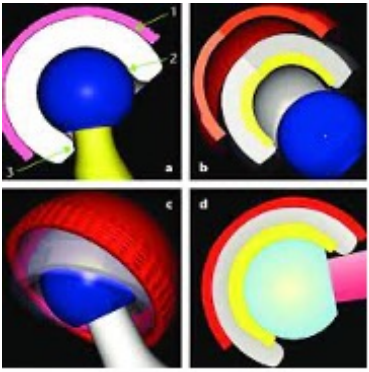
DOS Kongressen
16.-18. november 2022
Vingsted, Denmark

Abstracts



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DOS Abstractbog

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VIDENSKABELIGT PROGRAM

DOS KONGRESSEN 2022 16-18 November 2022 Vingsted, Denmark

TIME	Tuesday 15.11.22
09:00-16.00	**UDDU pre-congress workshop: The New Curriculum**

TIME	Wednesday 16.11.22			
	Centersalen	**Vingsal 1**	**Vingsal 2**	**Vingsal 3**
09:00-09:30 09:30-10:00 10:00-10:30	**Symposium: UDDU**	**Session 1: Trauma Hip Fractures** (Michala Skovlund and Michael Brix)	**Session 2: Hand/wrist and Pediatrics** (Janni K. Thillemann and Jan D. Rölfing)	**Session 3: Hip Arthroplasty** (Ann Ganestam and Thomas Jakobsen)
10:30-11:00	*Coffee in Exhibition Area*			
11:00-11:30 11:30-12:00	**Session 4 : YODA Best Paper -** Centersalen (Christian Bredgaard Jensen and Claus Varnum)		**Session 5: Tumor, Infection and amputation** (Christina E. Holm and Christen Ravn)	**Session 6: Foot and Ankle** (Marianne Vestermark and Kristian Behrndtz)
12:00-12:30 12:30-13:00	*Lunch in Exhibition Area*			**Lunch Symposium(s)**
13:00-13:30 13:30-14:00 14:00-14:30 14:30-15:00	**Subspeciality Meetings**			
15:00-15:30	*Coffee in Exhibition Area*			
15:30-16:00 16:00-16:30 16:30-16:45	**YODA General Assembly**	**Subspeciality Meetings**		
17:00-17:30 17:30-18:00	Poster Walk			

TIME	Thursday 17.11.22				
	Centersalen	**Vingsal 1**	**Vingsal 2**	**Vingsal 3**	
07.30-08.00 08.00-08.30 08:30-09:00 09:00-09:20	**General Assembly and Breakfast** - Centersalen				
09:30-10:00 10:00-10:30 10:30-11:00	**Symposium: Bæredygtig Ortopædkirurgi**	**Session 8: Trauma** (Per Gundtoft and Peter Toft Tengberg)	**Session 9: Knee Arthroplasty** (Martin Lindberg-Larsen and Anders Troelsen)	**Session 10: Pediatrics** (Marie Fridberg and Julie L. Erichsen)	
11:00-11:30	*Coffee in Exhibition Area*				
11:30-12:00 12:00-12:30	**DOS Honorary lecture** - Centersalen Professor Matthew Costa				
12:30-13:00 13:00-13:30	*Lunch in Exhibition Area*			**Lunch Symposium(s)**	
13:30-14:00 14:00-14:30 14:30-15:00	**Symposium: Diagnostik af bakterielle knogleinfektioner**	**Symposium: KORTE KLINISKE RETNINGSLINIER** Kendskab til, brugen af og fremtiden for KKRér	**Session 11: Shoulder/elbow** (Rie Nyholm and Lars H. Frich)	**Session 12: Sports orthopedics** (Annika Winther and Bjarne Mygind)	**DOT workshop:** external fixation
15:00-15:30	*Coffee in exhibition area*				
15:30-16:00 16:00-16:30	**Session 13: DOS Best Paper** - Centersalen (Michael M. Petersen and Kristoffer W. Barfod)				
16:40-17:00 17:00-17:30	**Professor lectures** - Centersalen				

