyzed with respect toolisthesis, lordotic angle at adjacent level (AL) and differences in SS. SS was determined by $PI = PT + SS$. Clinical outcome was measured by Oswestry disability index (ODI) and SF-36 Physical Function (PF), Bodily pain (BP) and Physical Component Summary(PCS). Data was analyzed using STATA

Results: There was no difference in development of olisthesis at the (AL) between the two groups at 10 year follow-up ($p=0.43$). Lordotic angle of the adjacent disc decreased with 5 or more degrees in 6 patients in the TLIF group and 3 in the PLF group. Three pats in the TLIF group and 4 in the PLF group had an increase in lordotic angle at the adjacent disc, the remainders were unchanged ($p=0.58$). Five pat. in the TLIF group and 7 in the PLF groups had a decrease in SS of 5 degrees or more ($p=0.51$). There was no difference in ODI score nor PF, BS & PCS at 10 year follow-up between those who developed changes in adjacent disc angle and those who remained unchanged ($p=0.49$, $p=0.20$, $p=0.94$, $p=0.65$). The same held true for changes in SS ($p=0.46$, $p=0.49$, $p=0.39$, $p=0.58$)

Interpretation / Conclusion: No difference between the two fusion methods with respect to degenerative changes visible on radiographs at 10 years follow-up. Signs suggesting development in compensatory mechanisms (SS) was not associated with poorer clinical outcome

Clinical and patient-reported outcome after posterolateral - versus transforaminal lumbar interbody fusion - A matched cohort study on 422 patients with two-year follow-up

49.

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Background: Posterolateral- and transforaminal lumbar interbody fusion (PLIF and TLIF) are well-described techniques for treating lumbar mechanical disc degeneration. TLIF is preferred by some, due to easier foraminal decompression and less retraction of dura and nerve root, reducing the risk of nerve injury and epidural scarring. TLIF preserves the posterior tension band, which may provide better biomechanical stability. Whether these theoretical advantages translate to better clinical outcomes is unknown.

Aim: To compare clinical and patient-reported outcome (PRO) two years after TLIF or PLIF in patients with symptomatic lumbar mechanical disc degeneration.

Materials and Methods: This was a dual-center study over an eight-year period on patients undergoing single level fusion surgery with either TLIF or PLIF. We analyzed prospectively collected pre- and postoperative data from the national Danish surgical spine database (DaneSpine). The primary outcome was Oswestry Disability Index (ODI) score at two-year follow-up. Secondary outcome measures were scores on the European Quality of Life–5 Dimensions (EQ-5D) and visual analog scale (VAS) and the rate of intraoperative complications. To minimize baseline differences between the groups, propensity-score matching was employed in a 1:1 fashion, balancing the groups on preoperative factors including age, sex, back and leg pain, ODI, EQ-5D and previous spine surgery.

Results: The matched cohort included 211 patients in each cohort. There was no significant difference between the groups in the mean score on the ODI at two years (PLIF: 33 ± 20 vs. TLIF: 35 ± 20 , $p = 0.222$). We found no statistically significant differences in EQ-5D score (0.64 ± 0.26 vs. 0.61 ± 0.25 , $p = 0.201$), VAS score for back pain (46 ± 31 vs. 48 ± 29 , $p = 0.633$) or leg pain (41 ± 32 vs. 41 ± 33 , $p = 0.938$) between the PLIF and TLIF groups, respectively. Dural tears occurred in 9.5% in the PLIF group and 1.9% in the TLIF group ($p = 0.002$) corresponding to a relative risk of 5.0 (95%CI 1.7– 14.4).

Interpretation / Conclusion: We found no significant difference in PRO at two-year follow-up between PLIF and TLIF for the treatment of symptomatic lumbar disc degeneration. PLIF is associated with a five-times higher risk of dural tears.

Comparison of interventions for lumbar disc herniation: a systematic review with network meta-analysis

50.

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Background: There are a wide variety of surgical methods for treating lumbar disc herniation. Development has previous mainly been on minimal invasive technics. High revision rates due to reherniation has brought focus on technics to avoid reherniation.

Aim: The aim of this systematic review was to compare all current surgical methods for treating lumbar disc herniation, including newer methods with implants for annulus repair and dynamic stabilization.

Materials and Methods: A systematic review of randomized controlled trials comparing surgical treatments. Literature search in PubMed, Embase, and Cochrane library databases identified eligible studies. The investigated outcomes were: changes in pain (VAS score), disability score (Oswestry and Roland Morris) and reoperation rate with a minimum follow-up of one year. A network meta-analysis was performed in order to compare treatments and ranking.

Results: Thirty-two RCT studies, with 4877 participants, and 8 different interventions were identified. A significant difference was seen in change of pain score, as all treatments were superior to conservative treatment and percutaneous discectomy. This difference was only found to be of clinically importance when comparing conservative treatment and dynamic stabilization. There was no significant difference in reoperation rates or change in disability score, regardless of treatment. However, SUCRA plots showed a trend in ranking annulus repair and dynamic stabilization highest. Risk of bias assessment showed that 15 studies had a high overall risk of bias.

Interpretation / Conclusion: With this network meta-analysis, we have aimed to compare all treatments for herniated lumbar disc in one large comprehensive systematic review and network meta-analysis. We have compared across the 3 main outcomes: disability score, pain score and reoperation rate. We were not able to rank one single treatment as the best. Most of the treatments performed at the same level. However percutaneous discectomy and conservative treatment consistently performed worse than the other treatments. In general, the CINeMA evaluation according to the GRADE recommendations gave a high level of confidence for the study comparisons.

The clinical significance of the Modic changes grading score

51.

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Background: MC is present in up to 50% of all chronic low back pain patients. A grading score for MC has been previously proposed, but the association between the extent of MC involvement in the vertebral body, or MC grade and patient-reported outcomes (PRO) has not been investigated.

Aim: To evaluate the clinical significance and inter- observer reliability of the MC grading score in patients with low back pain and MC

Materials and Methods: MRI-scans from patients who had a discectomy registered in the Danish national spine register, DaneSpine, were reviewed. Based on the MRI findings the patients were divided into two groups: +MC and -MC. The MRI of patients +MC were graded using the MC grading score from A-C. All MRIs were reviewed by two physicians to evaluate the intra- and inter-reliability of the MC grading score. The association between MC grade and disability as measured by ODI and EQ-5D was analyzed by t-test.

Results: In total 300 patients were included, of these 150 had MC- 73 patients with MC-1 and 77 patients with MC-2. Of the +MC group, 34% had Grade A changes, 45% Grade B, and 21% Grade C. A scatter-plot showed that some patients with Grade B had worse PROs than some patients with grade C. Thus, patients were stratified into Grade A vs Grade B-C. A statistically significant higher percentage of patients with MC-1 had grade B-C changes compared to patients with MC-2 ($p<0.001$). Grade B-C changes were significantly associated with a worse preoperative ODI-score, 44 vs. 52 ($p=0.02$) and EQ-5D 0.46 vs. 0.26 ($p=0.05$) compared to Grade A. The intra- and inter-reliability of the MC grading score demonstrated substantial reliability, Intra Kappa=0.73, and Inter Kappa=0.64.

Interpretation / Conclusion: The current study found a significant difference in the vertical extent of MC between MC-1 and MC-2. An increased vertical extent of the intervertebral MC was significantly associated with worse pre-operative PROs. The reliability for the grading score was substantial for both intra- and interobserver reliability in a clinically relevant population. We suggest that further studies on degenerative spine changes include a description of the vertebral extent of MC as an MC grading score.

Feasibility and preliminary effect of strength training, nutritional supplement and anabolic steroids in rehabilitation of patients with hip fracture: A randomized controlled pilot trial (HIP-SAP1 trial)

52.

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Background: Anabolic steroid has been suggested as a supplement during hip fracture rehabilitation. A Cochrane Review evaluating the effect of anabolic steroids after hip fracture was inconclusive and recommended further trials.

Aim: To determine feasibility and preliminary effect of a 12-week multimodal intervention consisting of physiotherapy, nutritional supplement and anabolic steroid on knee-extension strength and function after hip fracture surgery.

Materials and Methods: Patients were randomized (1:1) during acute care to: 1. Anabolic steroid or 2. Placebo. Both groups received identical physiotherapy (with strength training) and a nutritional supplement. Primary outcome was change in maximal isometric knee-extension strength from the week after surgery to 14 weeks. Secondary outcomes were physical performance, patient reported outcomes and measures of body composition.

Results: 717 patients were screened, and 23 (target:48) randomized (mean age 73.4 years, 78% women). Main limitations for inclusion were “not home-dwelling” (18%) and “cognitive dysfunction” (16%). Among eligible, the main reason for declining participation was “Overwhelmed and stressed by situation” (37%). Adherence to interventions was: Anabolic steroid 87%, exercise 91% and nutrition 61%. Addition of anabolic steroid showed a non-significant between-group difference in knee-extension strength in the fractured leg of 0.11 (95%CI -0.25;0.48) Nm/kg in favor of the anabolic group. Correspondingly, a non-significant between-group difference of 0.16 (95%CI -0.05;0.36) Nm/Kg was seen for the non-fractured leg. No significant between-group differences were identified for the secondary outcomes. 18 adverse reactions were identified (anabolic=10, control=8).

Interpretation / Conclusion: Early inclusion after hip fracture surgery to this trial seemed non-feasible, primarily due to slow recruitment. Although inconclusive, positive tendencies were seen for the addition of anabolic steroid. Trial registration: NCT03545347

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Background: Inequalities in healthcare are a persistent challenge. Previous studies have shown patient-related disparity in the quality of in- hospital care. However, it is unknown whether recommended in-hospital care is provided equally to patients with and without known comorbidity.

Aim: We examined whether comorbidity is associated with the quality of in-hospital care among hip fracture patients.

Materials and Methods: From the Danish Multidisciplinary Hip Fracture Registry, we included 31,443 hip fracture patients (2014-2018). Comorbidity was measured using the Charlson Comorbidity Index (CCI). Quality of in- hospital care was defined as fulfillment of process performance measures including preoperative optimization, early surgery, early mobilization, assessment of pain, basic mobility, nutritional risk, need for anti- osteoporotic medication, fall prevention and a post-discharge rehabilitation program, reflecting guideline-recommended in- hospital care for hip fracture patients. The outcomes were 1) all-or-none composite measure defined as fulfillment of all relevant process performance measures and 2) fulfillment of the individual process performance measures. Using binary regression, we calculated relative risk (RR) for the association between CCI and outcomes.

Results: The overall proportion of hip fracture patients, who fulfilled the all-or-none measure, was 31%. Among patients with no comorbidity, 34% fulfilled all-or-none measure vs 29% among patients with high comorbidity (CCI > 3), which corresponds to a 15% lower chance. The impact of comorbidity varied slightly with calendar year. Increasing comorbidity was also associated with lower fulfillment of the individual process performance measures. Preoperative optimization, early surgery and early mobilization appeared to be most difficult to provide patients with comorbidity.

Interpretation / Conclusion: Increasing level of comorbidity was associated with lower quality of in-hospital care among hip fracture patients. Our results highlight the need for tailored clinical interventions to ensure that comorbid patients also benefit from the positive progress in hip fracture care in recent years.

Comorbidity in patients with hip fracture; current trends in prevalence and association with 30-day mortality – a population-based cohort study – A population-based cohort study

54.

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Background: Treatment of hip fracture patients is challenging due to their high comorbidity burden, and mortality. Due to the aging population, we would expect an increasing trend in comorbidity burden of hip fracture patients. It is unclear if use of different comorbidity indices have impact on comorbidity trend and subsequent mortality.

Aim: To examine the current trend in prevalence of comorbidity measured with different indices and the magnitude of the association between comorbidity and 30-day mortality.

Materials and Methods: From the Danish Multidisciplinary Hip Fracture Registry we included 31,443 hip fracture patients (2014–2018). As a measure of comorbidity we used two diagnosed-based indices; Charlson Comorbidity Index (CCI) and Elixhauser, and a medicine-based index; RxRisk. We categorized patients as having no -, moderate -, severe - or very severe comorbidity. We calculated sex and age adjusted odds ratios (aORs) for 30-day mortality with 95% confidence intervals (CI).

Results: Measured with the CCI, 38% of the hip fracture population had no comorbidity, compared to 44% and 28% with the Elixhauser and RxRisk index. The CCI measured 21% with very severe comorbidity whereas Elixhauser and RxRisk index measured 9% and 19 %. The prevalence of patient categories with no, moderate, severe and very severe comorbidity within each index did not change from 2014 to 2018. Compared to patients with no comorbidity, patients with very severe comorbidity had aORs for 30-day mortality of 2.7 (CI: 2.4–2.9) using CCI, 2.6 (CI: 2.4–3.1) using Elixhauser, and 3.1 (CI: 2.7–3.4) using the RxRisk index.

Interpretation / Conclusion: More than 50% of the hip fracture patients has comorbidity, but the prevalence of comorbidity depends on the index used. However, the prevalence of comorbidity burden was stable during the study period irrespective of the index used. All indices had a dose-response association between comorbidity level and 30-day mortality, and the magnitude of the association was unrelated to the index used.

Loss of pre-fracture basic mobility status at hospital discharge for hip fracture is associated with 30-day post-discharge risk of infections – A four-year nationwide cohort study of 23,309 Danish patients.

55.

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Background: The loss of prefracture basic mobility status is associated with increased mortality and any readmission after hip fracture. However, it is less known if the loss of prefracture mobility has impact on acquiring a post-discharge infection.

Aim: To examine if the loss of prefracture basic mobility status at hospital discharge was associated with hospital- or community-treated infections within 30-days of hospital discharge after hip fracture.

Materials and Methods: Using the nationwide Danish Multidisciplinary Hip Fracture Registry from January 2014 through November 2017, we included 23,309 patients undergoing surgery for a first-time hip fracture. The Cumulated Ambulation Score (CAS, 0–6 points) was recorded using questionnaire at admission (prefracture CAS) and objectively assessed at discharge. The loss of any CAS-points at discharge compared with prefracture CAS was calculated and dichotomized (yes/no). Using Cox regression analyses, we estimated the hazard ratio (HR) with 95% confidence interval (CI) of any hospital treated infection, hospital-treated pneumonia or community-treated infection adjusted for sex, age, body mass index, Charlson Comorbidity Index, residential status, type of fracture, and length of stay.

Results: Total of 12,046 (62%) patients lost their prefracture CAS status at discharge. Among patients with loss of CAS status, 6.0% developed a hospital-treated infection compared to 4% of those who did not lose their prefracture CAS. Correspondingly, 9.2% versus 6.2% developed a community-treated infection. The risk of 30-day post-discharge infection increased with increasing loss of any CAS points. The adjusted HRs for patients who had lost their prefracture CAS status, compared to patients who did not, was 1.34 (CI: 1.16–1.54) for hospital-treated infection, 1.35 (CI: 1.09 – 1.67) for pneumonia and 1.36 (CI: 1.21–1.52) for community-treated infection.

Interpretation / Conclusion: In this large national cohort study, we found that loss of pre-fracture basic mobility status upon hospital discharge was strongly associated with 30-day postdischarge risk of developing infection. This emphasise the clinical importance of carefully focusing on regaining the prefracture basic mobility before discharging the patient.

The incidence of hip fractures, amongst elderly aged 70+, continues to decrease.

56.

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Background: Hip fracture patients, constitutes one of the largest groups of patients in most of the orthopedic departments, and represents a substantial burden to the health system. It is therefore of interest to study the development of the number of fractures, and the incidence rates. From studies conducted in our department we know, that the annual number of fractures on Funen in the 70'ties was approximately 500 a year and the incidence rates were increasing. Around the millennium, the number was approximately 800 a year and the rates were decreasing. We have found it of interest to follow up on the above mentioned studies.

Aim: To compare the incidence rates of hip fractures on Funen from the periods 2000-2003 and 2017- 2019 for patients aged 70+, and see if there has been a significant change.

Materials and Methods: Data from the first period are from a study conducted in our department by Nymark et al. Data from the second period are calculated from our local Register, where all patients from Funen (except from the municipalities of Ærø and Middelfart fractures) are included.

Results: For men aged 70+ the incidence rates for the two periods were 0,83 (C.I. 0,72-0,95) and 0,56 (C.I. 0,48-0,65) and for women aged 70+ 1,86 (C.I. 1,72-2,01) and 1,01 (C.I. 0,91-1,11) in both cases a significant reduction of 32% and 46%. If the data are split into four age groups 70-79 80-84 85-90 and 90+the same tendency is seen. The age- and sex specific rates have decreased between 18,6 and 54,9% in the 8 groups. The number of patients in the period 2017-19 was 519, 568 and 515 and corrected for inhabitants in the two excluded municipalities: 570, 631 and 572.

Interpretation / Conclusion: The age- and sex specifik incidence rates for hip fractures have fallen significantly from the period 2000-2003 to 2017-2019 in all age groups older than 70. The patient group is still a large group, but the absolute number of fractures has decreased as well, which means that the expected rise, due to an increasing elderly population, has not been seen. It seems as if the general health among the elderly population has improved, and therefore compensated for the forecasted rise in the number of hip fractures.

Development and Validation of a Model for Predicting Mortality in Patients with Hip Fracture: Population-Based Cohort Study

57.

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Background: One-year mortality following hip fracture surgery is 30% on average. However, user-friendly prediction tools to guide clinicians and patients on appropriate targeted preventive measures are needed.

Aim: We aimed to develop a user-friendly chart displaying one-year mortality of hip fracture patients.

Materials and Methods: Using the population-based Danish Hip Fracture Registry, we identified all patients with a first-time hip fracture in 2011–2017 (N=28,791). We assessed patient-related prognostic factors available at the time of admission as potential predictors of mortality: Nursing home residency, comorbidity (Charlson Comorbidity Index), frailty (Hospital Frailty Risk Score), basic mobility (Cumulated Ambulation Score), atrial fibrillation, fracture type, Body Mass Index, age, and sex. We examined the association with one-year mortality by determining the cumulative incidence, applying univariable logistic regression and assessing discrimination (area under the ROC curve [AUROC]). We fitted a decision tree model on a development cohort (70% of patients) and plotted the relative variable importance of each predictor. We then selected relevant predictors for the final model (logistic regression). We subsequently assessed discrimination and calibration based on the validation cohort (remaining 30% of patients).

Results: All predictors showed an association with one-year mortality, but discrimination was moderate; age and Charlson Comorbidity Index had the best AUROC of 0.65 and 0.61, respectively. The final model included nursing home residency, Charlson Comorbidity Index, Cumulated Ambulation Score, Body Mass Index, and age. It had an acceptable discrimination (AUROC 0.74) and calibration, and predicted one-year mortality risk spanning from 5% to 91% depending on the combination of predictors in the individual patient.

Interpretation / Conclusion: Using information obtainable at the time of admission, one-year mortality among patients with hip fracture can be predicted. We present a user-friendly chart for daily clinical practice and provide new insight regarding the interplay between prognostic factors.

Quality of in-hospital care and postoperative complications and mortality among hip fracture patients with Parkinson's disease.

58.

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Background: Patients with Parkinson's disease (PD) have a high risk of sustaining fractures. They are also less likely to regain their previous functional status after hip fracture, and have a higher risk of complications than patients without PD. It remains uncertain if mortality is affected by PD and in addition, no studies have investigated if quality of care is equal for PD and non-PD patients.

Aim: To investigate the association between PD and quality of in-hospital care, postoperative complications, and mortality in patients with hip fracture.

Materials and Methods: We included patients aged 65+ with an incident hip fracture from 2004–2017, registered in Danish Multidisciplinary Hip Fracture Registry who had not been treated with antibiotics or admitted with an infection 7 days prior to hip surgery. Patients with PD were defined with ICD-10 "G20" prior to hip fracture. Using log- binomial regression, we calculated both 30- day crude and adjusted risk ratios (aRR) with 95% confidence intervals (CIs) for the following outcomes: hospital-treated infections as well as pneumonia, urinary tract infection, sepsis, community-treated infections, cardiovascular events, quality of in-hospital care (measured by fulfilment of quality indicators) and mortality. Analyses were adjusted for age, sex and Charlson comorbidity score.

Results: We identified 75.635 patients without and 1915 patients with PD at the time of hip fracture. Compared to non-PD, presence of PD was associated with higher risk of any hospital-treated (aRR = 1.27 (CI: 1.10–1.45) and community-treated infection (aRR = 1.28 (CI: 1.20–1.37)), pneumonia (aRR = 1.38 (1.11–1.69)), urinary tract infection (aRR of 1.58 (CI: 1.28–1.92)) and sepsis (aRR = 1.18 (CI: 0.67–1.89)), but a reduced aRR for cardiovascular events of 0.59 (CI: 0.41–0.82). PD was associated with increased risk of 30-day mortality (aRR = 1.11 (CI: 0.97–1.27)). aRRs for fulfillment of all quality indicators was found to be approximately 1.

Interpretation / Conclusion: Hip fracture patients with PD have a higher risk of infections and mortality within 30 days after surgery. They do however receive equal quality of in-hospital care after hip fracture compared to non-PD patients.

No clinically relevant difference between operative and non-operative treatment in tendon elongation measured with the Achilles tendon resting angle (ATRA) 1 year after acute Achilles tendon rupture

59.

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Background: Studies have shown that elongation of the injured Achilles tendon after acute Achilles tendon rupture (ATR) is negatively associated with clinical outcomes. The difference between operative and non-operative treatment on the length of the Achilles tendon is only sparsely investigated.

Aim: The aim of the study was to investigate if the operative and non-operative treatment of ATR had different effects on tendon elongation.

Materials and Methods: The study was performed as a registry study in the Danish Achilles tendon database (DADB). The primary outcome of the study was an indirect measure of Achilles tendon length: the Achilles tendon resting angle (ATRA) at 1-year follow-up. The variable of interest was treatment (operative or non-operative).

Results: From August 2015 to January 2019, 438 patients (154 operatively treated and 284 non-operatively treated) were registered with full baseline data and had their ATRA correctly registered at 1-year follow-up in DADB. The analysis did not show a clinically relevant nor statistically significant difference in ATRA between operative and non-operatively treated patients at 1-year follow-up (mean difference - 1.2°; 95% CI -2.5; 0.1; n.s) after adjustment for potential confounders.

Interpretation / Conclusion: There were neither clinically relevant nor statistically significant differences in terms of the ATRA at 1-year follow-up between the operative and non-operatively treated patients. This finding suggests that operative treatment does not lead to a clinically relevant reduction in tendon elongation compared to non-operative treatment and it should therefore not be used as an argument in the choice of treatment.

Acute Achilles tendon rupture – Investigation of a genetic contribution to the etiology. A registry study from the Danish Twin Registry.

60.

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Background: The etiology and pathogenesis of acute Achilles tendon rupture (ATR) are complex and not fully understood. Some studies have shown possible associations between specific genes and ATR. No twin studies have yet investigated the genetic component of ATR.

Aim: To identify a possible genetic component in the risk of ATR.

Materials and Methods: The study was performed as a registry study using the Danish Twin Registry and the Danish National Patient Registry. Twins registered with the diagnosis codes DS86.0 and DS86.0A were retrieved and the probandwise concordances for monozygotic (MZ, ~100% identical genetics) and same-sex dizygotic (ssDZ, ~50% identical genetics) were calculated. If the probandwise concordance rate in the MZ twins was larger compared to the ssDZ twins, the results suggest a genetic component of the etiology.

Results: From 1994 to 2014, 577 twin pairs were registered in the Danish Twin Registry with at least one of the twins having had an ATR. Of those, 122 were MZ (5 concordant pairs, 117 discordant pairs) with a probandwise concordance rate of 0.079 (CI 95% 0.027;0.170) and 230 were ssMZ (5 concordant pairs and 225 discordant pairs) with a probandwise concordance rate of 0.043 (CI 95% 0.014;0.095). No statistically significant difference between the groups was found (p-value 0.31).

Interpretation / Conclusion: If one twin of a pair have had an ATR, this study found a risk of ATR for the second twin of 8% for a MZ twin and 4% for a ssDZ. The larger probandwise concordance rate for MZ twins compared to ssDZ speaks for a genetic component in the etiology, however the finding was not statistically significant and no definite conclusions can be made.

61.

Estimation of Patient Acceptable Symptom State (PASS) and Treatment Failure (TF) threshold values for the Achilles tendon Total Rupture Score (ATRS) at 6 months, 1 year, and 2 years after acute Achilles tendon rupture.

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Background: Interpretation of the Achilles tendon Total Rupture Score (ATRS) is challenging as there is no knowledge regarding at what score the result of treatment is considered satisfactory by the patients.

Aim: 1) to describe the proportion of patients who find their symptom level to be satisfactory, to reflect treatment failure or neither, and 2) to estimate the Patient Acceptable Symptom State (PASS) and the Treatment Failure (TF) threshold values for ATRS at 6 months, 1 year, and 2 years after ATR.

Materials and Methods: The nationwide Danish Achilles tendon Database (DADB) includes patients treated operatively or non-operatively after ATR. From 1 May 2020, the included patients were asked at 6 months, 1 year, or 2 years after their ATR whether they considered their symptom level to be satisfactory (PASS anchor question), and if not, if they considered their symptom level to reflect treatment failure (TF anchor question). Patients who on 1 January 2021 had answered both the anchor questions and the ATRS were included in the study population for the given time point. The PASS and TF threshold values of ATRS at each follow-up time point were estimated using the adjusted predictive modeling method, which is based on logistic regression.

Results: 166 (51%) patients were included at 6 months, 248 (50%) patients at 1 year, and 287 (57%) patients at 2 years. The proportion of patients who considered their symptom level to be satisfactory was 61% at 6 months, 50% at 1 year, and 66% at 2 years. The proportion of patients who considered their symptom level to reflect treatment failure was 5% at 6 months, 11% at 1 year, and 10% at 2 years. The ATRS PASS threshold value (95% CI) was 49 (46-52) at 6 months, 57 (54-60) at 1 year, and 52 (49-55) at 2 years. TF threshold value (95% CI) was 30 (23-36) at 6 months, 33 (26-40) at 1 year and 35 (29-39) at 2 years.

Interpretation / Conclusion: The PASS threshold value for ATRS ranged between 49 and 57. The TF threshold values ranged between 30 and 35. The values can help interpret the outcome of ATR when measured with the ATRS. At 6 months to 2 years after ATR, 50-66% of the patients had a satisfactory symptom level, while 5-11% considered their symptom levels to reflect treatment failure.

Patient reported outcome measures for ankle instability. An analysis of 17 existing questionnaires.

62.

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Background: Chronic ankle instability (CAI) is a common condition. The effect of non-surgical and surgical treatment can be evaluated by patient reported outcome measures (PROMs). It is imperative that there is at least one adequately validated PROM for this purpose. Content validity is ensured by patient involvement when developing the PROM, and construct validity is statistically assessed using modern test theory (MTT) models.

Aim: To i) evaluate the content validity and the measurement properties of all PROMs that might be relevant for evaluating patients with ankle instability, and ii) determine the most valid of these PROMs

Materials and Methods: Two searches were performed in PubMed and SCOPUS (November 2019), one to identify PROMs used for patients with ankle instability and one to identify all validity studies of these PROMs. Quality assessment of development and construct validity was performed in accordance with current guidelines.

Results: The first search found seventeen PROMs relevant for ankle instability. The second search found fifty- six relevant validity studies. These were included in the quality assessment. Three PROMs were developed with input from patients and were thus potential candidates: the Cumberland Ankle Instability Tool (CAIT), the Lower-Extremity Functional Scale (LEFS), and the Foot and Ankle Ability Measure (FAAM). CAIT had never been validated using MTT-models and the validity could not be determined. LEFS had been validated four times with MTT-models for patients with an ankle injury, but all analyses revealed inadequate fit to the statistical model. FAAM had been validated with MTT models several times with various results. One study of patients with instability found adequate fit to the MTT model.

Interpretation / Conclusion: Three of seventeen PROMs were developed with patient input. Of these, only FAAM exhibited fit to an MTT model for patients with ankle instability. According to current guidelines, no existing PROM possesses adequate content and construct validity for patients with ankle instability. Based on the present analyses, FAAM is suggested as the best choice as an outcome measure for these patients.

Heel-rise Height (HRH) shows better capability than Achilles tendon resting angle (ATRA) in reflecting patient limitations and return to previous activities one year after acute Achilles tendon rupture.

63.

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Background: Studies have shown that tendon elongation following acute Achilles tendon rupture (ATR) is negatively correlated with clinical outcomes. Knowledge about how the indirect measures of elongation, the heel-rise height (HRH) and the Achilles tendon resting angle (ATRA), correlate with other outcomes is limited.

Aim: To examine if the indirect length measures correlated with patient limitations and return to previous activities one year after ATR.

Materials and Methods: The study was performed as a registry study in the Danish Achilles tendon Database (DADB). The analyses investigated if HRH (limb symmetry index (LSI)) and relative ATRA one year after rupture, correlated with return to the same type of work, return to the same type of sport, satisfaction with the result, and the Achilles tendon total rupture score (ATRS) at the same time point. The correlations were calculated using Pearson's correlation coefficient and point-biserial correlation coefficient.

Results: From August 2015 to January 2019, 477 patients were registered in DADB one year after ATR with the outcomes of interest. HRH (LSI) showed statistically significantly fair correlations to satisfaction with the result ($r=0.32$) and ATRS ($r=0.35$). Additionally, it showed statistically significantly poor correlation to the same type of work ($r=0.29$) but did not statistically significantly correlate with return to the same type of sport. Relative ATRA showed statistically significantly poor correlations to satisfaction with the result ($r=0.13$) and ATRS ($r=0.09$) but did not correlate statistically significantly with return to the same type of work or return to the same type of sport.

Interpretation / Conclusion: Neither relative ATRA nor HRH (LSI) showed strong correlations to return to work, return sport, satisfaction with the result, or ATRS. When comparing the relative ATRA and HRH (LSI), HRH (LSI) seems to be a better outcome in reflecting patient limitations and return to previous activities one year after ATR.

Mid-term results after treatment of complex talus osteochondral defects with HemiCAP implantation.

64.

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Background: Osteochondral defects (OCDs) of the talus represents a surgical challenge. Primary OCDs with a size less than 150 mm² /15 mm in diameter, without large cyst formation or other complicating factors can be treated with simple arthroscopic bone marrow stimulation techniques. When confronted with more complex OCDs a HemiCAP metal resurfacing implant of talus might be an option but few follow-up studies exist.

Aim: To evaluate the mid-term results after HemiCAP implantation in patients with complex OCDs during the period 2008–2016.

Materials and Methods: Patients were included during the period 2008–2016. Inclusion criteria's were: OCD of the medial or lateral talar dome, symptoms for >1 year since last surgery, OCD treated at least 1 year conservatively without effect. Exclusion criteria's were: defects larger than 20 mm, ankle osteoarthritis Grade >II or other ankle pathology, known allergy to implant material or diabetes. Outcome measures were the American Orthopaedic Foot and Ankle Society Score, the Numerical Rating Scale, Foot and Ankle Outcome Score, sports participation, work level and radiographic evaluation. Implant survival, defined as the implant remaining in situ without revision to total ankle arthroplasty, ankle fusion or removal of the implant was evaluated as well.

Results: 31 patients were included during the period with a mean follow-up of 50 months (11.5 – 81.4). All outcome measures improved significantly. Only one patient had an complication registered which were an infection treated with antibiotics. 13 patients (41,9 %) had an additional procedure performed (eg. arthroscopic debridement, hardware removal, cheilectomy) with none of the patients being revised.

Interpretation / Conclusion: The primary aim of OCD treatment is to reduce pain, and this is achieved with the HemiCAP implant in patients with complex OCDs even tough patient information and selection is mandatory due to the relative high numbers of additional surgery following the HemiCap implantation.

The Effect of a Single Hyaluronic Acid Injection in Ankle Arthritis - a Prospective Cohort Study.

65.

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Background: Non-operative measures are often used as first line treatment in ankle osteoarthritis (OA). One of these measures consists of hyaluronic acid (HA) injections in the affected ankle joint but the efficiency of this treatment is uncertain with lacking evidence regarding both the effect and number of injections needed.

Aim: To evaluate the effect on Self-reported Foot and Ankle Score (SEFAS) score, visual analogue scale (VAS) score at rest and VAS score at activity prior to and 6 months after a single dose of HA in patients with grade I - IV OA of the ankle.

Materials and Methods: Patients above 18 years were included during the period December 2017 to Marts 2019. All patients were not interested in surgery and had tried other conservative measures without effect. Included patients received a single intra-articular injection of either Cingal (4 mL, 88 mg HA plus 18 mg triamcinolone hexacetonide) or MonoVisc (4 mL, 88 mg HA) in the affected ankle joint, with the latter being used in case of diabetes or surgeon preference. Age, gender, OA-grade, SEFAS- score, VAS at activity and at rest prior to injection and after 6 months was registered. Statistical analysis was conducted in SAS 9.4.

Results: A total of 33 patients were included in the study with 14 being lost to follow-up. As such, 19 patients (31.5 % men and 68.5 % women) with a median age of 55 (range 30-81) were included for analysis. Fifteen (79 %) were injected with Cingal and 4 (21%) with Monovisc. Median SEFAS-score remained unchanged at 21 ($p=0.13$) while VAS at activity went from 7 to 6 (0.003) and VAS at rest was reduced from 4 to 3 (0.03).

Interpretation / Conclusion: The unchanged SEFAS-score together with the minor changes in VAS at activity and at rest indicates that a single injection of HA might be insufficient to produce a clinical response after 6 months and further studies on the subject should focus on treatment protocols with multiple injections.

The effect of sole gentamicin loaded bio-composite treatment following limited or extensive debridement of osteomyelitis lesions in a porcine model

66.

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Background: CERAMENTTM|G is an absorbable gentamicin loaded bio-composite, trusted by several clinical studies as an on-site vehicle of antibiotics for the treatment of chronic osteomyelitis.

Aim: We aimed to assess the sole effect of CERAMENTTM|G, i.e. without additional systemic antibiotic therapy, in relation to a limited or extensive debridement of osteomyelitis lesions in a porcine model.

Materials and Methods: Osteomyelitis was induced in nine pigs by inoculation of 10⁴ CFU of *Staphylococcus aureus* into a drill hole in the left tibia. After one week, the pigs were allocated into three groups. Group A (n=3) received no treatment during the study period (19 days). Group B (n=3) and C (n=3) received limited or extensive debridement 7 days post inoculation, respectively, followed by injection of CERAMENTTM|G into the bone voids. The pigs were euthanized 10 (Group C) and 12 (Group B) days after the intervention.

Results: All animals demonstrated confirmatory signs of bone infection post-mortem. The estimated amount of inflammation was substantially greater in Groups A and B compared to Group C. In both Groups B and C, peptide nucleic acid fluorescence in situ hybridization (PNA FISH) of CERAMENTTM|G and surrounding bone tissue revealed bacteria embedded in an opaque matrix, i.e. within biofilm. In addition, in Group C, the peak post-mortem gentamicin concentrations in CERAMENTTM|G and surrounding bone tissue samples were 16.6 µg/mL and 6.2 µg/mL, respectively.

Interpretation / Conclusion: CERAMENTTM|G may not be used as a stand-alone alternative to extensive debridement or be used without the addition of systemic antibiotics.

A scheduled operation day might reduce early surgical failures within 30 days after major dysvascular lower limb amputation A single-center 2-year prospective cohort study of 163 patients compared with a historical control group of 165 patients

67.

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Background: Patients who undergo a major dysvascular lower limb amputation (LLA) often have a poor outcome. Even though advancements in perioperative risk stratification and care have improved, the short-term mortality and complications remains high.

Aim: The aim of this study is to investigate whether a scheduled operation day can reduce early surgical failure in patients undergoing a major LLA.

Materials and Methods: A total of 328 consecutive patients undergoing major LLA at a university hospital from January 2016 through December 2019 were enrolled. Early failure was defined as re-amputation or revision within 30 days of the primary amputation. In January 2018, a new regime was introduced entailing two scheduled operation days (Tuesday and Friday). No other changes were made in the standard care and regime. Follow up (until death or 30-days post-amputation) and data analysis comparing the two cohorts (year 2016–2017, n=165 vs. 2018–2019, n=163) was done for continuous and categorical data, as appropriate.

Results: The overall median (25–75% quartiles) age of patients was 74 (66–83) years, 61 % were men, 91% had an ASA grade ≥ 3 , and was primarily amputated due to atherosclerosis and diabetes mellitus (92 %). The index amputee levels were 36% below knee, 60 % trans femoral, and 4% major bilateral with no significant difference between the two cohorts, and correspondingly for other patient characteristics. In the study cohort 59% of amputations were done on the scheduled Tuesday or Friday versus 36% in the control group ($p < 0.001$). Correspondingly, more patients (72.4% vs 57.6%, $p = 0.005$) were amputated during daytime, while no significant increase was seen for senior surgeons present during amputations (53% vs. 47%, $p = 0.174$). The cause of early failure was primarily related to infection or necrosis, and the 30-day failure rate was reduced to 11.0% (n=18) in the study cohort compared to 16.4% (n=27) in the control group ($p = 0.2$). The failure rate in the study cohort was 8.3% for amputation on the scheduled Tuesday or Friday versus 14.9% when done on other days ($p = 0.186$).

Interpretation / Conclusion: Scheduled operation days for patients who undergo a major LLA might reduce the early failure rates.

Development and comparison of one-year survival models in patients with primary bone sarcomas. External validation of a Bayesian belief ne

68.

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Background: Bone sarcomas often presents late with advanced stage at diagnosis, resulting in varying short-term survival. In 2016 Nandra et al. generated a Bayesian belief network model (BBN) for 1-year survival of patients with bone sarcomas.

Aim: The purpose of present study is to: 1) External validate the prior 1-year BBN prediction model for survival of patients with bone sarcomas, 2) To develop a Gradient Boosting machine (GBM) model using Nandra et al.'s cohort and evaluate if the GBM model outperform the BBN model suggested by Nandra et al. when externally validated on an independent Danish population cohort.

Materials and Methods: The training cohort comprised 3493 patients newly diagnosed with bone sarcoma from the institutional prospectively maintained database at The Royal Orthopaedic Hospital, Birmingham UK. The validation cohort comprised 771 patients with newly diagnosed bone sarcoma included from The Danish Sarcoma Registry between January 1st, 2000 and June 22nd, 2016. Predictive performance of models was evaluated by area under receiver operator characteristic curve (AUC ROC) analysis, Brier score and decision curve analysis (DCA).

Results: External validation of the BBN 1-year prediction model demonstrated AUC ROC of 68% (95%CI, 62%–73%). AUC ROC of the GBM model demonstrated 75% (95%CI: 70%–80%), overall model performance by Brier score was 0.09 (95%CI: 0.077–0.11) and DCA demonstrated a positive net-benefit for threshold probabilities above 0.5. External validation of the developed GBM model demonstrated AUC ROC of 63% (95%CI: 57%–68%) and the Brier score was 0.14 (95%CI: 0.12–0.16).

Interpretation / Conclusion: External validation of the 1-year Bayesian belief network survival model yielded poor outcome and is hence not recommendable for clinical usage. The developed Gradient Boosting Machine 1-year survival model did not outperform the prior Bayesian belief network model, and modernization is pending.

Quantitative measurements of adaptive bone remodeling around the Cemented Zimmer® Segmental stem after tumor resection arthroplasty using dual-energy X-ray absorptiometry.

69.

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Background: Limb salvage surgery is currently offered to more than 90% of patients with bone or soft tissue sarcomas and to a greater extent also to patients with metastatic bone disease.

Aim: The aim of the present study was to evaluate the adaptive remodeling of the periprosthetic cortical bone after insertion of a tumor prosthesis with a cemented stem.

Materials and Methods: A prospective study of 21 patients (F/M=12/9), mean age 55 years (range 15-81) with metastatic bone disease (n=9), sarcomas (n=8) or aggressive benign tumors (n=4) who underwent bone tumor resection and reconstruction with a tumor prosthesis (Zimmer® Segmental 130 mm straight fluted cemented stem with trabecular metal (TM) collars) in the proximal femur (n=10), distal femur (n=9) or proximal tibia (n=2). Measurements of bone mineral density (BMD) were done postoperatively and after 3, 6, and 12 months of the periprosthetic bone and in both ankles by using dual-energy X-ray absorptiometry. BMD (g/cm²) was measured in 4 regions of interest around the cemented stem and in one region of interest 1 cm proximal from the ankle joint. Repeated measures ANOVA and students paired t-test was used to evaluate BMD changes over time.

Results: At 1-year follow-up, BMD compared to the postoperative value was seen in all 4 regions of interest with a statistically significant bone loss of 8-15%. The bone loss was most pronounced (14-15%) in the 2 regions of interest closest to the TM collar and lowest (8%) adjacent to the tip of the stem. We found the largest reduction in BMD around proximal femoral stems (11%-18%). After 1 year the decrease in BMD of the ankle on the affected extremity was 9% and the ankle on the contralateral extremity was close to baseline.

Interpretation / Conclusion: The periprosthetic BMD around the cemented 130 mm Segmental stem decreased significantly during the first postoperative year and is considered caused by a combination of stress shielding and immobilization.

Clinically relevant reductions in physical function in patients undergoing resection and reconstruction surgery with tumour prostheses due to bone sarcoma

70.

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Background: Physical function and quality of life (QoL) are patient-important outcomes but are sparsely reported for patients that due to bone sarcoma undergo resection and reconstruction of bone in lower limb.

Aim: The aim of this study was therefor to describe physical function and QoL for this patient group.

Materials and Methods: Thirty patients operated between 2006 and 2016 (proximal femur [n=12], distal femur [n=14], proximal tibia [n=4]) were compared to 30 matched controls in a cross-sectional design. Differences between groups were tested for: isometric muscle strength in hip abduction, knee extension and knee flexion, six-minute walk test (6MWT) and 30s sit-to-stand test (STS). In the patient group, measures of physical function were correlated to the EORTC QLQ-C30 Global Health (GH) and Physical functioning (PF) subscales. Paired samples t-test was used for analyses of between group differences and Spearman's rank test for correlations within the patient group. The significance level was set to $p < 0.05$.

Results: The patients were assessed 2–12 years after surgery. Mean age was 51 years and mean BMI 26. Between group differences were found for hip abduction and knee extension strength, both for patients' surgical and contralateral leg. Differences were also seen for the 6MWT (499 vs. 607 m, $p < 0.001$) and the STS (12 vs. 18, $p < 0.001$). Lower scorings of GH correlated to muscle weaknesses in hip abduction ($\rho = 0.43$, $p = 0.019$) and lower scorings of PF correlated to muscle weaknesses in hip abduction ($\rho = 0.51$, $p = 0.006$) and knee extension ($\rho = 0.40$, $p = 0.034$).

Interpretation / Conclusion: Compared to controls, patients with bone sarcoma receiving resection–reconstruction surgery with a tumour prosthesis showed muscle strength deficits in both surgical and contralateral leg and less walk and sit-to-stand capacity. Compared to reference values, patients' walk and sit-to-stand capacity were at levels of 80-year-old men and women. Muscle weaknesses were associated to lower QoL scorings, indicating that muscle strength influence the perception of QoL. These results reflect physical function at long term and to provide patients facing this surgery with a tangible image of future function, it should be included in preoperative patient information.

Challenges in the orthopedic nursing of tumor patients receiving a tumor prosthesis in the lower extremities

71.

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Background: Bone sarcomas are often localized in the lower extremities, and frequently the surgical treatment is major surgery using tumor prostheses. Giant cell tumors are not categorized as malignant tumors, but they are locally aggressive and therefore sometimes treated surgically with tumor prostheses.

Aim: This study aims to evaluate challenges in the nursing aftercare of orthopedic tumor patients receiving a tumor prosthesis in the lower extremities.

Materials and Methods: In a retrospective cohort study, we included 15 patients (F/M=11/4, mean age 42 years (range: 18–72)) treated at Rigshospitalet between 05.11.16 – 01.4.20 with a tumor prosthesis in the lower extremities (proximal femur (n=4), distal femur (n=5), proximal tibia (n=4), femoral shaft or total femur (n=2)) due to Ewing sarcoma (n=3), osteosarcoma (n=5), chondrosarcoma (n=4), giant cell tumor (n=2) or myksofibrosarcoma (n=1). We performed a medical record review with focus on challenges related to nursing aftercare. One patient had an amputation the day after primary surgery due to arterial thrombosis thus leaving 14 patients for the study.

Results: The mean duration of hospital stay was 13 days (range: 5–32). Six patients had neoadjuvant chemotherapy prior to surgery. Nine patients needed a blood transfusion during surgery and/or postoperatively (SagM n=68, fresh frozen plasma n=26, thrombocytes n=9, human albumin n=3). Four patients had extra supervision from an anesthesiologist due to severe pain, 7 patients needed medication more than 5 times a day besides planned medication. Twelve patients had nausea and treated with medication. All patients were treated with cefuroxime 1.5g x 3 postoperatively (mean: 8 days, range: 4–22), 3 patients (no. 6, 12, 15) were treated with other antibiotics after termination of cefuroxime, 3 patients (no. 2, 10, 12) had leakage from the surgery wound after 5, 6 and 8 days. The mean days until the first attempt to mobilization to the bed edge were 3 days (range: 2–4).

Interpretation / Conclusion: Orthopedic nurses can help minimize the challenging aspects during hospital stay identified in this study. Further studies are needed to identify which aspects are important for the patients, this could be done in a prospective qualitative setup.

Ewing's sarcoma of the calcaneus treated by limb sparing surgery with calcanectomy and reconstruction with a composite of an allograft and a vascularized osteocutaneous fibula graft

72.

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Background: Primary malignant bone tumors of the calcaneus are very seldom, and due to poor possibilities to do surgery with wide margins in this region and limited options for reconstruction after calcanectomy many orthopedic oncologists use amputation as the preferred surgical treatment in such cases.

Aim: We present two cases of Ewing's sarcoma of the calcaneus treated with calcanectomy and reconstruction with a composite of an allograft and a vascularized osteocutaneous fibula graft.

Materials and Methods: The medical cases of 2 girls suffering from Ewing's sarcoma of the calcaneus that were almost 6 years old (case 1) and 16 years old (case 2) at the time of surgical treatment with calcanectomy in respectively August 2012 and October 2013 are presented. Both patients were without metastatic disease and received pre- and post-operative chemotherapy.

Results: In both cases removal of the calcaneus was performed using a combined medial and lateral incision. In case 1 a femoral head allograft was fitted to replace the removed calcaneus, and in case 2 a calcaneus allograft was used. In both cases, with the aim of obtaining arthrodesis, the allograft was fixed to the talus and cuboid bone with screws. A distally pedicled osteocutaneous flap was used for reconstruction of soft tissue, and a 5-6 cm piece of vascularized fibula bone was fitted into the allograft and fixed using staples. Arthrodesis between talus and the graft healed and full weight-bearing was allowed in both cases 8-9 months postoperatively. At follow-up 6½ and 4½ years after surgery both patients were without local recurrence or metastases, and they were both pain-free and able to walk using normal footwear without any walking-aids.

Interpretation / Conclusion: Biological reconstruction is possible after removal of the calcaneus because of primary malignant bone tumors and long-term good functional results can be achieved.

Acetabular retroversion does not affect outcome in primary hip arthroscopy for femoral-acetabular impingement. Data from the Danish Hip Arthroscopy Registry.

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Background: Patients with femoral-acetabular impingement syndrome (FAIS) in the presence of acetabular retroversion (AR) may be treated surgically by arthroscopy or reverse periacetabular osteotomy (PAO). The short and mid-term results after arthroscopic treatment are promising, but the evidence is mainly based on small, retrospective cohort studies.

Aim: The purpose of the present study was to investigate differences in results after arthroscopic treatment of FAIS between patients with and without radiographic signs of AR in a large, prospective cohort from the Danish Hip Arthroscopy Registry (DHAR). We hypothesized that there are no differences.

Materials and Methods: Data on 4,914 hip arthroscopies performed during 2012–2019 were obtained from DHAR. Patients with radiological signs of osteoarthritis (Tönnis > 1) or hip dysplasia (CE angle < 25 degrees) were excluded. The clinical outcomes for patients with AR (defined by a positive posterior wall sign (PWS) in combination with a positive Ischial Spine Sign (ISS)) and without AR (no PWS, no ISS) were analyzed one and two years after surgery. The primary outcomes were the six domains of the Copenhagen Hip and Groin Outcome score (HAGOS), while secondary outcomes were the Hip Sports Activity Scale (HSAS), a visual analogue pain scale (VAS) and a numeric rating scale (NRS) for pain. A total of 3,135 hip arthroscopies were included, of which 339 had AR, 1876 did not, and 920 had one of the two signs (PWS and ISS) present.

Results: No statistically significant differences ($p > 0.05$) between patients with and without AR were found in neither the primary outcomes (HAGOS domains) nor the secondary outcomes (HSAS, VAS, NRS), one and two years after surgery. Both groups showed clear improvement at both follow-ups compared to preoperative values.

Interpretation / Conclusion: The short-term outcome one and two years after arthroscopic treatment of FAIS in Denmark is not different for patients with and without AR.

Six-weeks of intensive rehearsals for the Swan Lake ballet shows structural changes of the Achilles tendons in dancers

74.

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Background: In professional ballet dancers four out of five injuries are related to overuse and Achilles tendinopathy is the second most common overuse problem.

Aim: The objective was to investigate, first, whether six weeks of intensive ballet dance exposure is associated with structural and clinical changes in the Achilles tendon; second, the importance of demographics, self-reported Achilles pain, and generalized joint hypermobility (GJH).

Materials and Methods: Data were collected at baseline and at six weeks' follow-up, using Achilles tendon ultrasound tissue characteristics (UTC) as primary outcome (percentage distribution of echo-type I-IV; type I=intact and aligned bundles, type II=discontinuous/wavy bundles, type III=fibrillar, type IV=amorphous cells/fluid). Secondary outcomes included clinical signs of Achilles tendinopathy, Achilles tendon pain during single-leg heel raise, self-reported symptoms (VISA-A questionnaire) and GJH.

Results: Sixty-three ballet dancers (aged 18-41) participated. From baseline to follow-up, UTC echo-type I decreased significantly ($\Delta = -3.6$, $p = 0.001$; 95% CI: $-5.8; -1.4$), whereas echo-type II increased significantly ($\Delta = 3.2$, $p < 0.0001$, 95% CI: $1.6; 4.8$). Furthermore, a significant effect of limb (left limb showed decreased echo-type I and increased echo-type III+IV) and sex (women showed decreased echo-type I and increased in type II) was found. No significant changes in the remaining secondary outcomes were found.

Interpretation / Conclusion: Ballet dancers showed structural changes in UTC, corresponding to a decreased echo-type I distribution after six weeks of rehearsing for Swan Lake ballet. No changes in self-reported symptoms, clinical signs of Achilles tendinopathy and single-leg heel raise test were seen from pre- to post-rehearsal. Thus, structural changes in the Achilles tendon seem to appear earlier than clinical signs of tendinopathy.

Is hip impingement frequent in world junior elite badminton players and is it correlated with ROM?

75.

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Background: In high demand sports like soccer and ice hockey there is a high prevalence of femoroacetabular impingement syndrome (FAIS) in youth populations which may predispose to OA. Internal rotation deficit in the hip of football players is a predictor of hip and groin pain compared to an asymptomatic population and differences in range of motion (ROM) of the hip may be a contributing risk factor for differences in lower extremity injuries between women and men. There are no published reference values for ROM and impingement in the hip of badminton players

Aim: To report ROM and impingement of the hip in elite junior badminton players and to report any differences between sex and between Asian and non-Asian players. Secondly to determine if any correlation exists between ROM, impingement and injury history

Materials and Methods: Players at the World Junior Badminton Championship in 2018 were examined in supine for hip flexion, internal- and external rotation and the impingement tests FADIR and FABER. Injury history was obtained from a questionnaire from the World Olympic Association

Results: Two hundred and eighty four players of 433 aged 16–18 years were examined. One hundred and forty three players answered the questionnaire. Females demonstrated greater hip ROM than boys in both sides. In the dominant side hip flexion was ($137.7^\circ (\pm 9.1)$ vs. $132.2^\circ (\pm 11.1)$, $p < 0.001$), IROM ($60.0^\circ (\pm 10.9)$ vs. $49^\circ (\pm 11.1)$, $p < 0.001$) and EROM ($57.9^\circ (\pm 9.9)$ vs. $54.7^\circ (\pm 8.9)$, $p = 0.004$). Hip flexion was higher in Asian players compared with non-Asian players ($139.1^\circ (\pm 8.4)$ vs. $130.3^\circ (\pm 10.7)$, $p < 0.001$). One hundred (35 %) players had at least one positive impingement test in the dominant or the non-dominant hip. A possible relationship between a positive FADIR and a decrease in hip flexion was found in the dominant hip, OR 1.06 (1.02– 1.11) $p = 0.005$. A total of 104 injuries were reported with five hip related injuries. No correlation between injury and examinations was found

Interpretation / Conclusion: Females and Asians demonstrated higher ROM in the hip than males and non-Asians. Impingement of the hip is frequent and may be related to low hip flexion. Future studies are needed to examine if impingement is correlated with x-ray findings

Hip arthroscopy trends: Bony morphologies, cartilage injuries, post-operative outcomes, and surgical rates – an overview of 5294 hip arthroscopies performed from 2012 to 2020

76.

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Background: Hip arthroscopy is effective for treatment of hip pain, but a detailed overview is lacking.

Aim: We aimed to classify causes of hip pain based on bony morphologies in patients having hip arthroscopy, and investigate corresponding cartilage injuries, 1-year outcomes, and surgical rates from 2012 to 2020.

Materials and Methods: In total, 5294 hip arthroscopies (no previous hip surgery) were identified in the Danish Hip Arthroscopy Registry. Six classifications were made: normal; cam; pincer; borderline dysplasia; cam and pincer; cam and borderline dysplasia. These were defined based on alpha angle (AA) (normal [$AA < 55^\circ$] or cam [$AA \geq 55^\circ$]) and lateral center-edge angle (LCEA) (normal [$25^\circ \leq LCEA \leq 39^\circ$], pincer [$LCEA > 39^\circ$], or borderline dysplasia [$LCEA < 25^\circ$; 10 patients $< 20^\circ$]). Cartilage injuries were rated during surgery as none-to-mild (grade 0–2) and moderate-to-severe (grade 3–4). Self-reported symptoms were assessed with The Copenhagen Hip And Groin Outcome Score (HAGOS) 1-year post-surgery. Surgical rates were calculated for each classification as surgeries per year relative to total surgeries the same year.

Results: In total, 82.5 % had bony morphologies: cam (66.9 %); cam and pincer (6.3 %); cam and borderline dysplasia (5.9 %); pincer (1.9 %); borderline dysplasia (1.5 %). Remaining patients (17.5 %), all without deviant bony morphologies, were classified as normal. Patients with cam morphology had the highest proportion of grade 3–4 acetabular cartilage injuries: cam and borderline dysplasia (54.6 %); cam (46.5 %); cam and pincer (42.0 %). At 1-year, patients with pincer morphology had the highest HAGOS subscale scores (46.5 to 75.4 points), while borderline dysplasia patients had the lowest scores (22.4 to 56.9 points). Hip arthroscopies in patients with normal morphology showed a gradual increase from 7.7 % in 2012 to a plateau of 25 % in 2017–2020.

Interpretation / Conclusion: Data on hip arthroscopies in Denmark show that cam is the most prevalent morphology and is associated with the highest proportion of grade 3–4 cartilage injuries. Patients with borderline dysplasia have the worst 1-year outcome. Surgical rates in patients with normal morphology have increased from 2012 (<10 %), and now constitute 25 % of surgeries.

Five year follow up of the HAFAl-cohort – outcome after hip arthroscopic surgery in patients with femoroacetabular impingement syndrome

77.

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Background: Patients with femoroacetabular impingement syndrome (FAIS) often experience pain, decreased function and quality of life (QoL). Hip arthroscopy is used to treat the patients but long-term data on the surgical outcome are sparse.

Aim: We aimed to investigate clinical examination, radiographic assessment and patient-reported outcomes in patients with FAIS five years after hip arthroscopy.

Materials and Methods: Sixty patients (aged 36 ± 9 , 63% females) participated in the original HAFAl cohort and had hip arthroscopy in 2015–2016. Five years after surgery, patients were invited for a follow-up which included clinical examination by the surgeon (pain provocation test of m. psoas major, FADIR test (flexion, adduction and internal rotation) and FABER test (flexion, abduction and external rotation), standing anterior-posterior pelvic radiograph for assessment of the lateral joint space width (LJSW) and completion of the Copenhagen Hip and Groin outcome score (HAGOS) and the Hip Specific Sports Activity scale (HSAS).

Results: Twelve (20%) of 60 patients, had re-operations and 6 patients (10%) had a total hip replacement (THR). Forty-three patients were seen for clinical examination and x-ray. 53% of those had a positive pain provocation test, 36% had a positive FADIR test and 25% had a positive FABER test. In patients who did not convert to THR, LJSW was average 3.7 ± 1.1 mm. Forty-seven patients completed HAGOS (Median [25th, 75th quartile]); Pain: 76 [65;93], Symptoms: 71 [57;86], Activities of daily living: 85 [65;100], Sport: 66 [50;84], Participation in sport: 50 [25;75], QoL: 60 [45;80]. All HAGOS subscales improved compared with before surgery ($p < 0.001$). The median [25th, 75th quartile] HSAS was 2 [1;3]. Patients with a positive FADIR test had significantly worse HAGOS subscales.

Interpretation / Conclusion: Five years after surgery, patients experienced mild pain and symptoms, were able to participate in physical activities and had radiographs showing an acceptable LJSW. However, clinical examination and scores for participation in sport and QoL indicated that patients still have problems related to the hip. This highlights the need for further research aiming to improve rehabilitation of these patients.

Are 5-Year Hip Arthroscopy Outcomes Associated with Hip Morphology and Cartilage Status in Patients with Femoroacetabular Impingement Syndrome? - A National Registry Study with HAGOS Outcomes in 281 patients 78.

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Background: Specific bony hip morphologies, such as severe cam, dysplasia, and cartilage injuries result in inferior short-term patient-reported outcomes (<2 years), while their effect on mid- and long-term (≥5-years) outcomes are unknown.

Aim: To investigate if changes in patient-reported outcome from pre- to 5 years post-surgery, is associated with pre-surgery bony hip morphology and cartilage status in patients with FAIS.

Materials and Methods: Patients were identified in the Danish Hip Arthroscopy Registry. Patient reported outcome was assessed with Copenhagen Hip and Groin Outcome Score (HAGOS). Hip and groin function were specifically assessed with HAGOS (ADL and Sport) at pre- and 5 years post-surgery. Multiple regression analyses assessed the adjusted associations between hip morphology and cartilage injuries with HAGOS ADL and Sport. Morphology was defined using Alpha Angle (AA) and (LCEA) in the following way: cam ($55^\circ < \alpha < 78^\circ$); pincer ($LCEA > 39^\circ$); borderline dysplasia: ($20^\circ < LCEA < 25^\circ$). Hip OA was defined by Joint Space Width (JSW): mild (3.1 mm.2 cm²).

Results: The study included 281 patients (mean \pm SD age 35.53 ± 10.1 years, 52.3% females). For bony morphologies, no cam (ADL: $\Delta 16$ points) and cam (ADL: $\Delta 7$ points) was associated with larger improvements in HAGOS compared with severe cam, and so was no hip OA (HAGOS ADL: $\Delta 21$ points) compared to OA. For cartilage injuries, femoral head cartilage injury area $< 1 \text{ cm}^2$ was associated with larger improvements in HAGOS (ADL: $\Delta 17$ points, Sport: $\Delta 21$ points) compared to patients with femoral cartilage area of $> 2 \text{ cm}^2$ ($p < .05$).

Interpretation / Conclusion: No severe cam morphology, no OA, and femoral head cartilage injury area $< 1 \text{ cm}^2$ were associated with larger improvements in patient-reported outcome 5 years after hip arthroscopy compared to severe cam morphology, OA, and femoral cartilage injury area $> 2 \text{ cm}^2$.

Stratified care in hip arthroscopy – can we predict unsuccessful outcomes? Development and temporal validation of multivariable prediction models

79.

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Background: Approximately 50 % do not have acceptable symptoms (PASS) 1 year post hip arthroscopy. It is unknown whether pre-operative clinical information can be used to stratify care, so patients likely to have unsuccessful outcomes are not offered surgery. The first steps towards this is development and validation of reliable clinical prediction models.

Aim: We aimed to develop and validate clinical prediction models to identify patients with an unsuccessful or successful outcome 1 year post hip arthroscopy.

Materials and Methods: Patient records were extracted from the Danish Hip Arthroscopy Registry (DHAR). Outcomes were defined as unsuccessful/successful if patients did not have/had a score corresponding to PASS in any of the six subscales of the Copenhagen Hip and Groin Outcome Score (HAGOS) at 1-year post hip arthroscopy. A-priori, 26 common clinical variables from DHAR were selected, including demographics, radiographic parameters of hip morphology, and self-reported measures. We used a separate cohort of 1082 hip arthroscopy patients (surgery performed 25th April 2012 to 4th October 2017). to develop the clinical prediction models. Subsequently, we externally validated predictive performance of the models in a separate cohort of 464 hip arthroscopy patients (surgery performed 5th October 2017 to 13th May 2019).

Results: For unsuccessful outcomes, predictive performance on the external validation dataset showed adequate calibration and acceptable discrimination (AUC: 0.75, 95 % CI [0.70-0.80]) with sensitivity and specificity ranging 0.0-0.97 and 0.2-1.0, respectively, depending on the risk threshold. For successful outcomes, predictive performance showed adequate calibration, but poor discrimination (AUC: 0.679, 95 % CI [0.625-0.733]).

Interpretation / Conclusion: Common clinical variables were able to predict patients with an unsuccessful outcome 1-year after hip arthroscopy. This clinical prediction model can be used to support clinical evaluation and shared decision making by informing the orthopedic surgeon and patient about the risk of an unsuccessful outcome, and thus when surgery may not be appropriate. This may reduce unsuccessful outcomes and could therefore improve the overall outcome of hip arthroscopy in the future.

Migration of the uncemented Echo Bi-Metric and Bi-Metric THA stems: a randomized controlled RSA-study involving 62 patients with 24-months follow-up **80.**

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Background: Despite the good results after total hip arthroplasty (THA), new implants are continuously being developed to improve the durability. The Echo Bi-Metric (EBM) THA stem is the successor to the Bi-Metric (BM) THA stem. The EBM stem includes many of the features of the BM stem, but minor changes in the design might improve the clinical performance.

Aim: We compared the migration behavior with radiostereometric analysis (RSA) of the EBM stem and the BM stem at 24 months and evaluated the clinical outcome.

Materials and Methods: We randomized 62 patients with osteoarthritis (mean age=64 years, Female/Male=28/34) scheduled for an uncemented THA to receive either an EBM or a BM THA stem. We performed RSA within 1 week after surgery and at 3, 6, 12, and 24 months. The clinical outcome was evaluated using Harris Hip Score (HHS) and Oxford Hip Score (OHS).

Results: At 24 months, we found no statistically significant differences in migration between the two implants. During the first 3 months both the EBM and the BM stems showed visible subsidence (-2.5 mm and -2.2 mm respectively), and retroversion (2.5° and 2.2° respectively), but after 3 months this stabilized. The expected increase in HHS and OHS was similar between the groups.

Interpretation / Conclusion: The EBM stem shows a migration at 24 months not different from the BM stem, and both stems display satisfying clinical results.

Patient-reported outcome after dislocation of primary total hip arthroplasties – a cross-sectional matched case-control study derived from the Danish Hip Arthroplasty Register

81.

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Background: It is well-known that there is substantial risk of re-dislocation and eventually revision after the first dislocation following primary THA, but knowledge about patient-reported outcomes (PRO) after dislocation and closed reduction is lacking.

Aim: Our aim was to report on health- and hip- related quality of life (QoL) in patients with dislocation following primary THA due to osteoarthritis.

Materials and Methods: We conducted a cross-sectional, matched case-control study involving patients registered in the Danish Hip Arthroplasty Register between 2010 and 2014. Dislocations were captured in the Danish National Patient Register using a validated algorithm. We matched patients with dislocation 1:2 upon age, sex, date and hospital of primary surgery to patients without dislocation. They received two PRO questionnaires (EQ- 5D, HOOS) and three patient satisfaction items. Results are presented as means with 95% confidence intervals and analyzed with multiple linear regression.

Results: We identified 1010 living patients with dislocation. The response rate was 70.1%. Mean follow-up was 7.2 years from index surgery and 4.9 years from the latest dislocation. Patients without dislocation reported a higher EQ-5D VAS score of 75.6 (74.5-76.7) compared to 67.8 (65.9-69.7) in the dislocation group ($p<0.01$). Regarding hip-related QoL, patients with dislocation reported a lower HOOS-QoL domain score of 62.8 (60.2- 65.4) compared to 82.9 (81.7-84.1) in the control group ($p<0.01$). Even after five years from the latest dislocation, the HOOS-QoL score was still low, demonstrated by 65.6 (62.0-69.2) points. The other HOOS domains were consistently 8-10 points worse after dislocation. Regarding satisfaction, only 59% reported either an "excellent" or a "very good" overall result after experiencing dislocations, as opposed to 85% for the controls.

Interpretation / Conclusion: This is the first national case-control study on PRO after hip dislocation. The study showed that both health- and hip-related QoL is markedly and persistently reduced compared to a control group even 2-5 years after the latest dislocation. The most important aspect must be to avoid the first episode of dislocation, since the full relieving potential for this THA is never achieved.

Revision risk of total hip arthroplasty with vitamin E doped liners: Results from The Danish Hip Arthroplasty Register 82.

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Background: The main long-term revision cause for total hip arthroplasty (THA) is aseptic loosening. This is associated with polyethylene wear and a lower wear would, in theory, reduce the rate of revision due to aseptic loosening. Vitamin E doped polyethylene liners have been designed to reduce wear, but the material is rather new and needs post marked surveillance analysis in large register studies.

Aim: The aim of this nationwide population-based study was to investigate 1) the risk of polyethylene-related endpoints (aseptic loosening, wear, granuloma, or osteolysis) from 12 months after THA with vitamin E-doped polyethylene (VEPE) liners compared to THA with cross-linked annealed or remelted polyethylene (XLPE) liners and 2) the risk of any and specific revision causes.

Materials and Methods: We included THAs from The Danish Hip Arthroplasty Register from January 1, 2008 to June 30, 2019, with uncemented cup, VEPE or XLPE liner, and metal or ceramic head. The outcome was polyethylene-related endpoints from 12 months and onwards, and further outcomes were any and specific revision causes. Risk of revision was estimated using Cox regression.

Results: A total of 110,803 THAs were assessed for eligibility and 63,892 THAs (55,230 patients) were included in the study, 5,885 (9.2%) THAs with a VEPE liner and 58,007 (91.8%) with a XLPE liner. Median observation time was 5.35 (inter-quartile range (IQR) [3.62, 7.09]) years for VEPE and 4.78 (IQR [2.64, 7.68]) for XLPE. We found a lower risk of revision for polyethylene-related endpoints from 12 months for VEPE compared to XLPE (hazard ratio (HR) 0.51 [0.31, 0.84]). THAs with VEPE liners were associated with increased risk of any revision within the first 3 months (HR 1.57 [1.33, 1.86]), revision recorded as aseptic loosening within 3 months (4.15 [2.19, 7.87]), fracture within 3 months (HR 2.58 [1.99, 3.34]), and other revision at any time (1.35 [1.00, 1.81]).

Interpretation / Conclusion: VEPE liners had a lower revision rate due to polyethylene-related endpoints from 12 months compared to XLPE liners. No difference in other specific reasons was shown. Regarding safety, we found one cracked liner in VEPE while thirteen cracked liners were reported for XLPE.

Outcomes of surgical hip abductor tendon repair with one-year follow-up. Our initial experience.

83.

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Background: Awareness of Gluteus medius (GM) and/or minimus tendon tears as the cause of lateral hip pain (LHP) has been growing over the past two decades. It is estimated that GM tears may be present in as many as 25% of late middle-aged women and 10% of middle-aged men. Tears that impart significant functional impairment to patients and may be a source of debilitating and chronic LHP. Unfortunately, these tears are often misdiagnosed and, thus, treated insufficiently. In recent years, surgical repair has shown promising results.

Aim: To report one-year outcomes of our initial 40 cases of surgical repair of GM tendon tears.

Materials and Methods: Data were prospectively collected between September 2017 and October 2020. Inclusion criteria for the study were patients undergoing surgical GM repair who had completed a one-year follow-up. MRI was pre-operatively used to visualize the GM tears and select patients deemed suitable for surgery. Pre- and 12-months post-operative testing included pain (at rest, during activity and worst pain (NRS 0-10)), patient reported outcome measures (Copenhagen hip and groin score (HAGOS), Oxford Hip score (OHS), EQ-VAS and Global rating of Change (GROC)), and maximal voluntary isometric contraction of hip abduction (MVC) measured with a hand-held dynamometer.

Results: The cohort included 40 patients (36 women) with a median age of 55 years (range 18-81). From pre- to 12-months post-operative, pain at rest, during activity and worst pain decreased from 4.7 to 1.6, 6.3 to 2.5, and 8.6 to 4.5 ($p > 0.001$), respectively. All HAGOS sub scores, OHS and EQ-VAS improved (HAGOS; pain: 35 to 67, Symptom: 43 to 71, ADL: 34 to 65, Sport/Rec: 21 to 53, PA: 16 to 44, QOL: 23 to 52 ($p > 0.001$), OHS; 22 to 33 ($p > 0.001$) and EQ-VAS: 61 to 72 ($p = 0.0107$)). At follow-up the success rate of GROC ("moderately better" to "very much better") was 61.1%. MVC of the operated and non-operated hip increased by 0.09 Nm/kg (95% CI 0.007;0.17) and 0.03 Nm/kg (95% CI -0.04;0.11).

Interpretation / Conclusion: This study indicates that surgical repair may be an effective treatment of MRI verified gluteus medius tears. At one-year follow-up, the patients experience less pain, and subjective outcome measures and hip abductor strength improve.

Does choice of bearings influence the survival of cementless stemmed total hip arthroplasty in the patient between 20 and 54 years? A comparison of metal-on-metal, ceramic-on-ceramic and metal-on-highly-crosslinked-polyethylene bearings from the NARA

84.

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Background: Young patients risk undergoing multiple revisions of their total hip arthroplasty (THA) leading to poorer clinical outcome. Different bearings have been introduced to improve the survival of the THA. However, long-term results of these bearings in young patients are unknown.

Aim: Our aim was to compare the survival and risk of revision of primary stemmed cementless THA with metal-on-metal (MoM) and ceramic-on-ceramic (CoC) to that of metal-on-highly-crosslinked-polyethylene (MoXLP) bearings in patients between 20-54 years with primary osteoarthritis or childhood hip disorders.

Materials and Methods: The study population was identified from the Nordic Arthroplasty Register Association dataset and consisted of 2,246 MoM, 4,227 CoC and 10,433 MoXLP THA operated between 1995-2017. We used the Kaplan-Meier estimator for calculation of THA survivorship and Cox regression to estimate the hazard ratio (HR) of revision (including 95% confidence intervals) due to any and specific causes adjusted for sex, age, diagnosis, year of primary surgery and femoral head size. MoXLP was used as reference. The hazard ratios were given in 0-2, 2-7 and 7-15 years to meet the assumption of proportional hazards.

Results: The median follow-up was 10.3 years for MoM, 6.6 years for CoC and 4.8 years for MoXLP. 15 years postoperatively the Kaplan-Meier survival estimates were 80% (78-83%) for MoM, 92% (91-93%) for CoC and 94% (93-95%) for MoXLP bearings. The 0-2, 2-7 and 7-15 years adjusted HRs of revision by any cause were 1.4 (0.9-2.3), 3.3 (2.1-5.1) and 4.5 (2.3-8.8) for MoM and 1.1 (0.8-1.4), 1.0 (0.7-1.4) and 2.3 (1.2-4.3) for CoC bearings. After 7-15 years follow-up, the unadjusted cause specific HR of revision due to aseptic loosening was 6.4 (1.5-28) for MoM and 4.2 (0.9-20) for CoC THA. MoM and CoC had a 7-15 years adjusted HR of revision due to 'other' causes of 6.3 (2.1-19) and 2.1 (0.8-6.0).

Interpretation / Conclusion: For patient between 20-54 years receiving a primary stemmed cementless THA MoXLP bearings have better survival than MoM and CoC bearings, mainly because of lower risk of revision due to aseptic loosening and 'other' causes.

No difference for changes in BMD between two different cementless hip stem designs 2 years after THA

85.

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Background: This study evaluates how 2 different total hip arthroplasty (THA) stems compares regarding adaptive bone remodelling. The stems are both proximally porous coated, aiming for proximal fixation, but with different dispersal of the coating. They are also differently designed regarding the distal tip of the stem.

Aim: We aimed to investigate if there is a difference in periprosthetic adaptive bone remodelling between two different designs.

Materials and Methods: From February 2016 to September 2017, we randomised 62 patients, 1:1 (mean age=64 years, Female/Male=28/34), scheduled for an uncemented THA to receive either an EBM or a BM THA stem. We performed dual-energy x-ray absorptiometry (DEXA) scans within a week after surgery and at 3, 6, 12 and 24 months with measurements of bone mineral density (BMD) in the 7 Gruen zones (region of interest (ROI) 1-7). Additionally, Oxford Hip Score and Harris Hip Score were collected at 6, 12 and 24 months.

Results: We found a decrease in BMD between the postoperative and the 24-months values in all ROIs for both stems. The greatest decrease over time was seen for both groups in the ROI1 (BM =-8.4%, $p=0.044$, and EBM=-6.5%, $p=0.001$) and ROI7 (BM =-7%, $p=0.005$, and EBM=-8.6%, $p<0.0005$). We found a tendency in ROI2-4 of a higher degree of bone loss in the EBM group. However, this difference only continued beyond 6 months in ROI4 (24 months: BM=-1.2% and EBM =-2.8%, $p=0.001$).

Interpretation / Conclusion: The stems show similar adaptive bone remodelling and are clinically performing well

Risk factors for dislocation and re-revision after first-time revision total hip arthroplasty due to recurrent dislocation – a study from the Danish Hip Arthroplasty Register

86.

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Background: Persistent instability after hip revision due to dislocation is a serious problem. In order to lower the risk of this complication, it is essential to identify risk factors.

Aim: Our aim was to analyze surgery- (liner type, extent of revision, head size) and patient- (age, sex, Charlson comorbidity index (CCI)) related risk factors for both new dislocation and re-revision of any cause following a first-time revised hip due to dislocation.

Materials and Methods: We included patients with a primary THA due to osteoarthritis and a first-time revision due to dislocation registered in the Danish Hip Arthroplasty Register (DHR) from 1996–2016. Patients were followed from the day of the first revision to either Dec. 2018, re-revision, or death. We identified dislocations in the Danish National Patient Register based on a validated method and re-revisions in the DHR. Risk factors were analyzed by a Fine-Gray multiple regression analysis adjusting for the competing risk of death. Results are presented as sub-distribution hazard ratios (sHR) with 95% confidence intervals.

Results: We identified 1,678 first-time revisions due to dislocation and 22.4% of these had a new dislocation. 19.8% were re-revised for any reason. Median follow-up was 5.3 years. For new dislocations, the sHR was 0.36 (0.27–0.48) for those who had a constrained liner (CL) during revision and 0.21 (0.08–0.58) for dual mobility cups (DMC) meaning a lower risk of dislocations compared to regular liners. Changing only the head/liner increased the risk of dislocation (sHR=2.65 (2.05– 3.42)) compared to full cup revisions. Age, sex, CCI, and head size was not significant risk factors for new dislocations. Regarding risk of new re-revision, changing only head/liner resulted in an increased risk of re-revision (sHR=1.73 (1.34–2.23)). Patients <65 years had increased risk of re-revision compared to 65–75 years (sHR=1.36 (1.05–1.77)). Sex, CCI, head size and liner type were not significantly associated with re-revisions.

Interpretation / Conclusion: Patients revised with a DMC and CL were associated with a lower risk of dislocation after a first-time revision but not re-revision whereas only changing the head/liner was associated with higher risk of dislocation and re-revision.

The impact of socioeconomic status on the 30- and 90-day risk of infections after a total hip arthroplasty

87.

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Background: In orthopaedic surgery, the quality of care and outcomes after surgery are correlated to socioeconomic status (SES). However, previous research concerning infection is limited by assessing SES only by a single marker, no distinction between infection causes, or area-based SES measurements.

Aim: We examined whether SES is associated with the risk of hospitalization due to infections after total hip arthroplasty (THA) within 30 and 90 days.

Materials and Methods: We obtained individual-based information on SES markers (cohabitation, education, income, and liquid assets) on 103,901 THA patients from Danish health registers (year 1995–2017). The outcome was readmission due to any infection, pneumonia, urinary tract infection (UTI), or periprosthetic joint infection (PJI). We calculated the cumulative incidences with death as competing risk, and we used the pseudo-observation method and generalized linear regression to estimate relative risks (RR) with 95 % confidence intervals (CI).

Results: The cumulative incidence of any infection at 90 days was highest among patients who lived alone (1.5% (CI 1.3–1.6)), had the lowest education (1.1% (CI 1.0–1.6)), had the lowest income (1.5% (CI 1.3–1.6)), and had lowest liquid assets (1.3% (CI 1.1–1.4)). The RRs for any infection within the first 30 days were 1.5 (CI 1.3–1.7) for patients living alone vs. cohabiting, 1.3 (CI 1.1–1.6) for medium income vs. high income, and 1.6 (CI 1.4–1.8) for low liquid assets vs. high liquid assets. Education was not associated with the risk of any infection, however, the RR for pneumonia was 8.0 (CI 2.2–30.0) for low education vs. high education. The RR for PJI were 1.2 (0.6–2.3) for patients living alone vs. cohabiting, 1.6 (0.8–3.3) for low liquid assets vs. high liquid assets. The same trends were seen within the first 90 days.

Interpretation / Conclusion: We found that living alone, low education, low income, and low liquid assets were all associated with higher risks of infections within the first 30 and 90 days after THA. Our findings highlight the socioeconomic disadvantage as a risk factor for developing infection after THA, emphasizing the importance of policy-, patient-, and surgeon practice when addressing inequalities in THA outcome.

Dislocation rate of Dual Mobility Cup in 2711 THAs with up to ten years follow-up

88.

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Background: Dislocation is a well-known complication after total hip arthroplasty (THA). The dual mobility cup (DMC) has shown promising results in lowering the dislocation rate compared to conventional cups, but not many studies on long-term dislocation rate of DMC in a large cohort are available.

Aim: To determine the dislocation rate of DMC in primary THAs in a large cohort with up to ten years follow-up. Further, to elucidate factors that might affect the dislocation rate.

Materials and Methods: The Danish Hip Arthroplasty Registry (DHR) was used to identify primary THAs with DMC inserted at Viborg Regional Hospital since January 2001. 2711 were included, 1874 Saturne® cups and 837 Avantage™ cups. Events of dislocations, revisions and patient deaths were retrospectively identified by review of medical files. Information for subgroup analysis was collected from DHR.

Results: The two-year dislocation rate for DMC was 2,21%, ten-year dislocation rate was 2,79%. The risk of dislocation was lowest in patients who had THA with DMC due to primary arthrosis with a ten-year dislocation rate of 1,4% and highest in patients treated for a displaced collum femoris fracture with a ten-year dislocation rate on 4,00%. No significant difference in risk of dislocation was found when comparing Saturne® and Avantage™ cups.

Interpretation / Conclusion: Our findings indicate a lower dislocation rate of DMC compared to conventional cups, especially in regard to long-term risk. Further studies on prosthesis survival of DMC are needed.

Socioeconomic status and use of analgesic drugs before and after primary total hip arthroplasty: A population based cohort on 103,209 patient undergoing primary total hip arthroplasty during 1996-2018

89.

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Background: Hip osteoarthritis (OA) approximately affects 11% of people globally. When pharmacological and non- pharmacological treatment fail to provide adequate pain relief, total hip arthroplasty (THA) is recommended. Although THA is an effective and common procedure, persistent pain and use of analgesics up to two years after THA surgery are common.

Aim: We examined the trends in the utilization of analgesics before and after THA, overall, and in relation to markers of socioeconomic status (SES) in a population based cohort.

Materials and Methods: We used the Danish Hip Arthroplasty Registry to identify 103,209 patients who underwent THA between 1996 and 2018. Data on medication and SES markers were obtained from Danish medical databases. Proportions of redeemed prescriptions for analgesics with 95% confidence intervals (95%CI) were calculated for 4 quartiles before and 4 quartiles after THA for the entire THA population, and by three SES markers (education, cohabiting status and wealth).

Results: Overall, the proportion of analgesic use was 41.8% (95%CI 40.5;42.1) at 9-12 months and 58.8% (95%CI 58.5;59.1) at 0-3 months before THA. The proportion of analgesics reached its highest at 64.0% (95%CI 63.7;64.3) 0-3 months after THA, but declined to 27.0% (95%CI 26.8;27.3) at 9-12 months after THA. Low education, living alone and having low wealth (low SES) were associated with higher proportions of analgesic use both before and after THA. Use of analgesics decreased after THA regardless of SES, but the decrease was less pronounced among patients with low SES.

Interpretation / Conclusion: The use of analgesics decreased 9-12 months after THA, but remained relatively high. Our results suggest that clinicians should focus in the larger extent on patients with low SES when phasing out of opioid treatment and planning rehabilitation.

Strength of fixation in non-metallic vs. metallic tension band wiring of patella fractures - A human cadaveric biomechanical study

90.

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Background: Transverse patella fractures are traditionally treated with metallic tension band, which is associated with high reoperation rates due to implant failure, infection, and most of all implant prominence. Non-metallic techniques could be a viable alternative.

Aim: To assess whether strength of fixation of transverse patella fractures using a non-metallic all suture-based technique applied only in soft tissue is comparable to traditional metallic tension band.

Materials and Methods: Twenty paired human cadaveric specimens were included. A transverse fracture was created, reduced and fixated using either a standardized non-metallic or metallic technique in a pairwise random fashion. Metallic fixation was done according to the AO description of modified anterior tension band wiring with k-wires. Specimens were fixed in 90 degrees of flexion and underwent 200 cycles of loading in a MTS® apparatus by pulling the Quadriceps tendon to 300 Newton. Fracture displacement was optically monitored using digital image correlation. Primary outcome was mean fracture displacement after 200 cycles compared to the first cycle. Subsequently, load-to-failure was assessed by a monotonic pull to 1000 N. Failure was defined as a drop in the force measured by the force transducer.

Results: For cyclic loading analysis, one specimen from each group was excluded due to technical difficulties with the DIC. Median (min-max) fracture displacement was 0.65 mm (0.06-1.3) in the non-metallic group ($p=0.931$) and 0.68 mm (0-1.23) in the metallic group. No difference in displacement was found between the two groups in the repeated measures analysis of variance ($p=0.5524$). For load-to-failure analysis one specimen was excluded. 2/9 specimens failed in the non-metallic group (at 979 and 635 N) and 2/10 failed in the metallic group (745 and 654 N).

Interpretation / Conclusion: Non-metallic and metallic techniques showed similar strength of fixation during both cyclic and failure loading. We conclude that the non-metallic technique biomechanically is a viable alternative to traditional tension band fixation. Non-metallic techniques may have fewer implant-related complications, which we suggest as a focus for future studies.

Weight-based cefuroxime dosing provides comparable orthopedic target tissue concentrations between weight groups – A microdialysis porcine study

91.

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Background: In orthopedic surgery, perioperative antibiotic prophylaxis is a key element in the prevention of surgical site infections (SSI). For the majority of procedures, antibiotic administration follows fixed dosing regimens irrespective of weight. Obese patients (BMI ≥ 30 kg/m²) have higher risk of SSI's, which may be attributed to insufficient antibiotic target tissue concentrations.

Aim: To investigate the effect of weight-based cefuroxime dosing on plasma and target tissue concentrations relevant for orthopedic surgery; bone, skeletal muscle and subcutaneous tissue.

Materials and Methods: Eighteen female pigs were included and randomized to three study groups of six pigs differentiated by weight: Group 1: 53–57 kg, Group 2: 73–77 kg, and Group 3: 93–97 kg. Microdialysis catheters were placed for sampling in cancellous bone (scapular neck), deltoid muscle and surgical site subcutaneous tissue. Blood samples were drawn from a central venous catheter. Cefuroxime was dosed according to weight (20 mg/kg) and administered intravenously as one bolus. Continuous sampling was performed during 8 hours from cefuroxime infusion. Cefuroxime concentrations were quantified using chromatography. The primary endpoint was time above cefuroxime clinical breakpoint minimal inhibitory concentration for *Staphylococcus aureus* ($T > \text{MIC}$ (4 $\mu\text{g/mL}$)).

Results: Similar $T > \text{MIC}$ (4 $\mu\text{g/mL}$) in all target tissues were found between groups. Mean $T > \text{MIC}$ (4 $\mu\text{g/mL}$) ranged between 116–137 min (plasma), 118–154 min (bone), 109–146 min (skeletal muscle), and 117–165 min (subcutaneous tissue) across the three groups. A mean cefuroxime concentration of 4 $\mu\text{g/mL}$ was reached within 19 min in all the investigated compartments and in all groups.

Interpretation / Conclusion: Weight-adjusted (20 mg/kg) cefuroxime dosing provided comparable plasma and orthopedic target tissue $T > \text{MIC}$ (4 $\mu\text{g/mL}$) in three different weight groups. Especially in obese patients, a weight-based cefuroxime dosing approach may optimize the perioperative target tissue exposure and potentially reduce the risk of surgical site infections.

Electrical impedance correlates with radiographic bone healing in rabbits

92.

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Background: Home-based monitoring of fracture healing has the potential of reducing routine follow-up and improve personalized fracture care. Implantable sensors measuring electrical impedance might detect changes in the electrical current as the fracture heals.

Aim: The aim was to investigate whether electrical impedance correlated with radiographic fracture healing.

Materials and Methods: Eighteen rabbits were subjected to a tibial osteotomy that was stabilized with an external fixator. Two electrodes were positioned, one electrode placed within the medullary cavity and the other on the lateral cortex, both three millimeters from the osteotomy site. Transverse electrical impedance was measured daily across the fracture site at a frequency range of 5 Hz to 1 MHz using an Analog Discovery 2 Oscilloscope with Impedance Analyzer. Biweekly x-rays were taken and analyzed blinded using a modified anterior-posterior (AP) radiographic union score of the tibia (RUST). Each animal served as its own control by performing repeated measurements from time zero until the end of follow-up.

Results: At 5 Hz measurements, a linear mixed model revealed an average impedance at day zero of 10670 ± 272 Ohm ($p < 0.001$) and a change in impedance from day 0 to day 7 of -3330 ± 152 ($p < 0.001$). The slope from day 0–7 was estimated as -548.6 ± 26 ($p < 0.001$) and was steeper than the slope after day 7 which was estimated to -85.6 ± 4 ($p < 0.001$). This indicates that the impedance decreased quicker before day 7 and slower after day 7. The coefficient of variation for difference between RUST scores, from double intra-rater measurements of 15 radiographs with a minimum of 22 days between, was 1.3. Spearman's correlation coefficient between impedance and RUST score at the 5 Hz was -0.75 ($p < 0.001$).

Interpretation / Conclusion: This osteotomy model showed that the electrical impedance can be measured in vivo at a distance from the fracture site with a consistent change in impedance over time. This is the first study to demonstrate a significant correlation between increasing radiographic union score and decreasing impedance. Further studies are warranted to investigate how these new and important results can further be translated into larger animal studies.

Reduced risk of skin tears when treating Dupuytren's disease with collagenase and band-aid: A prospective cohort study

93.

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Background: Skin tears is one of the most common side effects when treating Dupuytren's disease (DD) with collagenase *Clostridium Histolyticum*. The skin tears occur when the finger is manipulated.

Aim: The purpose of this study was to examine the effects of a supplementary band-aid on the risk of skin tears for people treated with collagenase *Clostridium Histolyticum* for DD. Furthermore, we examined short-term effects, patient reported outcomes and adverse events.

Materials and Methods: From June 2012 to January 2017, 177 patients with DD and 237 fingers in total were treated with collagenase *Clostridium Histolyticum*. 108 patients received a supplementary band-aid before manipulation of the finger, and 104 did not. We compared the rate of skin tears between the two groups, as well as the effect on function, patient related outcomes, failure of treatment, adverse events, return to work, daily activities and patient satisfaction after 3 months.

Results: We found a 2.2 (CI 1.47 to 3.41, p-value <0.001) greater risk of skin tears during manipulation for patients who did not receive a supplemental band-aid. Skin tears occurred in 43.2% (CI 34.13 to 52.66) and 19.3% (CI 12.66 to 27.58) in the no band-aid and band-aid group, respectively. Furthermore, patients who received a supplementary band-aid had a better MCP joint function at the 3-month follow-up, and they returned more quickly to daily activities. There was no difference between the two groups in patient reported outcomes.

Interpretation / Conclusion: This study has shown that a supplementary band-aid can reduce the risk of skin tears in patients treated with collagenase during manipulation.

Superior survival and local control following particle therapy in chordomas

94.

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Background: Chordomas are rare slow-growing neoplasms affecting the spine from the base of the skull to the sacrum. These tumors are resistant to both chemo- and radiotherapy and situated in close proximity to radiosensitive neural structures. In theory particle therapy could remedy this based on the physical properties of the radiation.

Aim: The primary aim was to investigate the isolated clinical effects on overall survival following chordoma treatment with particle therapy versus photon radiotherapy in adults.

Materials and Methods: A systemic review of available literature was conducted in Cochrane, Medline and EMBASE and meta-analysis was performed on data from primary studies. The databases were searched from inception until December 2019. The search yielded 1118 articles of which 79 which were eligible for inclusion with a combined patient population of 4491.

Results: Our overall weighted estimate of the data suggests an advantage in treating chordomas located in skull and spine with particle therapy compared to photon radiotherapy on 5-year overall survival (81.4% vs 74.2%) and 5-year local control (70.6% vs 51.5%). A sub-analysis of particle therapy suggests carbon ion therapy to be slightly superior compared to proton therapy on 5-year overall survival (84.6% vs 79.7%) and 5-year local control (74.3% vs 68.1%).

Interpretation / Conclusion: Particle therapy allows for the safe and effective delivery of radiation doses exceeding 70 GyE (Gray equivalents), necessary to treat chordomas. It can spare surrounding tissues of up to 25 GyE, resulting in acceptable levels of radiation toxicities, while 5-year overall survival and local control is improved compared with photon-based therapies. Furthermore, carbon ion therapy appears to have improved outcomes compared to proton therapy, but this modality is not available in Denmark. There are several limitations to the study. The primary studies are retrospective, not uniform, of different timespans within nearly century, do not necessarily differentiate between various modalities, and chronological bias may be a significant confounder. As such the data is subject to significant confounders and direct comparative studies would be beneficial.

Can *one* exercise per day keep surgery away? A randomized dose-response trial of coordinated home-based knee-extensor exercise in patients eligible for knee replacement (the QUADX-1 trial).

95.

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Background: Guidelines recommend that exercise has been tried before surgery is considered in patients with severe knee osteoarthritis (OA). Low knee-extensor strength is associated with worse symptoms in patients with knee OA. Exercise may play a role improving knee-extensor strength and physical function before surgery, but the optimal dosage is unclear.

Aim: To compare the efficacy of three knee-extensor strength exercise dosages on knee-extensor strength and patient-reported outcomes before surgery in patients eligible for knee replacement.

Materials and Methods: One-hundred and forty patients eligible for knee replacement were randomized to 2, 4 or 6 home-based knee-extensor exercise-sessions per week for 12 weeks. Eligibility for surgery was assessed by an orthopedic surgeon. Exercise instruction was done by a physiotherapist. The primary outcome was change in knee-extensor strength after 12 weeks. Secondary outcomes were: “need for surgery?” – re-evaluation of treatment, change in Oxford Knee Score, Knee Osteoarthritis Outcome Score, average knee pain last week (0–10 numeric rating scale), 6–minute walk test and stair climbing test. Intention-to-treat, One-way ANOVA statistics were used to analyze between-group differences. ClinicalTrials.gov ID: NCT02931058.

Results: After 12 weeks of exercise, data were available for 117 patients (39/group). Primary outcome: no difference between the three groups on knee-extensor strength at 12 weeks. Secondary outcomes: “need for surgery?” (all groups): 38 (32.5%) patients wanted surgery, 79 (67.5%) postponed surgery, and there was significant difference between group “2 sessions/week” and “6 sessions/week” for Oxford Knee Score (4.2 [95% CI 0.6 to 7.8], $P=0.02$) and average knee pain last week (NRS 0–10) (–1.1 [95% –2.2 to –0.1], $P=0.03$) in favour of two sessions per week. No other differences were observed.

Interpretation / Conclusion: Prescribing knee-extensor exercise for 2, 4 or 6 times per week result in the same levels of knee-extensor strength after 12 weeks. However, two home-based exercise sessions a week seems superior in relation to patient-reported outcomes – and importantly – only one of three patients wanted surgery after home-based knee-extensor exercise.

Comparison of cementless double-peg, cemented single-peg and cemented double-peg femoral component migration after medial Oxford unicompartmental knee replacement – A 5-year randomized RSA study.

96.

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Background: Many studies have investigated the tibial component migration but the knowledge on femoral component migration is limited.

Aim: This study aimed to examine the potential fixation difference between cemented single-peg (CS), cemented double-peg (CD) and cementless double-peg (CLD) femoral components of medial unicompartmental knee arthroplasty (UKA).

Materials and Methods: 80 patients (mean age = 63 years, 48 males) with medial knee osteoarthritis were randomized 3-ways to cemented single-peg UKR (n=29), cemented double-peg UKR (n=26) or cementless double-peg femoral UKR components (n=25). Patients were followed 5 years postoperatively with RSA and bone mineral density (BMD).

Results: At 5-years follow-up, femoral component total translation was comparable between the CS, CD and CLD group ($p=0.60$). The femoral internal/external rotation was 0.17 degrees (95% CI: -0.04 – 0.37) for the CS group, 0.62 degrees (95% CI: 0.40 – 0.84) for the CD group, and 0.50 degrees (95% CI: 0.28 – 0.71) for the CLD group, with higher rotation in the CD group than the CS group ($p=0.01$). There was no correlation between periprosthetic BMD and component migration.

Interpretation / Conclusion: Considering cemented single-peg femoral components as reference, cemented double-peg components showed slightly higher internal/external rotation at 5-years follow-up, which although statistically significant might not be clinically relevant. There was no dependency on periprosthetic bone mineral density.

Circumstances for optimized medial Unicompartmental Knee Arthroplasty outcome. Learning from 20 years of propensity score matched registry data.

97.

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Background: Medial Unicompartmental knee arthroplasties (UKA) have historically produced revision rates up to six times higher than those of total knee arthroplasty (TKA). However, recent changes to practice have been linked to improved implant survival for UKA, leading to the hypothesis that the risk of revision for UKA has decreased over the last 20 years.