TIME	Friday 18.11.22			
	Centersalen	**B**	**C**	**D**
09:00-09:30 09:30-10:00	**Symposium: Meet the experts** **Specialist: Ankle fractures**	**Session 14: Trauma** (Rikke Bielefeldt and Rasmus Stokholm)	**Session 15: Knee Arthroplasty** (Andreas Kappel and Lasse E. Rasmussen)	**Session 16: Spine** (Ane Simony and Søren Ohrt-Nissen)
10:00-10:30	*Coffee in Exhibition Area*			
10:30-11:00 11:00-11:30	**Guildal Lecture og Guildal donationer** - Centersalen			
11:30-11:45	*Presentation of new specialists in Orthopedic Surgery - Centersalen*			
11:45-12:15 12:15-12:45	*Lunch in Exhibition Area*			**Lunch Symposium(s)**
12:45-13:15 13:15-13:45	**Symposium: Meet the experts** **Basic: Hip fractures**	**Session 17: Trauma** (Bjarke Viberg and Jeppe Barckman)	**Session 18: Hip Arthroplasty** (Stig S. Jakobsen and Martin Kirkegaard)	**Session 19: Sports and Shoulder/elbow** (Jeppe V. Rasmussen and Christian Dippmann)
13:45-14:00	*Coffee in exhibition area*			
14:00-14:30 14:30-15:00	**DOS Battle** - Centersalen			

INDHOLDSFORTEGNELSE

ONSDAG, D. 16. NOVEMBER 2022

TORSDAG, D. 17. NOVEMBER 2022

FREDAG, D. 18. NOVEMBER 2022

SESSION 1: TRAUMA HIP FRACTURES

16. november

09:00 - 10:30

Lokale: Vingsal 1

Chair: Michala Skovlund and Michael Brix

1. Reduced dislocation rate with a piriformis sparing posterior approach in hemiarthroplasty for femoral neck fractures

Bjarke Viberg[1], Erik Qvist Kristensen[1], Thomas Gaarsdal[2], Henrik Palm[3,4], Charlotte Densing Petersen[3], Søren Overgaard[3,4], Thomas Giver Jensen[3]

[1]Department of Orthopaedic Surgery and Traumatology, Lillebaelt Hospital - University Hospital of Southern Denmark; Department of Orthopaedic Surgery and Traumatology, Odense University Hospital[2]; Department of Orthopaedic Surgery and Traumatology, Copenhagen University Hospital, Bispebjerg[3]; Department of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen[4]

Background: Danish femoral neck fracture (FFN) patients treated with hemiarthroplasty (HA) have one of the highest risk of dislocation in the world due to use of the posterior approach (PA). An option could be changing to an anterior capsule approach but perhaps there is a more feasible way to lower the dislocation rate by a piriformis sparing posterior approach (PSPA).
Aim: To compare the PSPA to the PA in FFN patients treated with HA concerning dislocations, reoperations, and total surgery related complications.
Materials and Methods: On the 1st of January 2019, the PSPA was introduced at two hospitals as a new treatment standard. A sample size was calculated on the basis of a 5 percent point reduction in dislocations and due to an expected 25% mortality rate, 264 in each group was needed. A 2-year inclusion period with 1-year follow-up was therefore estimated including a historical cohort 2 years prior to the PPPA introduction. Data was retrieved from the hospitals administrative databases and all health care journals as well as x-ray images were reviewed. An adjusted relative risk (RR) was calculated using Cox regression given with 95% confidence interval.
Results: There were 650 FFN patients treated with HA, 72% were women, and 42% were more than 85 years. There was no baseline difference between the PSPA and PA group regarding sex, age, comorbidity, BMI, smoking, alcohol, mobility, length of surgery, blood loss, implant positioning or mortality. There was a difference in type of HA due to a change in one hospital but also more surgeons in training in the PSPA group. The dislocation rate was reduced from 11.7% in the PA group to 4.6% in the PSPA group ($p<0.001$) yielding a RR of 2.8 (CI 1.4;5.5). The reoperation rate due to PSPA was reduced from 7.4% to 3.2% ($p=0.022$) resulting in a RR of 2.4 (1.1;5.4), and the total surgery related complications were reduced from 15.2% to 6.7% ($p<0.001$) resulting in a RR of 2.8 (1.5;4.9).
Interpretation / Conclusion: PSPA in FFN patients treated with a HA was associated with a reduction in dislocations from 11.7% to 4.6%. This approach could easily be introduced and in the authors' opinion, the approach has the potential to lower the dislocation rate even further by sparing all structures posteriorly.