Aim: Therefore, the aims were to 1) investigate changes to revision risk for UKA over the last 20 years compared to TKA, 2) identify implant, surgery or patient factors that correlate to UKA revision risk and 3) describe the survival probability for the current UKA and TKA practice.

Materials and Methods: All knee replacements reported to the Danish Knee Arthroplasty Register from 1997 to 2017 were linked to the National Patient Register and the Civil Registration System for information on comorbidities, emigration and mortality. We included all primary UKA and TKA performed due to primary osteoarthritis and propensity score matched TKA procedures to UKA procedures in a 4:1 ratio. Revision and mortality were analyzed using competing risk cox regression with a shared gamma frailty component.

Results: The matched cohort included 48,195 primary knee arthroplasties (9639 UKA). Difference in revision rates between UKA and TKA have significantly decreased over the last 20 years from 3-year hazard ratio 5.52 (CI 95 % 2.73-11.2) to 1.45 (CI 95 % 1.16- 1.81) due to increased UKA survival. Fixation mode, UKA usage rates and surgical volume all significantly modified the revision risk for UKA, and changed parallel to the decreasing revision risks. Thus the current typical UKA practice using cementless fixation at high usage unit has increased the 3-year implant survival to 96.4 % (CI 95 % 97.4- 95.4) which is 1.1 % lower than that of current TKA practice.

Interpretation / Conclusion: There has been a decrease in UKA revision risk over the last 20 years, reducing the difference in revision risk between UKA and TKA. High usage rates, surgical volume and the use of cementless fixation have increased during the study period and were all associated with lower UKA revision risks.

Length of Stay and 90-Day Readmission/Complication Rates in Unicompartmental Versus Total Knee Arthroplasty: A propensity-score-matched study of 10,494 procedure performed in a fast-track setup.

98.

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Background: It is still debated whether to use unicompartmental (UKA) or total knee arthroplasty (TKA) in appropriate osteoarthritis cases. UKA potentially offers faster recovery and fewer short-term complications. However, studies are reporting differences in preoperative comorbidity between TKA and UKA patients that could be affecting outcomes.

Aim: The aim of this study was to investigate differences in length of postoperative stay (LOS), readmissions and complications within 90 days of surgery between propensity score matched UKA and TKA patients.

Materials and Methods: UKA and TKA patients, operated in well-defined fast-track setup, from nine orthopaedic centers were included in this study. Propensity score matching (intended ratio = 1:3 [UKA:TKA]) was used to address differences in preoperative comorbidity between UKA and TKA patients resulting in a matched cohort of 2786 UKA patients and 7708 TKA patients. Univariable regression models, multivariable mixed effects models with surgical center as a random effect, and Chi-Squared test were used to investigate differences in LOS, readmission and complication rates between UKA and TKA patients.

Results: No indications of imbalance within demography and preoperative comorbidity were present between groups after matching. The UKA-group had a lower LOS compared to the TKA-group (median LOS 1 vs 2 days, $p < 0.001$). UKA patients were more likely to be discharged on the day of surgery (OR = 38.5 [95% CI 27.0-52.6]) and less likely to have a LOS > 2 days (OR = 0.20 [95% CI 0.17-0.24]) compared to TKA patients. There was no difference in 90-day readmission rate. UKA patients had fewer prosthetic joint infections (OR = 0.50 [95% CI 0.26-0.99]) and reoperations (OR = 0.40 [0.20-0.81]) compared to TKA patients. However, aseptic revisions were more frequent in UKA patients compared to TKA patients (OR = 2.5 [95% CI 1.1-6.0]).

Interpretation / Conclusion: UKA patients had shorter hospital stays, a higher rate of discharge on the day of surgery, fewer prosthetic joint infections and reoperations compared to TKA patients. However, TKA patients had fewer aseptic revisions. Our findings support the use of UKA in a fast-track setup whenever indicated.

Prosthesis survivorship after revision knee arthroplasty performed on the indications; “pain without loosening” versus “aseptic loosening” – a Danish nationwide study

99.

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Background: Patients having a knee arthroplasty revised on the indication “pain without loosening” are thought to experience a worse outcome than patients revised on other indications.

Aim: The purpose of this study is to investigate the survival of knee arthroplasties revised on the indication “pain without loosening” compared to “aseptic loosening” and to compare survival rates over two time-periods, 1997–2009 and 2010–2018.

Materials and Methods: This is a retrospective cohort study on data from the Danish Knee Arthroplasty Register (DKR) and the Danish National Patient Register (DNPR). The main outcomes are incidence rates of re-revisions reported as proportions. Competing risks regression adjusted for other variables.

Results: 3753 knee revision arthroplasties were performed in the period 1997–2018. 1111 (29.6%) on the indication “pain without loosening” and 2642 (70.4%) on the indication “aseptic loosening”. The cumulated incidences of re-revision in the “pain without loosening”-cohort after 2, 5 and 20 years were 11.6% [9.9;13.6], 17.7% [15.6;20.1] and 22.6% [20.2;25.1] and in the “aseptic loosening”-cohort 10.5% [9.4;11.8], 15.6% [14.3;17.1] and 19.0% [17.5;20.5]. Subhazard ratio for re-revision comparing “pain without loosening” to “aseptic loosening” was 1.08 [0.89;1.31], $p=0.414$. The risk of re-revision in the “pain without loosening”-cohort in the first period at 2, 5 and 8 years was 11.1% [8.7;14.0], 18.0% [15.0;21.5] and 22.0% [18.6;25.7]. The risk of re-revision in the second time-period at 2, 5 and 8 years was 12.2% [9.7;15.0], 17.5% [14.6;20.8] and 18.2% [15.2;21.5]. The risk of re-revision in the “aseptic loosening”-cohort in the first time-period was 11.4% [9.6;13.4], 18.5% [16.3;20.9] and 21.7% [19.3;24.3]. In the second time-period the risk was 9.9% [8.6;11.5], 13.7% [12.1;15.5] and 14.6% [12.9;16.4].

Interpretation / Conclusion: We did not find an increased risk of re-revision for patients having a knee arthroplasty revised on the indication “pain without loosening” compared to “aseptic loosening”. The survival rates improved from 2010–2018 compared to 1997–2009 on both indications.

Tibia component under-sizing is related to high degrees of migration in cementless TKA.
- 111 patients RSA data for cementless tibia components, blinded x-ray assessments and two years follow-up.

100.

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Background: Radiostereometric analysis (RSA) studies have shown that continuous migration of tibia components can predict aseptic loosening after total knee replacement (TKA). In this study we investigated if accurate size and placement of the tibia components, could be related to the degree of migration using RSA measurements.

Aim: To investigate if undersizing/oversizing, malalignment of the tibia component is related to higher degrees of component migration.

Materials and Methods: We performed 2 year follow up of 111 patients who underwent TKA surgery with cementless tibia components. Radiostereometric analysis was performed postoperatively and after 3, 6, 12 and 24 months. Postoperative X-rays were evaluated with respect to component size and placement in the tibia, by experienced knee surgeons blinded to migration data, and clinical outcome. Statistics: Multivariate linear regression analysis

Results: Continuous migration (12–24 months) was negatively related to tibia component under-sizing -0.2 (CI $-.33 - -.08$). Subsidence was related to absence of posterior cortical support -0.7 (CI $-1.09 - -.28$), absence of lateral cortical support 0.8 (CI $.29 - 1.37$) and frontal plane varus malalignment 0.6 (CI $.12 - 1.16$) and component under-sizing -0.4 (CI $-.06 - -.68$). Posterior tilt was related only under-sizing 0.6 (CI $.27 - 1.11$).

Interpretation / Conclusion: Undersized cementless tibia components are at risk of poor fixation with continuous migration, and therefore higher risk of aseptic loosening should be expected.

Does changes in Unicompartmental Knee Arthroplasty practice pattern influence reasons for revision? A study of 9639 cases from the Danish Knee Arthroplasty Register.

101.

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Background: The changes to practice for medial unicompartmental knee arthroplasty (UKA) seen in recent years, have been linked to decreased UKA revision risk. Is the decreased risk due to a decreased risk for all revision indications, or is it linked to a few select indications?

Aim: We aimed to determine the national revision indication pattern and the timing for revision by indication for UKA and Total Knee Arthroplasty (TKA). Secondly, to investigate any changes to UKA revision indication patterns over time and any correlation to recent changes in UKA practice.

Materials and Methods: All primary knee replacements performed due to primary osteoarthritis and their revisions reported to the Danish Knee Arthroplasty Register in 1997-2017 were included. Complex surgeries were excluded. Comorbidity, mortality and emigration status was obtained from the National Patient Register and Civil Registration System. TKA procedures were propensity score matched 4:1 to UKA procedures. Revision risks were compared using competing risk cox proportional hazard regression with a shared gamma frailty component to account for bilateral cases.

Results: Loosening was the most common revision indication for both UKA (26.7 %) and TKA (29.5 %). Pain and disease progression accounted for 54.6 % of the remaining UKA revisions. Infections and instability accounted for 56.1 % of the remaining TKA revisions. TKA revisions were on average performed 6 months earlier than UKA revisions, due to differences in revision indication patterns. The prevalence of UKA revisions from loosening or pain have decreased over the last decade, and were in 2017 among the three least common indications. Cementless UKAs were less likely to get revised from pain (HR 0.40, CI 95 % 0.170.94) or loosening (HR 0.29, CI 95 % 0.100.81) than cemented UKAs. UKA revisions from pain (HR 0.67, CI 95% 0.500.91) or loosening (HR 0.51, CI 95 % 0.370.70) were less likely at high UKA usage units.

Interpretation / Conclusion: The overall 20 year revision patterns for UKA and TKA are comparable to previous published patterns. There has been a large change in revision pattern for UKA in the last decade, and with the current surgical practice, revision due to pain or loosening are significantly less likely.

In- and outpatient supervised rehabilitation regime vs. self-management instruction following unicompartmental knee arthroplasty – a pilot study in two cohorts

102.

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Background: The optimal rehabilitation strategy after a unicompartmental knee arthroplasty (UKA) is unclear.

Aim: We aimed to pilot study the effect of transitioning from a supervised to a self management rehabilitation regime by study of patient outcomes subsequent to UKA surgery.

Materials and Methods: Fifty consecutive patients scheduled to undergo unilateral UKA surgery at our institution between 22nd February 2016 and 18th of January 2017 were prospectively identified. Performed UKAs were grouped into two cohorts, Supervised Cohort and Self-management Cohort, temporally separated by new rehabilitation regime introduction. Self-management Cohort(n=25) received an extensive inpatient rehabilitation regime along with outpatient referral to rehabilitation center. The Self-management Cohort(n=25) were only instructed in use of crutches and free ambulation at own accord. Follow-up (F/U) was 1 year from receiving UKA. A range of outcomes were recorded, and between-cohort differences compared: knee joint range of motion, pain and functional limitations, length-of-stay, readmission rate, pain during activity and rest, and knee circumference.

Results: Complete data was obtained for n=45 patients. The mean between-cohort difference in ROM from preoperatively to discharge was 15.4 degrees (CI:5.2,25.8, p=0.004), favoring the supervised regime, with no difference at 3- or 12 months F/U. No significant difference was detected in other outcomes.

Interpretation / Conclusion: Transition to a simple rehabilitation regime following UKA surgery was associated with decreased ROM at discharge, which was not present at 3-and 12 months F/U. We found no other between-cohort differences for any other outcomes, although the study was likely underpowered for these outcomes. We encourage large-scale replication of these findings using randomized designs.

Patients with knee osteoarthritis can be divided in subgroups based on tibiofemoral joint kinematic clustering of gait – An exploratory and dynamic radiostereometric study

103.

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Background: In an attempt to alleviate symptoms of the disease, patients with knee osteoarthritis (KOA) frequently alter their gait patterns. Understanding the underlying pathomechanics and identifying KOA phenotypes is essential for improving treatments.

Aim: We aimed to investigate altered kinematics in patients with KOA to identify subgroups.

Materials and Methods: Sixty-six patients with symptomatic KOA scheduled for total knee arthroplasty and 12 age-matched healthy volunteers with asymptomatic knees were included. We used k-means to separate the patients based on dynamic radiostereometric assessed knee kinematics. Ligament lesions, KOA score, and clinical outcome were assessed by magnetic resonance imaging, radiographs, and patient reported outcome measures, respectively.

Results: We identified four clusters that were supported by clinical characteristics. Compared with the healthy group; The flexion group (n=20): revealed increased flexion, greater adduction, and joint narrowing and consisted primarily of patients with medial KOA. The abduction group (n=17): revealed greater abduction, joint narrowing and included primarily patients with lateral KOA. The anterior draw group (n=10): revealed greater anterior draw, external tibial rotation, lateral tibial shift, adduction, and joint narrowing. This group was composed of patients with medial KOA, some degree of anterior cruciate ligament lesion and the greatest KOA score. The external rotation group (n=19): revealed greater external tibial rotation, lateral tibial shift, adduction, and joint narrowing while no anterior draw was observed. This group included primarily patients with medial collateral and posterior cruciate ligament lesions.

Interpretation / Conclusion: Patients with KOA can, based on their gait patterns, be classified into four subgroups, which relate to their clinical characteristics. The findings add to our understanding of associations between disease pathology characteristics in the knee and the pathomechanics in patients with KOA. A next step is to investigate if patients in the pathomechanic clusters have different outcomes following total knee arthroplasty.

Is use of tourniquet associated to increased risk of venous thromboembolism after fast-track total knee arthroplasty? – a prospective multicentre cohort study of 16,267 procedures

104.

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Background: Venous thromboembolism (VTE) is an important postoperative complication to total knee arthroplasty (TKA). The introduction of fast-track has shown favorable outcomes with regards to risk of VTE. However, use of tourniquet has shown conflicting results for risk of VTE after TKA. To date no data exist on the associated risk for VTE after TKA using tourniquet in a fast-track set-up.

Aim: Consequently, we hypothesized that use of tourniquet in an unselected prospective multicenter fast-track TKA setting with in-hospital only thromboprophylaxis if length of stay (LOS) ≤ 5 days were associated to increased risk of 90-day VTE.

Materials and Methods: We used an observational cohort study design from 9 dedicated fast-track centres including unselected unilateral primary TKA from 2010–2017. Prospective collection of preoperative risk-factors, complete follow-up on LOS, 90-day readmissions and mortality from the Danish National Patient Registry; use of tourniquet from the Danish knee arthroplasty register; and identification of postoperative VTE from health records if LOS > 4 days or 90-day readmission. Risk analysis were performed using a mixed effects logistic regression model adjusting for previously identified risk-factors for 90-day VTE after fast-track TKA and TKA (BMI, age, and history of VTE) as fixed effects and department as a random effect.

Results: Of the 16,267 procedures (39.1% males, mean age 67.9 (SD 10.0) years, median LOS 2 [IQR 2–3]) 12,518 (77.0%) were performed using a tourniquet (median duration 60 [51–70] min). The annual tourniquet usage varied greatly between departments from 0 % to 100%, but also within departments from 99% to 0%. The 90-day incidence of VTE was 77 (0.47%) without significant difference with or without tourniquet 52 (0.42%) vs 25 (0.67%) ($p=0.056$), respectively. This association remained insignificant with OR 0.62 (95% CI: 0.38–1.01, $p=0.054$) after adjustment for previously identified risk-factors.

Interpretation / Conclusion: The use of tourniquet was not associated to increased 90-day VTE risk after fast-track TKA. However, further investigations on the unexpected insignificant tendency of a protective effect of tourniquet is warranted.

Biomechanical comparison of tension band wiring and all-suture fixation in transverse olecranon fractures

105.

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Background: Tension band wire (TBW) fixation is a well-known method for treating simple displaced olecranon fractures, though associated with a high risk of complications such as wound breakdown or prominent hardware causing discomfort. An all-suture technique (AS) has been proposed as an alternative with potentially fewer complications but this technique has never been validated in a biomechanical setup.

Aim: To evaluate strength of fixation in simple olecranon fractures comparing TBW to AS.

Materials and Methods: Twenty matched pairs of fresh-frozen human cadaveric elbows were used. A transverse fracture was made, reduced and fixated using either TBW or AS. Standardized TBW fixation was done according to AO principles and AS was done as described by Phadnis et al. The triceps tendon was mounted in a Measure Test Simulate apparatus with the elbow fixed in 90 degree flexion and loaded to 200 N for 200 cycles. Fracture displacement was optically monitored using Digital Image Correlation (DIC). The Primary outcome was median fracture displacement after 200 cycles. Finally, a load-to-failure test (LF) was performed by a monotonic pull to 1000 N. Failure was defined as a drop in force measured by a force transducer.

Results: Two specimens in the AS group were excluded from cyclic loading analysis due to technical difficulties with DIC. For cyclic loading analyses, median (min-max) fracture displacement was 0.18 mm (0.00-1.48) in the TBW group and 0.28 mm (0.10-0.44) in the AS group ($p=0.315$). No difference in displacement was found between the 2 groups in repeated measures analysis of variance ($p=0.329$). For LF, 8 out of 10 specimens failed in the TBW group (median LF 747 N) and 6 out of 10 specimens failed in the AS group (median LF 791 N). All TBW constructs failed due to breakage of the wire. Fracture in the dorsal cortex of the transverse suture tunnel, suture breakage and triceps failure were the failure mechanism in 3, 1 and 2 AS constructs, respectively.

Interpretation / Conclusion: There was no difference in fixation strength between TBW and AS. Our findings suggest AS to be a feasible alternative to TBW and we hypothesize that it may have fewer hardware-related complications as it is a non-metallic implant.

Moxifloxacin Concentrations in the Knee Joint, Tibial Bone, and Soft Tissue when combined with Rifampicin: A randomized porcine microdialysis study

106.

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Background: Peri- and postoperative antibiotics are key adjuvant treatment tools in the management of prosthetic joint infection (PJI). The combination of moxifloxacin and rifampicin may be an attractive treatment option for cases caused by staphylococci or other common Gram-positive bacteria; however, previous studies have reported a reduction in spinal tissue and plasma concentrations of moxifloxacin when coadministered with rifampicin. The magnitude of this reduction in the tissues relevant for PJI treatment is not known.

Aim: To evaluate the effect of rifampicin on moxifloxacin area under the concentration-time curve from 0 to 24 h (AUC_{0-24h}) in the synovial fluid of the knee joint, tibial bone, and adjacent subcutaneous tissue under steady-state conditions using microdialysis in a porcine model.

Materials and Methods: Twenty female pigs were randomized to receive oral treatment with moxifloxacin monotherapy (Group A, n=10) of 400 mg once daily for three days or a combination-therapy (Group B, n=10) of 400 mg of moxifloxacin once daily for three days combined with 450 mg of rifampicin twice daily for seven days. Microdialysis was applied for sampling in the synovial fluid of the knee joint, tibial cancellous and cortical bone, and adjacent subcutaneous tissues. Plasma samples were taken as a reference. Measurements were obtained for 24 h.

Results: Coadministration of moxifloxacin and rifampicin resulted in reductions of the moxifloxacin AUC₀₋₂₄ in the target tissues in the ranges of 67–85% ($p < 0.05$). The corresponding change in plasma was 20% ($p = 0.60$). For both groups the tissue penetration ($fAUC_{tissue} / fAUC_{plasma}$) was incomplete in all tissues. The highest moxifloxacin tissue penetration was in the knee joint: 0.59 (Group A) and 0.24 (Group B). The lowest tissue penetration was in cortical bone: 0.17 (Group A) and 0.04 (Group B).

Interpretation / Conclusion: We demonstrated a significant reduction of moxifloxacin AUC₀₋₂₄ in tissues relevant for acute PJI treatment when coadministered with rifampicin. The target tissue concentrations were significantly more reduced than the plasma concentrations. This may be particularly important as plasma concentrations are used in clinical practice to assess moxifloxacin treatment sufficiency.

Normal values of dynamic Distal Radioulnar Joint kinematics: evaluated with a new technique using Automated Radiostereometric analysis

107.

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Background: Little is known about the normal values for in-vivo distal radioulnar joint (DRUJ) kinematics. Such data could be useful to diagnose DRUJ instability by defining normal DRUJ translation during active exercises.

Aim: This study aimed to report normal values of DRUJ kinematics in uninjured forearms during a subject applied press test using dynamic radiostereometry (RSA) and investigate method reliability.

Materials and Methods: Thirty-three subjects (19 women) with a mean age of 31 years were prospectively recruited for participation in a study on triangular fibrocartilaginous complex injury and DRUJ instability. The current study included the contralateral uninjured asymptomatic and clinical stable forearm. DRUJ kinematics was recorded by non-invasive dynamic RSA during a standardized press test examination performed by the subjects. AutoRSA software was used for image analyses. Computer tomography-based forearm bone models were generated to define standardized anatomical axes and coordinate systems to estimate kinematic outcomes including: DRUJ translation, the ulnar head position in the sigmoid notch (DRUJ position ratio), and changes in ulnar variance. Repeatability of dynamic RSA press test-retest examinations was evaluated in order to approximate the method precision and Inter Class Coefficient (ICC) rater agreement.

Results: The mean maximum press test pressure application was 6.0 kg (95%CI 5.1; 6.9). This pressure resulted in a mean DRUJ translation of 4.7 mm (95%CI 4.2; 5.5), a mean DRUJ position ratio of 0.40 (95%CI 0.33; 0.44) and a mean ulnar variance increase of 1.1 mm (95%CI 1.0; 1.2). Maximum DRUJ translation was reached at a 5 kg press test threshold. The ICC rater agreement of DRUJ translation was excellent ($r .93$) and within a prediction interval of 0.53 mm.

Interpretation / Conclusion: In conclusion, this clinical study reports the normal values of DRUJ kinematics during the press test examination using a non-invasive dynamic RSA imaging method and demonstrate excellent ICC rater agreement and high precision. The next step will be to establish kinematic values in patients with DRUJ instability and determine limits for normal versus pathological DRUJ kinematics.

Effects of Tourniquet Inflation on Peri- and Postoperative Cefuroxime Concentrations in Bone and Tissue

108.

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Background: Tourniquet is widely used in orthopedic surgery to reduce intra-operative bleeding and improve visualization. In order to prevent surgical site infection, correct timing of antimicrobial prophylaxis and tourniquet inflation is important.

Aim: The objective of this study was to evaluate the effect of tourniquet application on peri- and postoperative cefuroxime concentrations in subcutaneous tissue, skeletal muscle, calcaneal cancellous bone, and plasma.

Materials and Methods: Ten patients scheduled for hallux valgus or hallux rigidus surgery were included. Microdialysis catheters were placed for sampling of cefuroxime concentrations bilaterally in subcutaneous tissue, skeletal muscle, and calcaneal cancellous bone. A tourniquet was applied on the thigh of the leg scheduled for surgery (tourniquet duration time (range): 65 (58; 77) minutes). Cefuroxime (1.5 g) was administered intravenously 15 minutes prior to tourniquet inflation, followed by a second dose 6 hours later. Dialysates and venous blood samples were collected for 12 hours. The primary endpoint was the time for which the free cefuroxime concentration was maintained above the clinical breakpoint minimal inhibitory concentration ($T > MIC$) for *Staphylococcus aureus* ($4 \mu\text{g/mL}$).

Results: A cefuroxime concentration of $4 \mu\text{g/mL}$ was reached within 22.5 minutes in all compartments and patients. For cefuroxime the $T > MIC$ ($4 \mu\text{g/mL}$) ranged between 4.8– 5.4 hours across compartments, with similar results for the tourniquet and non-tourniquet exposed leg. Comparable $T > MIC$ and penetration ratios were found for the first and second dosing intervals.

Interpretation / Conclusion: Administration of cefuroxime (1.5 g) 15 minutes prior to tourniquet inflation is safe in order to achieve tissue concentrations above $4 \mu\text{g/mL}$ throughout surgery. A tourniquet application time of approximately 1 hour did not affect the cefuroxime tissue penetration in the following dosing interval.

109.

Does the use of tourniquet increase the risk of venous thromboembolism following Total Knee Arthroplasty? – A pseudorandomized study of 19,804 patients from the Danish Knee Arthroplasty Registry

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Background: In TKA, “Tourniquet use was associated with significantly higher risk of venous thromboembolisms (VTE) compared to surgery without a tourniquet” concluded a recent Cochrane Review based on underpowered RCTs with VTE as secondary outcome. Nationwide arthroplasty registries have the power to analyze rare outcomes like VTEs but are also vulnerable for confounding. Currently, Denmark has a unique set-up as tourniquet-use is (1) 50/50, (2) based on the surgeons’ preference and (3) rarely contraindicated and thus unrelated to the patients. Together, this enables tourniquet-use to pseudorandomize the patients registered in the Danish Knee Arthroplasty Registry.

Aim: Does the use of tourniquet increase the risk of VTE within 90-days of primary TKA?

Materials and Methods: We retrieved 19,804 patients with CR-TKA from 2014 to 2018. Of these, tourniquet was used in 10,111(51%) and not in 9,693 (49%). The cohort was linked with the National Prescription Database and the National Patient Registry to collect a total of 42 potential confounders such as length of stay, prior VTE, heart diseases, anticoagulants, BMI etc. The 90-days incidence of VTEs and the relative risk of VTE were endpoints and reported with 95% confidence intervals (CI). Standardized mean difference (SMD) was used to estimate the intergroup balance. As a sensitivity analysis, we repeated the calculation in a propensity-score matched setup to ensure balance in all potential confounders.

Results: As expected, the groups were comparable across all included confounders (SMD<0.1) except 3 (Charnley class, American Knee Society’s functional score and implant fixation). The 90-days incidence of VTEs was 0.8% (95% CI: 0.6–1.0) when tourniquet was used and 1.1% (95% CI: 0.9–1.3) when not ($p=0.02$) corresponding to a relative risk of 0.70 (95% CI: 0.53–0.93) associated with tourniquet- use. 1,292 (6%) patients were excluded to balance the remaining 3 potential confounders in the matched cohort and comparable results were found in this analysis.

Interpretation / Conclusion: Based on this, first-of-its-kind, pseudorandomized nationwide arthroplasty registry study it seems safe to conclude that use of tourniquet does not increase risk of VTE within 90 days of primary TKA.

COMBINED ANTERIOR CRUCIATE LIGAMENT REVISION WITH RECONSTRUCTION OF THE ANTERO-LATERAL LIGAMENT DOES NOT IMPROVE OUTCOME AT 2-YEAR FOLLOW-UP COMPARED TO ISOLATED ACL REVISION; A RANDOMIZED CONTROLLED TRIAL.

110.

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Background: It is essential to obtain rotational stability of the knee after anterior cruciate ligament reconstruction (ACL-R) and a supplemental reconstruction of the antero-lateral ligament (ALL-R) has been suggested to support this. It is unknown, if ALL-R in combination with ACL revision after failed ACL reconstruction result in better outcome than ACL revision alone.

Aim: To investigate the effect of ALL-R in ACL revision surgery.

Materials and Methods: Patients eligible for first time ACL revision were randomized to either isolated ACL revision (- ALL group) or ACL revision combined with a single-stranded allograft ALL-reconstruction (+ALL group). Patient reported outcomes and function were evaluated at two-year follow-up using KNEES-ACL, KOOS, and Tegner activity scale. Objective knee laxity was evaluated using an instrumented Rolimeter test, the pivot shift test, and a manual Lachman test.

Results: A total of 103 patients were enrolled with 49 patients in the +ALL group and 54 patients in the -ALL group. No baseline differences between groups were seen regarding age, gender, and body mass index. Meniscal injury and cartilage lesions were seen in 27% and 45% in the +ALL and in 20% and 41% in the -ALL group, respectively. The ACL revision was performed with allograft in 20% of the patients in the +ALL group and 15% in the -ALL group. There were no significant differences in the KNEES-ACL subgroups, KOOS subgroups and Tegner score between groups at two-year follow-up. No significant differences between groups were seen at one-year follow-up regarding objective laxity measured with Rolimeter test, Lachman test, and pivot shift test.

Interpretation / Conclusion: Supplemental ALL reconstruction in ACL revision does not improve subjective outcome at two-year follow-up and objective outcome at one-year follow-up compared to isolated ACL revision.

An enhanced interdisciplinary discharge program can lower readmissions for hip fracture patients in nursing home facilities

111.

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Background: Hip fracture patients in nursing home facilities (NHF) are very fragile and have a higher readmission and mortality rate compared to other hip fracture patients. These fragile and complex patients need special attention and cooperation between numerous parties in order to reduce the complications.

Aim: To assess the effect of an enhanced interdisciplinary cooperation between the orthogeriatric ward, municipality and nursing home facilities (NHF) for hip fracture patients

Materials and Methods: From January 2018 to July 2020, hip fracture patients who were discharged to NHF were included prospectively. Intervention was performed in the two of five municipalities having an acute team, the remainder municipalities were control group. The intervention group received multifaceted care with a tailored treatment plan. NHF followed a safety program 14 days post-discharge assessing vital signs, weight, pain, signs of constipation, hours of mobilization, daily intake of fluids and high-protein beverages. Acute team nurses undertook visits (planned as well as unplanned) and could take blood samples and administer intravenous fluids and antibiotics at the NHF. Control participants received usual care. Primary outcome was 30-days readmission, secondary were mortality, mobility, and quality of life.

Results: There were 100 patients in the intervention group and 152 in the control group. The median age was 86 years, 68% were female, over 60% had a low mental score but there was no statistical difference in any of the baseline variables. The 30-day readmission rate was 14% in the intervention group compared to 30% in the control group ($p=0.004$). The 30-day mortality was 6% in the intervention group compared to 13% in the control group ($p=0.068$). There was no statistically significant difference in mobility between the two groups but there was a higher health related quality of life score in the intervention group ($p=0.045$).

Interpretation / Conclusion: An enhanced interdisciplinary cooperation between hospital and NHF has the ability to lower readmissions and potentially mortality. This study calls for every department to reassess their strategy towards patients discharged to NHF.

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Background: The Danish Fracture Database (DFDB) has delivered data for numerous studies and currently there are more than 75,000 fracture- related surgical procedures registered. However, the validity of the data is only known for two hospitals.

Aim: To determine completeness and validity of the Danish Fracture Database.

Materials and Methods: Patients registered with a primary or planned secondary procedure in the DFDB in 2016 were included. For validity, patient medical records were assessed using a sample of 10% of the study population. The sample was randomly selected and stratified according to anatomical region and hospital. We calculated validity as positive predictive value (PPV) for both non-dichotomous and dichotomous variables. Key variables were date of surgery, operated side, and type of surgery. For type of surgery, validity was defined as the presence of the correct type of surgery in DFDB, regardless of other types registered. Observations unavailable in patient medical records or containing missing values were excluded on an individual variable level. For completeness all primary or planned- secondary procedures in the DFDB in 2016 were compared with cases in the Danish National Patient Registry (DNPR) in 2016. Cases were matched on CPR number, date for surgery and hospital. Completeness was calculated as sensitivity of the DFDB overall and stratified by hospital volume.

Results: For validity, the sample population consisted of 1,541 patients. The mean age was 61 years (2–102 years) and 45.2% were male. PPV for key variables was 97% for date of surgery, 98% for operated side, and 99% for type of surgery. PPV ranged from 81% to 100% with ASA score and trauma status as lowest at 81% and 86% respectively. Pathological fracture (n=8) and location of periprosthetic fracture (n=19) were both at 100%. For variables other than ASA score and trauma status, PPV was more than 94%. For completeness, the sample population consisted of 16,225 cases in the DFDB and 23,397 cases in the DNPR. Sensitivity was 55% overall, ranging from 54% to 60% for large and small volume hospitals.

Interpretation / Conclusion: This indicates that the DFDB in general has high validity, however, it also suggests that the DFDB is lacking in completeness.

Patient-related risk factors for nonunion following surgically managed, traumatic, diaphyseal fractures: A systematic review and meta-analysis

113.

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Background: Nonunion is a severe complication in the treatment of fractures and evidence on patient-related risk factors for nonunion following surgically managed fractures is limited. The risk of nonunion is possibly associated with several biomechanical and epidemiological factors.

Aim: To systematically review and assess patient-related risk factors for nonunion following surgically managed, traumatic, diaphyseal fractures.

Materials and Methods: We searched Medline, Embase, Scopus, and Cochrane using a search string developed with aid from a scientific librarian. No date restrictions were made and languages included: English, French, German, Danish, Norwegian, and Swedish. The studies were screened independently by the two main authors using Covidence. Eligible study data was extracted. We performed random-effects-meta-analyses for risk factors found in five or more studies including smoking, sex, open/closed fracture, Gustilo, AO/OTA classification, infection, diabetes, and obesity. Nonunion and risk factors were assessed as a binary outcome, and a 2x2 contingency table was made for each risk factor. The evidence synthesis was performed using odds ratio (OR) as effect measure.

Results: Of 11.738 records screened, 30 were eligible and included a total of 38,465 patients. The age ranged from 16 to 100 years. One study was prospective, one was uncertain, and the remaining 28 were retrospective. Twenty-five studies were eligible for meta-analyses. Sex and obesity were not a significant risk factors for nonunion, however, smokers had a 70% increased likelihood of nonunion, 95% CI 1.2 to 2.4. Open fractures, diabetes, infection, higher Gustilo, and increasing AO were also significant risk factors for nonunion ($p < 0.05$).

Interpretation / Conclusion: Establishing compelling evidence on risk factors for nonunion is challenging due to the heterogeneity and complexity of nonunion, and because the current studies are predominantly small and retrospective. However, with this study, we can conclude that smoking, open fractures, diabetes, infection, increasing Gustilo and AO are significant risk factors for nonunion following surgically managed, traumatic, diaphyseal fractures.

Complications of Fitbone and Precice intramedullary bone lengthening nails: a systematic review with 782 patients

114.

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Background: Intramedullary lengthening nails were introduced to reduce complications in limb lengthening. More than 16000 intramedullary Precice and Fitbone lengthening nails have been implanted worldwide. Complications are so far only heterogeneously reported in small case series, and no systematic overview of complications exists.

Aim: To perform a systematic literature review of complications with Fitbone and Precice bone lengthening nails in lower extremity bone lengthening.

Materials and Methods: In PubMed, EMBASE, Cochrane Library a systematic search, with no limits concerning study design, date or language, was performed with search string of medical subject headings: Bone Nails, Bone Lengthening and "Word" Fitbone and Precice nail. One author selected the articles. The first and last author assessed complications. Complications were severity graded (Black et al. 2015) and categorized into subgroups based on origin.

Results: The search found 952 articles, 116 were full text screened and 41 included. 983 segments were lengthened in 782 patients (age: 8–74 years). Number of patients: 208 congenital, 305 acquired limb shortening, 111 short status, 158 unidentified etiology. We identified 332 complications (34% of segments). Type I (minimal intervention): 11% of segments; Type II (substantial change in treatment plan): 15% of segments; Type IIIA (failure to achieve goal): 5% of segments; Type IIIB (new pathology or permanent sequelae): 3% of segments. Joint contracture/subluxation/luxation was the most frequent type IIIB complication. The two most frequent origins of complications were related to device (13% of segments) and bone (9% of segments).

Interpretation / Conclusion: In this first systematic review of complications with intramedullary bone lengthening nails, the overall risk of complication was high with one complication for every three segments lengthened. In one of every four segments, the complication had a major impact on treatment: substantial change in treatment, such as unplanned surgery (15%), failure of achieving lengthening goal (5%) or introduction of a new pathology or permanent sequelae (3%).

Radiographs of 366 removed limb lengthening nails reveal differences in bone abnormalities between different nail types: FITBONE, PRECICE and STRYDE.

115.

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Background: Limb lengthening nails have largely replaced external fixation in limb lengthening and reconstructive surgery. However, the adverse events and high prevalence of radiographic changes recently noted with the STRYDE lengthening nail have raised concerns about the use of internal lengthening nails.

Aim: The aim was, therefore, to compare the prevalence of radiographic bone abnormalities between STRYDE, PRECICE, and FITBONE nails prior to nail removal

Materials and Methods: This study was performed as a retrospective case series from three centers. Patients were included if they had either of the three limb lengthening nails (FITBONE, PRECICE, or STRYDE) removed. Standard orthogonal radiographs immediately prior to nail removal were examined for bone abnormalities at the junction of the telescoping nail parts.

Results: In total, 306 patients (168 males, 138 females) had 366 limb lengthening nails removed. The mean (SD, min-max) from nail insertion to radiographic evaluation was 434 days (SD 381, 36 – 3015 days). 77% (20/26) STRYDE nails had bone abnormalities at the interface compared with only 2% (4/242) FITBONE and 1% (1/98) PRECICE nails ($P < 0.0001$). In addition, the extent of bone abnormalities was more pronounced in the STRYDE nails compared with the other nails.

Interpretation / Conclusion: Bone abnormalities at the interface of telescoping nail parts were seen in the majority of STRYDE nails, but only very rarely with FITBONE or PRECICE nails. Of clinical importance, the low prevalence of radiographic changes at the junctional interface of 242 evaluated FITBONE and 98 evaluated PRECICE nails at the time of nail removal does not warrant clinical concerns.

The quality of tension band wiring for olecranon fractures is related to complications. A multicentre cohort study

116.

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Background: Tension band wiring (TBW) is the most frequently used fixation for displaced olecranon fractures. TBW is generally known as a simple method that can be performed by most orthopaedic surgeons and has satisfying results.

Aim: The aim of this study was to determine if the quality of the TBW osteosynthesis for displaced olecranon fractures in adult patients was associated with complications.

Materials and Methods: This is a multicentre retrospective cohort study with data on adult patients with an operatively treated displaced olecranon fracture. From 2013 to 2018, eligible patients were retrieved using diagnosis codes for elbow and olecranon fractures from the hospitals administration databases in the Region of Southern Denmark. Patients' health care files were reviewed for operation details and complications. Major complication was defined as any re-operation within 8 weeks or deep infection. Any loss of fixation was added to define surgical complications. Pre- operative x-rays were classified using the Mayo classification and early postoperative x-rays were assessed for quality of the TBW osteosynthesis based on the 10 imperfection from Schneider et al. yielding 10 points if no imperfections were present. STATA was used for descriptive statistics with median and inter quartile range. Chi square test was used for group comparison.

Results: 307 patients were included, 68% females, median age was 64 (IQR=24), and 20% were ASA \geq 3. There were 76% Mayo type 2A and 20% type 2B. A postoperative cast applied for 96% of the patients for 2 (IQR=1) weeks. The TBW's were rated with a median score of 8 points (IQR=2). There were 12% with major complications. No complications were seen if given 10 points, 6% if given 9 points, and 11–17% if given between 5–8 points, thereby resulting in a clear relation between a higher score and less complications ($p<0.0000$). There were 30% with surgical complications demonstrating similar relation between higher points and less complications ($p<0.001$).

Interpretation / Conclusion: There were 12% with major complications and we found a clear relation between the quality of osteosynthesis and complications. Surgeons need to be very thorough when performing TBW in order to reduce the postoperative complications.

Injuries among Motorcycle riders – did imposed legislation for young riders modify the age and severity composition of patients seen at the A&E department in Odense University Hospital from 2003–2020?

117.

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Background: In the 2010s stricter age limits for motorcycles were imposed intended to reduce number of young victims,

Aim: To investigate changes in severity, age composition and epidemiology of injured Motorcycle accident victims during the period 2003–2020 in relation to imposed age restrictions on size of Motorcycles in 2013.

Materials and Methods: All acute patients treated at the Accident and Emergency Dept (A&E) at Odense University Hospital in the period 2003–2020 were eligible for study if driving a two wheeled motorized vehicle (n=6043). Following scrutiny of descriptive texts patients were excluded if contained in at least one of: Passengers (n=236), Use of Scooter 45 (n=2158), Moped (n=2728), Sports and other (n=42), Age < 18 (n=1291). The remaining 1099 patients were verified as MC riders and included in the analysis. Data on drivers killed at the injury scene were obtained from Statistics Denmark (Routine Road Injury Statistics). Statistical analysis was preformed using EpiData Analysis (version 3.0.0.1).

Results: Among the 1099 injured treated in hospital 42 % (95% CI 39 – 45) suffered severe injury. Of the injured included 38 % (95% CI 35 – 41) were injured after 2013, 62 % (95% CI 59 – 65) before – a significant reduction of 24 %. The age profile of injured showed an increase in the 50+ year-olds after 2013, OR 2.06 (95% CI 1.58–2.68). No significant change was found for 20+ or 25+ year-olds (OR 1.10 (95% CI 0.78–1.55), 1.05 (95% CI 0.73, 1.52) respectively). Severity were significantly associated with age, injuries becoming more severe, the older the victim ($p<0.0001$). Over the period we saw no difference in overall severity ($p=0.618$). 12 % (95% CI 10 – 14) of the injured were women. Women were less severely injured ($p=0.017$), Men and women did not differ significantly in age profile or ratio of injured over the period. 31 were killed at the scene, 10 % were women.

Interpretation / Conclusion: The legislation changes of 2013, imposing stricter age-limits for riding the big motorcycles, did not significantly modify the severity composition or ratio of injured in the affected age groups. The women and the young riders of both sexes were less severely injured. Men 45–64 years old were most frequent in the death- statistics.

Risk of Reoperation in Simple Ankle Fracture Surgery when Comparing Locking Plate with Non-Locking Plate

118.

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Background: Locking plates were initially designed to provide improved stability to ankle fractures with poor bone quality but are currently widely used. The literature is sparse regarding the benefit of locking plate in ankle fractures.

Aim: The aim is to compare the risk of reoperation for locking plate compared with non-locking plate in patients with ankle fractures. Secondary, to investigate the distribution of locking plate use in Denmark.

Materials and Methods: The study was a population-based register study. Data regarding patients with AO type 44A1/2 and 44B1/2 who were treated with either locking or non-locking plates were obtained from the Danish Fracture Database from March 15, 2012 to December 31, 2016. The follow-up period was 24 months. Major complications were defined as complications requiring surgical intervention, with the exception of simple hardware removal 6 weeks after primary surgery, which was defined as a minor complication. Multivariate regression analysis was performed to determine relative risk (RR), adjusted for age, sex, American Society of Anesthesiologists Classification (ASA) score and the level of the surgeon's experience. All results are reported with 95% confidence interval.

Results: A total of 2,177 ankle fractures were included, among which 718 (33%) were treated with locking plates, and 1,459 (67%) were treated with non-locking plates. The mean age was higher in the locking plate group ($p < 0.001$) and locking plate was used more often in women ($p = 0.018$), in patients with higher ASA-score ($p < 0.001$), and in patients operated by consultants ($p = 0.018$). In both groups, the risks for major and minor complications were 3% and 22%, respectively, resulting in adjusted RRs of 1.00 (95% CI 0.66;1.66) for major reoperation comparing locking with non-locking plates and 0.92 (95% CI 0.76;1.11) for minor reoperations. The proportion of locking plate use varied widely between departments, ranging from 6% to 61%.

Interpretation / Conclusion: We conclude that there is no significant difference in association to reoperation when comparing locking plates with non-locking plates among patients with surgically treated ankle fractures. The indication of locking plate use should be evaluated on all hospitals.

The Positive Predictive Value of Ankle Fracture Diagnoses and Surgical Procedure Codes in the Danish National Patient Registry

119.

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Background: Knowledge about the validity of data is essential for understanding the precision of studies using data from the Danish National Patient Registry (DNPR).

Aim: To validate the quality of ankle fracture registry data by estimating the positive predictive value (PPV) of the diagnosis and procedure codes regarding ankle fractures reported to the DNPR.

Materials and Methods: We identified all patients, with an ankle fracture diagnosis code and/or procedural codes for surgical fixation of ankle fractures in the period 01.01.2018 to 31.12.2018 from the health care database of four hospitals: two university and two regional centers located in Zealand, Funen and two in Jutland. The primary outcome was the PPV of a random sample of 10% from the group of patients with both an ankle fracture diagnosis and an ankle fracture procedure code. Secondly, patients with only an ankle fracture diagnosis code or only an ankle fracture surgical procedural code were extracted for validation. Data from medical records, as well as radiographs including radiological descriptions were extracted for each study subject. Two consultants independently reviewed radiographs including radiological descriptions in order to validate the ankle fracture diagnosis and procedure codes registered in the DNPR.

Results: From the four centers 651 patients with both an ankle fracture diagnosis and an ankle fracture surgical procedure codes were included in the source population, of which 65 (10%) were extracted for validation. The Positive Predictive Value (PPV) of registry data reported to the DNPR with both ankle fracture diagnosis and procedure code was 93%. Furthermore, 56 patients were identified with either an ankle fracture diagnosis or an ankle fracture surgical procedure code and extracted for validation. In these cases, the PPV was 91% if only an ankle fracture diagnosis was reported and 82%, if only a surgical procedure code was reported.

Interpretation / Conclusion: The study shows that the ankle fracture diagnosis and procedure codes registered in the DNPR are of high quality and therefore a valuable data source for research on ankle fractures.

The First COVID Lockdown's Impact on the Number, Distribution and Severity of Hand Injuries at an Accident and Emergency Department.

120.

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Background: During the lockdown of the COVID-19 pandemic in Denmark in March 2020, the trauma Accidents and Emergency (A&E) Department of Odense University Hospital, experienced a marked drop in visits. We had the impression that there was a larger decline in visits for minor injuries compared to severe injuries.

Aim: The aim of this study was: 1) to present how the lockdown during the 1. wave of the COVID-19 pandemic affected the number and distribution of hand injury related visits in the A&E at OUH. 2) to analyze the distribution of injuries during the COVID-19 lockdown, in order to examine patients' ability of self-assessing the need for a visit to the A&E.

Materials and Methods: We analyzed the Incident Rate Ratio (IRR) between the first month of the lockdown with 1 month up to the lockdown. We compared this IRR with the IRR for the equivalent periods of 2019. The outcomes were: Diagnoses (or diagnosis-groups), activity during injury (ADI), mechanism of injury, age-group and gender. Secondly, certain specific diagnoses (or diagnosis-groups) were analyzed with regards to ADI and mechanism of injury.

Results: We observed a significant (95% confidence interval) reduction of 30,6% for all hand injuries in 2020. We observed a significant reduction in IRR for minor injuries of 58,7% and a non-significant reduction of 15,3% for severe injuries. The IRR in 2020 was significantly lower in 2020 for ages: 0-14, 15-17 and 25-49 years. The relative reduction in IRR was markedly larger for men (40,8%) than women (22,3%).

Interpretation / Conclusion: We observed a far greater reduction in minor injuries than severe injuries compared to 2019. This result could imply the patients' ability to assess their injury severity is perhaps better than previously presumed. It is unclear if this result, could be recreated during different circumstances. Further research on this subject is needed.

Physical function, Quality of life and complications following a distal intra-articular tibia fracture; External Fixation (EF) or Open Reduction Internal Fixation (ORIF); A prospective cohort/observational study 121.

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Background: Physical function and Quality of life (QoL) following a distal intra-articular tibia fracture (DIATF) has been demonstrated low regardless of operation method but only few studies have reported on this. The evidence is dominated by retrospective studies.

Aim: To perform a prospective cohort study with focus on physical function, QoL and complications evaluating Danish patients with a DIATF operated by either EF or ORIF.

Materials and Methods: From December 2015 to December 2019 patients with a DIATF (AO 43B1-3 and C1-3), and operated with either EF or ORIF, were prospectively included in a multicentre study with 7 departments. Primary outcome was comparison of 12 months physical function evaluated by the Self-reported Foot and Ankle Score (SEFAS) and EQ5D. Secondary were SEFAS and EQ5D at 1.5, 3, and 6 months follow-up as well as reoperation. Group comparison statistics were performed using the chi square for categorical data and the students t-test for continuous data. Descriptive data consists of mean with standard deviation.

Results: There were 59 patients with a DIATF included, 29 treated with EF. The mean age was 46 (1.9), 57% were males with no statistical difference between groups including for AO classification, comorbidities, smoking, and alcohol abuse. Mean SEFAS score 12 months postoperatively was 23 (9.4) in the EF group compared to 29 (11.2) in the ORIF group ($p=0.77$). At 1.5 month the SEFAS in the EF group was 15 (7.9), at 3 months 20 (9.2), and 22 (7.3) after 6 months compared to 20 (8.2) ($p=0.02$), 20 (8.5) ($p=0.9$), and 27 (10.6) ($p=0.01$) in the ORIF group. The mean EQ5D index at 12 months was 0.68 (0.12) in the EF group compared to 0.78 (0.12) in the ORIF group ($p=0.22$). Similar patterns for the 1.5, 3, and 6 months EQ5D follow-ups were seen as with the SEFAS data. In total, there were 46% reoperations with no difference between groups ($p=0.5$).

Interpretation / Conclusion: There is no significant difference between the EF and ORIF group in terms of 12 months physical function and QoL but there was statistical difference after 1.5 and 6 months in favour of ORIF. No statistical difference was seen in reoperations.

Short-term patient-reported outcome of stemless total shoulder arthroplasty for osteoarthritis is similar to that of stemmed total shoulder arthroplasty: a study from the Danish Shoulder Arthroplasty Registry. 122.

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Background: The results after stemless total shoulder arthroplasty (TSA) are promising, but only few and small studies have compared the results with that of stemmed TSA.

Aim: The aim was to compare the patient-reported outcome after stemless and stemmed TSA for primary osteoarthritis and to compare different stemless arthroplasty systems.

Materials and Methods: We included all anatomical TSAs reported to the Danish shoulder arthroplasty registry from 2014 to 2018. The Western Ontario Osteoarthritis of the Shoulder (WOOS) index at one year was used as a patient-reported outcome. The raw score was converted to percentages of the maximum score. General linear models were used to analyse the difference in mean WOOS index between stemless and stemmed TSA and between stemless arthroplasty systems.

Results: 1197 stemmed and 253 stemless TSAs were included. The mean WOOS index was 82 (SD=21) for stemmed TSA and 86 (SD=19) for stemless TSA. The stemless TSA had a statistically significant better score compared with stemmed TSA in the univariate model (4, CI: 0-7). The difference remained statistically significant in the multivariate model (6, CI 1-10) but did not exceed the minimal clinically important difference (MCID) which is estimated to ten. There was no difference in the mean WOOS index between the Nano and the Eclipse system (difference 3, CI -10 to 5).

Interpretation / Conclusion: We found a statistically significant better WOOS index score of stemless TSA compared with stemmed TSA, but the difference did not exceed the MCID. The stemmed and stemless TSA can be used equivalently in the treatment of patients with primary glenohumeral osteoarthritis.

Terminology and diagnostic criteria used in clinical studies investigating subacromial impingement syndrome: A scoping review

123.

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Background: There is no universally appraised definition of the entity known as subacromial impingement syndrome (SIS). This makes it difficult for clinicians to interpret scientific results, and to communicate with each other and patients.

Aim: To map the literature concerning the terminology and the diagnostic criteria used in clinical studies investigating SIS.

Materials and Methods: Pubmed, Embase, CINAHL and SPORTDiscus were searched from inception to June 2020 using known terms for SIS. New terms, that were discovered, were fed back into the search string. Peer-reviewed clinical studies investigating SIS were eligible for inclusion. Studies containing secondary analyses of a previously published study, reviews, pilot studies and studies with less than ten participants were excluded. Two reviewers independently screened titles and abstracts, three reviewers independently applied in- and exclusion criteria to full-text versions of the articles, and one reviewer extracted data. Disagreement between the reviewers was resolved by dialogue.

Results: 11.056 records were identified. 911 were retrieved for full-text screening. 535 were included. In total, 20 different terms for SIS were identified. The diagnostic criteria were generally based on pain provocative shoulder tests. Over 100 different test combinations were identified. The most commonly used tests were Hawkin's, Neer's and Painful Arc (53%, 51% and 31% of the studies, respectively). 58% of the studies reported use of imaging. 30% of the studies used a combination of clinical tests and imaging. 9% of the studies specified that they included patients with full-thickness supraspinatus tears and 46% specified that they did not.

Interpretation / Conclusion: There is a worrying lack of consensus regarding terminology and diagnostic criteria for SIS. The variation in diagnostic criteria is so extensive that many studies are hardly comparable to each other with overlapping inclusion criteria and exclusion criteria. This calls for careful consideration when interpreting the results of studies investigating SIS and when comparing studies. It also highlights the need for a consensus regarding terminology and diagnostic criteria for SIS.

The epidemiology of acute acromioclavicular dislocations in an urban population. A prospective cohort study investigating the capital region of Denmark

124.

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Background: Acromioclavicular (AC) joint dislocations are common injuries accounting for 9–12% of all injuries to the shoulder girdle. The frequency is widely reported in the literature; however only limited research is available that describes the incidence and basic epidemiological features of the injury in a general urban population.

Aim: To investigate the incidence and epidemiology of acute acromioclavicular joint dislocations in the capital region of Denmark.

Materials and Methods: All patients with acute AC joint dislocation admitted to the Emergency Departments at three University Hospitals serving a population of 549,225 residents in the Capital region of Denmark were prospectively registered from 1 January to 31 December 2019. Patients with trauma to the shoulder, pain from the AC joint and increased coracoclavicular distance on radiographs were included and classified according to Rockwood's classification. Rockwood type I injuries were excluded as they represent a sprain to the joint rather than a true dislocation. Data on age, sex, affected side and mechanism of injury were registered.

Results: 106 patients, male:female ratio 8.6:1, were included. The overall incidence of AC joint dislocations was 19.3 per 100,000 person years at risk (PYRS); 34.9 per 100,000 PYRS for males and 4.0 per 100,000 PYRS for females. The age distribution was bimodal peaking at the ages of 20–24 (39.8 per 100,000 PYRS) and 55–59 (43.6 per 100,000 PYRS). Rockwood type III was the most common type of AC joint dislocation accounting for 55.7% of the injuries. Type II and V accounted for 40.6% and 3.8% respectively. There were no type IV or VI dislocations. The most common mechanism of injury was sports accounting for 80/106 (75.5%) with cycling accounting for almost half of all injuries with 51/106 (48.1%).

Interpretation / Conclusion: The incidence of AC joint dislocations was 19.3 per 100,000 PYRS. Rockwood type III was the most common type of injury accounting for 55.7% of the injuries. Young and middle-aged males were at highest risk. 75.5% of the injuries occurred during sports, most frequently during cycling.

Low methodological quality and conflicting conclusions of meta-analyses comparing operative and non-operative treatments for proximal humeral fractures

125.

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Background: Proximal humeral fractures are the third most common non-vertebral osteoporotic fractures among the elderly. Both operative and non-operative treatment options exist. Many systematic reviews have conducted meta-analyses to summarize the current evidence, but the conclusions have been conflicting. Conflicting conclusions may be caused by methodological flaws that introduce bias.

Aim: We aim to study the relation between methodological quality and conclusions of meta-analyses comparing operative with non-operative treatments for PHFs.

Materials and Methods: We conducted a systematic search of EMBASE, PubMed, The Cochrane Library and Web of Science for meta-analyses comparing non-operative with operative treatment for PHFs. The methodological quality of the included meta-analyses was assessed using AMSTAR2. The conclusions were scored for three outcome domains (functional outcome, quality of life, and harm) on a validated scale ranging from 1 to 6, with 1 defined as conclusions highly favouring non-operative treatment and 6 highly favouring operative treatment. Lastly, we analysed the association between methodological quality and conflicting conclusions.

Results: We included 21 systematic reviews: 19 meta-analyses and 2 network meta-analyses. Most ($n = 18$, 95%) of the meta-analyses were rated as having 'critically low' quality, while the remaining one (5%) was rated as having 'low' quality. The most under-reported AMSTAR2 items were related to protocol, source of funding for included studies, list of excluded studies and appropriate statistical methods when combining results from non-randomized studies of intervention. The conclusions were conflicting for all three outcome domains, even for meta-analyses reporting similar PICO question. Due to the consistently low quality, it was not possible to determine an association between methodological quality and conflicting conclusions.

Interpretation / Conclusion: It was not possible to determine an association between methodological quality and conflicting conclusions. Efforts are needed to improve the quality of future meta-analyses comparing operative with non-operative treatments for PHFs.

Less than half of patients in secondary care adheres to clinical guidelines for subacromial pain syndrome and have acceptable symptoms after treatment: A Danish nationwide cohort study of 3306 patients

127.

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Background: According to evidence-based guidelines for treatment of subacromial impingement (SIS), non-operative care with three months of exercise therapy is first line of treatment, but guideline adherence is unknown.

Aim: We investigated to what degree current care complies with clinical guidelines and to what extent successful outcomes are achieved.

Materials and Methods: We invited all 4521 patients diagnosed with SIS at any Danish hospital during a 3-months period to participate in this nation-wide retrospective population-based cohort study. The questionnaire used to obtain patient-reported information on content of care was based on the Danish National Clinical Guidelines for treatment of SIS and referral guidelines. Nine members of the working group responsible for the National Clinical Guidelines, including three orthopedic surgeons, commented on the questionnaire. We developed a revised version based on systematic condensation of all comments. Participants also reported patient acceptable symptom-state. Invitations were sent to eligible patients 3.5 months after diagnosis at the hospital.

Results: In total, 3306 eligible patients completed the questionnaire at median 16.7 weeks after diagnosis at a hospital. In total, 45% had completed 12 weeks of exercise therapy, while 13% had not engaged with exercise therapy at all. The remaining patients had completed less than 12 weeks and were either still engaged with exercise therapy (29%) or had stopped (13%). From the full cohort, 21 % had underwent surgery for their shoulder condition at four months follow-up, with 40% of these reporting to have engaged with exercise therapy for 12 or more weeks before surgery. Exercise therapy most commonly included mobility (93%), strengthening (87%), stretching (77%), and posture correction/scapula setting (57%). Only 43% of patients undergoing non-operative care had reached acceptable symptom-state.

Interpretation / Conclusion: Less than half of patients diagnosed with subacromial impingement follow the clinical guidelines recommending three months of exercise therapy. Furthermore, less than half of the patients reaches an acceptable symptom-state. Future investigations should focus on the link between guideline adherence and treatment result.

Superior Capsular Reconstruction. Preliminary results after one year in 10 patients

128.

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Background: Irreparable Supraspinatus tendon tear is a challenging condition to treat with modalities ranging from physiotherapy to reverse arthroplasty (RSA). Superior Capsular Reconstruction (SCR) is a method to restore stability and to reduce pain by inserting a graft between the glenoid and the greater tuberosity. Using a fascia lata autograft was originally described by Mihata in 2012, but other types of grafts in order to reduce donor site morbidity are available.

Aim: The objective of this prospective study was to determine the clinical result one year post-surgery after arthroscopic SCR with a human decellularised dermal matrix graft.

Materials and Methods: Ten patients (7 men, 3 women) aged 59–75 year (average 66) with large irreparable rotator cuff tear underwent Superior Capsular Reconstruction with a human decellularized dermal graft (Lifenet Health). Seven patients had prior ipsilateral shoulder surgery. DASH and WORC score were calculated before surgery and 1 year post-operatively as well as ROM. MRI was done before operation, but only present in 5 patients after 1 year. Measurement of the acromiohumeral interval (AHI) and scoring according to fatty infiltration (Goutallier) and the Hamada classification was done.

Results: At one year follow-up two patients had a RSA due to unacceptable outcome. In the remaining 8 patients DASH score improved from 52 to 38 and WORC score from 60 to 31. Active flexion and abduction increased from 80 to 135 degrees and from 65 to 170 degrees (median values). After one year MRI showed all grafts present but defects in 4/5 grafts and no improvement in the AHI, fatty infiltration or Hamada classification.

Interpretation / Conclusion: Superior Capsular Reconstruction (SCR) with a dermal allograft in patients with large irreparable supraspinatus tendon tear gives good clinical results by improving pain and functional score in 8/10 patients. However the graft seems to have a high risk of failure, and no improvement in the radiological parameters for degenerative conditions in the cuff and joint was observed.

Is bone mineral density and body mass index associated with the morphology of fractures of the proximal humerus: a descriptive study of 56 consecutive cases classified according to the Neer and the AO system

129.

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Background: Proximal humeral fractures (PHF) are closely associated with osteoporosis and are the third most common non-vertebral fractures in elderly. Falls from standing height account for about 94% of proximal humeral fractures in patients older than 65. The most commonly used classification systems are the Neer and the AO classification. Both systems describe morphological aspects of the fracture anatomy aiming to support diagnostics, treatment, prognostics, research and communication. Few studies have studied the association between BMD (hip, neck and lumbar scores), BMI and fracture morphology of PHF. We hypothesize that there will be an association, and a potential for predicting patients need special need for osteoporosis management.

Aim: To study the association between the fracture morphology classified as 5 ordinal Neer-categories and 9 AO-groups, respectively, and bone mass density, age and body mass index.

Materials and Methods: A consecutive series of patients referred to Fracture Liaison Service (FLS) within a 12- month period were classified based on plain radiographs according to Neer into 5 categories: 1-part, 2-part, 3-part, 4-part and + (fracture dislocation or articular surface) and 9 AO groups (A1 to C3) by the senior author. FLS included DXA scan and subtraction of BMD, BMI and evaluation of vertebral fractures and previous peripheral osteoporotic fractures.

Results: We included 56 patients, 15 one-part, 25 two-part, 15 three-part and 1 fracture dislocation. 35 fractures were AO type A, 19 were type B and 2 were type C. We found that 28 had osteopenia and 20 had osteoporosis. 28% had a previous osteoporotic fracture. There was no difference in BMI, age, or sex distribution between the groups. We found no significant correlation between Neer category and BMI, age or BMD hip, neck or lumbar scores. We found no association between Neer category and BMD hip, neck or lumbar scores on the ordinal regression analysis ($p \geq 0.285$). The same correlation and regression analysis was done for AO categories and no significant association was found ($p \geq 0.100$).

Interpretation / Conclusion: We found no association between BMD and BMI and the fracture morphology. Though, for more safe estimates more patients need to be included.

Management of olecranon fractures prior to modern surgery (1750–1850): an illustrated historical review

130.

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Background: Recently, it has been proposed that stable fractures of the olecranon (Mayo Type II) in elderly with low functional demand can be managed non-surgically. When non-surgical management is considered, functional aspects of bandaging as well as biomechanics and pathoanatomy are taken into account. We hypothesized that a thorough understanding of these aspects can be found in the rich late 18th and early 19th century medical literature.

Aim: To provide a review of historical approaches to the biomechanics, pathoanatomy, functional bandaging and complications of olecranon fractures in the pre-surgery period (1750–1850) and to discuss whether the historical sources can inform current non-surgical management.

Materials and Methods: We searched in bibliographical databases, national libraries and historical medical encyclopedias. References from potentially eligible monographs and articles were hand searched. Drawings and engravings were analyzed qualitatively by the authors.

Results: We found a comprehensive knowledge of diagnostics, biomechanics and pathoanatomy in the period 1750–1850. The deforming force of the triceps muscle on the proximal fragment was well understood. Reduction of the fragment was attempted, but retention was difficult. Several ingenious devices and functional bandages in different degrees of extension and with direct pressure were proposed for keeping the fragments together. Ankylosis was a known complication. A debate on osseous versus fibrous healing of olecranon fractures and the functional consequences of fibrous healing can be found in the early 19th century sources. A collection of previous unknown illustrations will be presented.

Interpretation / Conclusion: A rich literature on the biomechanics, pathoanatomy, functional bandaging and complications after olecranon fractures can be found in the late 18th and early 19th century. The discussion on fibrous versus osseous healing as well as principles of functional bandaging may have interest for a modern reader.

Minimal clinically important differences (MCID) for the Western Ontario Osteoarthritis of the Shoulder Index (WOOS) and the Oxford Shoulder Score (OSS)

131.

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Background: The minimal clinically important difference (MCID) is an important instrument in the interpretation of changes in PROM scores. To our knowledge, no MCID of the Western Ontario Osteoarthritis of the Shoulder Index (WOOS) score has ever been reported and no studies have reported a MCID for the Oxford Shoulder Score (OSS) based on patients with glenohumeral osteoarthritis, treated with an anatomical total shoulder arthroplasty (aTSA).

Aim: The aim of this study was to determine MCID for WOOS and OSS in a cohort of patients with glenohumeral osteoarthritis treated with an aTSA.

Materials and Methods: All patients treated with an aTSA for glenohumeral osteoarthritis at our institution between March 2017 and February 2019 were included. Each patient completed the WOOS and the OSS preoperatively and one year postoperatively. At one year the patients were asked to rate their overall improvement on a 7-point scale. We used an anchor-based method as our primary method to calculate the MCID, supported by two different distribution-based methods.

Results: The MCID of WOOS was 12.3 according to the anchor-based method and 14.2 and 10.3 according to the two distribution-based methods. The MCID of OSS was 4.3 according to the anchor-based method and 5.8 and 4.3 according to the two distribution-based methods.

Interpretation / Conclusion: For patients with glenohumeral osteoarthritis treated with an aTSA the MCID values were 12.3 points for WOOS and 4.3 points for OSS. To our knowledge, this is the first study to report a MCID value for WOOS and the first study to report a MCID value for OSS in this subgroup of patients.

Manipulating the journal impact factor? A study of journal self-citations

132.

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Background: The Journal Impact Factor (JIF) is often used as an indicator of research quality by tenure, promotion, and funding assessment committees. Thus, a higher JIF could lead to increased visibility for journals and more publication submissions. This provides incentives for journal editors to optimize in accordance with the JIF formula; the number of citations received in a given year to a journal's publications from previous two years divided by the number of only articles and reviews from previous two years. However, the use of JIF to assess research quality is highly problematic, since it can easily be manipulated. A strategy to boost the JIF-score is by increasing the rate of Journal-Self-Citations (JSC) to the two previous years (JIF-years), which increases the number of citations (size of the numerator).

Aim: The aim is to investigate to what extent Orthopedic journals might use different strategies to influence and increase their JIF-scores.

Materials and Methods: All journals indexed in the subject category Orthopedics by the Journal Citation Report between 1997 and 2018 were analyzed. The data source was the in-house database version of Web of Science owned by the Royal Institute of Technology (KTH). The study covers 95 journals, 210,528 publications, and 3,990,809 citations. We analyze the publishing and citation patterns of these journals and apply different measures to identify which strategies might be the most frequent in the field to optimize the impact factors and which journals might take most advantage of these strategies to boost their JIF and ranking.

Results: Our first results show that the rate of JSC to JIF-years tend to be as almost double as high than usual. Still, there are large variance in the JSC intensity among journals. If the JSC to the JIF-years are excluded, the impact factor on average decreases 15%. For the 2018 JIF ranking, four journals in the top10 changes position when JCS are excluded.

Interpretation / Conclusion: The study finds a strong tendency for JSC in the JIF- years. It suggests that the inclusion of JSC in the calculation influences the JIF-scores and ranking of journals.

134. What is so special about the myotendinous junction? – a RNA-sequencing study

134.

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Background: The connection between the muscle fibers and the tendon, name the myotendinous junction (MTJ), is architecturally constructed to transmit force between muscle and tendon, but at the same time it is vulnerable to strain injury. In order to explain why these injuries occur and suggest how they can be prevented, a better understanding of the composition and cellular components of the MTJ is needed. Previous studies have shown the presence of an unique collagen type at the MTJ, Collagen XXII, which is not demonstrated elsewhere in the skeletal muscle system.

Aim: The aim was to evaluate the gene expression of the MTJ and compare it to the adjacent muscle and tendon. We aimed to find new targets that are unique to the MTJ and of importance for the strength or recovery of the tissue. In addition, we wanted to identify targets that are higher expressed at the MTJ compared to the neighboring muscle and tendon.

Materials and Methods: Samples were collected from the superficial digitorum flexor muscle from 20 horses, frozen and sliced into sections containing muscle, MTJ and tendon tissue before preparation for RT-PCR. Based on the mRNA results a t-stochastic neighboring embedded plot (t-SNE) was made and sets of samples from 5 horses with the clearest separation between tissues were chosen for RNA sequencing. An expected contribution of muscle and tendon was calculated for all targets based on the known expression of 2-300 of the most selective muscle and tendon genes. Any variation between the expected and measured gene expression was regarded as expressed by the MTJ.

Results: No targets were found to be uniquely expressed at the MTJ. Collagen XXII α 1 was expressed 17-fold higher compared to the expected value. Generally, genes involved in remodeling and reformation of skeletal muscle fibers and extracellular matrix were expressed to a larger extent at the MTJ.

Interpretation / Conclusion: Despite the MTJ being a region specialized in force transmission with a highly specialized morphology no genes could be demonstrated as being unique to this region. The genes expressed higher in the MTJ compared to muscle and tendon were related to remodeling activities, and this confirms the previous finding of high rates of remodeling at the MTJ.

A new gold standard to measure the surface area of the myotendinous junction in humans

135.

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Background: Strain injuries occur in the myotendinous junction (MTJ) where muscle and tendon meet. Clinical studies have demonstrated that eccentric exercise is effective to prevent these injuries, and to explain this positive effect, it is relevant to study the ultrastructural adaptations of the MTJ to exercise. Electron microscopy of the MTJ has revealed a very folded interface between muscle and tendon, increasing the surface area of the MTJ. In animals these foldings increase as response to training. However, electron microscopy analyzes only very small segments of the entire MTJ, and results might not be representative for the entire MTJ. In addition muscle fiber types cannot be distinguished by electron microscopy, which would be relevant, as there are indications that the surface area varies between type 1 and 2 fibres.

Aim: To develop a method where the surface area of MTJ in entire muscle fibers can be measured and the muscle fiber type can be established.

Materials and Methods: For this pilot study a sample from one patient scheduled for ACL-surgery was collected from the semitendinosus muscle. Following fixation, the sample was manually dissected into single muscle fibers with intact MTJ. Using immunofluorescent antibody against collagen XXII (a marker of MTJ) and myosin heavy chain I, the MTJ and the muscle fiber type was identified. With a spinning disc confocal microscope each fiber was scanned and a 3-D reconstruction was made from the images. From this 3D-reconstruction the area and volume of the interface could be measured. 28 muscle fibers were analyzed (16 type I and 12 type II fibers)

Results: An average area of $25817 \mu\text{m}^2 \pm 6095$ and volume of $4509 \mu\text{m}^3 \pm 1236$ was found when pooling both fiber types. No significant differences in area or volume were seen between fiber types.

Interpretation / Conclusion: With confocal microscopy it was possible to analyze the interface area between muscle and tendon from a large number of fibers. There was relatively small variance between fibers, and this method is useful to measure the effects of exercise on the interface area of the MTJ.

Wear of osteoarthritic femoral head against a HipCap implant in a hip simulator

136.

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Background: An intraarticular unconstrained resurfacing HipCap, intended for use in patients with osteoarthritis, have been tested for biomechanical strength analysis. The obtained information of implant wear against the osteoarthritic surface is limited.

Aim: The objective was to characterize the long-term laboratory wear of a harvested osteoarthritic femoral head rotating into a HipCap implant made of BioDur BioDur® Carpenter CCM® Alloy.

Materials and Methods: The experimental test was performed according to ISO14242-1 load pattern using ASTM hip simulator accessory mounted on the FastTrack 8874 axial torsional test system (Instron). The test was kept at 37 degrees Celcius, and run in saline water 0.9 % mixed with Atamon Atamon. The load was chosen as 1 kN for the entire sample life with rotation of the actuator from -90 to 90 degree which is showing a hip rotation corresponding to standard.

Results: The femoral head/cup has been subject to 5.100.000 cycli so far and is still running with the load pattern simulating a body weight of 100 kg. The implant showed no degradation, but may be influenced by failure of the fixture, which is a challenge in these tests. The bone changed colour due to increased load from the implant or influenced by the saline. No bone insufficiency at the femoral head has been observed.

Interpretation / Conclusion: The osteoarthritic femoral head surface, which has undergone condensation of mineral with an eburnated eburnated surface seem rather wear resistant to the HipCap implant with polished surface. The test may approximately correspond to 5 years wear for a person with moderate physical activity. The wear test is still running.

Foot and Ankle Ability Measure (FAAM): Danish dual-panel translation, cultural adaptation and assessment of construct validity by Rasch analysis.

137.

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Background: There are numerous patient-reported outcome measures (PROMs) for patients with chronic ankle instability (CAI). However, the Foot and Ankle Ability Measure (FAAM) is the only PROM with adequate content and construct validity for these patients. It was developed with involvement of patients with CAI, and the measurement properties fit a modern test theory (MTT) model. Notwithstanding, FAAM is not available in a Danish version.

Aim: The aim was to translate and culturally adapt the original English version of FAAM into Danish and to assess its measurement properties using Rasch MTT.

Materials and Methods: Translation and adaptation was conducted using the dual panel method. Cultural adaptation was performed by subsequent cognitive interviews with eight patients and face validity was explored by interviews with seven health care professionals. Finally, construct validity was assessed by analyzing completed questionnaires from 206 patients (70%) of the 293 recruited patients with various ankle and foot conditions, using the Rasch Unidimensional Measurement Model (RUMM) software program.

Results: The original 29-item version was translated and culturally adapted to Danish utilizing the Dual Panel process and reviewed by Danish patients who confirmed content relevance, after small adaptations. Face validity was confirmed. Rasch modelling revealed that the scale was not unidimensional, meaning that domain scores could not be aggregated. The 21-item ADL domain showed misfit, but after removing 6 items, the resulting 15-item scale displayed adequate fit to a partial credit Rasch model. The Sports domain also exhibited misfit, but after removing one item and adjusting the scale due to differential item functioning related to age for another item, a 7-item scale showed good fit. This resulted in a 22-item, 2-dimensional Danish version of FAAM with good measurement properties.

Interpretation / Conclusion: The FAAM was successfully translated to Danish and demonstrated relevance for patients with CAI. A Danish 22-item version of FAAM exhibits robust measurement properties for patients with various conditions of the lower leg, ankle and foot, including CAI.

Intermittent Hypoxic Therapy for Treatment of Musculoskeletal Chronic Pain – a Consecutive Cohort

138.

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Background: Intermittent hypoxic therapy (IHT) is a treatment modality that can induce systemic effects by exposing the patient to short-term hypoxic stress by lowering of inspiratory oxygen tension in short intervals followed by normoxic or hyperoxic recovery. This has been shown to induce several systemic effects including a magnitude of changes in inflammatory and anabolic cytokines. SANA (SANA Medical Systems, Aarhus) is a new private institution specializing in research and treatment of pain using data-driven algorithm-based individualized IHT.

Aim: The aim of this study was to investigate the clinical effects of a novel algorithm of IHT on musculoskeletal chronic pain in a prospective consecutive cohort.

Materials and Methods: A consecutive cohort of self-referred patients treated in the SANA clinic with chronic musculoskeletal pain (>3 months) were included. Patients were treated with individualized IHT. They completed a Numeric Rating Scale for pain intensity (NRS) and a 36-Item Short Form Health Survey (SF-36) prior to treatment and 6 weeks after the first treatment. Prior to each treatment session patients also completed NRS. Patients with pre-treatment NRS of ≤ 2 were excluded. P-values less than 0.05 were considered significant.

Results: Thirty-six patients were included, and the follow-up rate after 6 weeks were 62%. Mean age was 43 years and mean duration of symptoms was 55 months. The average number of treatments were 5. We found that IHT significantly reduced pain after 6 weeks in both rest (NRS 6.0 to 2.5; $P=0.0039$ (week), NRS 6.0 to 2.0; $P=0.0078$ (month)) and activity (NRS 7.5 to 3.0; $P=0.0001$ (week), NRS 7.0 to 3.0; $P=0.0004$ (month)). Additionally, IHT increased health-related quality of life, an improvement that was significant in five out of eight domains related to pain and function. Lastly, we found that IHT significantly reduced pain on NRS from baseline to the evaluation after 2 treatments in both rest ($P=0.009$) and activity ($P=0.0009$).

Interpretation / Conclusion: We conclude that this novel algorithm of individualized IHT is associated with significant pain reduction and improved health-related quality of life in patients with musculoskeletal chronic pain.

Benefits and harms of exercise therapy for patients with diabetic foot ulcers: A systematic review

139.

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Background: One of the most feared complications of diabetes mellitus is diabetic foot ulcers (DFU), as it can cause severe adverse consequences such as amputation or death. Patients are often required to refrain from bearing weight on their affected limb, leaving some patients immobile for weeks, months or even years. This is in direct contrast to guidelines for diabetes where exercise therapy and physical activity are core elements in the treatment. This leaves patients and caretakers with a paradox. If a DFU evolves, should patients continue following the guidelines for diabetes? Even if these guidelines include recommendations of brisk walking and exercising at high intensity.

Aim: Exercise therapy is a core element in the treatment of diabetes, but the benefits and harms for patients with a diabetic foot ulcer are unknown. We aimed to systematically review the benefits and harms of exercise therapy for patients with DFU.

Materials and Methods: We searched six major databases. We performed citation and reference searches of included studies and contacted authors of ongoing trials. We included randomized controlled trials to assess potential benefits on health-related quality of life (HRQoL) and harms of exercise therapy. Observational studies were included to identify potential harms of exercise therapy.

Results: We included 10 published publications of 9 trials and results from two unpublished trials including a total of 281 individuals with DFUs receiving various forms of exercise therapy. Due to lack of HRQoL measurements and high heterogeneity, it was not possible to perform meta-analyses. Results on HRQoL was present in one unpublished study. Harms reported ranged from musculoskeletal problems, increased wound size, to amputation; however, no safe conclusions could be drawn from the available data due to high heterogeneity and risk of bias in the trials.

Interpretation / Conclusion: Protective strategies are often preferred over therapeutic exercise which might have unforeseen consequences for patients over time. Based on the current literature, no evidence-based recommendations can be provided on the benefits and harms of exercise therapy for patients with DFUs. Well-conducted RCTs are needed to guide rehabilitation.

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Background: Total ankle replacement (TAR) is a rapidly growing treatment for end-stage ankle arthritis. TAR is generally performed as an inpatient procedure with an average length of stay between 2.5–3.2 days. Previous studies have shown that out-patient TAR is safe and cost-effective but others have found increased complication rates associated with out-clinic surgery but the literature is sparse on this topic.

Aim: To evaluate the admission length together with complication, re-admission and non-scheduled contact to the out-patient clinic rates in patients operated with TAR at Hvidovre University Hospital. The study also aims at identifying risk factors associated with admission length >1 day.

Materials and Methods: Since 11th of December 2015 all patients treated at Hvidovre University Hospital with TAR have been subjected to the fast track setting where discharge is planned the first post-operative weekday after cast application. For this study data was collected on all patients treated during the period 11th of December 2015 to 1th of October 2019 with a minimum of three months follow-up. Data was collected regarding age, sex, ASA-score, BMI, co-morbidity, complications-, re-admission rates and non-scheduled contact to the out-patient clinic.

Results: 151 patients were included. No difference was found between patients discharged after one day when compared with those admitted >1 day. 54.3% was discharged one day after surgery while 32.4 % was discharged after 2 days and 13.3 % after >2 days. The overall readmission rate was 1.95 % while 5.95 % had a complication and 16.65 % had a non-scheduled contact to the out-patient clinic. None of the included variables was found associated with admission length >1 day in both uni- and multivariate logistic regression analysis.

Interpretation / Conclusion: Fast track TAR seems safe even though only 50 % of the patients could adhere to this. The main reasons for prolonged admission was soft-tissue swelling not allowing cast application or surgery at the end of the week delaying cast application. Also, special attention has to be made regarding analgesic treatment and cast application, in order to reduce the number of non-scheduled contacts to the out-patient clinic.

Symptomatic cyst formation under the Scandinavian Total Ankle Replacement (STAR) talar component treated with allogenic bone graft and subtalar arthrodesis

141.

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Background: STAR is a treatment option for advanced arthritic conditions in the ankle joint. Formation of cysts under the talar component is a known complication. Increasing cyst volume may increase risk for implant failure.

Aim: To evaluate a uniform cohort with talar cyst formation under STAR talar component treated with allogenic bone graft and simultaneous subtalar arthrodesis.

Materials and Methods: During the period from June 1998 to June 2018, 465 patients, 254 (55%) males and 211 (45%) females, were treated with a total of 518 implants. 83% of cases had primary implant due to Osteoarthritis (OA), 17% due to Rheumatoid Arthritis(RA). Data was collected prospectively. 15(3,2%) patients treated with allogenic bone graft and subtalar arthrodesis were identified. A clinical examination, AOFAS-score, VAS pain score and x-rays were obtained pre-operatively, post operative and at follow-up.

Results: 15 patients, 11 (73%) males and 4 (27%) females, treated with allogenic bone graft and subtalar arthrodesis were identified. All 15 patients had the primary implant due to OA. Median time from primary surgery to graft and arthrodesis was 5,5 years (IQR 4,6 - 9,0). Median time from bone graft and arthrodesis to follow-up was 5,0 years (IQR 3,6 - 6,4). At follow-up 11(73%) patients had healed, of which 2(13%) had re-formation af talar cysts but no migration on x-ray. 3(20%)patients had migration of the talar component with a still functional implant. 1(7%) had revision surgery after 1,2 years.

Interpretation / Conclusion: Allogenic bone graft with simultaneous subtalar arthrodesis is a good treatment option for implant threatening cyst formation under STAR talar component. After median 5,0 years follow-up 11 patients had healed successfully, and a further 3 implants remained satisfactory functional in spite of migration and only 1 implant had failed demanding revision.

Irreducible chronic metatarsophalangeal luxation in patients with rheumatic arthritis treated by resection arthroplasty of the small metatarsal heads

142.

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Background: The classic Rheumatoid Arthritis (hereafter RA) deformities include Hallux Valgus, hammertoes and a collapse of the transverse arch. The typical patient presents with metatarsalgia as the main complaint, but also pressure points from footwear on bunion and hammertoes. The goal of rheumatoid fore-foot surgery is to reduce pain and normalize the foot to fit common footwear by correcting deformities. In our department, this surgical correction has consisted of first ray metatarsophalangeal arthrodesis, small metatarsal head resection and hammertoe correction by proximal interphalangeal arthrodesis.

Aim: To establish a basic understanding of patient satisfaction and surgical outcome of this surgical procedure in our institution.

Materials and Methods: We report from a consecutive retrospective self-controlled cohort study of 33 patients (50 feet) operated with the same technique.

Results: 30 of the 33 patients confirmed willingness to repeat surgery. 16 of 33 patients wore hand-sewn shoes before surgery, postoperatively this was reduced to 7 of 33. Solid metatarsophalangeal fusion of the great toe was found in 47 of 50 feet and the metatarsal parabola was acceptable by radiological assessment.

Interpretation / Conclusion: This cohort showed a high level of patient satisfaction and outcome. This cohort is non-comparative and allows no conclusions on the effects of surgery, but patient willingness to repeat is good and we will continue to offer this procedure to our patients with severe rheumatoid fore-foot deformities.

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Background: Long-term muscular deficits are common after Achilles tendon ruptures. Early use of exercises is recommended in the literature, but the actual content of the exercises is sparsely investigated.

Aim: To examine the feasibility of an early progressive resistance exercise program for patients with Achilles tendon rupture regarding patient acceptability of the exercises and compliance of the intervention.

Materials and Methods: Participants with an acute Achilles tendon rupture treated non-surgically were recruited at Aalborg University Hospital. During the 9 weeks of immobilizing with a walker boot, the patients attended weekly supervised exercises sessions and performed home exercises. Exercises were ankle plantarflexion isometric exercises, seated heel-raises and resistance exercise with elastic band. Patient acceptability was evaluated using a 7-point Likert scale, and we hypothesized 80% of the patients would rate the top four scores. Adherence to the exercise program was defined as 80% of the patients performing at least 50% of the home exercise sessions. During the intervention, tendon healing was monitored, and adverse events were recorded.

Results: 16 patients [mean age 46 (range 28–61), male/female = 13/3] completed the intervention. Cause of rupture were sport in 12 cases and four had recently returned to sport after a longer break. Pre-intervention Achilles tendon total rupture score was 98 (SD 7.6). All patients rated the acceptability of the exercise program in the top three on the 7-point Likert scale at 9- and 13-weeks follow-up and 9/16 rated the highest score (very acceptable). The mean performance of home exercises was 74% (range 4–117) of the total sessions possible. One patient had difficulties coping with the intervention and activity of daily living during the intervention period. There were no re-ruptures, but one case of deep venous thrombosis (pain and edema at the second session).

Interpretation / Conclusion: The early progressive resistance exercise program was feasible based on patients rating the exercise program highly acceptable and compliance with the exercises was high.

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Background: Plantar heel pain (PHP) used to be considered a self-limiting condition, where pain was thought to resolve within a year after onset. Recent investigations have indicated that a large proportion of patients may experience pain for several years despite having received specialized care.

Aim: To explore the long-term prognosis of individuals treated for PHP.

Materials and Methods: Patients treated for PHP at the orthopaedic foot and ankle ward, Aalborg University Hospital, between 2011–2018 were contacted via e-mail and asked to participate in the study by completing online questionnaire. Questionnaires concerned demographic and participant characteristics, presence of heel pain during the past four weeks, mean heel pain intensity during the past week measured on a 0 to 10 numerical rating scale, work situation, comorbidities, and overall health status as measured by the EQ5D. These results are preliminary and data collection is continuing, so a higher response rate is expected.

Results: A total of 254 (68% women) completed the questionnaire (38% of all diagnosed with PHP during the 8 year period), median BMI of 28.0 kg/m² (IQR 25.0–32.2). Mean age was 54 years (SD 12) and the median period of heel pain was 20.5 months (IQR 9– 60). 55% (95%CI 49–61%) reported they had experienced heel pain during the past four weeks at follow-up, with a median pain intensity of 5 (IQR 3– 7). 76–86% of these reported concomitant pain in either shoulders, legs/hips or backs. Among those still experiencing heel pain, 17.5% had to change their work assignments due to heel pain, 25% had days with sick leave due to heel pain (median days off work 21 (IQR 7–90)) and 27% reported depressive symptoms on the EQ5D.

Interpretation / Conclusion: Despite specialized care, more than half the sample still reported PHP up to 10 years after initial treatment. Not only were they still experiencing pain, but the condition was also found to be associated with sick leave and a change in work assignments in a substantial number of participants, and one in four reported depressive symptoms. These results emphasise the large impact PHP may have on people with PHP and highlights the need for more effective treatments.

The feasibility and acceptability of a six-month progressive exercise therapy and patient education intervention for patients with hip dysplasia ineligible for periacetabular osteotomy

145.

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Background: Hip dysplasia can be surgically treated with periacetabular osteotomy (PAO). However, PAO is not offered to or accepted by all patients. Hence, no evidence-based interventions exist for patients ineligible for PAO.

Aim: The aim was to evaluate the feasibility and acceptability of a six-month progressive exercise therapy and patient education intervention for patients with hip dysplasia ineligible for PAO prior to conducting a full-scale randomised controlled trial (RCT).

Materials and Methods: Feasibility was evaluated as recruitment, retention and mechanisms of impact. Recruitment and retention were monitored through intervention records. Mechanisms of impact were evaluated as change in Copenhagen Hip and Groin Outcome Score (HAGOS) pain, hip muscle strength and single-leg hop test (SLHD) over a 6-month follow-up period. Acceptability was evaluated as expectations, perceptions, adherence, benefits and harms. Adherence was evaluated by self-reports, whereas the other components were evaluated through semi-structured interviews.

Results: The feasibility evaluation showed that 30 (median age: 30, IQR 24–41) of 32 eligible patients accepted inclusion in the study, and that 24 patients completed the 6-month follow-up. Furthermore, HAGOS pain improved by 11 (CI 5–17) points and hip strength improved by 0.2 (CI 0.04–0.4) Nm/kg (abduction), 0.2 (CI 0.01–0.4) Nm/kg (flexion) and 0.3 (CI 0.02–0.5) Nm/kg (extension). Finally, SLHD improved from a median of 0.4 (IQR 0.3–0.4) metres to 0.5 (IQR 0.5–0.6) metres, $p < 0.001$. Patient acceptability was characterised by high perceived value of the intervention, and that expectations to the intervention were met. A total of 20 of 24 patients completed at least 2/3 of planned training sessions.

Interpretation / Conclusion: A six-month progressive exercise therapy and patient education intervention is considered feasible and acceptable. Thus, it seems relevant to conduct an RCT to investigate the effectiveness on pain, muscle strength and performance. If such trial can confirm the results of the present study, it has potential clinical impact in patients with hip dysplasia ineligible for PAO.

Increased anterior pelvic tilt in patients with acetabular retroversion compared to the general population: A radiographic and prevalence study

146.

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Background: The prevalence of acetabular retroversion is sparsely investigated and it may be associated with increased anterior pelvic tilt.

Aim: To investigate whether patients with symptomatic and radiographically verified acetabular retroversion demonstrated increased anterior pelvic tilt compared to a control group, and furthermore to evaluate the prevalence of acetabular retroversion in the general population.

Materials and Methods: We assessed anteroposterior pelvic radiographs in standing position of 111 patients with acetabular retroversion and 132 matched controls from the general population. Pelvic tilt was assessed by the sacrococcygeal joint–symphysis distance and pelvic-tilt-ratio. Acetabular retroversion was defined as positive cross-over sign and posterior wall sign. A nonparametric regression model was used to test between-group differences in median pelvic tilt. The prevalence was calculated as the ratio of subjects and hips with acetabular retroversion, respectively.

Results: The patient group had significantly larger median anterior pelvic tilt of 14.3 mm in sacrococcygeal joint–symphysis distance and -0.08 in pelvic-tilt-ratio, compared to controls. The prevalence of subjects in the general population was 24% and 18% for unilateral or bilateral acetabular retroversion, respectively.

Interpretation / Conclusion: We found that patients with symptomatic acetabular retroversion have increased anterior pelvic tilt compared to the general population. Radiographic sign of acetabular retroversion was highly prevalent in the general population. This should be considered when diagnosing and treating patients with hip pain, as they may not necessarily originate from the radiographic verified acetabular retroversion.

A home-based exercise and activity modification program in patients with acetabular retroversion and excessive anterior pelvic tilt – a feasibility and intervention study

147.

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Background: Patients with symptomatic acetabular retroversion is reported having reduced functional ability and quality of life but little is known about the effect of non-surgical interventions.

Aim: To investigate feasibility and change in patient-reported symptoms of a home-based exercise intervention in patients with acetabular retroversion and excessive anterior pelvic tilt, in comparison with a prior control period.

Materials and Methods: Patients with symptomatic acetabular retroversion and excessive anterior pelvic tilt were included. Following an 8-week control period, patients were instructed to follow an 8-week targeted (3 times/week) progressive home-based exercise intervention. Feasibility assessment included; dropout, acceptable adherence ($\geq 75\%$ of sessions), exercise-related pain, and adverse events. Primary outcome was change in the Copenhagen Hip and Groin Outcome Score (HAGOS) pain subscale. Secondary outcomes included change in the remaining HAGOS subscales, EQ-5D-3L questionnaire, and pelvic tilt measured by EOS® scanning.

Results: Forty-two patients (39 women) (median [interquartile range (IQR)], 20.5 [19 – 25 years]) were included. Three patients were lost to follow-up (one regretting participating during the control period, one during the intervention period and one patient was lost at follow-up). Adherence to exercise sessions was 85%. Exercise-related pain and adverse events were acceptable. Between-period mean change score for the HAGOS-PAIN subscale was 5.2 points (95% confidence interval [CI]: [-0.3 – 10.6] and -1.6 degree [-3.9 – 0.7]) of anterior pelvic tilt. Additionally, patients who responded positively (\geq minimal clinically important difference) to the exercise intervention ($n = 10$, 26%), all had a pre- exercise HAGOS-PAIN score between 47.5 to 70 points.

Interpretation / Conclusion: Current exercise intervention was feasible. However, no clinical relevant changes in self-reported hip-related pain, function, quality of life, nor anterior pelvic tilt were found. Post-hoc responder analysis revealed that patients with moderate pain at baseline might benefit from current exercise.

Are improvements in pain and hip function after primary or revision hip replacement related to markers of socioeconomic status?

148.

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Background: Total hip replacement (THR) is commonly performed on patients with severe hip osteoarthritis (OA). Clinically meaningful improvements on pain and function have been reported for primary THR, while there is little evidence on improvement after revision THR. Moreover, outcomes such as pain and function after THR may be associated with socioeconomic status (SES).

Aim: We investigated if changes in Harris Hip Score (HHS) differ among patients undergoing primary and revision THR, and their association with SES.

Materials and Methods: A population-based cohort study was conducted on 16,932 patients undergoing primary and/or revision THR from 1995–2018 due to hip OA. The patients were identified in the Danish Hip Arthroplasty Registry. Outcome was defined as mean change in HHS (0–100) from baseline to 1-year follow-up, and its association with SES markers (education, cohabiting and wealth) was analyzed using multiple linear regression adjusting for sex, age, comorbidities and baseline HHS.

Results: Over 1-year follow-up, mean change in HHS increased for both patients undergoing primary THR: 42.9 (95% CI 42.6;43.1) and revision THR: 30.8 (95% CI 28.7;32.8), ($P < 0.001$). For primary THR, SES markers higher education, cohabiting and higher wealth were associated with significantly greater improvement in HHS compared to lower education, living alone and lower wealth.

Interpretation / Conclusion: Patients undergoing primary and/or revision THR can expect clinically important improvement on HHS 1 year after surgery. However, higher improvement can be expected after primary THR, and the improvements are negatively related to low SES, which may help directing rehabilitation resources to the patients with the highest need.

Impact of socioeconomic status on the 90- and 365-day rate of revision and mortality after total hip arthroplasty: A cohort study based on 103,901 THA patients from national health registers

149.

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Background: Socioeconomic inequality in health is increasingly recognized as an important public health issue. Low socioeconomic status (SES) correlates with negative outcome after total hip arthroplasty (THA). However, only few studies have investigated the impact of SES on revision risk and mortality.

Aim: To examine whether SES is associated with revision and mortality rates after THA within 90 and 365 days.

Materials and Methods: We obtained individual-based information on SES markers (cohabitation, education, income, and liquid assets) on 103,901 THA patients from Danish health registers (year 1995–2017). The outcome was revision (any revision or due to infection, fracture, or dislocation) and mortality. We calculated the cumulative incidence with 95% confidence intervals (CI) treating death as competing risk. Cox regression analysis was used to estimate adjusted hazard ratio (aHR) of each outcome with 95% confidence interval for each SES marker.

Results: The cumulative incidence of any revision at 1 year was highest among patients who lived alone (2.2% (CI 2.1–2.4)), had the highest education (2.1% (CI 1.9–2.9)), had the highest income (2.1% (CI 2.0–2.3)), and had the lowest liquid assets (2.3% (CI 2.1–2.4)). Within 90 days, the aHR for any revision was 1.3 (CI 1.1–1.4) for patients living alone vs cohabiting; 2.0 (CI 1.4–2.6) for low income vs high income among patients <65 years, and 1.2 (CI 0.9–1.7) for low liquid assets among patients >65 years. Education was not associated with 90-days revision rate. The same trends were seen within 365 days. Living alone and the low SES markers were all associated with increased mortality rate within both 90 and 365 days.

Interpretation / Conclusion: We showed that living alone, low income, and low liquid assets were associated with increased revision and mortality up to 365 days after THA surgery indicating substantial socioeconomic inequality. By knowing these risk factors, we may focus on how we can prevent complications in patients with low SES. This may be by offering better rehabilitation to patients living alone, thereby securing a better minimal level of function, improving their outcome and minimizing inequality in this respect.