2. Prediction of 30-day mortality in patients undergoing hip fracture surgery: the impact of surgery delay.

Thomas J. Hjelholt[1], Bjarke L. Viberg[2], Henrik Palm[3], Morten T. Kristensen[4], Niels Dieter Röck[2], Alma B. Pedersen[1]

[1]Department of Clinical Epidemiology, Department of Clinical Medicine, Aarhus University and Aarhus University Hospital, Aarhus, Denmark. [2]Department of Orthopaedic Surgery and Traumatology, Odense University Hospital [3]Department of Orthopaedic Surgery, Copenhagen University Hospital, Bispebjerg and Frederiksberg, University of Copenhagen, Copenhagen, Denmark [4]Department of Physical and Occupational Therapy, Copenhagen University Hospital, Bispebjerg-Frederiksberg and Department of Clinical Medicine, University of Copenhagen

Background: Thirty-day mortality following hip fracture surgery in Denmark is 10% on average. However, previously published studies indicate substantial variation depending on patient characteristics.

Aim: To evaluate the impact of surgery delay on the 30- day mortality risk, considering other important patient characteristics.

Materials and Methods: We identified all patients with a first-time hip fracture in 2011-2017 (N=28,791) from the population-based Danish Multidisciplinary Hip Fracture Registry. We used a previously published model for 1-year mortality on the same cohort, including the following patient-related predictors as explanatory variables: nursing home residency, comorbidity, pre-fracture basic mobility, BMI, and age. Subsequently, we stratified patients according to surgery delay from admittance (>6 hours, >12 hours, >18 hours, >24 hours and >36 hours). Outcome was death within 30 days from surgery. Using the logistic regression model, we predicted the absolute risk of death within 30 days based on all possible combinations of the included predictors.

Results: Depending on patient characteristics, predicted 30- day mortality spanned from 1% to 81%. We observed no clear variation in mortality across strata of surgery delay. E.g. patients aged 80-85 years admitted from own home waiting <12 hours for surgery had mortality ranging from 3% to 30% depending on levels of comorbidity, mobility, and body mass index. Corresponding numbers in patients waiting >12 hours were 3% - 28%. For the same patients waiting <18 hours, mortality ranged from 3% to 28%, whereas for those waiting >18 hours mortality ranged from 2% to 28%. For patients aged 65-70 years admitted from own, mortality varied from 1% to 14% and from 1% to 15% if waiting <12 and >12 hours, respectively.

Interpretation / Conclusion: Thirty-day mortality vary greatly depending on patient characteristics, but our data does not indicate that surgery delay impact mortality substantially. Selection of patients for early surgery based on factors not included in the model could, however, explain the apparently missing effect of surgery delay on 30-day mortality.

3. The majority of community-dwelling hip fracture patients return to independent living with minor increase in care needs

Christina Frølich Frandsen [1 2], Maiken Stilling [1 2 3], Eva Natalia Glassou [1 4], Torben Bæk Hansen[1,2]
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Background: Hip fracture patients are fragile, and the majority fail to fully recover to their pre-fracture functional level, resulting in an increase in institutionalization.
Aim: The study aimed to investigate risk factors for poor short-term functional recovery and failure to return to independent living 12 months after a hip fracture.
Materials and Methods: From 2011 and through 2017, all surgically treated hip fracture patients admitted from their own homes were included in a prospective cohort study. Patient characteristics, comorbidities, surgical method, and mobilization during the hospital stay were registered. Short-term functional recovery was measured at discharge using a cumulated ambulatory score (CAS). At 12 months, patients were interviewed regarding residence, regaining function, and care needs. Multivariable logistic regression was used, reporting odds ratio (OR) with 95% confidence intervals (95%CI).
Results: 2,006 patients had data regarding their hospital stay and were included in the analyses for short- term functional recovery. 1,342 patients were interviewed at 12 months and used in the analyses for failure to return to independent living. Modifiable variables associated with poor short-term functional recovery (CAS<6) were hypoalbuminemia, not mobilized to standing within 24 hours, and length of stay. Failure to return to independent living at 12 months was found in 10% of the patients and was primarily associated with patient characteristics and comorbidities, but also poor short-term functional recovery (CAS<6). However, few reported increased care needs of those returning to independent living.
Interpretation / Conclusion: The risk factors associated with poor short-term functional recovery were primarily static. However, mobilizing patients to standing within 24 hours from hip fracture surgery is modifiable and found to be associated with short-term functional recovery. The present study found that failure to return to independent living at 12 months is seen in the frailest patients. However, the majority remains in their own home with only a slight increase in care needs.

4. A multilevel approach for evaluating hospital variation in red blood cell transfusion after hip fracture surgery in a population-based cohort study

Pia Kjær Kristensen1, Nickolaj Risbo2, Pedersen Alma Becic2
1) Department of Ortopaedics, Aarhus University hospital 2) Department of Clinical Epidemiology, Aarhus University hospital

Background: Surgery for hip fractures frequently requires red blood cell (RBC) transfusion in order to treat pre-existing and acute acquired anemia and operative bleeding. Postoperative anemia in hip fracture patients is associated with reduced rehabilitation and functional independence, as well as increased mortality. However, the indications for RBC transfusion in elderly with hip fractures had not been standardized.
Aim: To examine the variation in use of RBC transfusion within seven days after hip fracture surgery across 21 orthopaedic departments in Denmark.
Materials and Methods: In this nationwide population-based cohort study, patients who underwent surgery for an incident hip fracture in 2016 and 2017 (n=11,372) were identified in the Danish Multidisciplinary Hip Fracture Registry. Data on RBC transfusion were obtained from the Danish Transfusion Database. Prevalence of RBC transfusion was defined as transfusion within 7 days after surgery (yes/no). We used a stepwise multilevel logistic regression analysis to investigate predictors of variation adjusting for sociodemographic, fracture type, Charlson Comorbidity Index, type of surgery and prescriptions of anticoagulants, steroids, and NSAIDs. The variation between hospitals was examined using the Intra Class Coefficient (ICC).
Results: The overall prevalence of RBC transfusion was 32.9 %. The adjusted prevalence of RBC transfusion varied from 16.0% to 73.1%. A pertrochanteric fracture (Odds Ratio (OR)= 7.14 95% Confidence Intervals (CI) (5.96-8.54), high sociodemographic score (OR=3.15 CI(2.77- 3.59) and pre-fracture use of anticoagulants (OR=1.31 CI(1.19-1.44) were predictors of higher risk of RBC transfusion. The ICC indicated that 8.8% of the adjusted variance was due to hospital differences.
Interpretation / Conclusion: Substantial variation in use of RBC transfusion within 7 days after hip fracture surgery among departments exists. The major part of the variation is explained by patient-related factors such as fracture type, sociodemographics and use of anticoagulants. One tenth of the variation is related to systematic differences between hospitals. Further analyses are needed to examine the impact of hospital-level variation on the prognosis of hip fracture patients.