Validity of Perioperative Visual Estimation of Acetabular Fragment Correction in Periacetabular Osteotomies

150.

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Background: Periacetabular osteotomy (PAO) is a well- established surgical treatment of symptomatic developmental dysplasia of the hip (DDH) in young patients by normalizing the lateral center edge angle (LCEA) and acetabular index (AI). Hence, the correction of the acetabular fragment is a hallmark of the PAO procedure.

Aim: To evaluate the efficacy of common practice using fluoroscopy-guided visual estimation of the correction of the fragment during PAO.

Materials and Methods: Forty-nine consecutive patients undergoing PAO due to symptomatic DDH was enrolled. Following the surgical correction of the acetabular fragment the surgeon was asked to visually assess the postoperative lateral center-edge angle (LCEA) and acetabular index (AI). At the follow-up 6–8 weeks postoperative standing x-rays were obtained. Perioperative assessments of LCEA and AI were compared with perioperative and postoperative measurements obtained by three PAO surgeons. Interobserver variation was assessed by regression analysis and Bland- Altman analysis was determine correlation between visual assessment and measurements. A clinical relevant difference (CRD) of 5 degrees was selected a priori.

Results: Mean correction of the LCEA was 11.1 degrees (–4 to 23.5) and the average AI correction was –10.7 degrees (–20 to –4). The interobserver agreement was high for LCEA ($r^2=0.83$) and acceptable for AI ($r^2=0.60$). Visual estimation significantly overestimated the correction of the LCEA angle by 1.5 degrees (95%CI 1.0:1.9) and significantly overestimated AI by 0.31degrees (95%CI 0.22;0.39) compared with postoperative result. Retrospective measurements on the perioperative x-rays showed that this would have led to a significant underestimation of the correction of LCEA of 1.4 degrees (95%CI 1.0:1.9) and overestimation of AI by 2.7 degrees (95%CI 1.9;3.5). This bias was below the CRD threshold. LCEA each using perioperative measurement rather than visual estimation would lower the number of patients outside the CDR from 22 patients (45%) and 16 patients (33%). For AI a shift from under- to overestimation was observed.

Interpretation / Conclusion: Perioperative visual estimation is not sufficiently effective for assessing the postoperative outcome of LCEA and AI in PAO.

Resistance training with low-loads and concurrent partial blood flow restriction (BFR) combined with patient education in females suffering from gluteal tendinopathy: A feasibility study

151.

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Background: To date, there exists no gold standard conservative treatment for lateral hip pain due to tendinopathy of the gluteus medius and/or minimus tendon (GMT), a condition often complicated by pain and disability. Higher loads during everyday activities and exercise seems to be contraindicated with GMT.

Aim: To evaluate the feasibility of resistance training with low-loads concurrent partial blood flow restriction (BFR) and patient education.

Materials and Methods: Patients were recruited from three hospitals in the Central Denmark Region. The intervention consisted of four sessions/week for 8 weeks with one weekly supervised session. From week three patients exercised with applied partial BFR by means of a pneumatic cuff around the proximal thigh of the affected leg. Baseline and 8 weeks follow-up (8FU) testing included maximal voluntary isometric contraction of hip abduction (MVC), 30-second chair stand test (30-s CST), and patient reported outcome measures (The Victorian Institute of Sport Assessment-Gluteal Questionnaire (VISA-G), EuroQol -Visual Analogue Scale (EQ-VAS) and pain Numerical Rating Scale (NRS 0-10)). At 8FU Global Rating of Change (GROC) was collected.

Results: 16 women with a median (IQR) age of 49 (44-60) years were included. Mean Body Mass Index 27.3 ± 3.8 kg/m². Adherence to the total number of training sessions and the BFR-exercise was 96.4% and 94.4%. Two patients dropped out due to i) illness before initiation of BFR-exercise and ii) pain in the affected leg related to the BFR-exercise. From baseline to FU8 mean pain decreased from 5.5 to 2.7 NRS ($p > 0.001$). 30-s CST improved from 14.9 to 20 repetitions ($p > 0.001$). EQ-VAS and VISA-G improved from 70.1 to 80.4 ($p = 0.02$) and 55.2 to 65.9 ($p = 0.11$). MVC of the affected leg increased by 0.21 (95% CI 0.10;0.32) Nm/kg. MVC of the unaffected leg increased by 0.11 (95% CI -0.01;0.24) Nm/kg. At FU8 the success rate of GROC ("moderately better" to "very much better") was 66.67%.

Interpretation / Conclusion: BFR-exercise seems to be a feasible treatment for GMT. At FU8, patients reported clinically relevant reduction in pain, increased quality of life and high global improvement rating. Improvements of both MVC and 30-s CST implies improved strength and function.

Gluteal-related lateral hip pain; - a painful condition with poor subjective outcomes

152.

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Background: Lateral hip pain (LHP) due to tendon pathologies of M. gluteus medius and minimus' insertion at the greater trochanter are often misdiagnosed and may lead to unrecognized disability. To what degree this disability subjectively affects the patient has not yet been clearly elucidated.

Aim: The aim of this study was to evaluate pain and patient reported outcomes in patients presenting with LHP in the context of a public financed health care system.

Materials and Methods: Data were collected from September 2017–November 2020 at a regional teaching hospital. Inclusion criteria were clinical and MRI verified hip abductor tendon pathology. Baseline testing included pain scoring (NRS) and patient reported outcome scores: Copenhagen Hip and groin outcome score (HAGOS), Oxford hip score (OHS) and EuroQol–Visual Analogue Scale (EQ–VAS).

Results: In the study period, 151 patients (94% women) with a median age of 55 years were included. LHP (NRS, 0–10) at rest, during activity and worst pain at any given time was 4, 7 and 9, respectively. Mean patient reported outcome scores were HAGOS: Pain 42.9, Symptoms 49.8, ADL 42.2, Sport/Rec 28.1, PA 25, QOL 27.8; OHS: 24; EQ–VAS: 59.6.

Interpretation / Conclusion: We found that patients with hip abductor tendon pathology displays poor patient reported outcomes, which are comparable to patients suffering from severe hip Osteoarthritis. There is a need for further research into this patient group. The results are based on a heterogeneous study population in terms of variety of hip abductor tendon pathology and co-morbidities and needs to be interpreted as such.

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Background: Increasing numbers of THA and TKA are performed with expanding applications in a younger and elderly population. Recurrent complicated aseptic and septic revisions and periprosthetic femoral fractures are growing in numbers resulting in extensive loss of femoral bone stock making it unable to support revision implants. For these complicated cases Total Femur Replacement (TFR) is an alternative to amputation.

Aim: To assess the functional outcomes and the complication associated with TFR used in revision arthroplasty.

Materials and Methods: We retrospectively reviewed 24 non-tumour cases that received a TFR for revision surgery: mean age 71 (40-85) years, F/M=13/11, mean follow-up 51 (12-180) months, mean number of previous revisions 3.8 (1-12), history of periprosthetic infection (n=11). The indications for TFR were severe femoral bone loss because of aseptic loosening (n=10), septic loosening (n=7), periprosthetic fracture (n=7) and osteomyelitis (n=1).

Results: Mean operating time was 271 (133-600) minutes and mean blood loss was 3417 (560-7300) ml. 9 patients had a well-fixed acetabulum component and 15 cases had acetabular cup revision. 11 hips received a constraint liner, 4 patients a dual mobility cup and 9 cases had non-constraint liners. The knee components were all rotating- hinged knee. None of the 11 cases with a constraint liner dislocated, 8 of 13 patients (62%) without constraint liners dislocated. 12 patients had no additional procedures and 12 patients had additional surgical procedures with 6 patients revised for infection: 1 total exchange of the TFR and 5 treated with DAIR. No amputations were performed. 16 patients were on lifelong antibiotics, and at end of follow-up 4 patients had died of causes unrelated to surgery. We found good patient satisfaction and low pain scores with low activity level.

Interpretation / Conclusion: TFR for revision surgery in non-tumour cases resulted in limb salvage in all patients and with only 1 patient having total exchange of the TFR implant. However, minor revision for infection and hip dislocation was common occurrences and high rates of infection should be expected.

Does daily physical activity differ between patients with femoroacetabular impingement syndrome and patients with hip dysplasia?

154.

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Background: Femoroacetabular impingement syndrome (FAIS) and acetabular hip dysplasia (HD) are common hip diseases. The literature describes patients with FAIS as athletic males, while patients with HD have been described as primarily non-athletic females.

Aim: The aim was to compare accelerometer-based physical activity (PA) behaviours between patients with Femoroacetabular impingement syndrome (FAIS) and patients with acetabular hip dysplasia (HD), and to compare PA of patients with healthy volunteers. Furthermore, to compare self-reported sporting function between patients with FAIS and patients with HD.

Materials and Methods: In this cross-sectional study, combining data from previously studies involving patients with FAIS or HD, PA was measured with accelerometer-based sensors and sporting function was measured with the Copenhagen Hip and Groin Outcome Score. Data on patients with FAIS or HD and healthy volunteers was collected in other studies and merged for comparison in this study.

Results: Fifty-five patients with FAIS (36% males), 97 patients with HD (15% males) and 60 healthy volunteers (40% males) were included. Patients with FAIS spent 4% point more time on very low intensity activities and 1% point less time on moderate intensity activities compared with patients with HD, while self-reported sporting function did not differ between the two groups. Both groups spent 2% point less time on high intensity activities per day than healthy volunteers.

Interpretation / Conclusion: Patients with FAIS had lower level of PA than patients with HD. Since both groups spent less time on high intensity activities than healthy volunteers, the majority of these patients may be described as non-athletic.

Carriages of *S. aureus* among arthroplasty surgeons and relation to prosthetic joint infections using MALDI-TOF MS

155.

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Background: Prosthetic joint infection (PJI) is a severe complication in total hip and knee arthroplasty with great consequences. *S. aureus* is the most common pathogen within PJI. The most important independent risk factor for PJI is nasal colonization with *S. aureus*. Nasal colonization represents both a risk for the colonized individuals and their immediate contacts.

Aim: To identify the sub-types of *S. aureus* colonizing the individual surgeons and examine if the carrier state and sub-type changes over a period of one year and secondly to examine if the isolates of *S. aureus* from PJI is the same as carried by the surgeon performing the surgery.

Materials and Methods: This prospective study included all 11 surgeons employed at Section for Hip and Knee Replacement, Lillebaelt Hospital Vejle. All have been tested from the nares every 2nd week from December 1, 2017 to November 30, 2018. Patients operated in the same period were followed one year to register if they have undergone revision surgery due to PJI. At the end of the study period all isolates of *S. aureus* have undergone typing by matrix- assisted laser desorption ionization time-of- flight mass spectrometry (MALDI-TOF MS). Isolates identified from PJI were compared to the most recent isolates obtained from the surgeon around the time of the surgery.

Results: During the study period, the mean number of tests obtained from each was 20 (range 17- 25). 4 surgeons were chronic carriers, 5 intermediate and 2 were non-carriers of *S. aureus*. All 9 either chronic- or intermediate- carriers had different sub-types. Out of 1,670 primary hip or knee arthroplasties, 10 patients had revision due to PJI. 9 was infected with *S. aureus* and only 1 with *S. epidermidis*. The 10 PJIs were distributed between 6 surgeons. One surgeon had 3 infected patients, 2 had 2, the remaining 3 only 1. None of the *S. aureus* sub-types found in the surgeons were the same as in the samples from the PJI.

Interpretation / Conclusion: The proportion of chronic- and intermediate- *S. aureus* carriers seems to be high among surgeons compared to the general population, but they all had different sub-types indicating that there was no endemic departmental strain. None of the sub-type found among the surgeons were isolated from the PJI.

Reoperation rates for the Dual Mobility Cup in Total Hip Arthroplasty

156.

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Background: Total hip arthroplasty (THA) is used to treat osteoarthritis in the hip as well as fractures of the femoral neck. Instability followed by dislocation is a common indication for THA revision surgery. A dual- mobility acetabular component (DMC) has been designed to address this issue and lower dislocation rates in THA. A major concern with the DMC is increased stress on the implant components and therefore, accelerated polyethylene (PE) wear. It has been proposed that the increased PE wear will lead to a shorter survival of the prosthetic components, but long-term follow-up studies on DMC THA have yet to be performed. Viborg Regional Hospital has since 2001 primarily used the dual mobility cup in THA for patients over the age of 70, presenting a unique possibility to study the long-term revision rate for the DMC.

Aim: The aim of the study is to investigate the revision rate of the dual mobility cup in total hip arthroplasty. Furthermore we wish to investigate if the indication for THA had any effect on survival of the prosthetic components.

Materials and Methods: A retrospective cohort study of all patients who received a primary THA with a DMC at Viborg Regional Hospital between 2001 and 2018 was conducted. Information regarding revision arthroplasty were obtained from the National Registry of Patients and the Danish Hip Register.

Results: We found the 10-year survival rate for the DMC in THA to be 91% (95% CI=7.43% to 10.90%). We found no significant difference in the 10-year revision rate between THA performed due to arthrosis and THA performed due to fractures. We did however, find a significant difference in 5 and 10 year survival for those two subgroups.

Interpretation / Conclusion: Our findings suggest that, when performing a primary THA, the DMC is level with the conventionally used liner regarding long-term component survival.

Evaluation of Magnetic resonance images from 120 patients presenting with lateral hip pain from 2016 to 2020 – no signs of the infamous trochanteric bursitis.

157.

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Background: Bursitis at the greater trochanter has historically been identified as a major pain generator in patients presenting with lateral hip pain (LHP), and the majority of established treatments have focused on treatment of this anatomic structure. Steroid injections has been the mainstay in conservative treatment, sometimes combined with various types of rehabilitation. In cases of refractory LHP, surgery on the Iliotibial band often combined with a bursectomy has been the gold standard. However, a recent retrospective study in 1.000, non-selected, hip magnetic resonance imaging (MRI) scans has highlighted the potentially low prevalence of trochanteric bursa, which questions the role of an inflamed trochanteric bursa as the origin of LHP.

Aim: To evaluate prospectively performed MRI in LHP patients with special attention to the presence of isolated trochanteric bursitis.

Materials and Methods: MRI scans of 120 patients (94% women, median age of 54 years (IQR: 48-64)) with LHP seen at a public outpatient orthopedic clinic between 2016- 2020 were independently evaluated by two raters. The presence of high-intensity signals in the trochanteric area, and the subjective interpretation of these high intensity signals were independently noted by each rater. Subsequently, a consensus agreement was made between the raters in cases of disagreement.

Results: Two patients (2%) had isolated greater trochanteric (GT) bursitis, 30 patients (25%) had to some degree elements of inflammation in the GT bursa but with concomitant pathological changes to the hip abductor tendons, and 5 patients (4%) had relevant pathological changes to the hip abductor tendons with bursitis in the sub-gluteus minimus bursa with no bursitis in the GT bursa. 24 patients (20%) had pathological changes to the hip abductor tendons without concomitant bursitis. The remaining patients did not have high-intensity signals in neither the bursa nor the hip abductor tendons.

Interpretation / Conclusion: Isolated bursitis in the trochanteric area in patients referred with LHP in an outpatient orthopedic clinic is infrequent, whereas pathologies in the hip abductor tendons are frequent, and this finding should guide future diagnostic and treatment choices.

**Custom-made Triflanged Implants In
Reconstruction Of Severe Acetabular Bone
Loss With Pelvic Discontinuity After Total Hip
Arthroplasty 40 cases with 2-11 Years follow-up**

158.

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Background: Revision of a failed total hip arthroplasty with massive acetabular bone loss and pelvic discontinuity is a reconstructive challenge. Treatment options includes morselized bone graft and structural allograft used with uncemented hemispherical acetabular components, cages, porous metal augments, and cup- cage reconstruction. A custom-made triflanged implant has recently been introduced as a new option of treatment.

Aim: The purpose of this study was to evaluate the use of a Custom made Triflanged Implant in cases with pelvic discontinuity. We monitored healing rate, migration and overall survivorship defined as revision of the implant for any reason.

Materials and Methods: We reviewed 40 consecutive patients, mean age 68.7 years (48-85) with a failed THA and pelvic discontinuity. Mean follow-up was 54 months (24-132). The implant for acetabular reconstruction was custom-manufactured on the basis of a three- dimensional model of the hemi-pelvis created from computed tomography (CT). The Harris Hip score was performed and the acetabular bone defects were all classified as type V according to the Gross classification. Center of rotation (COR) was calculated. Postoperative radiograph was analyzed in relation to: Healed or unhealed discontinuity and stable/unstable fixation.

Results: Mean Harris Hip score was 80 (47-96). Mean intraoperative blood loss was 1500 ml (235-6500) and mean surgery time was 147 min. (72-331). COR was established in 36 of the patients and no major intraoperative complications occurred. The discontinuity healed in 40 (95%) of the cases. Thirty-five patients (83%) had no additional procedures. Seven patients experienced dislocation (16%) five of these were treated with a constrained liner. We observed two septic loosening (5 %) revised in 2 stage procedures, and one re-infection (2%) treated with DAIR and life-long antibiotic. 40 (95%) of the implants was defined as stable with 100% survivorship for aseptic loosening.

Interpretation / Conclusion: The 3D costum made Triflanged Implant makes it possible to optimized screw and implant positioning with high accuracy and with rigid fit on bone fixation thus permitting healing of the discontinuity and biological fixation of the acetabular component.

Introduction of a new treatment algorithm reduces the number of periprosthetic femoral fractures (PFF) following primary THA in elderly females 159.

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Background: Increasing global usage of cementless prostheses in total hip arthroplasty (THA) surgery presents a challenge, especially for elderly patients. To reduce the risk of early periprosthetic femoral fractures (PFF), a new treatment algorithm for females >60 years undergoing primary THA was introduced.

Aim: The aim of this study was to determine the impact of the new treatment algorithm on the early risk of peri- and post-operative PFFs and guideline compliance.

Materials and Methods: A total of 2,405 consecutive THAs that underwent primary unilateral THA at our institution were retrospectively identified in the period January 1st 2013 to December 31st 2018. A new treatment algorithm was introduced on April 1st 2017 with female patients aged >60 years intended to receive cemented femoral components. Prior to this, all patients were scheduled to receive cementless femoral components. Demographic data, number of peri- and post-operative PFFs and surgical compliance were recorded, analyzed and intergroup differences compared.

Results: The utilization of cemented components in female patients >60 years increased from 12.3% (n=102) to 82.5% (n=264). In females >60 years a significant reduction in the risk in early post-operative and intra-operative PFF following introduction of the new treatment algorithm was seen; (4.57% vs 1.25%, $p=0.007$) and (2.29% vs. 0.31%, $p=0.02$), respectively. Overall risk for post-operative and intra-operative fractures combined was also reduced in the entire cohort (4.1% vs 2.0%, $p=0.01$).

Interpretation / Conclusion: Use of cemented fixation of the femoral component in female patients >60 years significantly reduces the number of PFF. Our findings support use of cemented femoral fixation in elderly female patients.

Revision total hip arthroplasty in patients with extensive proximal femoral bone loss using distal fixated modular femoral components.

160.

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Background: Revision total hip arthroplasty (rTHA) is a challenging procedure especially in the presence of severe bone loss where implant fixation is compromised. Tapered fluted stem and long cylindric stems provide the possibility to bypass the regions of proximally deficient bone and to obtain stability and fixation in the distal femoral bone.

Aim: the purpose of this study was to assess the performance and evaluate the midterm results after femoral revision with an uncemented modular implant design in a cohort with severe bone loss; 44% being classified as Saleh's type III-V bone defect.

Materials and Methods: We performed a retrospective review of 100 patients (101 hips) who underwent a (rTHA) using a fluted, tapered, or long cylindric modular femoral stem design. (Arcos Modular Revision Femoral System (ZimmerBiomet®, Warsaw, IN, USA). Mean follow-up was 5,8 (range 2,5 to 9,4.) years. Mean age 69,5 (range 24–91) years. Harris Hip Score (HHS), Oxford Hip Score (OHS) and EQ-5D were obtained. Radiographs were reviewed evaluating bone loss, osseointegration of the distal femoral stem, migration, and restoration of the proximal femur.

Results: The Indication for revision were infection (41%), aseptic loosening (37%) and periprosthetic fracture (11%). 5 hips required revision with removal of the femoral stem (5%). 3 patients had their stem removed because of infection, 1 was removed because of aseptic loosening, and 1 had early dislocation twisting the stem in retroversion. (was revised with a new long cylindric stem with distal screw fixation). During follow-up 10 patients experienced dislocation, 1 sustained periprosthetic fracture, and 1 had soft tissue revision. Of the 76 hips available for radiographic evaluation, 61 hips (80%) showed radiographic evidence of restoration of proximal femoral bone. Mean HHS was 78 points (range 41–100). The mean OHS results was 35 points (range 8–48). Mean EQ-5D VAS score was 70 (range 25–100).

Interpretation / Conclusion: Distal fixated modular femoral components have the potential to achieve long-term biological fixation, even in the presence of extensive bone loss with 95% survivorship at midterm follow-up.

Physical capacity among patients treated with periacetabular osteotomy for hip dysplasia: preliminary results from a cross-sectional study

161.

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Background: Hip dysplasia is characterized by a shallow and oblique acetabulum, potentially resulting in damage to intra-articular structures and early development of secondary osteoarthritis. Periacetabular osteotomy (PAO) is the standard joint articulating structures and early development of secondary osteoarthritis. Periacetabular osteotomy (PAO) is the standard joint-preserving surgical treatment for young and middle-aged patients with symptomatic hip dysplasia. Despite improvements in patient-reported outcome measures (PROMs), the physical activity profile remains unchanged, and lack of functional capacity and abnormal biomechanics still persist following PAO. This may compromise the efficacy of PAO, and leave patients at risk of early conversion to total hip arthroplasty and development of life style related problems as cardiovascular disease.

Aim: The aim of this study was to investigate parameters of impaired physical capacity following PAO.

Materials and Methods: Eight patients (women, aged 27+/-2 years), with a body mass index of 23+/-1, treated with PAO for hip dysplasia within the last 2+/-1 years, were included. Physical capacity was investigated using PROMs, laboratory-based, and clinical measures, and the associations between these measures. Hip and groin function and pain was measured with The Copenhagen Hip and Groin Outcome Score (HAGOS). Laboratory based, and clinical measures, and the associations between these measures. Hip and groin function and pain was measured with The Copenhagen Hip and Groin Outcome Score (HAGOS). Laboratory-based and clinical measures were assessed by standardized 3D gait analysis and examination of hip and muscle-tendon-related pain using a standardized clinical entity approach. related pain using a standardized clinical entity approach.

Results: HAGOS scores were (mean (SD): pain=61 (5), symptoms=58 (3), ADL=68 (7), sport/rec=54 (7), PA=25 (10), QoL=42 (8)). The prevalence of positive flexion-adduction-internal rotation test and iliopsoas-related pain was 75% and 50%, respectively. The association between HAGOS pain and peak hip extension angle and peak hip flexor moment was $r=0.71$ ($p=0.07$) and $r=0.02$ ($p=0.96$), respectively.

Interpretation / Conclusion: Patients with hip dysplasia experience impaired physical capacity two years following PAO. Our preliminary results indicate a possible correlation between hip pain and biomechanical parameters, however this needs to be investigated further in a larger cohort.

Patient and public involvement in the Danish PROHIP trial: A thematic exploration of key stakeholder input, experiences, and perceptions.

162.

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Background: Total hip arthroplasty (THA) and exercise provide improved function and reduced pain for hip osteoarthritis. Current treatment selection is based on low evidence as no randomised controlled trials (RCTs) are available. Furthermore, low recruitment rates and intervention crossover are common in RCTs comparing surgery to exercise. Patient and public involvement (PPI) may improve trial design and implementation of research findings. Thus, a PPI protocol was embedded into the Progressive Resistance Training versus Total Hip Arthroplasty in Patients with End-stage Hip Osteoarthritis (PROHIP) trial.

Aim: To explore context-relevant key stakeholder input in order to optimise the design and execution of a planned comparative RCT.

Materials and Methods: Fourteen patients undergoing THA, two orthopaedic surgeons and two physiotherapists, and four political stakeholders were recruited. Six focus group interviews were conducted according to group status using semi-structured interview guides. Interviews were recorded, transcribed verbatim and thematically analysed.

Results: Three key themes emerged: (1) 'Patient recovery expectations', (2) 'The influence of professional authority', and (3) 'Inconsistent health care provider communication'. Theme 1 suggested that patients experienced their hip problem as disabling and considered recovery without THA unlikely. However, after THA, expectations for a quick return to activities of daily living were high. Theme 2 highlighted that both surgeons and physiotherapists claimed expert knowledge and clashed regarding explanatory and management frameworks. Therefore, patients may feel pressured into choosing between THA or exercise. Finally, theme 3 indicated that health care providers tended to use a management narrative best suited to their preferred intervention. Therefore, patients risk being medicalised differently.

Interpretation / Conclusion: Patients, orthopaedic surgeons and physiotherapists may introduce systematic bias into the PROHIP trial. Methodological considerations to improve trial design may include development of a neutral patient information narrative delivered by an independent health care provider group during enrolment and a prospective cohort study investigating the external validity.

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Background: Exercise may be a preventive, disease-modifying, or alleviating treatment at different stages of hip osteoarthritis (OA); pre-clinical, mild-moderate hip OA, severe hip OA and after hip arthroplasty (THA).

Aim: To summarize the effects of exercise as primary, secondary and tertiary prevention at different stages of hip OA and in patients undergoing THA.

Materials and Methods: In a narrative review, we summarized the evidence investigating exercise as a risk factor in the development of hip OA (primary prevention). Then, we summarized secondary and tertiary preventive effects of exercise in patients having mild-moderate or severe hip OA. Finally, we evaluated the effects of exercise after THA (tertiary prevention).

Results: High exposure to exercise and sports injuries may increase the risk of developing hip OA, while moderate levels of exercise oppositely may decrease the risk of developing hip OA. In mild to moderate hip OA, exercise can reduce pain and improve function, while sparse evidence suggest no effect on quality of life. In patients with severe hip OA, exercise may improve function and muscle strength, and reduce pain when assessed before and/or shortly after THA, whereas the effects seem to cease at long-term follow-up postoperatively. We found no results indicating that exercise has a secondary preventive effect on hip OA. Postoperative exercise initiated within one year after THA show improved functional capacity and muscle strength, while having little effect on patient-reported function and quality of life.

Interpretation / Conclusion: Being moderately physically active and maintaining muscle strength is primary prevention of hip OA. Furthermore, exercise may offer tertiary prevention in mild-moderate and severe OA, as well as in patients undergoing THA. There is no data on exercise as secondary prevention of hip OA.

3D-boneprint service in hospital - for preoperative planning and assessment of bone loss revision in hip arthroplasty

164.

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Background: Preoperative assessment of the degree and location of bone defects of the acetabulum and proximal femur is essential to planning successful revision surgery. When based on traditional x-rays and CT-scans exact classification of acetabular bone loss is difficult. When planning acetabular revision using a customized component a 3D-boneprint is often provided by the manufacturer, however, this is an expensive solution and often not provided when planning operation using standard revision cups and augmentation. In our institution 3D prints are now provided by the radiologic department.

Aim: To improve preoperative assessment of the degree and location of bone defects of the acetabulum and proximal femur and reduce the cost in doing so.

Materials and Methods: We present examples of clinical cases and the cost reducing method of in house bone printing. As a result of a collaboration between department of radiology, the orthopaedic surgeon can now request a 3D-print bone model based on the CT generated 3D images. The bone models are printed at the department of radiology and sent to the surgeon as an in the facility service.

Results: The bone prints are used as 1:1 sized sketch works for implanting revision cups and augments to ensure these will achieve sufficient fixation prior to surgery. If the surgeon estimates that a customized component is required the patient is referred to a highly specialized center for revision surgery.

Interpretation / Conclusion: 3D-print bone models for preoperative planning in patients with acetabular and femur bone defects, holds the perspective of improving the outcome for a challenging group of patients. When provided by Orthopedic companies 3D-prints come at a high price, however in our institution 3D-prints are now available provided by the radiologic department, at a lower cost. The socio-economic perspective could be advantages as some patients who might otherwise be planned for surgery with an expensive customized component, might be assessed suitable for surgery with a less expensive revision component. Also a thorough preoperative planning using bone models, could potentially reduce the need for later revisions having made the right choice in components the first time.

Bone remodeling and implant migration of uncemented femoral and cemented asymmetrical tibial components in total knee arthroplasty DXA and RSA evaluation with 2-year follow-up

165.

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Background: Aseptic loosening is one of the major reasons for late revisions in Total Knee Arthroplasty (TKA), this risk can be detected with Radiostereometric Analysis (RSA) where micromovements (migration) can be measured and therefore recommended in the phased introduction of orthopedic implants. A decrease in Bone Mineral Density (BMD), measured with Dual-energy X-ray Absorptiometry (DXA), is related to the breaking strength of the bone and measured concurrently with RSA.

Aim: Aim: Evaluate implant migration and bone remodeling of cemented asymmetrical tibial and uncemented femoral TKA components with a follow-up period of 2-years.

Materials and Methods: A prospective longitudinal cohort of 29 patients (F/M=17/12, mean age 65.2 years), received a hybrid Persona® TKA (Zimmer Biomet, Warszawa, Indiana) consisting of a cemented tibial, an all-polyethylene patella and uncemented trabecular metal femoral components. Follow-up: pre-operative, one week, 3, 6, 12 and 24 months after surgery, and double examinations for RSA and DXA were performed at 12 months. RSA results were presented as Maximal Total Point of Motion (MTPM) and segmental motion (translation and rotation), whereas DXA results were presented as changes in BMD in different Regions of Interest (ROI).

Results: MTPM at 3, 6, 12 and 24 months were 0.65 mm, 0.84 mm, 0.92 mm and 0.96 mm for the femoral component and 0.54 mm, 0.60 mm, 0.64 mm and 0.68 mm, respectively for the tibial component. The highest MTPM occurred within the first 3 months. Afterwards, most of the curves flatten and stabilize. The proportion of femoral components with migration greater than 0.10 mm between 12-24 months were 16% and the proportion of tibial components with migration greater than 0.2 mm between 12- 24 months were 15%. BMD distal femur: ROI I 26.7%, ROI II 9.2% and ROI III 3.3%. BMD proximal tibia: ROI I 8.2%, ROI II 8.6% and ROI III 7.0% after 2- years.

Interpretation / Conclusion: Migration patterns and changes in BMD for femoral component correspond well with previous studies and marginally higher migrations results are observed with the tibial component.

The effect of obesity on Patient Reported Outcome Measures after Unicompartmental Knee Arthroplasty

166.

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Background: The global prevalence of obesity is increasing, and unicompartmental knee arthroplasty (UKA) accounts for an increasing proportion of primary knee arthroplasties. Contemporary indications suggest that obesity is not a contraindication to UKA, but some surgeons may still be reluctant to perform surgery on obese patients.

Aim: This study examines the effect of obesity on Patient Reported Outcome Measures (PROMs), complication and readmission rates after UKA surgery.

Materials and Methods: UKAs performed at Hvidovre Hospital, Denmark from April 2016 to December 2020 were divided into three groups based on body mass index (BMI): BMI <30 (ref.), BMI 30-34.9, BMI >34.9. Oxford Knee Score (OKS), Forgotten Joint Score (FJS) and Activity and Participation Questionnaire (APQ) were assessed pre-operatively and at 3, 12 and 24 months after surgery. Student's t-test and linear regression models adjusted for sex and age were used to compare mean PROM scores and score improvements respectively. Readmissions and complications within 90 days of surgery were compared using chi-square test.

Results: 492 UKAs with a mean BMI of 30.1 (SD 5.8) were included. From pre-op to 3, 12 and 24 months, no significant differences in adjusted OKS and FJS improvements were present between BMI groups, however, mean pre-operative OKS was lower for both BMI 30-34.9 (22.7, $p<0.01$) and BMI >34.9 (19.5, $p<0.01$) compared with BMI <30 (25.2). BMI >34.9 also had lower pre-op FJS and APQ. After 12 months, obese patients' adjusted APQ improvement remained lower compared with non-obese; 9.5 (CI 18; 1) for BMI 30-34.9 ($p=0.036$) and 10.8 (CI 21; 0.2) for BMI >34.9 ($p=0.047$). After 24 months, the differences in mean APQ scores and score improvements were non-significant. There was no difference in 90-day readmission and complication rates between BMI groups.

Interpretation / Conclusion: Although their pre-operative scores are lower, obese patients can expect PROM improvements within 2 years of UKA surgery that do not differ from those seen in non-obese patients. This supports contemporary evidence-based indications for UKA and should be used in the shared-decision making process when addressing expectations after surgery in obese patients.

No-fault compensation after primary total knee replacement in Danish hospitals 2005–2017

167.

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Background: In Denmark, 99,507 primary total knee arthroplasties (TKA) were performed between 2005–2017. Although TKA surgeries have a high success rate for providing substantial health gains in quality of life, complications, failed surgeries, and patient dissatisfaction are unavoidable. As we've shown in a previous study, 2.6% of all primary total hip arthroplasties in Denmark resulted in a compensation claim reported to Danish Patient Compensation Association (DPCA), and half of these were approved.

Aim: We examined the Danish Patient Compensation Association (DPCA) database to outline the frequency and financial burden of compensation claims after primary TKA in Denmark.

Materials and Methods: This was a retrospective study of closed compensation claims following TKA reported to DPCA between 1st of January 2005 and 31st of December 2017. The primary cause for claim was included.

Results: There were 1,611 primary TKA claims out of 29,370 orthopaedic cases reported (5.5%). This accounts for 2% of all TKAs performed in this period. The approval rate was 42%. The number of claims filed was gradually increasing with a peak in 2012, followed by a decrease. The total payout was DKK 145,269,621. The highest payouts were for infection (DKK 59,011,085), insufficient or incorrect treatment (DKK 32,371,468), nerve damage (DKK 19,831,988), and incorrect indication (DKK 9,069,492). Collectively, these four complications accounted for 83% of the total amount of payouts. Claims most likely to be filed were due to insufficient or incorrect treatment (29%), infection (23%), dissatisfaction with correct treatment (17%), and nerve damage (7%). However, those likely to result in payout were incorrect prosthesis or equipment, and infection, both with a payout acceptance-rate of 14%, respectively.

Interpretation / Conclusion: 2% of all primary TKAs resulted in a compensation claim reported to DPCA with a 42% approval-rate. The majority of payouts were due to infection, insufficient or incorrect treatment, nerve damage, and incorrect indication. Although DPCA manages claims for patients, the data can also provide beneficial feedback to arthroplasty surgeons with the aim of improving patient care.

Consequences for pre-operative pain and function when postponing elective knee and hip arthroplasty due to the coronavirus pandemic

168.

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Background: Worldwide, the coronavirus outbreak causes postponement of elective surgery. For patients with end-stage osteoarthritis awaiting knee or hip arthroplasty, uncertainty remain whether the treatment effect will be the same, or if the postponed surgery has led to deterioration in pain, function and general health.

Aim: To evaluate the impact of postponing elective knee and hip arthroplasty, due to the pandemic, on pre-operative pain, function and general health in patients with end-stage osteoarthritis.

Materials and Methods: A prospective cohort study of 194 patients from one Danish public hospital with postponed elective primary knee or hip arthroplasty due to the nationwide lockdown from March 2020. Patients responded to questionnaires when surgery was cancelled and again before surgery, if re-scheduled within December 1, 2020. Changes in pain and function were evaluated with the Oxford Knee and Hip Scores (OKS, OHS) and general health with the EuroQol 5- dimension scale (EQ5D). Additionally, we asked about patients' concerns and whether they felt improved, unchanged or deteriorated during the wait-period.

Results: Complete data were obtained for 110 (57%) patients, 59 awaiting knee arthroplasty (median age 70, 58% female) and 51 awaiting hip arthroplasty (median age 72, 67% female). Knee and hip arthroplasty were postponed for median (range) 111 (29-244) and 83 (35-216) days, respectively. 34% were concerned the postponement would lead to poorer outcome. Mean differences in OKS and OHS were 0 (95% Confidence interval (95% CI) -1 - 1) and -1 (95% CI -2 - 0) from surgery cancellation to re-scheduled surgery. Mean difference in EQ5D index was 0.0 (95% CI 0.0 - 0.1) for both groups. 75 (68%) patients felt importantly deteriorated.

Interpretation / Conclusion: Pre-operatively, patients worry about altered treatment outcome due to postponed surgery and feel deteriorated during the wait-period although not reflected in patient-reported outcome measures.

CHARACTERISTICS OF PATIENTS REQUIRING EARLY TOTAL KNEE REPLACEMENT AFTER SURGICALLY TREATED LATERAL TIBIAL PLATEAU FRACTURES

169.

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Background: Surgical treatment with open reduction and internal fixation (ORIF) is the primary choice of treatment for displaced tibial plateau fracture (TPF). Most of the patients report a satisfying outcome at long term follow-up. Some patients develop knee pain, valgus misalignment and post-traumatic osteoarthritis. Early treatment with a total knee replacement (TKR) is a widely accepted treatment option for severe knee complications after ORIF. However, only limited information regarding specific characteristics of patients at high-risk of developing posttraumatic osteoarthritis and early conversion to TKR is available.

Aim: The aim of this study was to compare basic characteristics of patients requiring early treatment with TKR and patients not requiring TKR within 3 years following a lateral tibial plateau fracture.

Materials and Methods: The study design was a comparative cohort study with a 3-year follow-up from the primary fracture. From December 2013 to November 2016, 56 patients were diagnosed and surgically treated for a lateral TPF at Aalborg University Hospital. Characteristics regarding the patients' age, gender, BMI, trauma mechanism, co-morbidity, Charlson index, smoking status, alcohol consumption, medicine and number of days from primary surgery to TKR were obtained from the patient's medical chart and from an interview. Fracture classification was performed according to the AO- classification on preoperatively obtained CT- scans and soft tissue injuries were identified by MR-scans. Prior to TKR, all patients were evaluated by x-ray of the knee and valgus malalignment and osteoarthritis were measured.

Results: Five of the 56 patients were operatively treated with a TKR no longer than 3 years from the primary surgery. Median age 61 years, 80% females, median BMI 29.9 kg/m², 4 patient had osteoporosis or osteopenia. Four of the patients presented with an AO-type 41-B1, 1 patient a 41-B3 and all the patients had soft tissue injuries in the knee.

Interpretation / Conclusion: Being female in gender, severe co- morbidity, obesity, osteopenia, fracture type AO 41-B1 and soft tissue injuries were associated to early total knee replacement following surgically-treated lateral tibial plateau fractures.

Patient safety in distal femoral resection knee arthroplasty for non-tumor indications. A consecutive case series of 41 patients.

170.

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Background: Distal femoral resection knee arthroplasty may be a viable option for several indications other than bone tumors. Resection knee arthroplasty appears to be becoming more common, but patients requiring this type of surgery are often elderly and with high comorbidity.

Aim: The aim of this study was to report in-hospital complications, readmissions, reoperations, and mortality after distal femoral resection knee arthroplasty for non-tumor indications.

Materials and Methods: We retrospectively identified a consecutive cohort of 41 knees (41 patients) treated with distal femoral resection knee arthroplasty in a single institution between 2012 and 2020. Indications for surgery were failure of osteosynthesis (8), primary fracture treatment (2), periprosthetic fracture (20), and revision arthroplasty with severe bone loss (11). A major reoperation was defined as a major component exchange procedure or amputation. Mean follow-up was 3.7 years.

Results: The mean age was 71.3 years (SD 12.6), and 68.3% were female; 9.8% were ASA I, 43.9% ASA II, and 46.3% ASA III. Median length of stay was 6 days (range 3–15) with no major in-hospital complications, but 24.2% required blood transfusion. The 90-day readmission rate was 19.5% (n=8), of which 50% was prosthesis-related. Four patients (9.8%) underwent major reoperation due to infection (n=2), mechanical failure (n=1), or periprosthetic fracture (n=1). The mortality rate was 0% ≤ 90 days and 2.4% ≤ 1 year.

Interpretation / Conclusion: Distal femoral resection knee arthroplasty in this fragile patient population appears to be a viable and safe option considering that the alternative in most cases is femoral amputation.

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Background: Cardiac complications after arthroplasty surgery are a leading cause of postoperative morbidity and mortality. Monitoring arthroplasty patients regarding myocardial injury after non-cardiac injury (MINS) using high-sensitive troponin T (hsTnT) measurements has been suggested. However, limited knowledge regarding perioperative hsTnT levels in fast-track hip and knee arthroplasty (THA/TKA/UKA) is available.

Aim: This study aims to describe perioperative hsTnT levels fast-track THA/TKA/UKA. Secondly we aimed at describing the occurrence of MINS, cardiac complications and mortality within 90 days.

Materials and Methods: Patients undergoing either primary total hip (THA), total knee (TKA) or unicompartmental knee arthroplasty (UKA) in a fast-track setting between January 2019 and February 2020 had hsTnT levels measured preoperatively and on postoperative day 1. HsTnT levels ≥ 14 ng/L were considered elevated. MINS was defined as a post-hsTnT level ≥ 20 and < 65 ng/L with an absolute change ≥ 5 ng/L from the pre-hsTnT level or a post-hsTnT level ≥ 65 ng/L.

Results: 546 patients were included. Pre- and postoperative hsTnT (pre- and post-hsTnT) levels were elevated in 139 patients (25.5%) and 165 patients (30.2%), respectively. 31 patients (5.7%) had MINS. Of 407 patients with non-elevated pre-hsTnT levels, 48 patients (11.8%) had elevated post-hsTnT levels. Of the 139 patients with elevated pre-hsTnT levels; 117 patients (84.2%) had elevated post-hsTnT levels and 22 patients (15.8%) had decreased to non-elevated post-hsTnT levels. Of the 139 patients with elevated pre-hsTnT levels, 86 patients (61.9%) had a post-hsTnT level below the pre-hsTnT level. In total 2 (0.4%) cases of mortality due to cardiac complications occurred within the first postoperative days both in MINS patients.

Interpretation / Conclusion: In summary 25.5% and 30.2% of hip and knee arthroplasty patients had preoperative and postoperative hsTnT elevation, respectively. 84.2% of patients with elevated preoperative hsTnT levels remained elevated postoperatively. Further knowledge on perioperative hsTnT levels in surgery specific subpopulations is needed.

Mega-prosthetic joint replacement of the distal femur in non-tumor cases.

172.

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Background: Mega-prosthetic joint replacement of the distal femur is also an option for management of massive bone loss in revision total knee arthroplasty (TKA) or because of fractures. Even though this surgery is challenging with high rate of infection, patellar complications, and implant failure it is often the only option to avoid knee arthrodesis or amputation.

Aim: The purpose of this study was to evaluate the complications and outcome after implantation of mega-prostheses of the distal femur in non-tumor cases.

Materials and Methods: We retrospectively reviewed 65 patients mean age 66 (38-84) years, F/M=47/18, mean follow-up 45 (12-220) months that received a distal femoral resection and reconstruction with a mega-prosthesis because of a failed TKA due to loosening (aseptic or septic) or periprosthetic fracture or complications after a complex fracture with failed osteosynthesis. 41 patients (64 %) had previous TKA revision surgery and 19 patients (29%) previous periprosthetic infection. In this cohort 19 patients were revised for aseptic loosening and 12 patients for septic loosening. 18 patients were diagnosed with periprosthetic fracture and 6 patients with pseudoarthrosis. 6 cases with instability, 1 case with a comminute distal femur fracture and in 3 cases pain were the reason for revision.

Results: We found good patient satisfaction and low pain scores with moderate to low activity level. 39 patients (60%) had no additional procedures. 18 patients (27%) had major revision defined as removal or exchange of the femoral component because of aseptic loosening (n=11), periprosthetic fracture (n=4), septic loosening (n=2) and amputation (n=2), and 13 patients had minor revision due to instability, pain or patellar complications. Survival analysis shows that 70 % was free of major revision after 5 years.

Interpretation / Conclusion: Mega-prosthetic joint replacement of the distal femur is a good option for management of non-tumor cases (revision TKA and fractures) with massive bone loss, and thus amputation and knee arthrodesis can be avoided in most patients. However, there is a high risk that the patients have to undergo future additional surgery including major revision.

Are nerve blocks necessary for enhanced recovery after hip and knee replacement?

173.

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Background: Postoperative pain remains a challenge after total hip and knee arthroplasty (THA/TKA). Regardless, major reductions in length of stay without increased readmissions have been reported with the use of enhanced recovery protocols. Peripheral nerve blocks (PNB) are recommended for postoperative analgesia and potentially reducing length of stay (LOS) and readmissions. However, whether routine PNB are needed to achieve a LOS of ≤ 1 day within an enhanced recovery protocol with multimodal opioid-sparing analgesia, including high-dose preoperative steroid and local anaesthetic infiltration (LIA) is uncertain.

Aim: To investigate the use of PNB in fast-track THA and TKA patients with LOS ≤ 1 day and relation to department of surgery, 90-days readmissions, preoperative patient characteristics and discharge destination.

Materials and Methods: Observational multicentre study of consecutive elective enhanced recovery THA and TKA with a LOS of ≤ 1 day from January 2016–August 2017. Prospective recording of preoperative characteristics, information on PNB, anaesthesia, LIA, discharge destination, LOS and readmissions through the Danish National Patient Registry and medical records. A previously published risk-score for having a LOS > 2 days was used for comparing preoperative patient characteristics.

Results: Of 3471 procedures, 1763 (50.8%) had a LOS of ≤ 1 day with 99.7% discharged to own home. PNB was used in 2.5% of THA and 35.1% of TKA, but with considerable variations between departments (0.0–33.1%). There were no differences in 90-days readmissions with or without PNB (4.7% (CI:2.6–8.5) vs. 5.9% (CI:3.9–8.7) in TKA ($p=0.553$) and 5.3% (CI: 1.0–25.8) vs. 5.7% (CI:4.5–7.3) after THA ($p=0.999$)). Patients with PNB did not have a higher risk of scoring ≥ 6 points in risk of having a LOS > 2 than patients without use of PNB, (5.9% (CI:1.1–2.7) vs. 3.1% (CI:2.2–4.3) in THA ($p=0.421$) and 13.6% (CI:9.6–18.9) vs. 17.0% (CI:13.5–21.1) in TKA, $p=0.284$)

Interpretation / Conclusion: Routine use of peripheral nerve blocks may not be necessary to achieve LOS ≤ 1 day or reduce 90-days readmissions after fast-track THA and TKA. Further studies are needed to identify potential benefits of PNB in patients with LOS > 1 day or “high-risk” patients.

Microvascular free flap coverage of complex soft tissue defects after revision total knee arthroplasty

174.

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Background: Soft tissue defects after total knee arthroplasties (TKA) represent a major orthopedic challenge with amputation as a feared outcome. Microvascular free flap coverage can increase limb salvage rates, but complications related to the procedure are yet to be explored further.

Aim: The purpose of this study is to review our experience with free flap coverage for soft tissue defects after revision total knee arthroplasty.

Materials and Methods: Through a retrospective chart review of the past 15 years, we identified all patients who had free flap transfer to a knee with an existing TKA and in need of revision. Typically, the patients underwent standard two-stage revision arthroplasty. To identify areas of intervention, we divided the entire regimen into two phases divided by the free flap transfer.

Results: We identified 18 patients with a median age at primary TKA of 66 years (range 37 to 81), who were followed for a median of 5.1 years (range 0.2 to 10.6). The median duration from insertion of primary TKA to their final operation was 523.5 days (range 19 to 2591). During the entire period, patients underwent a mean of 7.6 surgical procedures one their knee with 3.6 orthopedic revisions prior to the free flap surgery and 0.6 after. Soft tissue coverage was achieved in all patients and no patients underwent amputation. One third of patients experienced early complications at recipient site after free flap surgery.

Interpretation / Conclusion: Microvascular free flap coverage of complex soft tissue defects after revision total knee arthroplasty proved achievable in all patients with successful limb salvage.

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Background: Cerebral palsy (CP) is the most common cause of motor impairment in children and occurs in about two per 1,000 live births. In CP low bone strength is highly prevalent and is associated with a risk of fractures. In fact, yearly fracture rates have been reported to be twice as high in children with non-ambulant CP compared to the general population. Epilepsy affects one third of children with CP and seizures as well as anti-epileptic drugs may negatively affect fracture rates.

Aim: We aimed to establish the age-specific fracture rates in Denmark including the entire Danish population of children with and without CP. Further, to specify the fracture rates in children with CP and epilepsy with and without anti-epileptic treatment.

Materials and Methods: Children with CP born 1997 to 2007 were compared to all persons born in the same period. Data from The National CP Register, The Danish National Health Register, The Civil Registration Register and The Danish Prescription Database were combined to establish fracture rates in groups of children based on the diagnosis and severity of CP as well as the diagnosis and treatment of epilepsy. Outcomes were registered 1997–2017.

Results: We identified 1,451 children with CP and 787,159 children without CP. Average follow-up time was 14 years. Fracture rates per 1,000 person years were 23/27 for females/males with CP and 23/29 for females/males without CP. Overall, 27% of children with CP sustained one or more fractures, while this proportion was 29% for children without CP. We stratified by sex and age group and found peak fracture rates of 35 to 50 in the age groups 5–9 years and 10–14 years. None of the fracture rates were significantly increased in children with CP when comparing peak rates or age group rates to children without CP. In children with and without CP an epilepsy diagnosis was associated with a 35%–56% increased fracture rate while anti-epileptic drug treatment was associated with a 53%–95% increased fracture rate.

Interpretation / Conclusion: We found no evidence that children with CP have more fractures than their peers. Fracture rates are increased in children diagnosed with epilepsy and particularly in children treated with anti-epileptic drugs.

Performance of lower limb peripheral nerve blocks among different orthopedic sub-specialties. A single institution experience in 246 patients.

176.

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Background: Continuous peripheral nerve blocks (cPNBs) have shown good results in pain management after orthopedic surgeries. However, the variation of performance between different subspecialties is unknown.

Aim: Describe our experience with cPNBs after lower limb orthopedic surgeries in different subspecialties.

Materials and Methods: This prospective cohort study was performed on collected data from cPNBs after orthopedic surgeries in lower limbs. Catheters were placed by experienced anesthesiologists using sterile technique. After catheterization, the patients were examined daily, by specially educated acute pain service nurses. The characteristics of the patients, duration of catheterization, severity of the post-operative pain, need for additional opioids, and possible complications were registered.

Results: We included 246 patients (=547 catheters). 115 (21%) femoral, 162 (30%) saphenous, 66 (12%) sciatic, and 204 (37%) popliteal sciatic nerve catheter were used. The median duration of a catheter was 3 days [IQR = 2 – 5]. The proportion of femoral, sciatic, saphenous, and popliteal nerve catheters with duration of more than two days was 81%, 79%, 73%, and 71% for, respectively. This proportion varied also between different subspecialties. 91% of the catheters remained in place for more than two days in amputations (n=56), 89% in pediatric surgery (n=79), 76% in trauma (n=217), 64% in foot and ankle surgery (n=129), and 59% in limb reconstructive surgery (n=66). The proportion of pain-free patients were 77 – 95% at rest, 63 – 88% at mobilization. 79 – 92% did not need increased opioid doses, and 50 – 67% did not require PRN opioid. 443 catheters (81%) were removed as planned. The cause of unplanned catheter removal was loss of efficacy in 69 (13%), dislodgement in 23 (4.2%), leakage in 8 (1.5%), and erythema in 4 catheters (0.73%). No major complication occurred.

Interpretation / Conclusion: 81 % of catheters remained in place until planned removal and opioid usage after surgery was lower than expected. Catheters were efficient in both adult and pediatric surgery; however a variation was seen between orthopaedic subspecialties regarding duration of nerve catheter usage.

Complex regional pain syndrome (CRPS) in children – treatment with peripheral nerve catheter

178.

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Background: Complex regional pain syndrome (CRPS) is a neuropathic condition characterized by circular allodynia and functional loss of an extremity. Treatment with continuous peripheral nerve blockade in children has so far only been reported in case studies.

Aim: This study reports our results and complications combining continuous peripheral nerve blockade for pain relieve and physio-occupational therapy in children with CRPS.

Materials and Methods: Inclusion criteria were children meeting Budapest criteria for CRPS, having sensory disturbances and allodynia, thereby losing the ability to self- support on their limb. Under general anesthesia and with ultrasound and electric stimulation guidance, a catheter was placed close to either the sciatic nerve, the saphenous nerve or the Brachial plexus. All children received continuous infusion of ropivacaine 0.2%, 5–7 mL/h combined with immediate physiotherapy and/or occupational therapy with a supplement of self-training every two hours throughout the day. The therapy focused on improving coordination, strength and sensory motor skills.

Results: 28 children were consecutively included (25 girls and 3 boys). 23 children had foot pain, 4 had pain in the hand and 1 had combined foot and hand pain. On admission the average age was 12 years (8–16); the average duration of pain was 12 months (2–64) with a median VAS score of 9 (7–10). Initiation of pain was either no trauma (9), minor trauma/distortions (17) or fracture (2). After an average observation period of 68 months (5.6 year) the median VAS score was 0 (0–7). In 2 children the treatment plan had no effect. In one child a relapse occurred 3 weeks after removal of the catheter, but renewed nerve catheter treatment was successful. One catheter had to be replaced due to accidental discontinuation. Finally, one child had a superficial infection. No neurological complications were observed during the period.

Interpretation / Conclusion: Treatment with continuous peripheral nerve block and training seems safe, effective and feasible for children with CRPS, resulting in pain-free or almost pain-free patients.

Aggravating activities for adolescents with Osgood Schlatter: a cross-sectional study

179.

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Background: A common knee complaint during adolescence, a crucial time for staying physically active, is Osgood Schlatter (OS). Activity ladders has been used for knee pathologies in adolescents to guide progression of loading during rehabilitation. They are based on order of expected symptom provocation from common activities. It is, however, unknown how adolescents with OS rate the level of aggravation from common activities.

Aim: To obtain self-reported ratings of common activities by adolescents with OS in order to rank them and comprise a activity ladder.

Materials and Methods: Adolescent patients with OS attending a specialized orthopedic clinic filled out a survey containing twenty-three activities, all of which were nominated as important by previous patients. Activities were rated by participants on a 5-point Likert scale ranging from 0 “does not provoke knee pain” to “provokes extreme knee pain” and subsequently ranked in groups (most, second most/least, and least aggravating activities) using median scores (x) and individually using mean (\bar{x}) scores.

Results: Thirty-three patients (age 13.5 ± 1.7 years, symptom-duration 23.6 ± 16.1 months) participated. Activities were ranked in 3 groups (median scores 4, 3 and 2). The most aggravating activities ($x = 4$) were kneeling ($x = 3.9$), sprinting ($x = 3.8$), acceleration ($x = 3.7$), landing ($x = 3.6$), high-speed running ($x = 3.6$), and deceleration ($x = 3.5$). The second-most/least aggravating activities ($x = 3$) were squatting ($x = 3.3$), climbing stairs ($x = 3.3$), fast/hilly cycling ($x = 3.2$), one-legged jumping ($x = 3.2$), side-ways change of direction ($x = 3.1$), walking fast or for a long distance ($x = 3.0$), two-legged jumping ($x = 2.9$), jogging ($x = 2.8$), kicking a ball ($x = 2.7$), and backwards change of direction ($x = 2.6$). The least aggravating activities ($x = 2$) were getting up from chair/toilet ($x = 2.7$), side-ways running ($x = 2.5$), light cycling ($x = 2.5$), skipping ($x = 2.4$), prolonged standing ($x = 2.4$), kicking in the air ($x = 2.4$), and walking shortly ($x = 2.2$).

Interpretation / Conclusion: For adolescents with OS, knee pain is provoked especially by kneeling and high-velocity sports- specific actions. These findings can form the basis for an OS-specific activity ladder to guide rehabilitation.

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Background: The use of tension-band plating, i.e. eight- plates is commonly used to correct coronal limb deformities in children. Changes in joint morphology have been observed after epiphysiodesis using eight-plates. It thus seems relevant to investigate if joint morphology also changes after temporary epiphysiodesis with this implant.

Aim: To evaluate potential changes in knee joint morphology after treatment of genu valgum with eight-plates.

Materials and Methods: A retrospective study was performed on radiographs of 39 children. All patients undergoing temporary medial hemi epiphysiodesis using eight-plates between 2015 and 2020 were included. Anteroposterior knee radiographs of all patients were reviewed. The patients were assigned to two groups, tibial and femoral group according to anatomic insertion of the eight-plates. Medial and lateral slope angles of the tibial plateau, tibial roof angle and femoral notch angle were measured. Mean differences between pre-operative and post-operative values were estimated with corresponding confidence intervals and p-values.

Results: 81 eight-plates were identified (femur 74, tibia 7) in 39 children. Mean insertion time was 17 months (95% CI: 14;20). Mean change of medial tibial and lateral slope angles was -1° ($-3;0$) and -5° ($-8; -3$, $p<0.05$). Mean difference in roof angle was -0.3° ($-2; 1$) in the tibial group. Mean change in femoral notch angle was -1° ($-3; 1$).

Interpretation / Conclusion: A minor change in the lateral tibial plateau angle was observed in the tibial group, however it may be within the measurement error of the evaluation. Otherwise, the insertion of eight-plates for hemi epiphysiodesis did not alter the knee joint morphology.

Functional outcome of clubfeet treated with the Ponseti Method

181.

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Background: Every year, approximately one in 1000 children in Scandinavia are born with a clubfoot deformity. The Ponseti Method is used worldwide and the prognosis is good.

Aim: The aim of this study was to investigate the functional outcome using the Clubfoot Assessment Protocol (CAP) and the Oxford Ankle Foot Questionnaire for Children (OxAFQ-C) in children aged 6–7 years treated with the Ponseti Method.

Materials and Methods: This consecutive retrospective study included 17 children (21 feet) at 6–7 years of age, treated for clubfoot by the Ponseti Method at a Danish hospital. The CAP is a comprehensive standardized instrument to evaluate the clubfoot with respect to mobility, muscle function, morphology and motion quality. The level of function as experienced by the children was assessed with the OxAFQ-C. Data were calculated by descriptive statistics, or by estimate, confidence interval and p-value where appropriate. A correlation was calculated to examine the agreement between the results from the CAP and the domains in the OxAFQ-C.

Results: The Total Score in the CAP was 76%, which resulted in a significant deviation of -18.24 from maximum score (95% CI = -21.09; -15.45, $p < .0001$). In particular, three tests had significant deviations from maximum score. Dorsiflexion in the ankle deviated by -1.95 (95% CI = -2.17; -1.74, $p < .0001$), Heel walking deviated by -1.76 (95% CI = -2.11; -1.43, $p < .0001$) and One-leg hop deviated by -1.57 (95% CI = -2.15; -0.99, $p < .0001$). In the domain Physical in the OxAFQ-C the score was 73.77%, which was a significant deviation of -6.29 (95% CI = -8.43; -4.15, $p < .0001$) from maximum score. There was a correlation between the Total Score in the CAP and the two domains Physical and Emotional in the OxAFQ-C.

Interpretation / Conclusion: This study concludes that children treated for clubfoot have significant deviations from normal function based on the CAP, with poorer results in dorsiflexion in the ankle, heel walking one-leg hop, and the domain Physical Activity in the OxAFQ-C. These findings suggest a continued focus on the long term implications of congenital clubfoot and its treatment.

Self-reported characteristics of adolescents with longstanding Osgood Schlatter from specialized care: cross-sectional study

182.

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Background: A common knee complaint during adolescence, a crucial time for staying physically active, is Osgood Schlatter (OS). As research into OS is only just emerging, a more detailed understanding of how OS patients presents are needed in order to design suitable treatments.

Aim: To explore Self-reported characteristics of adolescents with longstanding Osgood Schlatter.

Materials and Methods: Variables from self-reported instruments on symptoms, sports and physical activity participation, health, quality of life, mobility, pain beliefs and mental health amongst others, were collected from patients attending a specialized orthopedic inpatient setting, and the most novel findings are presented as summary data.

Results: Thirty-three patients (age 13.5 ± 1.7 years, symptom-duration 23.6 ± 16.1 months) participated. Acceptable symptom state was present in 36%, and 27% was satisfied with their sports performance. 81% had changed their level of physical activity and 51% currently participated in sports. Sports function was affected (mean KOOS child 'sport/rec' subscale 62 [95%CI 56–67]). Self-rated health was reduced (mean 0–100 EQ-D5-Y-VAS scale 56.1 [95%CI 45–84], 69% reported either 'some'- or 'a lot problems doing usual activities', and 31% 'some'- or 'a lot of problems walking about'. Quality of Life was reduced (mean KOOS child 'QoL' subscale score 49.6 [95%CI 45–55]). Patients scored mean 10 on the 0–12 pain-self efficacy scale (PSEQ-2), 62% reported a high level of kinesiophobia (TSK-17 38 point cutoff), and 31% being 'a bit worried, sad or unhappy'. Previous insidious heel pain was reported by 39%.

Interpretation / Conclusion: Osgood Schlatter patients are affected on satisfaction with symptoms, sports and physical activity participation, health, quality of life, mobility, pain beliefs and mental health. The consequences of Osgood Schlatter, typically denoted as benign and self-limiting, seems to have significant consequences on adolescents suffering from this condition. Addressing these factors are likely important when designing future effective management strategies.

Morten Jon Andersen

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Background: A poorly treated pediatric lateral humeral condyle fracture (LHCF) can result in growth disturbance and loss of elbow function. LHCF are Salter-Harris type IV physeal fractures that in many cases also involve the articular surface of the humerus. Treatment success is dependent on reduction of the physis and joint surface and a stable fixation. The Song classification discerns fractures that are incomplete from complete and undisplaced from displaced thereby describing fracture stability and aiding the surgeon in choosing the treatment strategy.

Aim: This project aimed to 1) describe fracture stage according to Song, 2) investigate if adequate reduction and fixation of LHCF was obtained during surgery and 3) report number of loss of reduction (LOR) after fixation.

Materials and Methods: We retrospectively reviewed all cases of operatively managed LHCF in children at Herlev Hospital from 2017-2020. Age, gender, Song stage, reduction quality, K-wire configuration and LOR was investigated. Song stage 2 and 3 cannot be distinguished on plain radiographs and were in the present study compiled in one group. Satisfactory reduction was defined as ≤ 2 mm gap centrally in all radiographic planes.

Results: We reviewed 48 fractures in 35 boys and 13 girls, mean age was 5 years (range, 2 to 12 years). Two (4%) fractures were Song stage 1, 24 (50%) stage 2-3, 10 (21%) stage 4 and 12 (25%) stage 5. 32 (67%) fractures were stabilized with divergent and 15 (31%) with parallel K-wires, one fracture was only casted following reduction. Satisfactory reduction was obtained in 35 fractures (73%). 7/10 (70%) Song stage 4 and 8/12 (67%) stage 5 had satisfactory reduction. Four (8%) fractures suffered LOR of which two were primarily fixed with divergent and two with parallel wires.

Interpretation / Conclusion: This study shows that 73% of fractures were reduced satisfactory and fixed with at stable K-wire configuration in 67% of cases. However, more than 1 in 4 fractures were either not properly reduced or were poorly stabilized and 8% suffered loss of reduction. The successful operative treatment of LHCF in children relies on the surgeons understanding of this fracture type and ability to properly reduce and fix the fracture.

A review of outcomes associated with femoral neck lengthening osteotomy in patients with coxa brevis

184.

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Background: Double and triple femoral neck lengthening osteotomies have been described to correct coxa brevis deformity. Only small studies reported the results.

Aim: Our aim was to provide an overview of the outcomes of double and triple femoral neck lengthening.

Materials and Methods: After an extensive search of different online databases, we included studies reporting the results of double and triple femoral neck osteotomies. Clinical and radiological outcomes, and reported complications were extracted. The review process was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Results: After evaluating 456 articles, we included 11 articles reporting 149 osteotomies in 143 patients (31% male, 64% female, 5% unspecified). Mean age of the patients was 20 years (range 7 years to 52 years). Indications were developmental hip dysplasia (51%), Perthes disease (27%), infection (6%), post-trauma (4%), congenital disorders (2%), slipped capital femoral epiphysis (1%), idiopathic (3%) and unknown (6%). The mean limb length discrepancy reduced by 12 mm (0 mm to 40 mm). In total, 65% of 101 positive Trendelenburg sign hips experienced improvement of abductor muscle strength. An 18% (9% to 36%) increase could be found in functional hip scores. Mean increase in articulo-trochanteric distance was 24 mm (10 mm to 34 mm). Five patients older than 30 years at the time of osteotomy and two younger patients with prior hip incongruency had disappointing results and required arthroplasty. In all, 12 complications occurred in 128 osteotomies, in which complications were reported.

Interpretation / Conclusion: Double and triple femoral neck lengthening osteotomies in coxa brevis show good results with few complications in the literature, especially in young patients with non-arthritic hips.

Usual care for Osgood Schlatter: A mixed-methods study to understand what caretakers are delivering and patients are receiving

185.

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Background: A common knee complaint during adolescence, a crucial time for staying physically active, is Osgood Schlatter (OS). The recommended types of modalities for conservative management in the literature is abundant and conflicting, and no level 1 evidence is available. For this emerging area of research, knowing the contents of usual care, are key to develop uniform and effective management strategies.

Aim: To gain knowledge directly from OS patients and clinicians on what care is delivered in clinical practice.

Materials and Methods: Semi-structured interviews and surveys were conducted in a specialized orthopedic clinic with OS patients, and across sectors and professions with clinicians managing OS patients.

Results: Thirty-three patients (age 13.5 ± 1.7 years, symptom-duration 23.6 ± 16.1 months) participated in interviews and 63 clinicians (physiotherapists, GPs, pediatric orthopedic surgeons, median 13 years practicing [IQR: 7.5–19.5], seeing median 10 OS patients per year [IQR: 5–17.5]), participated in interviews or filled out a survey. For patients, the most common modalities received were exercises (42%), advice to take a break from sports (24%), topical analgesics (24%), and cryotherapy (21%); followed by stretching, taping, acupuncture, laser therapy, shockwave therapy, and massage (12–18%); and 20 other types of modalities (>9%). Among clinicians, the most popular modality was ‘balance or alignment exercises’ used by 81%, followed by ‘straps or taping’ (79%). Other frequently used modalities were strength training (76%), cryotherapy (64%), stretching exercises (50%), orthoses (54%), manual therapy (41%), and painkillers (33%). All clinicians (100–98%) gave advice and information regarding load, pain and prognosis. The most agreed upon were “the prognosis is good” (90%) and “the condition is safe” (78%), and advise to “participate only with little pain” (54%) and “participate to your pain limit” (44%).

Interpretation / Conclusion: Numerous different modalities are received by Osgood Schlatter patients, but a set of modalities/advice seems to be the most prevalent in usual care: exercises, cryotherapy, stretching, topical/oral analgesic, advice on favorable prognosis, and advising a cautious approach to physical activity/sports.

Self-reported level of knowledge of clinical examination in developmental dysplasia of the hip – A web-based survey of midwives and general practitioners.

186.

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Background: The positive predictive value of clinical hip examinations of newborns performed by midwives and general practitioners in the Danish screening programme for developmental dysplasia of the hip (DDH) is low.

Aim: To assess the self-reported recognition of nationally recommended clinical hip examination techniques used in the universal clinical screening programme for DDH in newborns in Denmark among midwives, general practitioners (GPs), and GPs in training.

Materials and Methods: Through invitations via personal email and closed social media groups, we invited midwives, GPs, and GPs in training to answer a web-based open survey, where respondents were asked to identify which of six written descriptions of clinical hip examinations were featured in the national recommendations on DDH screening by the Danish Health Authority. Three of the descriptions were the published descriptions of the Ortolani, Galeazzi, and hip abduction examinations from the national guidelines and three descriptions were false and constructed by the author group. There was no limit on the number of examinations the respondents could mark as featured in national guidelines.

Results: A total of 178 (58 GPs, 97 midwives and 23 GPs in training) responses were included. 89% of responders were able to correctly identify the Ortolani manoeuvre and 92% were able to correctly identify one of the constructed descriptions as being false. The remaining four descriptions had significantly lower correct answer percentages ranging from 41% to 58% with significantly lower correct answer percentages of midwives for three out of all six descriptions when compared to GPs.

Interpretation / Conclusion: The recognition of two out of three recommended clinical hip examinations featured in the Danish screening guidelines for DDH was overall low among current screeners. Results from this study demonstrate the need to heighten the knowledge level of screeners.

Morten Jon Andersen

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Background: Management of medial humeral epicondyle fractures (MHEF) in children is one of the most controversial topics in pediatric fracture care. Historically fractures have been treated nonoperatively with good results. However, there has been a trend towards surgical fixation of this injury in the belief that it might improve grip strength and prevent elbow instability. There is consensus for fixation in cases of open fractures and entrapment of the epicondyle within the joint space. MHEF in conjunction with dislocation of the elbow favors fixation at many institutions. Fixation can be achieved with either K-wires or screws.

Aim: This project aimed to 1) describe fracture classification according to Wilkin, 2) describe fixation implant, and 3) investigate if adequate reduction was obtained during surgery.

Materials and Methods: We retrospectively reviewed all cases of operatively managed MHEF in children at Herlev Hospital from 2017-2020. Age, gender, Wilkin's classification, fixation implant and reduction quality were investigated. Wilkin classified fractures in four types: 1) nondisplaced, 2) minimally displaced (<5 mm), 3) significantly displaced (>5 mm) and 4) incarcerated in the joint. Satisfactory reduction was defined as ≤ 5 mm displacement.

Results: We reviewed 44 fractures in 16 boys and 28 girls, mean age was 11 years (range, 6 to 17 years). Preoperatively four (9%) fractures were nondisplaced, 18 (41%) were displaced <5 mm, 13 (30%) were displaced >5 mm. 10 (23%) fractures occurred together with a dislocation of the elbow on primary radiographs. In 9/44 (21%) cases the medial epicondyle was entrapped in the joint. 18 (41%) fractures were fixed with K-wires and 25 (57%) with screws. One fracture was reduced along with a joint dislocation and not fixed with an implant. 37/44 (84%) fractures were reduced and fixed to <5 mm of displacement.

Interpretation / Conclusion: This study showed that 50% (22/44) of surgically managed fractures had less than 5 mm of displacement preoperatively. Screw fixation was slightly favored over K-wires and the epicondyle was appropriately reduced in 84% of cases. In 21% of fractures the epicondyle was incarcerated in the elbow joint.

Referral criteria recognition of screeners in the Danish screening programme for hip dysplasia

188.

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Background: Despite a national screening programme for developmental dysplasia of the hip (DDH), a high number of patients need surgery for hip dysplasia after childhood. The Danish selective screening programme for DDH is based on clinical hip examinations and screening of recognized risk factors for DDH of all newborns.

Aim: To review risk factors used in the current regional referral guidelines for DDH and the self-reported recognition of these among midwives, general practitioners (GP), and GPs in training.

Materials and Methods: Review of existing guidelines: A survey of regional referral guidelines for DDH was conducted through a search in online regional guideline databases. Further, risk factors used as referral criteria for DDH were compared across regions. Knowledge of guidelines: Through an online survey, we asked midwives, GPs and GPs in training to identify which of six risk factors for DDH were currently featured as referral criteria for specialized DDH examination in the referral guidelines of their employment region. Answers were compared to the DDH referral guidelines of the responders' employment region.

Results: We collected 11 local and regional DDH referral guidelines. Six risk factors were identified from referral guidelines (breech presentation, oligohydramnios, family history of DDH, clubfeet, twins, and premature birth). No regions agreed in all risk factors used. We collected 178 survey responses. Overall correct answer percentages for currently used risk factors for DDH specified in alignment with regional guidelines was: 96% (breech presentation), 90% (family history of DDH), 66% (twins), 63% (premature birth), 34% (clubfeet), and 29% (oligohydramnios).

Interpretation / Conclusion: This is the first Danish study to find variation in referral criteria among Danish regional DDH referral guidelines within the national screening program. We found an overall high level of recognition for two out of six referral criteria but a low level of recognition for the other four. The lack of uniform usage of referral criteria for DDH, and the low knowledge of those used, is problematic in a selective screening program for DDH.

Does Virtual Reality affect pressure pain threshold and anxiety in children – a feasibility and validation study.

189.

Line Kjeldgaard Pedersen, Lucas Yang Vincent Fisker, Jan D Rölving, Karsten Gadegaard, Peter Ahlburg, Mette Veien, Lene Vase, Bjarne Møller-Madsen

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Background: Immersive Virtual Reality (VR) is a promising method to distract and lower pain and anxiety. It immerses the users in a 3D 360° alternate reality and its effect is thought to limit the processing of pain signals by stimulating the visual and auditory cortex. Studies indicates that the use of VR can reduce a child's anxiety and pain level maybe through distraction. VR is progressively being used in a clinical pediatric setting and seems to be beneficial for the children; but the use in children is still not evidence-based or validated. It is not known how this effect is caused and if VR can modulate the perception of pain. Algometry can be used to assess the pressure pain threshold (PPT) and has been validated in children. It is indicated that PPT declines in children just before surgery potentially due to the child's higher level of anxiety. A study has found that VR increases heat-pain tolerance and decreased anxiety in adults. This relationship has not yet been established in children.

Aim: The primary aim is to evaluate whether the use of immersive VR can modulate a child's PPT and anxiety level. The secondary aim is to test the validity and feasibility of a VR video condition versus a VR game condition using both non-VR control condition as well as non-immersive 2D condition.

Materials and Methods: 48 children (6–14 yrs) seen in the orthopedic outpatient clinic at Aarhus University Hospital will be included. Each child will go through four conditions and at setup with 16 possible sequences is generated to control for time effects. Prior to each condition and 4 minutes in PPT, pulse and modified Yale Pediatric Anxiety Scale will be assessed. Before and after the study, both NRS and a verbally administered questionnaire regarding the child's experiences with VR will be used.

Results: Pilot tests showed that PPT increases by 193 kPa (VR-Game), increases by 33 kPa (VR-Video) and declines by 5 kPa in the non-VR control condition.

Interpretation / Conclusion: The use of VR in healthy children increases the PPT and lowers anxiety. In addition, the use of VR in children is feasible. It is a promising tool for perioperative distraction, anxiety and pain management.

Correction of cubitus varus deformity with Guided growth: An unique serie of 7 patients

190.

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Background: Cubitus varus deformity occur with an incidence of up to 30% of supracondylar fractures because of malunion. The most common treatment of cubitus varus is a lateral closed wedge correction osteotomy. To our knowledge there is only one case report concerning the correction of cubiti varus with guided growth

Aim: The purpose of this study was to describe our results with correction of cubitus varus deformity with guided growth.

Materials and Methods: The study is a retrospective case study of 7 cases. All 7 included patients had surgery from 2013–2019 at Rigshospitalet, Pediatric Orthopedic department. Data on demographics, primary fracture, clinical findings and radiological measurements were collected from electronical patient charts (EPIC). All patients and their parents were informed prior to surgery that the surgical method was novel and that osteotomy could still be necessary. They all had temporary small not angle stabile plates (eight plates) to arrest growth of the lateral condyle physis.

Results: Primary fracture pattern was either a supracondylar fracture Gartland III (4 cases) or a lateral condylar fracture (3 cases). Mean age at fracture was 5 (3–8) and mean age at hemi-epiphysiodesis was 9,1 (8–12). 4 did not yet have removal of the eight-plate when this study was conducted and mean treatment time was 39 (34–54) month. Varus deformity was improved clinically with a mean of 11,2°(0–20°). Radiological carrying angle was improved in 4 cases with a mean of 5°. During follow-up screw placement diverged at an average of 5°(0–13°). 2 cases of lateral condylar fractures with loss of reduction during conservative treatment had less or no effect. One patient needed a second surgery to exchange the distal screw. All patients report that the eight-plate was prominent at the lateral condyle but no complains of pain during treatment.

Interpretation / Conclusion: In 6 of 7 (2 moderate) cases we found clinical improvement of cubitus varus with guided growth. Guided growth might have a role in the future treatment of selected patients with cubitus varus.

Use of the bioabsorbable Activa IM-Nail™ for treatment of pediatric diaphyseal forearm fractures – operative technique.

191.

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Background: Pediatric diaphyseal forearm fractures are common injuries and one of the most frequent reasons for orthopedic care. Fractures in need of surgery are often treated with metal Elastic Stable Intramedullary Nails (ESIN). Nail removal after 6–12 months is advocated in Denmark. Hardware removal has few complications; however, it is a substantial burden on the child, the family and healthcare economy. Bioabsorbable Intramedullary Nails (BIN) made from oriented poly L-lactide-co-glycolide (PLGA) copolymers are strong enough to support fractured bones. BIN have been developed for the same indications as metal ESIN.

Aim: We present the operative technique using the Activa IM-Nail™ (Bioretec Ltd., Finland) along with cases.

Materials and Methods: The fracture is reduced, and the cortical bone is opened using an awl. An appropriate size dilator is used to widen the medullary canal. The dilator is replaced with the appropriate size BIN which is inserted to the desired depth under image intensification. The implant is cut and inserted flush with the cortical surface. Wounds are closed using absorbable sutures and dressed. The injured arm is put in an above elbow splint. Post-operative radiographs of the forearm are taken. The patient is discharged when the child is well, either on the same day or day after surgery. The splint is worn until callus is established. Follow-up radiographs are taken after two and six weeks. Return to sports is not advocated before 3 months after surgery.

Results: We describe the surgical procedure and post-operative regime in detail using cases.

Interpretation / Conclusion: The use of BIN would deem hardware removal unnecessary and relieves the child of further surgery while reducing healthcare costs.

Elbow hemiarthroplasty 1 versus open reduction internal fixation for acute AO/OTA type 13C fractures – a systematic review

192.

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Background: Open reduction and internal fixation (ORIF) is the standard treatment for multifragmentary intra-articular distal humeral fractures. Fractures not amenable by ORIF are treated with total elbow arthroplasty (TEA). In recent years, elbow hemiarthroplasty (EHA) has been used as an alternative to TEA, as weight bearing restrictions and risk of component loosening are lower.

Aim: To compare the results, we systematically reviewed the literature reporting functional outcomes and complication rates after either EHA or ORIF for AO/OTA type 13C fractures.

Materials and Methods: We searched Pubmed, Embase, The Cochrane Library, and Scopus. Inclusion criteria: At least five patients, aged 50 years or older, AO/OTA type 13C fracture treated with either ORIF or EHA, and evaluation with the mayo elbow performance score (MEPS). Two reviewers independently screened the literature, blinded to each other's decisions. Initial data extraction was done by the first author, reviewed by the co-authors, and completed in plenum. Results were synthesized qualitatively with use of weighted means. No comparative statistical analyses were done.

Results: We included 24 papers, which included 88 patients treated with EHA and 507 patients treated with ORIF. We identified one RCT and 23 case-series. Weighted mean MEPS was 87,8 (n=83) in the EHA-group, and 84,5 (n=507) in the ORIF-group. Weighted mean flexion/extension arc was 106,6° (n=88) in the EHA-group and 98,8° (n=498) in the ORIF-group. Weighted mean pronation/supination arc was 165° (n=83) in the EHA-group and 146° (n=209) in the ORIF-group. There were 22 (31%) complications (n=70) in the EHA-group, and 95 (38%) complications (n=248) in the ORIF-group. Complication rates for ulnar nerve affection, infection with indication for revision, periprosthetic fracture, loosening, and non-union or fixation failure, were high in both groups.

Interpretation / Conclusion: We found comparable results of EHA and ORIF which indicate that EHA is a viable treatment option for AO/OTA type 13C fractures not amenable by ORIF. Due to high risk of bias, interpretation of the results should be done with caution, and randomized clinical trials comparing EHA with ORIF are needed before safe recommendation can be made.

Good functional outcomes after open reduction and internal fixation for acute distal humeral fractures AO/OTA type 13 C2 and C3 in patients aged over 45 years

193.

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Background: Distal humeral fractures are relatively rare fractures, which comprise about 2% to 5% of all fractures and 30% of elbow fractures. Open reduction and internal fixation (ORIF) with use of Double-plating is often preferred. Previous studies reported satisfactory results following ORIF, despite considerable rate of complications.

Aim: The purpose of the study was to report the functional outcomes and complications after ORIF for acute distal humeral fractures AO/OTA type 13 C2 and C3 with minimum 2 years follow-up. Our hypothesis was that ORIF provides functional outcomes that are comparable to total elbow arthroplasty (TEA) and elbow hemiarthroplasty (EHA) reported in the literature. Thus, a case series that focuses on the functional outcome and complication rates of ORIF for AO/OTA type 13 C2-3, being the most complicated distal humeral fractures, is needed before ORIF can be indirectly compared with the results of TEA or EHA.

Materials and Methods: During a 6-year period, 23 patients older than 45 years were treated with double-plating for AO/OTA type 13 C2 or C3 fracture. The mean age was 62 years (range, 46-80 years). The Oxford Elbow Score (OES) was used as primary outcome; and Mayo Elbow Performance Score (MEPS), pain severity score (VAS), range of motion, reoperations and complications were used as secondary outcomes.

Results: Median OES was 42 (range 25-48), Twenty patients achieved "good" to "excellent" outcomes and 3 patients achieved "fair" outcomes. Median MEPS was 85 (range 60-100), Eighteen patients achieved "good" to "excellent outcomes" and 5 patients achieved "fair" outcomes. VAS was 2 (range 0-5). The median flexion/extension and supination/pronation arcs were 120 degree (range 70-155) and 160 degree (range 75-170) respectively. Eight complications were recorded in seven patients, four of them required reoperation. Our results are comparable to the results of previously published studies regarding the outcome of ORIF, EHA, or TEA.

Interpretation / Conclusion: ORIF is a reliable treatment option for acute distal humeral fractures AO/OTA type 13 C2 and C3 in middle-aged and elderly patients, despite the considerable rate of complications. Good to excellent results can be obtained in most of the patients.

Ultrasonographic measures of subacromial structures in patients with subacromial pain demonstrate poor to good interrater reliability when performed by novice sonographers

194.

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Background: Ultrasonographic measurements of the subacromial structures are reliable in the hands of experienced sonographers, but it is unknown if inexperienced clinicians can achieve a satisfactory level of reliability.

Aim: To investigate if standardized subacromial ultrasonographic measures are reliable in the hands of novice sonographers.

Materials and Methods: Two novice sonographers performed a standardized ultrasonographic protocol on symptomatic and asymptomatic shoulders of patients diagnosed with subacromial pain. The protocol consisted of measures of supraspinatus tendon thickness, subacromial bursa thickness, acromio-humeral distance and an assessment of dynamic impingement. Intraclass correlation coefficients (ICC(2,1)), standard error of measurement (SEM), minimal detectable change (MDC), 95% Limits of Agreement (LOA) and Cohen's unweighted kappa were used to evaluate reliability and agreement.

Results: Twenty-eight patients were recruited resulting in the inclusion of 28 symptomatic and 20 asymptomatic shoulders. Intraclass correlation coefficients (ICC(2,1)) of supraspinatus tendon thickness ranged from 0.73 to 0.77 (SEM 0.4–0.5 mm; MDC 1.2–1.4 mm). Subacromial bursa thickness ICC ranged from 0.41 to 0.88 (SEM 0.2–0.4 mm, MDC 0.4–1.0 mm) and acromio-humeral distance ICC ranged from 0.68 to 0.72 (SEM 0.9 mm, MDC 2.5–2.6 mm). Cohen's kappa of dynamic impingement in symptomatic shoulders was 0.29.

Interpretation / Conclusion: Novice sonographers achieved poor to good reliability depending on the subacromial measure. Assessment of dynamic impingement in symptomatic shoulders resulted in fair reliability and was associated with systematic bias. Results were inferior to results obtained by experienced sonographers in previous studies.

Superior capsular reconstruction (SCR) – 2-year follow-up results.

195.

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Background: A prerequisite for a satisfying functional result in the treatment of an irreparable rotator cuff rupture is significant reduction of shoulder pain and better range of motion with increased glenohumeral joint stability.

Aim: Prospective study to examine the outcome after superior capsular reconstruction using a porcine extracellular matrix dermal graft. A special emphasis was primarily on the functional outcome, secondarily on radiographical shoulder changes.

Materials and Methods: Results were evaluated using the Constant score and WORC index over a 2- year period. All patients had magnetic resonance imaging of the injured shoulder after approximately one year. Graft integration and durability were qualitatively estimated as well as any graft deterioration or resorption.

Results: 19 patients with 19 superior capsular reconstructions were included over a 4-year period. Mean age was 59 years (range 45 to 70) at the time of surgery. At final follow-up (mean 24 months, range 23 to 28) the mean Constant score had improved by a percentage average of 115 % (0-268, % increase). The mean WORC index had increased by a percentage average of 131 % (0-484, % increase). 2 out of 19 grafts were completely ruptured on follow-up magnetic resonance

Interpretation / Conclusion: We saw a group of patients with variable but significant increases in functional results with increased satisfaction and limited pain. We did not find a complete correlation between functional outcome scores and graft durability nor with single cuff defects versus larger rotator cuff defects. The group of patients were generally measurably satisfied with their result. This study suggests that a superior capsular reconstruction can yield results that are comparable or superior to other known salvage treatment options in patients with large to massive rotator cuff defects without significant cuff tear arthropathy. The hypothesis that superior capsular reconstruction can be a relevant treatment method for irreparable rotator cuff tears could not be refuted despite a fairly low patient inclusion number. With these results, selected patients can be considered for a different treatment than reverse shoulder arthroplasty, debridement or tendon transfer.

Rotator Cuff Tear; A diagnose often missed at initial contact. A prospective study

196.

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Background: Rotator cuff tears are common injuries. They are often missed upon the initial examination at the emergency room.

Aim: In this study, the incidence rate of rotator cuff tears in patients seen in the emergency room with relevant shoulder trauma is evaluated. Furthermore, it is investigated, whether a limited clinical examination is correlated to an ultrasonography confirmed rotator cuff tear.

Materials and Methods: Patients referred to the emergency room with isolated shoulder trauma and no x-ray verified fracture, were referred to a follow-up examination with a shoulder surgeon within 14 days after trauma. At follow-up a limited clinical examination with three diagnostic tests was performed. The patients were tested for: abduction, external rotation and impingement. The clinical examination was immediately followed by an ultrasonography examination to determine the status of the rotator cuff.

Results: We included 59 patients in the study with a median age of 47 years. 7 (12%) patients had a rotator cuff tear (RC tear) upon evaluation. If the patient was a candidate for surgery, the cuff tears would be verified by MRI or arthroscopy. 17 patients had all three tests positive at the follow-up examination. Of these, 7 (24%) patients, had a RC tear. All patients with a RC tear had a positive test for external rotation, and all three diagnostic tests had negative predictive values above 92%.

Interpretation / Conclusion: 12% of the patients seen in the emergency room after isolated shoulder trauma had a RC tear. This study shows that a limited clinical examination can assist the surgeon in determining which patients are likely to have a RC tear and for whom, a referral for a concluding ultrasonography examination is likely recommendable.

Are progressive shoulder exercises feasible in patients with glenohumeral osteoarthritis or rotator cuff tear arthropathy eligible for shoulder arthroplasty?

197.

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Background: Only few studies have investigated the outcome of exercises in patients with glenohumeral osteoarthritis (OA) or rotator cuff tear arthropathy (CTA), and furthermore often excluded patients with a severe degree of OA. Several studies including a Cochrane review have suggested the need for trials comparing shoulder arthroplasty to non- surgical treatments. Before initiation of such a trial, the feasibility of progressive shoulder exercises (PSE) in patients, who are eligible for shoulder arthroplasty should be investigated.

Aim: To investigate whether 12 weeks of PSE is feasible in patients with OA or CTA eligible for shoulder arthroplasty. Moreover, to report changes in shoulder function and range of motion (ROM) following the exercise program.

Materials and Methods: Eighteen patients (11 women, 14 OA), mean age 70 years (range 57-80), performed 12 weeks of PSE with 1 weekly physiotherapist-supervised and 2 weekly home-based sessions. Feasibility was measured by drop-out rate, adverse events, pain and adherence to PSE. Patients completed Western Ontario Osteoarthritis of the Shoulder (WOOS) score and Disabilities of the Arm, Shoulder and Hand (DASH).

Results: Two patients dropped out and no adverse events were observed. Sixteen patients (89%) had high adherence to the physiotherapist-supervised sessions. Acceptable pain levels were reported. WOOS improved mean 23 points (95%CI:13;33), and DASH improved mean 13 points (95%CI:6;19).

Interpretation / Conclusion: PSE is feasible, safe and may improve shoulder pain, function and ROM in patients with OA or CTA eligible for shoulder arthroplasty. PSE is a feasible treatment that may be compared with arthroplasty in a RCT setting.

The Scapular Dyskinesis Test and the Scapula Assistance Test are reliable in patients with subacromial pain.

198.

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Background: Scapular dyskinesis is defined as winging or dysrhythmia of the scapula. The Scapular Dyskinesis Test (SDT) is a visually based method for evaluation of scapular dyskinesis where the patient performs five bilateral repetitions of shoulder abduction and five bilateral repetitions of shoulder flexion. The Scapula Assistance Test (SAT) is a maneuver where the examiner manually assists the patient's scapula in order to facilitate the normal scapulohumeral rhythm during active shoulder abduction in order to alleviate pain.

Aim: To investigate the interrater reliability of the SDT and the SAT performed by inexperienced raters in patients with subacromial pain.

Materials and Methods: Consecutive patients with subacromial pain from an orthopedic outpatient clinic were eligible for inclusion if they had at least three out of five positive tests from the following: Hawkin's, Neer's, Jobe's, Painful Arc and External Rotation Resistance Test. A medical student and a junior orthopedic resident performed the SDT (rated normal, subtle or obvious) and the SAT (rated positive or negative). The two raters were blinded to each other's results.

Results: 33 patients (mean age: 52 years, SD: 19) were included during a three-month period. 12 patients could not perform the SDT due to severe shoulder pain. The overall agreement for the SDT was 86% (linear weighted kappa = 0.81). The overall agreement for SAT was 82% (kappa = 0.61).

Interpretation / Conclusion: This study indicates that SDT and SAT are reliable in a clinical setting among inexperienced raters, with substantial and almost perfect reliability, respectively, and overall good agreement.

Measurement of glenohumeral instability after traumatic anterior shoulder dislocation or subluxation: A systematic review of the literature

199.

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Background: Traumatic anterior shoulder dislocation, or subluxation, affects shoulder kinematics. Different measures of glenohumeral translation have been presented, but no summary of results and evaluation of measurement methods exists.

Aim: To investigate anterior–posterior (A–P) glenohumeral translation in shoulders after traumatic anterior dislocation or subluxation.

Materials and Methods: This is a systematic review following the PRISMA guidelines. Patients ≥ 15 years with traumatic anterior shoulder instability were included. No intervention or comparator were investigated. The outcome was the A–P glenohumeral translation. A systematic search of PubMed, Embase, and Cochrane library was performed on September 21st 2020. Two reviewers individually screened titles and abstracts, reviewed full text, extracted data, and performed quality assessment with the NewCastle Ottawa Scale.

Results: Ten studies (355 shoulders) using various investigation methods were included: 1 with unstable shoulders only, 9 comparing stable and unstable. The most frequently tested limb position was a degree of abduction and external rotation, where the anterior translation in unstable shoulders ranged from 0.0mm (SD0.8) to 12mm (range 10–16), and one study found posterior translation of 11.1mm (SD4.1). When an anterior or anterior–inferior force was applied to the unstable shoulders, translations were consistently anterior, ranging from 4.9mm (SD0.6) to 7.9mm (SD3.1). Out of 25 comparisons, 18 reported larger A–P translation in the unstable shoulders than in the stable (5 with and 10 without statistical significance, 3 without reported significance). The largest reported difference was 4mm anteriorly (during empty-can abduction in the scapular plane or flexion in the sagittal plane) and 4.2mm posteriorly (posterior drawer test).

Interpretation / Conclusion: In shoulders with traumatic anterior instability, the glenohumeral translation was anteriorly directed in a majority of investigated motion tasks. The A–P glenohumeral translation is often larger in unstable shoulders than in stable, but not always significant. The literature is inconsistent regarding investigation methods, and it seems that measurements depend on the applied technique and limb position.

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Background: Comprehensive preoperative information is important to ensure that ACL patients are able to observe and respond to symptoms after discharge. Based on interviews, many patients express that these information meetings can be problematic due to difficulty of absence from school and that it is too much information during the meeting. Further, many patients were concerned after surgery and felt they were left alone with the problems.

Aim: The aim of this study was to investigate if it was possible to replace a personal pre-operative information meeting with a Web-program preparing for ACL reconstruction and to develop and implement an Action Guide to help patients to assess and address their post-operative concerns and problems.

Materials and Methods: A Web-program with all the pre- operative information was designed. To investigate how patients would like to be informed pre- operatively, 93 patients were allowed to choose between participating in the pre- operative information meeting or only to be informed by the Web-program. To address the patients` concerns after ACL surgery, we created an "Action Guide" based on the patients` experienced problems, The purpose of the Action Guide was to help the patients to decide what to do in the post- operative period according to different problems. To evaluate the Action Guide, 76 patients participated in a survey before and after implementation of the Action Guide. As an estimate of their concerns patients were asked about their telephone call to the clinic two weeks after surgery.

Results: After implementation of the Web- program patients participating in the information meeting were reduced by 89%. Patients have expressed satisfaction with the Web-program and it does not appear to have impaired the quality of the treatment. A survey showed that the number of telephone calls from post-operative patients decreased by 34% after implementation of the Action Guide.

Interpretation / Conclusion: Most patients with anterior cruciate ligament injuries prefer information from a Web-program instead of a pre- operative information meeting. An Action Guide can help the patients to assess and address their post- operative concerns and problems, which again can reduce telephone calls to the clinic.

Living conditions, pain, functional status and quality of life after distal femoral resection knee arthroplasty for non-tumor indications.

202.

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Background: With the increasing number of knee arthroplasties performed, the need of reoperations due to periprosthetic fractures or due to bone loss will also increase. Hence, the need of distal femoral resection knee arthroplasty is expected to increase. The procedure may be safe, but the true impact of these procedures on patient functional and health status is unknown.

Aim: to present living conditions, pain, functional status and quality of life after distal femoral resection knee arthroplasty for non-tumor indications.

Materials and Methods: We identified 45 knees (45 patients) treated with distal femoral resection knee arthroplasty in a single institution between 2012 and December 2020. 16 patients refused or was unable to participate (6 deceased). A total of 30 patients were included after informed consent. Oxford Knee Score (0–48, 48 best), EQ5D (5 dimensions) and Copenhagen Knee ROM were completed and information on pain and living conditions was obtained.

Results: The mean age was 67.9 years (SD 13.6) and 21 (70%) were female. A total of 27 patients (90%) lived in own home and 3 (10%) were staying in nursing homes. 20 (66.7%) of patients living in their own homes did not need home care, 5 (16.6%) received home care 1–2 times every 2. weeks and 5 (16.6%) every day. 18 patients (60%) used mobility aids (9 (30%) canes, 8 (26.7%) walkers, 1 (3.3%) wheelchairs). 9 (30%) used paracetamol or NSAID and 2 (6.7%) used opioids for their knee pain. Mean VAS pain score when standing was 1.30 (SD 2.2) and 2.8 (SD 3.1) in motion. Mean total Oxford Knee Score was 30.1 (SD 10.3). Mean EQ- 5Dindex score was 0.70 (SD 0.22) and mean EQ-5D VAS score was 55.4 (SD 23.9). Mean Copenhagen Knee ROM flexion was 116° (SD 21.6) and mean extension was – 2° (SD10.1)

Interpretation / Conclusion: Distal femoral resection knee arthroplasty appears to be a viable treatment option. Acceptable outcomes in terms of daily living, pain, functional status and quality of life of the patients can be achieved, especially when comparing with status after treatment alternatives such as femoral amputations.

BLOOD FLOW RESTRICTED WALKING IN ELDERLY INDIVIDUALS WITH KNEE OSTEOARTHRITIS: A PILOT STUDY

203.

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Background: Knee osteoarthritis (OA) negatively affects skeletal muscle size and strength, which impairs the capacity to perform activities of daily living and results in a reduced quality of life. Walking exercise with concurrent lower limb blood flow restriction (BFR- walking) has previously been shown to increase muscle strength and improve function in elderly Japanese individuals.

Aim: To examine changes in functional capacity and self-reported knee function in response to 8-10 weeks of blood flow restricted walking in elderly adults with knee osteoarthritis.

Materials and Methods: Fourteen elderly individuals diagnosed with knee osteoarthritis participated in 8-10 weeks of outdoor walking (4 km/h, 20 minutes/session, 4 times/week) with partial blood flow restriction (60% of arterial occlusion pressure) of the affected leg. Timed-Up & Go, 30-s sit-to-stand test, 40-m fast-paced walk test, 11-step stair-climb test, and Knee Osteoarthritis Outcome Score were assessed pre- and post-training.

Results: Nine participants completed 8-10 weeks of blood flow restricted walking. Considering completed case data, adherence rate was 93%, while mean knee pain and perceived exertion in the affected leg was 0.7 and 3.4 on a numerical rating scale from 0-10. Functional capacity was improved following the intervention period (30STS (+16%), TUG (-8%) and 40MWT (+5%)), while measures of self-reported knee function remained unchanged. Five participants withdrew from the study, of which four experienced intervention-related adverse events (knee pain, cuff discomfort).

Interpretation / Conclusion: The present group of elderly adults with knee osteoarthritis demonstrated improvements in functional capacity following 8-10 weeks BFR walk-training, without any changes in self-reported knee function.

Low-load blood flow restricted exercise as exercise for patient suffering from reactive arthritis

204.

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Background: Reactive arthritis (ReA) in the knee joint is characterized by joint swelling and pain. Exercise prohibiting muscular atrophy and loss of muscle strength is highly recommended. However, joint pain and swelling can affect the ability to reach sufficiently high exercise intensities to promote skeletal muscle hypertrophy and increase strength. Low-load blood flow restricted resistance exercise (BFRE) has previously been demonstrated to promote skeletal muscle hypertrophy and increase strength without exacerbating joint pain in other patient populations

Aim: To investigate if 12 weeks of BFRE every second day could increase lower limb function and decrease knee joint swelling in a young male patient suffering from long-lasting ReA

Materials and Methods: A 20-year-old male suffering from ReA in his right knee performed 12 weeks of home-based BFRE consisting of squat and lunges with body weight as the only resistance. Each exercise was performed every second day and consisted of 4 rounds of 30,15,15,15 repetitions interspaced by 30 seconds rest between sets and 5 min rest between exercises. Exercises were performed with a pneumatic cuff around the right limb and inflated to 130 mmHg (week 1-3), 140 mmHg (week 4-6), and then 150 mmHg (week 7-12). The pressure was maintained during each exercise and deflated in the 5-min rest pause between exercises. At baseline and after 3, 6, 9, and 12 weeks, the patient performed unilateral 30-sec sit-to-stand test (30STST), thigh circumference, and completed Knee Injury and Osteoarthritis Outcome Score (KOOS) (0-100) and the Forgotten Knee Joint Score (FKJS) (0-48) questionnaires.

Results: All planned sessions were completed without pain exacerbation from the knee. 30STS improved from 10 repetitions (reps) to 17 reps on the right limb and from 13 reps to 18 reps on the left leg. Thigh circumference decreased from 41 cm to 40.4 cm on the right leg and from 38.4 cm to 37.4 cm on the left leg. KOOS symptoms, ADL, and quality of life demonstrated a clinically relevant improvement from 54 to 64, 82 to 96, and 56 to 69. The FKJS decreased from 38 points to 27 point.

Interpretation / Conclusion: Home-based BFRE may be an effective exercise method for patients suffering from long-lasting ReA.

Superior survival and local control following particle therapy in chondrosarcomas of the axial skeleton

205.

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Background: Chondrosarcomas are malignant tumors of connective tissue, characterized by the formation of a chondroid matrix by the tumor cells and are the second-most common primary spinal sarcoma in adults. These tumors are resistant to both chemotherapy and radiotherapy and are situated in close proximity to radiosensitive neural structures. In theory, particle therapy could remedy this based on the physical properties of the radiation.

Aim: The primary aim was to investigate the isolated clinical effects on overall survival following spinal chondrosarcoma (SCS) treatment with particle therapy versus photon radiotherapy in adults.

Materials and Methods: A systemic review of available literature was conducted in Cochrane, Medline and EMBASE and meta-analysis was performed on data from primary studies. The databases were searched from inception until December 2019. The search yielded 1239 articles of which 28 which were eligible for inclusion with a combined patient population of 2151.

Results: Our overall weighted estimate of the data suggests a slight advantage in treating SCS located in skull and spine with particle therapy compared to photon radiotherapy on 5-year overall survival (93.4% vs 88.2%) and an advantage on 5-year local control (91.8% vs 75.9%). A sub-analysis of particle therapy paradoxically suggests carbon ion therapy to be slightly superior compared to proton therapy on 5-year overall survival (97% vs 91.9%) but not 5-year local control (88.7% vs 93.1%).

Interpretation / Conclusion: Particle therapy allows for the safe and effective delivery of radiation doses exceeding 70 GyE (Gray equivalents), necessary to treat SCS. It can spare surrounding tissues of up to 25 GyE, resulting in acceptable levels of radiation toxicities, while 5-year overall survival is slightly improved and local control is substantially improved compared with photon-based therapies. The difference in the treatment of SCS with proton or carbon ion therapy does not appear substantial. Further analysis of the outcomes and evidence of treatment effect is needed to eliminate center bias in the body of evidence.

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Background: Coccydynia is pain originating from the os coccygis, a condition for which several treatments are being practised today.

Aim: To evaluate the efficacy of available treatment options for patients with persistent coccydynia through a systematic review.

Materials and Methods: Original peer-reviewed publications on treatment for coccydynia were identified using PRISMA guidelines by performing a literature search of relevant databases, from their inception to January 17, 2020, combined with other sources. Data on extracted treatment outcome was pooled based on treatment categories to allow for meta-analysis. All outcomes relevant to the treatment efficacy of coccydynia were extracted. No single measure of outcome was consistently present among the included studies. Numeric Rating Scale, (NRS, 0 to 10) for pain was used as the primary outcome measure. Studies with treatment outcome on adult patients with chronic primary coccydynia were considered eligible.

Results: A total of 1980 patients across 64 studies were identified: 5 randomized controlled trials, 1 experimental study, 1 quasi-experimental study, 11 prospective observational studies, 45 retrospective studies and unpublished data from the DaneSpine registry. The greatest improvement in pain was achieved by patients who underwent radiofrequency therapy (RFT, mean VAS decreased by 5.11cm). A similar mean improvement was achieved from Extracorporeal Shockwave Therapy (ESWT, 5.06), Coccygectomy (4.86) and Injection (4.22). Although improved, the mean change was less for those who received Ganglion block (2.98), Stretching/Manipulation (2.19) and Conservative/Usual Care (1.69).

Interpretation / Conclusion: Ganglion block, conservative therapy and Stretching/Manipulation showed limited improvement. Although sparsely investigated, injections and ESWT showed promising results and should be considered before coccygectomy. Coccygectomy remains the most studied treatment, and despite having varying complication rates consistently demonstrates high efficacy when treating otherwise refractory patients. RFT demonstrated overall good relief of pain and may prove an alternative to surgery in the future.

Prognostic factors predictive of poor outcome following coccygectomy for patients with persistent coccydynia

207.

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Background: Coccydynia is pain originating in the coccyx and surrounding tissue. Coccygectomy, which is surgical amputation of the coccyx, is a way to relieve patients from their debilitating symptoms if nonoperative therapy fails to do so. The authors investigate prognostication in a prospective cohort of 134 coccygectomized patients who all suffered from persistent coccydynia and were diagnosed with instability of the coccyx. At present, no tool to improve patient selection is available.

Aim: The purpose of this study is to identify prognostic factors predictive of poor outcome following coccygectomy on patients with persistent coccydynia due to instability of the coccyx.

Materials and Methods: Through DaneSpine, the Danish National Spine Registry, 134 consecutive patients were identified from a single center experience on coccygectomy performed from 2011 to 2019. Patient demographics, including age, gender, body-mass-index (BMI), smoking status, work status, welfare payments as well as patient-reported outcomes (PROs), including pain VAS-score (0-100), Oswestry Disability Index (ODI), Euro-QoL-5D (EQ-5D), Short Form-36 (SF-36) Physical Component Score (PCS) and Mental Component Score (MCS) were obtained at baseline and at 1-year follow-up. In addition, patient satisfaction with the procedure was obtained at follow-up.

Results: A minimum of 1-year follow-up was available in 112 patients (84%). Mean age was 41.9 years (range 15-78) and 97 of the patients were female (87%). Patients were divided into three groups based on satisfaction. Regression showed no statistically significant association between the investigated prognostic factors and a poor outcome following coccygectomy. The satisfied group showed a statistically significant improvement in PROs at 1-year follow-up from baseline, whereas the not satisfied group did not show a significant improvement.

Interpretation / Conclusion: We did not identify factors prognostic for a poor outcome following coccygectomy. This suggests that neither of the included parameters should contradict treatment with coccygectomy for patients who suffer from persistent coccydynia with instability of the coccyx.

The knee stability evaluated by the pivot shift test and its relationship to KOOS Sports and KOOS Quality of life one year after primary anterior ligament reconstruction: A cross-sectional register study 208.

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Background: Knee function and ability to return to pivoting sports activities after anterior ligament (ACL) reconstruction is assumed to be influenced by postoperative rotational knee stability, which can be evaluated by the degree of pivot shift. The Knee injury and Osteoarthritis Outcome Score (KOOS) is an instrument to assess the patients' opinion about their knee problems. The relationship between postoperative pivot shift and the KOOS subscores Sports and Quality of life (QoL) have not previously been investigated.

Aim: The aim was to investigate whether KOOS Sports and KOOS QoL are related with the postoperative rotational stability evaluated one year after primary ACL reconstruction. The hypothesis is that patients with a pivot shift test degree ≥ 1 have lower outcome scores than patients with a pivot shift test degree = 0.

Materials and Methods: This cross-sectional study was based on data from the Danish Ligament Reconstruction Register (DLRR) from 2005–2019. Inclusion criteria: Primary isolated ACL reconstruction; age > 16 years; Patients had completed KOOS; Patients were evaluated and registered at the DLRR by orthopaedic surgeon or physiotherapist 1 year postoperatively including pivot shift test. The relationship between Sports, QoL and knee stability were analyzed using students t-test and presented as mean values with confidence intervals (95% CI).

Results: 1615 patients (48% females), mean age 25 (SD 8) years were found eligible for this study. 1334 (83%) patients had no pivot shift while 281 (17%) had degree 1–3. Mean KOOS Sports for patients with no pivot shift: 63.6 (95% CI 62.3;64.9) and with positive pivot shift: 59.4 (95% CI 56.6;62.3), ($P < 0.004$). Mean KOOS QoL for patients with no pivot shift: 59.0 (95% CI 57.9;60.1) and with positive pivot shift: 54.2 (95% CI 51.9;56.5), ($P < 0.0003$). The minimal important changes (MIC) for the KOOS Sports and QoL (12.1 and 18.3) were not met.

Interpretation / Conclusion: Knee related Sports and Quality of life is statistically related to rotational knee stability 1 year after ACL reconstruction. However, the differences in KOOS Sports and KOOS QoL between the groups were not clinically relevant.

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Background: Strengthening of the quadriceps musculature through high load resistance (HL-RT) training is a cornerstone in knee rehabilitation. Despite decreasing symptoms and improving strength, HL-RT can be unfeasible for some patients. Low-load blood flow restricted training (LL-BFRT) is an alternative, incorporating partial vascular occlusion. LL-BFRT has been found equal to HL-RT in terms of strength improvements, while being less stressful on the knee.

Aim: To assess the effect of an eight-week training protocol using LL-BFRT in patients with persisting knee pain.

Materials and Methods: Prospective cohort study consisting of participants with at least six months of persisting knee pain or at least 3 months of unsuccessful rehabilitation. The participants were instructed, by a physiotherapist, to do daily sessions of single-legged squat on the leg of the affected knee with blood flow restriction (BFR). Baseline and eight-week measurements were performed for the Knee injury and Osteoarthritis Outcome Score (KOOS), isometric maximal voluntary contraction (iMVC) for quadriceps extensions, thigh girth and physical performance tests. Results are given with 95% confidence interval.

Results: Thirty-five participants completed the study, two participants dropped out (one due to exercise related pain) and seven declined follow-up. The mean age was 38 years and 47% were female. LL-BFRT had a statistically significant effect with a mean change of 5.6 [0.1 ; 11.2] points in the KOOS-subscale for Quality of Life (QoL) ($p<0.04$), 14.6 [5.1 ; 24.0] Nm in iMVC ($p<0.01$), 11.6 [0.8 ; 22.4] cm in one-leg jump for distance ($p<0.04$), 25.9 [1.9 ; 49.9] cm in one-leg crossover jump ($p<0.04$), and 7.2 [3.0 ; 11.3] reps in one-leg 30 seconds side hop ($p<0.01$). Of the participants completing the study, the general session completion rate was 5.4 out of 7 weekly sessions, with a mean VAS score of 56.9 out of 100. No statistically significant improvements were observed in any other KOOS-subscale.

Interpretation / Conclusion: LL-BFRT is a feasible training form for patients otherwise unable to perform physiotherapy with improvements in the QoL subscale, iMVC and physical performance, but not in the subscale for pain.

External hip joint peak moments in walking, jogging, and sprint acceleration: An explorative cross-sectional study of healthy adults

211.

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Background: Athletes with femoroacetabular impingement syndrome often report problems in sprinting compared to walking and jogging. This discrepancy may be related to the difference in peak moments distributed across the hip joint

Aim: In this cross-sectional study, we examined external hip joint moments during walking, jogging, and sprint acceleration.

Materials and Methods: We included 20 healthy sports active adults (mean age 24.7 years). The primary outcome was external hip joint peak moments for adduction, abduction, flexion, and extension during: walking with a self-paced speed; jogging with 8–11 km/h; and maximal sprint acceleration. Data was collected in a 3D Motion Analysis Laboratory with two floor-embedded AMTI force platforms. The mean of three trials for each activity was captured on the dominant leg for analyses.

Results: Maximal sprint acceleration resulted in higher external peak moments than jogging and walking for all external moments ($p \leq 0.006$). The increase from walking and jogging to sprinting was 16–128 % for adduction, 168–195 % for abduction, 105–148 % for flexion, and 61–121 % for extension. Furthermore, a 36 % higher extension moment was observed for walking compared to jogging ($p < 0.001$), whereas a 96 % higher adduction moment was observed for jogging compared to walking ($p > 0.001$).

Interpretation / Conclusion: Substantially higher hip joint moments were observed in sprint acceleration compared to walking and jogging, whereas jogging only showed a higher adduction moment compared to walking. This information may explain why patients with femoroacetabular impingement syndrome often tolerate walking and jogging activities and to a lesser extent sprinting.

Rehabilitation with blood flow restriction resistance exercise in patients with early weight bearing restrictions after knee surgery: A feasibility study

212.

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Background: In musculoskeletal rehabilitation, blood flow restriction (BFR) resistance exercise is potentially indicated in patients who may not load tissues as required for “classic” heavy resistance exercise.

Aim: The purpose of this study was to explore the feasibility of rehabilitation with BFR resistance exercise in patients with early weight bearing restrictions after meniscus or cartilage repair in the knee joint.

Materials and Methods: In total, 42 patients with meniscus (n=21) or cartilage repair (n=21) in the knee joint attended 9 weeks of supervised rehabilitation with BFR resistance exercise at an outpatient rehabilitation center (5 sessions/week). Clinical outcomes were assessed at different time points from 2 to 26 weeks postoperatively and included: Thigh circumference (muscle size proxy), isometric knee-extension strength, knee joint and thigh pain, knee joint range of motion and effusion, perceived exertion, self-reported disability and quality of life, and adverse events.

Results: On average, patients performed 48 BFR sessions (35 home, 13 supervised). 38 patients reported 64 harms (dizziness, n=52) – none considered serious. Thigh circumference increased 0.6 cm (SD=1.5) from baseline to end of the rehabilitation program for the operated leg from 52.8 to 53.3 cm (p=0.01), and 0.1 cm (SD=1.1) for the healthy leg from 54.9 to 55.0 cm (p=0.41). At 26 weeks postoperatively, isometric knee-extension strength (limb symmetry index) was 83% (SD=25).

Interpretation / Conclusion: Rehabilitation with BFR resistance exercise initiated early after meniscus or cartilage repair in the knee joint seems feasible and may increase thigh muscle mass during a period of weight bearing restrictions. Harms were reported, but no serious adverse events were found. Trial registration: NCT03371901

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Background: The Knee injury and Osteoarthritis Outcome Score for Children (KOOS-Child) is a modified version of the adult KOOS. It consists of five domains ('Symptoms', 'Pain', 'ADL', 'Sports/Play', and 'QoL'), and aims to evaluate "knee injury that can result in post-traumatic osteoarthritis", including ACL deficiency. However, the measurement properties of KOOS-Child have yet to be assessed in a cohort of children with ACL deficiency.

Aim: To study the structural validity of the questionnaire KOOS-Child using modern test theory models (Rasch analysis and confirmatory factor analysis (CFA)).

Materials and Methods: Data were collected prospectively before surgery and at 1-year follow-up in a cohort of 226 children with ACL deficiency, treated with epiphyseal sparing reconstruction at Bispebjerg University Hospital. Patients with age >16, incomplete data, previous surgery, or concomitant fractures were excluded. For each subscale, we evaluated the fit of a CFA model, looked at modification indices to find a model with better fit if necessary, and confirmed the models using Rasch analysis. Rasch analysis assessed item fit. Floor and ceiling effects were reported.

Results: Four out of five subscales showed inadequate fit to the CFA model, while the 'QoL' subscale data fitted the model well. Rasch analysis confirmed these results. When adjusting the four subscales using a bi-factor CFA model, modelling local dependence, and removing redundant items, subscales exhibited better model fit. Most items in the three subscales 'Symptoms', 'Pain', and 'ADL' demonstrated substantial ceiling effects, with few exceptions.

Interpretation / Conclusion: The QoL subscale of KOOS-Child has adequate measurement properties in its original form for children with ACL deficiency. The four other subscales can be adjusted, either by removing non- functioning and redundant items, or by changing the scoring principles, to make them fit the models better. Suggestions for this are presented and can be used in a version 3.0 if they are confirmed in other studies. However, large ceiling effects in three subscales may reduce the sensitivity of these and induce type two errors. Future research should aim at determining the responsiveness and MCID of the scale.

Impaired one-legged landing balance in young female athletes with previous ankle sprain: a cross-sectional study.

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Background: Ankle sprain is the most common type of sports injury, especially in team sports. Previous ankle ligament sprain predisposes for recurrent ankle sprain. Standing and dynamic balance, as an indicator of ankle ligament re-injury risk, have been investigated using varying experimental approaches.

Aim: The aim of the present study was to examine a new test of functional recovery after ankle injury by focusing on the very early landing stability.

Materials and Methods: In the present cross-sectional study, 81 adolescent female elite team handball and football players were divided into two groups based on previous ankle sprain injury (PI) or not (C). The PI group were all back in full participation in their sports. All players were tested during a one-legged landing (OLL) and in a one-legged static stand balance test (OLBT). In the OLL test, CoP trajectory displacement was calculated in 200 ms time epochs for evaluation of the initial stages of dynamic landing balance. OLBT was evaluated by calculating total (10 seconds) displacement of the CoP trajectory.

Results: CoP displacement was greater in PI than C during the first 200 milliseconds epoch after landing ($p = 0.001$, PI (SD) = 44, C (SD) = 28) and in the subsequent 200 ms epoch ($p = 0.02$, PI (SD) = 20, C (SD) = 16). No significant differences between PI and C were observed in time epochs from 400 to 1000 milliseconds or in OLBT.

Interpretation / Conclusion: Adolescent elite athletes with a history of previous ankle sprain demonstrate impaired one-legged landing balance in the first 400 milliseconds following one-legged jump-stop landing compared to non-injured controls. Consequently, although athletes with previous ankle sprain may return to sport, dynamic postural control may not be fully restored. The one-legged landing test may be considered a relevant criterion tool for safe return-to-sport, and this test seems more sensitive to functional stability than a standing balance test.

Content validity of five PROMs used in orthopedic research, evaluated using the COSMIN Risk of Bias checklist: the mHHS, HAGOS, IKDC-SKF, KOOS and KNEES-ACL

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Background: Content validity is the most important measurement property of PROMs. The latest COSMIN guidelines for evaluating the content validity of PROMs are often referred to as a gold standard and have only sparsely been applied to PROMs for musculoskeletal conditions

Aim: To use the COSMIN Risk of Bias checklist to evaluate the content validity of five PROMs, that are highly relevant in musculoskeletal research and used by the arthroscopic community: the modified Harris' Hip Score (mHHS), the Copenhagen Hip and Groin Outcome Score (HAGOS), the International Knee Documentation Committee Subjective Knee evaluation Form (IKDC-SKF), the Knee injury and Osteoarthritis Outcome Score (KOOS) and the Knee Numeric-Entity Evaluation Score - ACL (KNEES- ACL).

Materials and Methods: The development articles for the five PROMs were identified through searches in PubMed and SCOPUS. An additional literature search was performed to identify studies assessing content validity of the PROMs. Any missing information were obtained from the five original developers after direct request if possible. To evaluate the quality of the development studies and rate the content validity, the COSMIN Risk of Bias checklist was applied to all relevant studies.

Results: Five development studies and three subsequent content validity studies were identified. One content validity study was of inadequate quality and excluded from further analysis. The development of mHHS, IKDC-SKF, and KOOS were rated inadequate and these PROMs possess insufficient content validity for their target populations. Due to the irrelevance of multiple items, KOOS was in particular inappropriate to evaluate patients with an ACL injury. The development of HAGOS was also rated inadequate, although the insufficiency aspects can be regarded as minor. KNEES-ACL possessed sufficient content validity.

Interpretation / Conclusion: Out of five highly relevant orthopaedic PROMs, only KNEES-ACL possessed sufficient content validity according to COSMIN guidelines. There is an urgent need in musculoskeletal research for condition-specific PROMs developed with adequate methods.

Patients ≥ 30 Years Have Greater Improvement in KOOS Following ACL Reconstruction: Results from the Danish Knee Ligament Reconstruction Registry

216.

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Background: The typical patient considered for anterior cruciate ligament reconstruction (ACLR) is an athlete in the second and third decade of their lives. As more people tend to be more physically active in their 30s and later on, the demands to the anterior cruciate ligament (ACL) may increase in this part of the population. This leaves the surgeon with an increasing need of scientific evidence when counselling patients ≥ 30 years prior to ACLR.

Aim: To determine the relationship between age at ACLR and patient reported outcomes (PRO) at one-year follow-up.

Materials and Methods: Nationwide registry study with prospectively collected data. Patients undergoing ACLR from 2005 to 2018 completed the Knee Injury and Osteoarthritis Outcome Score (KOOS) and Tegner activity scale prior to and one year after ACLR. Patients with multiligament injuries or revision ACLR were excluded, as were nonresponders. Patients were divided into three age groups of 0–14 years ($n = 174$), 15–29 years ($n = 2,873$) and ≥ 30 years ($n = 1,862$). Change in PRO from preoperatively to one-year follow-up and absolute PRO at baseline and one-year follow-up were assessed independently by univariable analyses. A multivariate regressions model for change in KOOS was performed to assess whether gender was a confounder.

Results: A total of 4,909 subjects were included (2,348 female, mean age 27.9 ± 10.6 years). Change in KOOS varied between the three age groups ($p < 0.001$). The ≥ 30 years age group had better outcomes than the 15–29 years age group in change in KOOS (1.44, CI: 0.19;2.69, $p < 0.01$), KOOS Pain ($p < 0.01$), KOOS ADL ($p < 0.0001$) and KOOS QoL ($p < 0.001$), but worse in Tegner ($p < 0.001$). No statistically significant differences were found in KOOS4, KOOS Symptoms or KOOS Sports/Recreation. The ≥ 30 years age group had statistically significant poorer absolute results before ACLR and at one-year follow-up compared to the 15–29 years age group in KOOS, all KOOS subscales and Tegner. Gender was not a confounder for change in KOOS between age groups 15–29 years and ≥ 30 years.

Interpretation / Conclusion: Patients ≥ 30 years show similar or greater benefits from ACLR as patients 15–29 years of age in KOOS and KOOS subscales, but not in Tegner, during one-year follow-up.

Combined Autologous Bone and Articular Cartilage Chip Transplantation for Osteochondral Lesions in the Knee - Outcome after 7.5 years

217.

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Background: Osteochondral injuries are difficult to treat, and no gold standard treatment exists. Autologous Dual- Tissue Transplantation (ADTT) is a one-step, combined autologous bone and articular cartilage chips transplantation for osteochondral injuries.

Aim: The aim of this study was to investigate the long- term results of Autologous Dual-Tissue Transplantation

Materials and Methods: Eight patients with osteochondral injuries were included. The bottom of the debrided defect was filled with autologous bone and superficially cartilage chips were embedded in fibrin glue. Evaluation was performed using MRI, CT and patient reported outcome scores.

Results: The IKDC score increased from 35.9 to 68.1, 73.0, 75.3 and 72.9 after one, two, five and 7.5 years ($p < 0.01$). The Tegner score improved from 2.5 to 4.7, 4.8, 4.8 and 4.6 at one, two, five and 7.5 years ($p < 0.001$). KOOS improved at one year and the improvements persisted at two, five and 7.5 years ($p < 0.01$). Cartilage repair evaluated using MOCART score improved from 22.5 to 53.1 at one year ($p < 0.01$), with a slight deterioration to 44.3 after 7.5 years (not statistically significant). CT showed an average bone defect filling of 80% at one year. At 7.5 years CT showed an average bone filling of 90% and a more even surface than at one year.

Interpretation / Conclusion: ADTT resulted in good subchondral bone restoration and cartilage repair. Significant improvements in patient reported outcome was found at one year postoperative and the improvements persisted at two, five and 7.5 years. This study suggests ADTT as a promising, low-cost, treatment for osteochondral injuries.

Maximal hip muscle strength and rate of torque development 6–30 months after hip arthroscopy for femoroacetabular impingement syndrome: A cross-sectional study

218.

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Background: Reduced sports function is often observed after hip arthroscopy for femoroacetabular impingement syndrome (FAIS). Impaired muscle strength could be reasons for this.

Aim: We aimed to investigate hip muscle strength after hip arthroscopy for FAIS and its association with levels of sports function and participation.

Materials and Methods: We included 45 patients (34 males; mean age: 30.6 ± 5.9 years) after unilateral hip arthroscopy for FAIS (mean follow-up [range]: 19.3 [9.8–28.4] months). Maximal isometric hip muscle strength (Nm/kg) including early- (0–100 ms) and late-phase (0–200) rate of torque development (Nm/kg/s) for adduction, abduction, flexion, and extension was measured with an externally fixated handheld dynamometer and compared between operated and non-operated hip. Associations between muscle strength and self-reported sports function and return to sport were investigated.

Results: For maximal hip muscle strength, no between-hip differences were observed for adduction, abduction, flexion, and extension ($p \geq 0.102$). For rate of torque development, significantly lower values were observed for the operated hip in flexion at both 0–100 ms (mean difference: 1.58 Nm/kg/s, 95% CI [0.39; 2.77], $p=0.01$) and 0–200 ms (mean difference: 0.72 Nm/s/kg, 95% CI [0.09; 1.35], $p=0.027$). Higher maximal hip extension strength was significantly associated with greater ability to participate fully in preinjury sport at preinjury level (Odds ratio: 17.71 95% CI [1.77; 177.60]).

Interpretation / Conclusion: After hip arthroscopy for FAIS subjects show limited impairments in maximal and explosive hip muscle strength between operated and non-operated hip. Higher muscle strength was positively associated with higher sports function and ability to participate in sport.

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Background: Bone marrow stimulation (BMS) is the most frequently used surgical treatment method for symptomatic cartilage injuries in the knee. During this treatment the subchondral bone is perforated in order to initiate a bone marrow healing response. How these perforations affect the subchondral bone morphology and remodeling postoperatively has not been extensively investigated.

Aim: The purpose of this study was to investigate how (BMS) affects the subchondral bone plate morphology and remodeling compared to adjacent untreated subchondral bone in a validated minipig model.

Materials and Methods: Three adult Göttingen minipigs received BMS with drilling as treatment for two chondral defects in each knee. The animals were euthanized after six months. Follow-up consisted of semiquantitative evaluation of histology with a novel subchondral bone scoring system and μ CT of the BMS subchondral bone. Data from BMS-treated subchondral bone was compared to adjacent healthy subchondral bone.

Results: Data from μ CT showed that subchondral bone treated with BMS had significantly higher connectivity density (CD) (25.7 1/mm³ vs. 21.4 1/mm³, $p = 0,048$) compared to adjacent untreated subchondral bone. For the histological semiquantitative score subchondral bone had good resemblance with adjacent untreated subchondral bone (7.9 vs. 10 $p = 0.00002$) with sparse formation of bone cysts (1%) but some surface irregularities and bone overgrowth were seen in 27% of the histological sections.

Interpretation / Conclusion: BMS with drilling does not cause extensive changes to the subchondral bone microarchitecture. Furthermore, the morphology of BMS subchondral bone had good resemblance with untreated subchondral bone with almost no formation of bone cyst but some surface irregularities and bone overgrowth.

Hip adductor squeeze strength and provoked groin pain intensity is lower in the ForceFrame compared to the Copenhagen 5-Second-Squeeze test: 220.

Implications for screening and early detection of groin problems

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Background: The long lever squeeze test can be used to screen and detect groin problems, based on hip adduction squeeze strength, and provoked groin pain, when maximal squeeze contraction is sustained for 5 seconds; referred to as the Copenhagen 5-second-squeeze test (5SST). A novel strength assessment system, the ForceFrame, also provides a method to measure squeeze strength and provoked pain in the long-lever position, albeit with a slightly different hip abduction angle. Since the hip angle can influence hip adduction strength values, this may affect the agreement between the 5SST and the ForceFrame.

Aim: To evaluate the agreement between the Copenhagen 5-Second-Squeeze test and the ForceFrame for measures of hip adduction squeeze strength and provoked groin pain in elite male soccer players.

Materials and Methods: From a Danish professional 1st tier soccer club, 83 elite youth to senior soccer players cleared for full training and match participation were included (mean age 16 ± 2.7 years). Maximum isometric squeeze strength (Nm/kg) and provoked groin pain intensity (numerical pain rating scale [0-10]) were obtained from both methods in a random order during the pre-season. Peak strength (best of two trials) and peak provoked groin pain intensity (highest of two ratings given immediately after each squeeze test) were extracted for analyses.

Results: A Bland-Altman plot of squeeze strength showed a systematic bias (-0.47 Nm/kg, 95% CI $[-0.57; -0.38]$) and very wide 95% limits of agreement $[-1.31; 0.39]$ Nm/kg, with strength being lower in the ForceFrame. The ForceFrame also resulted in lower provoked pain intensity (median NPRS 0 [IQR: 0-1] vs. 5SST: 1 [0-3], $p < 0.001$). Less players reported provoked groin pain (NPRS > 0) in the ForceFrame (27% [$n=22$] vs. 5SST: 61.4% [$n=51$], $p < 0.001$).

Interpretation / Conclusion: Agreement between the Copenhagen 5-second-squeeze test and the ForceFrame is poor. In the ForceFrame strength values was 15% lower, provoked pain was less intense and fewer players reported provoked groin pain. Consequently, the two methods are not interchangeable for assessing squeeze strength or provoked groin pain which may have implications for screening and early detection of groin problems.

Intra-day and Inter-day reliability and validity of the Reactive Strength Index derived from unilateral drop jumps measured on the My Jump 2 app and a force platform

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Background: The unilateral drop jump has been proposed as a test for measuring single-limb reactive strength index (RSI), a metric for the ability to rapidly absorb and produce force. RSI is considered important for performance and for guiding rehabilitation in athletes and physically active patients. RSI can be obtained clinically using a simple smartphone app based in video analysis. However, no data exists on the reliability or validity of deriving single-limb RSI from the MyJump2 application.

Aim: This study aims to investigate the reliability and validity of MyJump2 compared to a force platform, when measuring.

Materials and Methods: Thirty-seven participants (Tegner >5) aged 18-35 years attended two sessions and performed UDJs from three different box heights (15, 20, 25 cm) down onto a force plate in a random order whilst being recorded on a smartphone camera. Minimal detectable change (MDC) was established, and Bland-Almand plots and ICC (intraclass correlation coefficient) scores between instruments were examined for systematic bias.

Results: Excellent validity was found across all three heights; 15, 20 and 25 cm, respectively (ICC = 0.986, 95%CI:0.976-0.989, $p<0.001$). However, MyJump2 underestimated the RSI by approximately 0.05 RSI. Inter-rater reliability within MyJump2 showed excellent to near to perfect correlation (ICC = 0.989, 95%CI:0.952- 0.996, $p<0.001$). Intra-day reliability showed moderate-excellent correlation across all three heights (ICC = 0.810-0.887, $p<0.001$). Inter-day reliability showed moderate-excellent correlation across all three heights (ICC = 0.805-0.865, $p<0.001$). Low SB was found between the two instruments. The MDC of the RSI extracted from MyJump2 ranged 0.08-0.18 (10.4-24.25%), with the 25 cm box height having the lowest MDC.

Interpretation / Conclusion: MyJump2 app is valid and reliable compared to a force platform when measuring the RSI of UDJs from different jump heights. The 25 cm box height had the best results indicating that this height would be the best option when testing UDJs. Systematic bias is present between the app and force platform; therefore, practitioners should not compare results across these two instruments.

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Background: Patient-reported outcome measures (PROMs) are important to evaluate treatment effects of orthopaedic procedures. In Denmark, approximately 50 children are treated with ACL reconstruction each year. However, for those PROMs that are currently available to assess self-reported health- status in this patient group, content validity was not adequately ensured.

Aim: To use state-of-the art qualitative methods to develop a condition-specific PROM for children with ACL deficiency.

Materials and Methods: The development process followed modern principles for PROM development, and the ICF model was chosen as framework. Children with ACL deficiency were strategically recruited for interviews based on age, gender and treatment method to ensure maximum variation for all subgroups. Using a re-worded version of the adult ‘KNEES-ACL’ as a draft PROM, cognitive in-depth semi-structured interviews were conducted until data saturation was achieved. Relevance, coverage, and understandability also, were investigated. All interviews were recorded and transcribed. The NVivo 12 software was used in coding of items. All items were tested in their final form.

Results: There were substantial differences in the psycho- social challenges between adults and children/adolescent, with the latter group suffering a far wider negative psycho-social impact following their injury, mostly related to loss of participation in sports, lower self-confidence, lack of socializing with friends, and lower learning outcomes in school. The physical challenges were quite similar with few exceptions. Instead of one psycho-social domain, four new domains were created to ensure coverage. Most items from KNEES-ACL were retained; however, requiring rewording into simpler language.

Interpretation / Conclusion: A preliminary version of ‘KIDS-KNEES’ was created. Assessment of its psychometric measurement properties will be undertaken and likely result in a modified version, before it is valid for use.

Rehabilitation with blood-flow restricted resistance exercise to enhance recovery after knee surgery or injury: A retrospective study of 324 patients

223.

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Background: Blood flow restriction (BFR) resistance exercise is considered to be a safe and effective rehabilitation modality in increasing muscle mass and strength.

Aim: The aims of this study were to report changes in thigh muscle mass and knee pain, as well as adverse events during rehabilitation with BFR in a large cohort of patients seen in clinical practice after knee surgery or injury.

Materials and Methods: In this descriptive, retrospective, practice-based study, we included 324 patients who performed rehabilitation with BFR resistance exercise after knee surgery or injury at an outpatient rehabilitation center. From medical records, we extracted: Thigh circumference (muscle mass proxy) and knee pain during self-reported activity ((11-point numerical rating scale (NRS)) before and after rehabilitation, and any adverse events recorded.

Results: Thigh circumference difference between non-affected and affected leg was significantly smaller post- than pre-rehabilitation (1.1 vs 2.4; mean difference, -1.3 cm, [95% CI = -1.7 to -0.9], $p < 0.0001$, $n=76$). Knee pain during activity was lower post- compared to pre- rehabilitation (2.0 vs 3.7; mean difference, -1.9 NRS-points, [95% CI = -2.3 to -1.5], $p < 0.0001$, $n=159$). One patient fainted in relation to BFR resistance exercise during the rehabilitation period ($n=324$).

Interpretation / Conclusion: In this retrospective study, rehabilitation with BFR resistance exercise applied in clinical practice after knee surgery or injury appeared to increase thigh muscle mass while reducing knee pain during activity. Very few harms were reported suggesting underreporting.

A high number of positive pain provocation tests in patients with longstanding groin pain! – what does it tell us? 224.

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Background: Patients with longstanding groin pain are clinically examined with pain provocation tests and groin pain can be classified into clinical entities from these tests. It is, however, unknown how the number of positive pain provocation tests and clinical entities relates to groin pain intensity and disability in patients with groin pain.

Aim: Firstly, to investigate how the number of positive pain provocation tests relates to groin pain intensity and disability. Secondly, to investigate how the number of clinical entities relates to groin pain intensity and disability.

Materials and Methods: Male patients with longstanding groin pain, recruited from tier 2–5 soccer clubs, underwent a standardized clinical examination and 33 specific pain provocation tests were conducted. Groin pain was classified from pain provocation tests into clinical entities as adductor-, iliopsoas-, inguinal- or pubic-related groin pain. Groin pain intensity (0–10) was measured by the Copenhagen 5-second-squeeze test (5SST). Disability was measured with the Copenhagen Hip And Groin Outcome Score (HAGOS).

Results: We included 40 patients (mean 24 [SD: 3.2] years; 182 [5.7] cm; 78 [6,6] kg) with a median pain duration of 8.5 months (IQR: 4–36). The number of positive pain provocation tests (range: 2–23) showed a strong positive correlation to groin pain intensity ($r = 0.70$ [95% CI: 0.50;0.83]). Number of positive tests also showed weak to moderate negative correlations with disability measured by HAGOS subscales Pain ($r = -0.38$ [95% CI: -0.69;-0.06]), Symptoms (-0.52 [-0.73;-0.24]), ADL (-0.48 [-0.71;-0.18]) and Sport (-0.62 [-0.81;-0.36]). Similarly, the number of groin pain entities (range: 1–7) correlated positively with pain intensity and negatively with disability.

Interpretation / Conclusion: When examining patients with longstanding groin pain, the number of positive pain provocation tests correlate strongly with groin pain intensity and correlate weak to moderately with disability. Thus, in patients where pain is intense, and disability is severe – more pain provocation will often be positive – and consequently, relying on pain provocation tests in the diagnostic work-up of these patients is challenging.

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Background: Proximal Hamstring avulsion (PHA) is a rare injury. PHA's injury mechanism typically involves hyperextended knee and hyperflexed hip as seen in waterskiing, football and slipping injuries. Symptoms are a large hematoma on the back of the thigh, stiffness and pain during walking and sitting. Surgical repair is a treatment option. The effect of the surgery with regard to pain, function and quality of life is not well described.

Aim: The aim of the study was to investigate the effect of surgical treatment of PHA in regards to pain, function and quality of life at 6 and 12 months after surgery.

Materials and Methods: Patients with an (Magnetic Resonance Imaging) MRI verified PHA were included. MRI findings were avulsions from the Ischial Tuberosity involving 2-3 hamstrings tendons with a 1-2 cm retraction. In 2019 and 2020, patients had surgery and supervised rehabilitation. Subjective outcome measures were: Perth Hamstring Assessment Tool (PHAT), overall health visual analog scale (VAS), and Hip Sports Activity Scale (HSAS). Knee flexion strength was measured with a hand held dynamometer pre-surgery, and 6 and 12 months after surgery.

Results: 11 patients (7 males), mean age 49 ± 16 , were treated surgically mean 22 days after injury. At abstract submission 11 patients had 6 months scores and 8 patients had 1 year scores. The PHAT score increased from before surgery 41 ± 15 to 6 months 69 ± 20 ($p < 0.001$) and 12 months 70 ± 20 ($p < 0.001$). Furthermore, the VAS improved ($p = 0.02$): Before surgery 48 ± 22 to 6 months: 74 ± 18 . HSAS was rated 0 in all patients before surgery corresponding to "no participation in physical activities". At 6 months, the mean score was 2.2 ± 1.1 ($p = 0.005$) and at 12 months: 2.1 ± 1.7 ($p = 0.014$). Knee flexion strength at 30 degrees improved more than twofold after surgery: Before surgery: 0.29 ± 0.2 Nm/kg, 6 months: 0.69 ± 0.3 Nm/kg ($p < 0.001$), 12 months: 0.76 ± 0.5 Nm/kg ($p < 0.001$). Furthermore, the median strength difference between patient legs went from 70% to 32% at 6 months ($p < 0.001$) and 29% at 12 months ($p < 0.001$).

Interpretation / Conclusion: After surgical repair of a proximal hamstring avulsion, all patients improved in knee flexion strength, PHAT and VAS after surgery. Furthermore, patients were able to participate in sports.

Risk factors in anterior cruciate ligament reconstruction leading to ACL revision

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Background: Anterior cruciate ligament (ACL) revision results in worse outcome compared to primary ACL reconstruction (ACL-R).

Aim: To identify risk factors in primary ACL reconstruction leading to ipsilateral ACL revision surgery.

Materials and Methods: Data extracted from the Danish Knee Ligament Reconstruction Registry was used to identify risk factors for ACL revision surgery. Patients undergoing ACL reconstruction between 2005–2018, no contra-lateral knee injury and age > 14 years were included. Patient age, gender, trauma mechanism at primary ACL tear, graft selection, lateral and medial meniscus injury at primary ACL-R, meniscus repair or resection and Tegner activity score before primary ACL injury were evaluated using regression analysis to determine individual factors impact on risk for ACL revision surgery.

Results: A total of 29018 patients (60 % males) met the inclusion/exclusion criteria. Ipsilateral revision surgery was seen in 1436 cases (5 %). Hamstringgraft, bone-patella-tendon bone graft (BPTB), and quadricepstendon graft (QT) was used in 84, 9 and 6 % of the cases, respectively. Antero-medial portal for femoral tunnel drilling was used in 17480 patients (60 %). Increasing age at ACL-R resulted in significant reduction in the hazard ratio (HR) for later ACL revision. Antero-medial portal use for femoral tunnel drilling resulted in significant increase in HR compared to trans-tibial drilling. No significant difference in HR was observed regarding gender, trauma mechanism, meniscal injury, meniscal injury treatment, graft selection, or Tegner activity score.

Interpretation / Conclusion: Younger age and antero-medial drilling of the femoral tunnel in ACL-R were found to be predictors for increased HR for later ipsilateral ACL revision.

Stability in ankle fractures: What is the most reliable measure of tibiotalar joint clear space in diagnostic weightbearing radiographs?

227.

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Background: Isolated lateral malleolar fractures (ILMFs) should be examined with a diagnostic stress- test to differentiate stable from unstable injuries, in order to guide optimal treatment. Weightbearing radiographs (WBRs) one to two weeks after injury could be a feasible stress-test and be increasingly utilized, but the reliability of the radiographic measurements used to evaluate stability needs consideration.

Aim: What is the most reliable measure of tibiotalar joint clear space in diagnostic WBRs of ILMFs –one to two weeks after injury?

Materials and Methods: The primary outcome of this inter-observer reliability study was the Intraclass Correlation Coefficient (ICC) between eight observers obtaining four clear space measures described in the literature: Superior Clear Space (SCS); Medial Oblique Clear Space (MoCS); Medial Perpendicular Clear Space four mm below the talar dome (Mp4CS); and Medial Perpendicular Clear Space five mm below the talar dome (Mp5CS). Measurements were performed on diagnostic WBRs of 116 consecutive patients with ILMFs sampled from a single-center prospective cohort study conducted in our setting during 01.06.2016–31.05.2018, where all patients with ILMFs were treated non-operatively and examined with WBRs one to two weeks after injury.

Results: The SCS showed the highest inter-observer reliability (ICC = 0.92 CI 0.883–0.935) and could be obtained by all observers in all 116 cases (100%). The MoCS showed the highest inter-observer reliability of the medial clear space measurements (ICC = 0.883 CI 0.844–0.914), obtained by all observers in 115 cases (99.1%). The Mp4CS showed good inter-observer reliability (ICC = 0.864 [95%CI 0.821–0.899]), obtained by all observers in 106 cases (91.4%). The Mp5CS measure showed good inter-observer reliability (ICC = 0.870 [95%CI (0.827–0.907)]) and could be obtained by all observers in 84 cases (72.4%).

Interpretation / Conclusion: When assessing tibiotalar alignment in diagnostic WBRs of ILMFs, we recommend using the superior clear space measure and the perpendicular medial clear space measured four mm below the talar dome in clinical practice.

Intra-rater reliability of digital thermography in detecting pin site infection; A proof of concept study

228.

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Background: Digital infra-red thermography may have the capability of identifying local inflammations. Nevertheless, the role of thermography in diagnosing pin site infection has not been explored yet and the reliability and validity of this method for pin site surveillance is in question.

Aim: The purpose of this study was to explore the capability and intra-rater reliability of thermography in detecting pin site infection.

Materials and Methods: This explorative proof of concept study follows GRRAS -guidelines for reporting reliability and agreement studies. After clinical assessment of pin sites by one examiner using Modified Gordon Pin Infection Classification (Grade 0 – 6), thermographic images of the pin sites were captured with a FLIR C3 camera and analyzed by the FLIR tools software package. The maximum skin temperature around the pin site and the maximum temperature for the whole thermographic picture was measured. Intra-rater agreement was established and test-retests were performed with different camera angles.

Results: Thirteen (4 females) patients (age 9–72 years) were included. Indications for frames: 4 fracture, 2 deformity correction, 1 lengthening, 6 bone transport. Days from surgery to thermography ranged from 27 to 385 days. Overall, 231 pin sites were included. Eleven pin sites were diagnosed with early signs of infection: five grade 1, five grade 2, one grade 3. Mean pin site temperature was 33.9 °C (29.0–35.4). With 34 °C as cut-off value for infection, sensitivity was 73%, specificity 67%, positive predictive value 10% and negative predictive value 98%. Intra-rater reliability for thermography was ICC 0.85 (0.77–0.92). The temperature measured was influenced by the camera positioning in relation to pin site with a variance of 0.2.

Interpretation / Conclusion: Measurements of pin sites using the handheld FLIR C3 infrared camera was a reliable method and the temperature was related to infection grading. This study demonstrates that digital thermography with a handheld camera might be used for monitoring the pin sites after operations to detect early infection, however, future larger prospective studies are necessary.

Sliding hip screw vs intramedullary nail for AO/OTA31A1-A3, a systematic review and meta-analysis

229.

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Background: Studies have demonstrated no difference in outcome when comparing the sliding hip screw (SHS) with the intramedullary nail (IMN) in the treatment of trochanteric fractures. However, systematic analyses on the separated AO/OTA fracture subtypes 31A1-A2-A3 are not available.

Aim: To assess whether a sliding hip screw (SHS) or an intramedullary nail (IMN) is the best treatment for AO/OTA 31A1-A2-A3 trochanteric fractures.

Materials and Methods: A systematic review and consequent meta-analysis was conducted using search strings for the databases: Cochrane Library, CINAHL, Medline, and Embase. Two authors (JOW and MPB) independently screened the studies and performed data extraction. The primary outcome was major complications in total. The secondary outcomes were the specific major complications non-union, infection, mortality, and function measurements by any scoring system or Patient Reported Outcome Measurement (PROM). Quality assessment was performed using the Cochrane Risk Of Bias tool for randomized trials for RCT studies, and Cochrane Risk Of Bias In Non-Randomized Studies – of Interventions for non-RCTs. The meta-analyses were performed using Log Risk Ratio as the primary effect estimate.

Results: two thousand and fifty one studies were screened, but only six RCTs and six non-RCTs could be included in the meta-analysis, yielding a total of 10.402 patients. There were no significant difference concerning the outcomes: major complications in total, non-union, infection, and mortality when comparing SHS to IMN in AO/OTA 31A1, 31A2 or 31A3 trochanteric fractures. Due to a lack of compatible data, we were unable to perform a meta-analysis on function scores and PROM, but there were trends favoring IMN in 31A1 and 31A2 fractures.

Interpretation / Conclusion: No significant difference between SHS and IMN was found in the meta-analysis for any of the examined AO/OTA fracture subtypes concerning the primary and secondary outcomes. When assessing function scores and PROM, we found trends favoring IMN for 31A1 and 31A2 fractures, which should be explored further. Finally, all future studies should include the use of AO/OTA-subtype classification to improve data collection.

Short and long-term mortality in patients with trochanteric hip fractures (AO/OTA 31-A) treated with sliding hip screw versus intramedullary nail: A nationwide registry study from the Danish Fracture Database (DFDB) **230.**

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Background: Should trochanteric hip fractures (AO/OTA 31-A) be treated with a sliding hip screw (SHS) or an intramedullary nail (IMN)? This debate is still on-going and while most studies find no differences in post-operative complication rates, recent studies suggest an association between IMN and excess mortality rates when compared to SHS.

Aim: To compare mortality rates for IMN and SHS in elderly patients with trochanteric hip fractures (AO type 31-A).

Materials and Methods: This is a national registry study based on data from DFDB. Data on patients aged >65 years treated for a non-pathological AO-type 31-A trochanteric hip fracture with either IMN or SHS from January 2012 to December 2018 were retrieved. Data from DFDB was merged with data from the Danish Civil Registration System for time of death. Outcome measures were mortality presented as 30-day, 90-day, and 1-year mortality and the relative mortality risk in crude numbers and adjusted for age, sex, ASA-class, AO-type, and department.

Results: A total of 9,547 patients were included. The mean age was 83 years, 69.2% were female, and 55.1% were ASA-class 3-5. Most patients suffered a 31-A2 fracture (56.1%), followed by 31-A1 fractures (32.3%), and 31-A3 fractures (11.6%). Stable 31-A1 fracture subtypes were primarily treated with SHS (60.9%). Fracture subtypes 31-A2 and 31-A3 were treated with IMN in 90.2% and 96.6% of cases. The implant of choice was IMN in 74.4% of cases. The 30-day mortality for IMN- patients was 12.2% (867/7105) and 10.2% (248/2442) for SHS-patients. This trend persists at 90 days (19.7% vs 17.4%) and 1 year (31.0% vs 29.3%). The relative mortality risk for IMN compared to SHS was 1.20 [95% CI 1.06; 1.35] at 30- days, 1.11 [1.01; 1.22] at 90-days, and 1.05 [0.98; 1.13] at 1 year. The adjusted relative mortality risk for IMN compared to SHS was 1.12 [0.96; 1.31] at 30-days, 1.03 [0.91; 1.17] at 90-days, and 1.01 [0.92; 1.11] at 1 year.

Interpretation / Conclusion: We find an association between excess mortality and the use of IMN versus SHS in elderly patients with AO-type 31A fractures at 30 days and 90 days post-operatively, consistent with recent studies. However, this association diminishes when adjusting for sex, age, ASA-class, AO-type, and department.

Patient-Reported Outcomes of 7,133 Knee Fracture Patients: Results from a Nationwide Cross-Sectional Study with 1-, 3-, and 5-Year Follow-Up

231.

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Background: Few studies have described patient-reported outcomes (PROMs), prognoses and the current state of care of the knee fracture population. Studying risk factors of poor PROM scores is important in understanding the key drivers of poor outcome and in directing future quality-improvement initiatives.

Aim: 1) Report knee-specific and generic median PROM scores after knee fracture. 2) Identify risk factors for poor outcome defined by low median PROM scores.

Materials and Methods: In a Danish cross-sectional study of 7,133 distal femoral, patellar, and proximal tibial fracture patients during 2011–2017, OKS, FJS-12, EQ5D-5L Index and EQ5D-5L Visual Analogue Scale (VAS) were collected electronically via a national, CPR-linked digital mail system (response rate 53%; median age 60 years; 63% female). Poor outcome was defined as score lower than median PROM score. Poor outcome risk factors were estimated as odds ratios with 95% confidence intervals from binary logistic regression models.

Results: At 0–1 years after knee fracture, median PROM scores were 31 (OKS), 27 (FJS-12), 0.50 (EQ5D-5L Index) and 74 (EQ5D-5L VAS). All four PROM scores plateaued at 3–5 years after knee fracture. At >5 years after knee fracture, median PROM scores were 40 (OKS), 54 (FJS-12), 0.76 (EQ5D-5L Index) and 80 (EQ5D-5L VAS). Age >40 years was associated with poor OKS and FJS-12 scores at both short- and long-term follow-up after knee fracture. Comorbidity burden, distal femoral fracture and treatment with external fixation and knee arthroplasty were risk factors for poor outcome at long-term follow-up, for all four PROMs.

Interpretation / Conclusion: Knee fracture patients have relatively high knee function and quality of life (OKS, EQ5D-5L Index and EQ5D-5L VAS), while their ability to forget about the knee joint after knee fracture is compromised (FJS-12). Risk factors for poor outcome vary depending on the PROM and follow-up period studied. This study will further research in ensuring high quality of care for all patient groups regardless of their associated patient-, fracture- and treatment-related factors and in informing patients on varying aspects of expected outcome after knee fracture, including the presented risk factors which modulate their outcome.

Managing Self-harm patients in the emergency department – any change in burden with supposed social isolation during Covid-19 lock-down?

232.

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Background: Managing self-harm patients in the emergency department (ED) is a complex task. Multiple visits, patient denial of having a psychological issue as the cause for self-harm, patient denial of follow-up in psychiatric services, short time slots etc. all play a major role. The short treatment time slots in the ED are not well suited to manage complex psychosocial patients. This is further complicated by systematic reluctance to accept patient referral to psychiatric services. The code ALCC05 for “intended self-harm without expressed suicide” introduced in 2019 allows for identification of a cohort, before ALCC004 or ALCC02 were used for the “self-harm group”

Aim: To ascertain total contact pattern due to self-harm for a well-defined cohort and analyze whether covid-19 pandemic lockdown has led to changes in contacts due to self-harm in the ED

Materials and Methods: All patients with at least one visit due to “intended self-harm” to the ED at Odense University hospital during: Pre-covid (11/03/2019–10/03/2020) or Covid (12/03/2020–11/03/2021) are included. All contacts due to “self-harm” (ALCC05), “suicide attempt” (ALCC04) or “potential self-harm injury” defined as: cuts, bites, suffocation, inappropriate medication (ALCC02+EUBE/EUBF/EUBM/EUBP) were extracted in anonymized form for the two periods. Age by 11/03/2019

Results: The cohort consists of 264 patients with 933 contacts. Age range (11–95), median age ($m=34/f=19$). Males were older ($p<10^{-3}$). Contacts in pre-covid ($m=105/f=336$), Covid period ($m=72/f=420$). Sex Ratio (m/f) by age < 18 : (6/58), 18–21:(22/47), 22–33:(30/35), 33+:(35/34).). Females had more contacts per patient (Avg 4.4, 95% CI 4.1–4.7) than males (1.9, 95% CI 1.7–2.3). Type of injury was 59% cuts, 34% inappropriate medication and 7% other. About 10% of males and 15% of females have more than 5 contacts per year, but most have 1–2 per year (males: 89%, 95% CI 82%–95%) (females 69%, 95% CI 62–75%). No change in type of injury or average number of contacts per patient between pre-covid and covid period was observed

Interpretation / Conclusion: There was no difference in the number of patients treated for self-harm in the ED after Covid-19 lockdown. No difference was found in injury type or number of contacts per patient

Frailty and osteoporosis in hip fracture patients under the age of 60 – a prospective cohort of 218 individuals **233.**

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Background: Research on younger hip fracture patients is limited, and common preconceptions are that they suffer fractures due to high-energy trauma, alcohol- or substance use disorder but not due to osteoporosis.

Aim: We aimed to descriptively analyze the characteristics of young and middle-aged hip fracture patients and analyze bone mineral density (BMD) by dual energy x-ray absorptiometry (DXA) at the time of the hip fracture.

Materials and Methods: In a prospective multicenter cohort study on adult hip fracture patients under the age of 60 years, we collected detailed information on patient characteristics regarding demographics, the trauma mechanism, previous fractures, comorbidity and medication as well as lifestyle and health factors. BMD was investigated at the time of the fracture and DXA results were compared to population-based reference data.

Results: The cohort consists of 91 women and 127 men aged 23-59 years, median (IQR) 53 (47-57), accounting for 6% of all hip fractures during the study inclusion period. Most fractures, 83%, occurred in patients aged 45-59 years. Two-thirds of all fractures were the result of low-energy trauma. Half of the patients had a history of any previous fracture, and 5% had suffered a previous hip fracture. 32% of the patients were healthy, 33% had one previous disease, and 35% presented with multiple comorbidities, the health status distribution being different between women and men. The use of medication associated with increased fracture risk, e.g., cortisone, was 32%. Smoking was prevalent in 42%, harmful alcohol use reported by 29%, and signs of drug-related problems by 8%. Physical activity level was below WHO recommendations in 59% of the patients. Osteoporosis (t-score < -2.5) was found in 31%, osteopenia (t-score -2.5 to < -1) in 57% and normal BMD in 12%.

Interpretation / Conclusion: In hip fracture patients under the age of 60, risk factors for osteoporosis and fractures were abundant. Moreover, one-third of the patients had osteoporosis, a prevalence markedly higher than in the general population of the same age (7%). We suggest that young and middle-aged patients with hip fractures undergo a thorough health investigation, including DXA to rule out decreased bone mineral density.

Exercise therapy is effective at improving short- and long-term mobility, activities of daily living and balance in older patients following hip fracture: a systematic review and meta-analysis.

234.

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Background: Exercise therapy are often provided following hip fracture, but with large variations in time of initiation, content, duration, and intensity of the interventions provided. Previous reviews on the topic have been inconclusive, although positive trends were shown. A large number of new trials have been published within the last years, which calls for an update on the effects of exercise therapy in older patients following hip fracture.

Aim: To evaluate the short- and long-term effect of exercise therapy on physical function, independence and wellbeing in older patients following hip fracture from time of surgery up-to 1 year, and secondly, whether the effect was modified by trial level characteristics such as intervention modality, duration and initiation timepoint.

Materials and Methods: Medline, CENTRAL, Embase, CINAHL and PEDro was searched up-to November 2020. Eligibility criteria was randomized controlled trials investigating the effect of exercise therapy on physical function, independence and wellbeing in older patients (60+) following hip fracture and initiated within one year post-surgery.

Results: Forty-nine studies were included involving 3904 participants. Exercise therapy showed a small to moderate effect at short term on mobility (Standardized mean difference, SMD 0.49, 95%CI 0.22-0.76); Activities of Daily Living (ADL) (SMD 0.31, 95%CI 0.16-0.46); lower limb muscle strength (SMD 0.36, 95%CI 0.13-0.60); balance (SMD 0.34, 95%CI 0.14-0.54). At long term, a small to moderate effects were found for mobility (SMD 0.74, 95%CI 0.15-1.34); ADL (SMD 0.42, 95%CI 0.23-0.61); balance (SMD 0.50, 95%CI 0.07-0.94) and Health related Quality of Life (HRQoL) (SMD 0.31, 95%CI 0.03-0.59). Level of evidence was evaluated using GRADE ranging from moderate to very low, due to study limitation and inconsistency.

Interpretation / Conclusion: We found low level of evidence for a moderate effect of exercise therapy on mobility in older patients following hip fracture at end-of-treatment and follow-up. Further, low evidence was found for small to moderate short-term effect on ADL, lower limb muscle strength and balance. Trial registration:CRD42020161131

Outcomes and complications in motorized intramedullary bone transport for non-infected segmental defects: a retrospective review of 15 patients

235.

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Background: Intramedullary bone transport nails have been introduced to treat segmental bone defects. Only 5 cases have been reported in the literature, and no studies have reported outcomes after nail removal.

Aim: We investigated the healing and the complication rates in patients treated for segmental bone defects with a combined bone transport and lengthening FITBONE® nail.

Materials and Methods: A retrospective case series with fifteen patients (ten males, five females) were treated between 2012 and 2016. Informed consent from patients and approval by institutional board. The segmental bone loss was due to resection of non-union site in eight femurs and four tibias, or traumatic bone loss in two femurs and one tibia. The bone gap was ranged from 1 to 10 cm (median 3). The total nail distraction (transport and lengthening) was a median of 4 (2–8) cm. Preoperative limb length discrepancy was median of 2 (0–7) cm. Preoperative mechanical axis deviation was from 88 mm varus to 7 mm valgus. Median follow-up after nail removal was 46 (6–89) months. Complications were severity graded (Black et al). and rated as device or non-device related (Song et al.)

Results: 9 out of 10 femoral cases, and 4 out of 5 tibial cases healed with the bone transport nail. The unhealed femoral case was treated with shortening, bone graft and trauma nail. The unhealed tibial case was treated with external fixator and bone graft. At latest follow-up all fifteen patients have healed docking site and regenerate. 24 complications (15 device-related and 9 non-device) occurred in 11 out of 15 patients. 19 unplanned surgeries were performed in 10 out of 15 patients. The number of complications was: 0 in 4 patients, 1 in 4 patients, 2 in 3 patients, 3 in 2 patients, 4 in 2 patients. Final limb length discrepancy was median of 1 (0–3) cm.

Interpretation / Conclusion: In selective cases, segmental bone defects might heal with bone transport nail. Future research should focus on reducing device and non-device related complications by optimizing nail design and patient selection.

Many 30-day readmissions of older patients with hip fracture are emergency ward visits!

236.

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Background: 30-day readmission rates in the Capital Region of Denmark reported by The Multidisciplinary Hip Fracture Registry ranges from 21–29% (2018 report) and 15–19% (2019). Differences might be related to whether emergency ward visits are included.

Aim: We examined total readmission rates including emergency ward referrals within 30 days of discharge among elderly patients with a hip fracture.

Materials and Methods: Total of 687 consecutive patients aged ≥ 65 years discharged after treatment of an acute hip fracture at a university hospital between Jan 2018 and June 2019, were included. A readmission was defined as any hospital contact with physical attendance, and patients were followed until death or 30-days post-discharge. Date of readmission, place of “residence” at this time, cause and length of readmission were obtained from patient charts at the study hospital.

Results: Total of 220 (32% in 2018 and 31% in 2019) patients were readmitted within 30 days. Their median (IQR) age was 82 (76–89) years, 135 were women, 166 came from own home, 100 had a trochanteric fracture and 142 had an ASA grade ≥ 3 . Their acute care stay was a median of 8 (6–11) days post-surgery, and time to readmission was median 8.5 (4–18) days. Fifty-six (25%) and 89 (40%) of these patients, respectively, came from a nursing home and other 24-hour settings (“rehab”). Length of readmission stays were median 1 (0–6) day, and distributed as; 0 (emergency ward), 1, 2 and 3 days for respectively 89 (40%), 27, 18 and 14 of patients. Sixty-five (73%) of patients with an emergency ward visit came from a nursing home or other 24-hour setting. Readmissions were related to many potential or confirmed reasons; the most prominent being a new fall, hip fracture related pain, pulmonary, gastrointestinal, infection and luxation of arthroplasty.

Interpretation / Conclusion: One third of patients with hip fracture aged ≥ 65 years were readmitted within 30 days post-discharge and almost half was seen only in the emergency ward. Two thirds came from a nursing home or other 24-hour settings, and with the majority seen and handled in the emergency ward. Findings suggest that enhanced post-discharge medical attention and cross-sectorial collaboration is needed for these frail patients.

COMPLICATIONS IN ELECTIVE REMOVAL OF BONE LENGTHENING NAILS: A report of 225 patients

237.

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Background: Due to high complication rates and patient discomfort with external fixators, externally controlled motorized intramedullary lengthening nails have been introduced. These lengthening nails have shown excellent short-term results for lower limb lengthening. For the most frequently used intramedullary lengthening nails (FITBONE, PRECICE, STRYDE), the producers acclaim removal of the implants after accomplished treatment. Despite the requirement for nail removal, there is a lack of reports of complications on intramedullary lengthening nail removal.

Aim: The aim was to examine the intraoperative and postoperative complications of elective intramedullary lengthening nail removals.

Materials and Methods: A retrospective chart review of patients operated with intramedullary lengthening nails at Nationwide Children's Hospital, Ohio, USA and Aalborg University Hospital, Denmark were performed. Patient demographics, nail-information, and any complications occurring at or after nail removal were retrieved from the patient charts. Only elective nail removal of FITBONE and PRECICE or STRYDE nails in lower limb were included. Bone transport, stump lengthening and humeral lengthening were excluded.

Results: A total of 225 patients with 271 elective nail removals were included in the study. The mean (min-max range) follow-up time after nail removal was 282 days (0 – 2882 days). In 3 % complications occurred during nail removal and in 13 % after nail removal. Postoperative knee pain was reported in 18 cases, who all had nail removal through the knee joint, representing 8% of the retrograde femur nail removals and 7% of the tibia nail removals. 2 of the 4 postoperative fractures that occurred needed surgery. For femur and tibial nail, complications were 11% and 26 % respectively.

Interpretation / Conclusion: This is the first study examining complications in removal of bone lengthening nails. In 16 % of 271 nail removals a complication occurred at or after nail removal. This emphasizes that studies reporting on the overall risks of complications of bone lengthening nails must include nail removal and an adequate follow-up after this.

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Background: Surgery for hip fracture in patients treated with new oral anticoagulant (NOAC) is often delayed due to the presumed increased risk of bleeding and mortality. In contrast, surgical delay is associated with an increased mortality in non-NOAC patients.

Aim: To assess the association of surgical delay with readmission and mortality in hip fracture patients above 65 years with NOAC treatment

Materials and Methods: This is a register study from 3 regions during 01.01.2011–31.12.2017. All hip fracture patients with a dispensing for NOAC within 230 days before surgery were included. Primary exposure was surgical delay +/- 36 hours, secondary exposures were delays of <12 hours, 12 to <24 hours, 24 to <36 hours, 36 to <48, and 48 to <72 hours. Transfusion was defined as red blood cell transfusion within 7 days of surgery and readmission as any within 30 days of discharge. We performed Cox regression to estimate adjusted Hazard Ratios (aHR) with 95% confidence intervals adjusting for age, sex, BMI, comorbidity, marital status, type of fracture, type of surgery, year of surgery, region of residence, cohabiting status, and prior medication.

Results: A total of 911 hip fracture patients in NOAC treatment were identified. There were 63% females and 71% were older than 80 years old. There were 61% patients with a surgical delay less than 36 hours yielding an aHR for transfusion of 0.98 (0.79–1.22), for 30-day mortality 1.39 (0.88–2.17), for 1-year mortality of 1.06 (0.78–1.43), and for any readmission of 1.35 (0.99–1.83) compared to patients operated later than 36 hours. We observed no difference concerning transfusion, 30-day mortality, and 1-year mortality when comparing patients operated with delay of <12 hours, 12 to <24 hours, 24 to <36 hours, and 36 to <48 hours to patients operated between 48 to <72 hours. There is some indication that early surgery <24 hours is associated with increased risk of any readmission.

Interpretation / Conclusion: Surgical delay in NOAC treated patients was not associated with transfusion, 30-day or 1-year mortality. There was an indication of an associated higher risk of readmission with early surgery which could be due a proportion of +90 years patients.

Do acute inflammatory cytokines affect 3- and 12-month postoperative functional outcomes—a prospective cohort study of 12 patients with proximal tibia fractures

239.

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Background: Patients with intra-articular fractures tend to develop post-traumatic osteoarthritis (PTOA). The initial inflammatory response with elevation of inflammatory cytokines following joint trauma might be responsible for triggering cartilage catabolism and degradation.

Aim: We aimed to identify and quantify cytokine levels in fractured and healthy knee joints and the correlation of these cytokines with clinical outcomes.

Materials and Methods: In this prospective cohort study, synovial fluid and plasma were collected from 12 patients with proximal intra-articular tibia fractures before surgery. The concentration of sixteen inflammatory cytokines, two cartilage degradation products and four metabolic mediators were measured, comparing the acute injured knee with the healthy contralateral knee. Patients were evaluated 3- and 12-months after surgery with clinical parameters and radiographical scanning. Non-parametrical Wilcoxon rank-sum and Spearman tests were used for statistical analysis, and a P-value below 0.05 was considered significant.

Results: We found an elevation of the pro-inflammatory cytokines IL-1 β , IL-2, IL-6, IL-8, IL-12p70, TNF- β , IFN- γ , MMP-1, MMP-3, and MMP-9 and a simultaneous elevation of the anti-inflammatory cytokines IL-1RA, IL-4, IL-10, and IL-13 in the injured knee. Several pro- and anti-inflammatory cytokines and metabolic mediators were correlated with clinical outcomes 12 months after surgery, especially with pain perception.

Interpretation / Conclusion: Our results support that an inflammatory process occurs after intra-articular knee fractures, which is characterized by the elevation of both pro- and anti-inflammatory cytokines. There was no sign of cartilage damage within the timeframe from injury to operation. We found a correlation between the initial inflammatory reaction with clinical outcomes 12 months after surgery.

Reduction and K-wire fixation of pediatric supracondylar humerus fractures – do we practice what we preach?

240.

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Background: Faulty reduction or fixation of pediatric supracondylar humerus fractures (SCHF) can lead to loss of reduction (LOR), malunion and poor functional outcome. Configuration of K- wires have been extensively investigated and there is support for two divergent lateral-entry K-wires for stable fracture patterns and either three divergent lateral-entry or two crossed K- wires for unstable fracture patterns.

Aim: This study aimed to investigate if adequate surgical reduction and fixation of SCHF were obtained.

Materials and Methods: We reviewed all surgical cases of SCHF in children at Herlev Hospital from 2017–2020. Age, gender, Gartland classification, reduction, K-wire configuration, and LOR was recorded. Type 2A fractures were defined as minimally displaced and stable and other types as displaced and unstable. Satisfactory reduction was defined as the anterior humeral line (AHL) passing through the capitellum, the absence of rotation, varus and valgus, and less than 5 mm of displacement of the distal fragment in any plane.

Results: We reviewed 171 fractures in 85 girls and 86 boys, mean age was 6 years (range, 1 to 15 years). 53 (31%) fractures were stable/minimally displaced. 124 (73%) fractures were reduced to satisfaction. 8/53 (15%) minimally displaced and 39/118 (33%) displaced fractures were inadequately reduced. 26/53 (49%) stable fractures were treated with two lateral-entry K-wires and 16 (30%) with crossed wires. 23/118 (20%) unstable fractures were fixed with two lateral-entry wires, 13 (8%) with three lateral-entry wires and 56 (33%) with crossed wires. In 50/171 (29%) cases K- wire placement suffered from improper technic. We found 4 (2,3%) reoperations, one due to inadequate reduction and three due to LOR.

Interpretation / Conclusion: Satisfactory reduction was not achieved in 27% of cases. 20% of unstable fractures were only treated with two lateral-entry K-wires. 31% of fractures were fixed with other patterns than those recommended. K-wire configuration was technically faulty in 29% of cases. Focus should be on satisfactory reduction and adequate configuration of wires but equally so on the technical aspect of placing the wires to avoid instability and LOR.

Lingering challenges in everyday life for patients under the age of 60 with hip fractures. The lived experience of the first three years.

241.

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Background: The lived experience refers to how something is directly experienced by someone, not ascertained or registered by others. The experiences of sustaining a hip fracture (HF) in elderly are well known, but in younger age, this has not been described.

Aim: The aim was to illuminate the lived experience of recovery after HF in adults under the age of 60 years, to guide future healthcare services.

Materials and Methods: Participants were purposely sampled from a prospective multicenter cohort study and narrative interviews were conducted with 19 patients 0.7–3.5 years after the fracture by two experienced researchers. We used a phenomenological hermeneutic method to describe the patients' expressed essential meaning.

Results: The experience of sustaining a HF was expressed as a painful and protracted process of regaining self-confidence, function, and independence. The fracture threw the person into a situation of total stand-still in everyday life with feelings of weakness, disability, and inability. Participants described that the HF implied a sense of becoming old from one day to another, the body being feebler, and being looked upon as a burden by employees and colleges. Patients were afraid of new falls and fractures, resulting in an increased wariness. Stiffness, pain, and reduced physical abilities created a need for margins, never before required. At times of expressing fears and persisting symptoms related to the HF, patients describe being neglected and marginalized by the health care system, which was perceived as non-receptive and routinely driven by a notion that HFs affect only elderly. Rehabilitation targeted towards needs different from geriatric patients' was lacking but was requested by younger patients. Hope was a crucial part of the recovery process. Other encouraging factors to uphold motivation were family, understanding employers, and feedback from physiotherapists with a program based on individual abilities.

Interpretation / Conclusion: The lived experience of HF in patients aged under 60 includes substantial challenges in their everyday lives, still up to 3.5 years after the injury. Other rehabilitation pathways tailored to the needs of these patients, not only towards geriatric HF patients, are requested.

Increased mortality among comorbid, malnourished, and functional dependent patients with hip fractures – an observational cohort study among 2,810 patients

242.

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Background: Despite extensive research, a complete understanding of what influences mortality risk among patients with hip fractures is lacking. Previous research has primarily focused on non-modifiable risk factors, however, to improve outcome optimization of modifiable risk factors should be of great interest.

Aim: to examine 19 variables as risk factors for mortality among patients with hip fractures in a large, prospective cohort treated within a well-defined guideline.

Materials and Methods: All consecutive patients surgically treated for a hip fracture from January 2011 to December 2017 were included in the study (n=2,810). Variables were obtained from patient records and the Holstebro Hip fracture database, which prospectively registered data regarding demographics, comorbidity, malnutrition (low BMI or albumin), fracture type and treatment, hospital stay (including biochemistry, mobilization and discharge). Outcome was 30-day and 1-year mortality. The association between variables and mortality was examined by logistic regression.

Results: The patients were predominantly female with a median age of 81.6 years. The overall mortality was 9.5% and 24.1% for 30 days and 1 year, respectively. Unsurprisingly, some non-modifiable risk were associated with increased mortality at 30 days and 1 year; age ≥ 75 years (OR 2.25; CI 1.60–3.18), male gender (OR 1.85; CI 1.46–2.33) and nursing home residence (OR 1.87; CI 1.46–2.41). For modifiable risk factors ASA ≥ 3 (OR 1.70; CI 1.37–2.12), BMI < 20 kg/cm² (OR 1.86; CI 1.44–2.41), albumin < 35 g/L (OR 2.25; CI 1.79–2.84), low NMS (OR 2.26; CI 1.78–2.88), not regaining CAS (OR 1.53; CI 1.09–2.14) and no mobilization (OR 1.48; CI 1.11–1.97) were all associated with increased mortality at 30 days and 1 year (1-year OR are reported).

Interpretation / Conclusion: Multiple comorbidities, malnutrition, low pre-fracture mobility and inadequate recovery were found to be important risk factors for increased mortality among patients with hip fractures. Especially interesting as they, to a certain extent, are modifiable. Further research into optimizing is needed.

Level of experience and reoperations after internal fixation of patella fracture: A study from the Danish Fracture Database collaborators

243.

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Background: There is an impression of a relatively high complication rate in osteosynthesis of patella fractures. It is not clear whether surgeons' experience is a factor in reoperation rates.

Aim: To estimate any association between the surgeon's level of experience and major reoperation rates in patients with primary patella fractures treated with Open Reduction Internal Fixation (ORIF).

Materials and Methods: All adult patients with patella fractures treated with tension band wiring technique registered in Danish Fracture Database (DFDB) from 2012 to 2016 were included. Major reoperation was defined as re-osteosynthesis, deep infection or arthroplasty within one year but also included removal of hardware within three months. Minor reoperation was defined as hardware removal more than three months after primary surgery. Surgeons' level of experience was defined as the highest ranking member of the surgical team and grouped into 1) postgraduate doctor, internship, or residency 2) consultant doctor. Multivariate regression analysis for major reoperation was performed with surgeons' experience as the primary variable including adjustment for age, sex and American Society of Anaesthesiologists (ASA)-score. Results are given with 95% confidence interval.

Results: There were 610 patients included (440 treated by consultants) with a mean age of 63 (62;64), 52% male, 50% ASA group 2, 8% open fractures, and 33% AO type C3 fractures with no clinical relevant difference between the surgical experience groups. There were 9.4% major reoperations in the most inexperienced surgeon group compared to 10.7% in the experienced group. This yielded an adjusted relative risk of 1.14 (0.65;2.01). There were 34% with minor reoperation within one year after primary surgery yielding a relative risk of 1.01 (0.75; 1.36) with no statistical difference between the groups.

Interpretation / Conclusion: There was no statistical significant difference in rate of major or minor reoperation between consultants and non-consultants. Patients should preoperatively be informed of a high risk of reoperation due to major or minor complications within a year of primary surgery.

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Background: More than 60–65% of the surface area of the talus bone is covered with articular cartilage, which limits the intra-osseous blood supply. Talus account for 0.5 % of all fractures, and only 3% of all foot fractures. The primary mechanism of injury is often severe, and includes high energy, often making the patient group multi-traumatic. Associated skeletal lower leg injuries has been reported in 54% of all talus fractures, and 8% were multi-traumatic with injuries at other locations of the body. Sequelae such as avascular osteonecrosis (54%) and post-traumatic arthritis (25%) are common complications seen after treatment of all types of talus fractures.

Aim: Describe the demography and early complication rate after surgical treatment of both talar neck and corpus fractures.

Materials and Methods: In 2010–2013 we operated 29 consecutive patients (34 (14–54) years, F/M= 11/18) with 33 talus fractures, 19 corpus fractures and 14 neck fractures. All fractures were evaluated pre- and post- operatively with plain X-rays and CT. The operative technique was selected by the surgeon and was either ORIF (n=29), external fixation (n=3) or primary arthrodesis (n=1).

Results: Corpus fractures were classified by the Sneppen classification (type 1 (n=3), type 2 (n=3), type 3 (n=3) type 5 (n=10)) and neck fractures by the Hawkins classification (type 1 (n=7), type 2 (n=3), type 3 (n=3) type 4 (n=1). 19 patients sustained their injury in a high-energy trauma, 7 patients had an open fracture, and 4 patients had bilateral fractures. The number of associated injuries found were: 1–2 (n=15), 3–4 (n=5), 5 or more (n=2). 11 patients required more than one surgery in order to gain soft tissue coverage, infection control and ultimate healing. 2 patients had secondary arthrodesis of the ankle joint caused by AVN.

Interpretation / Conclusion: We found a higher number of associated injuries in patients with talus fractures than seen in other studies. The number of AVN was lower than otherwise reported, however, we experienced a high number of surgical interventions in order to achieve healing.

Clinical and radiological results treating patients with patella fractures using a non-metallic all suture-based fixation technique: a prospective case series of 24 patients

245.

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Background: Patella fractures requiring surgery are traditionally treated using metallic implants which are associated with high re-operations rates mainly due to implant prominence. Non-metallic fixation methods could be a solution to this problem.

Aim: To report results on adults with a patella fracture treated with a non-metallic all suture-based fixation technique.

Materials and Methods: From 01.11.2018 all adult patients with a patella fracture requiring surgery were treated using a suture tension band fixation method – a non-metallic all suture-based fixation technique. Prior to surgery all were informed of this technique and the possibility to be treated with the standard metallic tension band technique. 24 patients were enrolled consecutively by the end of august 2019 with no patients declining the non-metallic technique. We had no exclusion criteria regarding high age, fracture type, or functional level. Two surgeons performed the surgery. The standardized post-operative regimen comprised partial knee immobilization for 4 weeks. Follow-up was done at 2 and 4 weeks and 3- and 6- months post-surgery.

Results: No patients were lost to follow-up. 15 of 24 were females, median age of 59 years (19-81 years), and 8 open fractures. Fractures were simple 2- part in 5 cases and comminuted in 19 cases. In one case additional k-wires were needed for stability due to severe comminution. At 6 months the median knee ROM was 125 degrees (90- 150), median pain VAS at rest was 0,3 (0-2), median pain VAS at activity was 1,2 (0-5). Data on VAS were missing on two patients. All but 1 united radiologically. 7 patients had unexpected events (1 with asymptomatic non-union needing no further intervention, 2 with superficial wound infections treated successfully with oral antibiotics, 1 with prominent knots requiring implant removal, 2 with inflammation of the quadriceps tendon requiring corticoid injections and prolonged rehabilitation, 1 with deep venous thrombosis requiring oral antithrombotic medication).

Interpretation / Conclusion: This non-metallic all suture-based technique seems safe and could be an alternative to traditional metallic fixation for all types of patella fractures with a potential to significantly reduce the problem of prominent implants.

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Background: 3D-printing of bones is novel way in preoperative planning giving the surgeon a real-size fracture to evaluate by hand. There are studies from China showing shorter operation time, intraoperative blood loss, and better functional outcome but there are no studies assessing the impact on the preoperative plan.

Aim: To assess the effect of 3D-printed proximal tibia fractures in the preoperative plan. Secondly, to perform subanalysis of the effect divided on operative experience.

Materials and Methods: Data on bicondylar proximal tibia fractures treated with open reduction and internal fixation including dual plating was retrieved for 2019. We included 10 consultants in traumatology to perform a preoperative plan on the basis of CT- scan two times, thereafter the 3D-print, and divided them in to senior consultants and consultants, all specialized in traumatology. Data was entered in an electronic database. We defined a critical change in the preoperative plan as a change in the operative starting point, arthroscopic use, posterior plate, solitary screws, elevation of joint surface through fenestra, and in auto-/allograft use. Minor change was defined as change in length of plates. The surgeons evaluated their confidence after each preoperative plan. Chi-square test was used for categorical group comparison.

Results: There were 10 3D-printed proximal tibia fractures, median age 59 (range 45–79), 5 were female, and 92% were min. Schatzker type 4. The 3D-print lead to a critical change in 27% of the preoperative plans with no difference between junior or senior surgeons ($p=0.11$). The amount of changes was median 1 (1–5). There were 34% minor changes with no differences among the surgeon groups ($p<0.55$). There was a significant improvement in the level of confidence with the preoperative plan among junior surgeons ($p<0.001$) but not among senior surgeons ($p<0.24$).

Interpretation / Conclusion: 3D-print of proximal tibia fractures has a significant effect leading to a critical change in 27% of the preoperative plans with no difference due to the surgeons' experience.

**Competence in basic principles of osteosynthesis:
Development of procedure specific assessment
tools using an international Delphi study**

247.

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Background: Simulation-based training is emerging to meet the challenges of orthopaedic surgical education and assessment is essential to drive learning and ensuring competency. A prerequisite for meaningful assessment is an agreement on what constitutes competency and specific assessment tools.

Aim: The aim of the study is to identify technical assessment parameters to be included in 7 procedure specific assessment tools to evaluate the competencies of novice orthopaedic residents in applying basic principles of osteosynthesis (tension band, compression plate, locking plate, intramedullary nail, buttress plate, lag screw + neutralization plate and bridge plate) on a virtual reality simulator.

Materials and Methods: A 4-round international Delphi study is used to achieve consensus, among key international experts, on the content of the assessment tools, by use of online questionnaires. All panelists are AO faculty members. In round 1 open-ended questions are used to identify all potential assessment parameters to include in the assessment tools. In rounds 2 and 3 the panelists will rate the importance of each assessment parameter, eliminating those that do not meet the predefined thresholds for consensus. Additionally, in round 3, the panelists will define optimal intervals for each assessment parameter that will yield a maximum score, and the slope of a curve, on each side of the optimal interval, by which a less-than-maximum score will be determined. Finally, in round 4, the panelists will define weights of each the assessment parameters in the final assessment tools.

Results: Data collection is ongoing and is projected to be completed by July 2021. At present, the first Delphi round has been concluded with participation of a total of 100 AO faculty members from 45 different countries. Round 1 yielded a total of 1.051 parameters, that were reduced to 279 potential assessment parameters after qualitative analysis. The final assessment parameters will be presented at the congress.

Interpretation / Conclusion: The study will yield procedure-specific assessment tools for seven basic osteosyntheses allowing for automated assessment on a virtual reality simulator. Validity of the assessment tools will be explored in future studies.

Acellularized Nerve Allografts and Conduits for Peripheral Nerves in Sensory, Mixed and Motor Nerve Reconstruction: Outcomes from a single center after implementing these procedures.

248.

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Background: We have implemented the use of processed nerve allografts and conduits for nerve reconstruction where direct end-to-end suture was not possible after nerve injury.

Aim: To evaluate our ongoing results of nerve reconstruction from 2017 and onwards.

Materials and Methods: We have thus far had 51 individual nerve injuries with this type of nerve reconstruction. Sufficient data was available for 42 injuries (32 sensory, 9 mixed, and 1 motor nerves). The mean age was 44 (SD 16, range 12–72). Data collected at follow up included visual analog scale (VAS) pain scores, static two point discrimination (S2-PD) – defined as meaningful with values <15 mm, Semmes Weinstein Monofilament Examination (SMWE), grading of cold intolerance and hyperesthesia from 0–3 of perceived problems from pain or discomfort of normal touch when using the hand (0=hinders function, 1=disturbing, 2=moderate, 3=none/minor problems), grip strength, pinch strength and the disabilities of the arm, shoulder and hand score (Quick-DASH).

Results: The mean time of the last follow up was 250 days (SD 147, range 84–550). The mean VAS scores were 1.29 (SD 2.6, range 0–8) at rest and 2.75 (SD 3.4, range 0–10) at function. S2-PD with 14/22 (66.7%) patients having meaningful S2-PD. SMWE with 65.2% with protective sensation. Grip strength of the injured hand with a mean of 22.6 KgF (SD 11, range 2–48) and pinch strength with a mean of 5 KgF (SD 2.2, range 0–8). Cold intolerance of 0% with grade 0 and 69.6 % with grade 3, and hyperesthesia with 4.5 % with grade 0 and 63.6% with grade 3 function. Q-DASH with a median of 18 (SD 22.2, range 0–73). No difference in functional outcome was found between allografts and conduits. Two patients developed neuromas in connection with the allograft. One had revision surgery with a new allograft and one had the allograft removed, burying the proximal nerve end in adjacent muscle. Two other patients with allografts have not had satisfying functional outcomes and have had tendon transfers to restore function.

Interpretation / Conclusion: Thus far the results are good but not as good as other studies alike. At this point we found no obvious differences in subjective or objective results between nerve allografts and nerve conduits.

Outcome after treatment of distal fibula fractures using one-third tubular plate, locking compression plate or distal anatomical locking compression plate.

249.

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Background: Surgical treatment of lateral distal fibula fractures is associated with high risk of reoperation and complications. Within the last decade anatomical plates have been introduced.

Aim: The aim of this study was to report risks of reoperation and wound healing problems within one year after treatment with one-third tubular plate, locking compression plate or distal anatomical locking compression plate.

Materials and Methods: From 1 January 2010 until 31 December 2015 all patients having osteosynthesis of distal fibula with a one-third tubular plate, LCP or distal anatomical LCP plate at Copenhagen University Hospital, Bispebjerg, Denmark, were identified and retrospectively evaluated with a follow up of at least one year. Data on patient characteristics, fracture classification, surgical time, surgical delay and weight bearing were registered.

Results: 588 patients were included. 417 were treated using a one-third tubular plate with a reoperation risk of 11% (95% CI 8-14) (n=46) and wound healing problems risk of 21% (95% CI 18-25) (n=89). 114 received a LCP plate with a reoperation risk of 20% (95% CI 13-28) (n=23) and wound healing problems of 31% (95% CI 23-40) (n=35). 57 had a distal anatomical LCP plate with a reoperation risk of 23% (95% CI 14-35) (n=13) and wound healing problem risk of 40% (95% CI 29-53) (n=23). No difference was seen in fracture classification (Weber) between one-third tubular plate and distal anatomical LCP plate. Patient age ≥ 70 years ($p < 0.001$), smoking ($p = 0.001$), surgical time ≥ 90 min ($p = 0.006$) were associated with increased risk of wound healing problems in a multivariate regression model. We found no significant association between patient or fracture related risk factors and risk of reoperation within one year.

Interpretation / Conclusion: Distal anatomical LCP plates seems to be associated with higher risk of reoperation and wound healing problems compared to the one-third tubular plate and risk factors for wound healing problems were high patient age, smoking and increased surgical time.

Patients' perspectives on everyday life after hip fracture: A longitudinal interview study

250.

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Background: Time to recovery in everyday life functioning after a hip fracture ranges from four to twelve months. As duration of the recovery process varies considerably, patients' perspectives on everyday life may change over time.

Aim: To explore the impact of hip fracture on elderly patients' perspectives on everyday life at different time points

Materials and Methods: This is a longitudinal interview study. Twelve hip fracture patients were interviewed once during admission, and further three times within a year after the fracture. Hip fracture patients undergoing surgery, and of different gender, marital status and pre-fracture mobility were of interest.

Results: The fracture occurred at home while performing activities of everyday life. During admission, patients felt restricted by pain when performing activities of everyday life and expressed concern for their future ability to manage in everyday life. Briefly after discharge they were able to manage personal care, yet their everyday life activities were restricted for up to six months after the fracture. Most had regained their physical functioning 12 months following the fracture. Pain and the fear of falling were pervasive topics in all interviews.

Interpretation / Conclusion: Their hip and the fracture itself had little prominence in the fracture patients' responses. They referred to activities of everyday life and the level of support they needed as measures of the rehabilitation and recovery progress towards their usual lives before the hip fracture.

Technical note. Patella fractures treated with suture tension band fixation

251.

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Background: Patella fractures requiring surgery are traditionally treated using metallic implants, which are associated with high re-operations rates mainly due to implant prominence.

Aim: To overcome the problem of prominent metallic implants we present a non-metallic all suture-based technique based on braided sutures – the suture tension band fixation.

Materials and Methods: The suture is passed through soft tissue solely, that is: the quadriceps tendon, the patellar ligament, and the medial and lateral retinacula. Upon reduction the first and second sutures are passed through soft tissue in two distinct ways: “the modified circular suture” and “the modified figure-of-eight” suture, respectively. Both sutures start in the upper lateral corner of the quadriceps tendon where knots are likewise tied. If comminution is present the fracture is converted into a simple two-part fracture with one or two “box sutures” around the upper and lower pole, respectively.

Results: This technique is here described on our first six patients treated with this technique at our institution along with their clinical and radiological follow up. It is furthermore described in a step-wise, standardized way that can be adapted to all types of patella fractures. The described suture configuration allows maintenance of inter-fragmentary reduction until bony union without symptoms from the suture material.

Interpretation / Conclusion: The suture tension band fixation is a safe technique and non-metallic techniques may be a promising alternative to traditional metallic fixation methods.

Digital Platform Prototype for Telerehabilitation of Patients Treated with External Fixation Device after Complex Tibia Fractures

252.

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Background: Treatment with external circular frame after complex tibia fractures burdens both patients, relatives and the healthcare system. The treatment is long-lasting, with an average of 5.6 months, and thus patient courses must be well coordinated across sectors and knowledge sufficiently shared. Telerehabilitation, defined as rehabilitation using information and communication technologies to support health from a distance, may be a possible solution for this patient group.

Aim: The aim of this study was to develop a digital platform prototype for telerehabilitation of patients treated with external circular frame based upon participatory design and to test and evaluate the prototype.

Materials and Methods: The study was inspired by participatory design, in which users are involved in the development and design of technological solutions in order to ensure usability and inclusion of relevant functionalities. An iterative process took place in collaboration with patients (n=8), relatives (n= 4) and health professionals across sectors (n=6), where qualitative data collection techniques were used: cultural probes, observation in patients' homes, interviews (n= 18) and workshops (n=3). Patients were included until data saturation was reached.

Results: The first iteration of the prototype was qualitatively evaluated with a focus on design, content and relevance; patients and relatives found that the prototype was easily manageable, and the content supported their needs in the rehabilitation context, but health professionals expressed concerns about extra workflows and risk of double documentation. The prototype has to be further developed and tested in several clinical tests and on a larger scale before implementation.

Interpretation / Conclusion: Patients expressed a potential of telerehabilitation when treated with external circular frame. The study has initiated further investigation within Telehealth for orthopaedic surgery patients at Aalborg University Hospital.

Work ability and physical activities in patients with tumour prosthesis in hip or knee following bone sarcoma. A cross-sectional study comparing patients with healthy controls.

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Background: While most patients going through limb-sparing surgery (LSS) due to bone sarcoma are of the working-age population, limited knowledge exist about their work ability and physical demands at work.

Aim: The aim of this study was to assess work ability and work and leisure-time activity in these patients.

Materials and Methods: This cross-sectional study compared 20 patients, receiving LSS and reconstruction in proximal femur ($n=9$), distal femur ($n=7$) and proximal tibia ($n=4$) between 2006 and 2016, with 20 healthy controls. Both patients and controls were employed. The Musculoskeletal Tumour Society Score (MSTS) was used as descriptive information. The Work Ability Index (WAI), The Patient Specific Functional Scale (PSFS), activity monitor and the International Physical Activity Questionnaire (IPAQ) were used to evaluate work ability, work and leisure-time activities. Between group differences were assessed using unadjusted and adjusted (sex, age, BMI, educational level, type of work) general linear models.

Results: The patients were seen 7 (± 2.9) years post-surgery, had a mean age of 43 (± 13.6) years, BMI 27 (± 3.7) and MSTS of 69 (± 14.6)%. The adjusted analyses showed differences between patients and controls in general work ability (7.8 vs. 9.1 points, $p=0.002$) and work ability due to physical demands (3.2 vs. 4.6 points, $p<0.001$). There were between group differences in PSFS mean score (2.8 vs. 9.5 points, $p<0.001$). No differences were seen in step counts/day (10.588 vs. 12.239 steps, $p=0.144$) or the IPAQ (4107 vs. 4035 METs/week, $p=0.942$).

Interpretation / Conclusion: Most patients experienced difficulties in performing tasks requiring physical demands at work and leisure-time. Although we found no differences in step counts or METs per week, patients reported great difficulties in performing activities. Work ability should be further evaluated in future research. Elements of vocational rehabilitation might be considered in postoperative care for working-age patients following LSS and reconstruction with tumour prosthesis.

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