5. Geographic variation in hip fracture incidence and care-processes: a comparison between Ireland and Denmark

Mary Walsh1, Jan Sørensen2, Cathrine Blake1, Søren Paaske Johnsen3, Pia Kjær Kristensen4
1: UCD School of Public Health, Physiotherapy and Sport Science, Health Science Centre Dublin 2: Healthcare outcome Research Centre, Dublin 3: Danish Centre for Danish Health Service Research, Aalborg University Hospital 4: Department of Orthopaedics Surgery, Aarhus University Hospital

Background: Large variations have been found in quality of care received after hip fracture. Ireland and Denmark both have established hip fracture audits that drive quality improvement nationally. Comparisons between the countries would allow for international benchmarking of practice.
Aim: To explore geographic variation of care quality in Ireland and Denmark
Materials and Methods: Patients aged ≥65 years treated surgically for hip fracture in Ireland from 2017 to 2020 and in Denmark from 2016 to 2017 were included from the Irish Hip Fracture Database (n=12,904) and the Danish Multidisciplinary Hip Fracture Registry (n=12,924). The rate of hip fracture surgery per 1,000 older persons (>64 years) and the proportion of patients achieving 14 care indicators was calculated with 95% confidence intervals, standardized for age- group and sex against denominators from the Irish census (2016) and dataset. Geographic variation was explored based on hospital area (5 regions in Denmark, 6 Hospital Groups in Ireland). Systematic Components of Variation (SCV) were calculated for each indicator and country.
Results: The average annual standardized incidence of hip fracture surgery per 1,000 older population was 4.7 in Ireland and 5.7 in Denmark. There were notably different patterns of intracapsular fracture repair (Hemiarthroplasty: Ireland=85%, Denmark=52%) and very high variation for total hip arthroplasties (THA) in both countries (SCV Ireland=10.6, Denmark=97.9). Ireland achieved lower rates of surgery within 36 hours (59% versus 84%), nutritional assessment (27% versus 84%), and pre-discharge mobility recording (52% versus 92%), with latter measures showing high within-country variation (SCV=19 and 25, respectively). Ireland showed longer hospital stays (median 12 versus 7 days), but lower 7-day (1.0% versus 3.1%) and 14-day (2.0% versus 5.5%) mortality.
Interpretation / Conclusion: Ireland and Denmark have similar hip fracture incidence, but different patterns of intracapsular fracture repair. Ireland should improve care in relation to early surgery, mobility, and nutrition assessment. Between-country differences in length of stay, THA provision and mortality require further investigation.

6. Orthogeriatric home visit is associated with overall reduced 30-day readmission following surgical treatment in +65-year-old patients with hip fracture

Thomas Giver Jensen[1], Martin Aasbrenn[2], Morten Tange Kristensen[3], Troels Haxholdt Lunn[4], Eckart Pressel[2], Henrik Palm[1], Charlotte Suetta[2], Søren Overgaard[1], Anette Ekmann[2]
Department of Orthopaedic Surgery, Copenhagen University Hospital Bispebjerg and Frederiksberg, Denmark[1]; Geriatric Research Unit, Department of Geriatrics, Copenhagen University Hospital Bispebjerg and Frederiksberg, Denmark[2]; Department of Physio & Ergotherapy, Copenhagen University Hospital Bispebjerg and Frederiksberg, Denmark[3]; Department of Anaesthesia and Intensive Care, Copenhagen University Hospital Bispebjerg and Frederiksberg, Denmark[4];

Background: High readmission rates are commonly seen in patients with hip fracture. However, evidence indicates that multidisciplinary home visits after hip fracture may improve care and reduce overall readmission rate.
Aim: We investigated whether an orthogeriatric home visit was associated with overall 30-day readmission in +65-year-old patients surgically treated for hip fracture.
Materials and Methods: We compared two year-cohorts separated by one year. Thus, 246 patients aged +65-year admitted with hip fracture between 13th June 2020 – 12th June 2021, discharged to own home or care facilities, and visited ≥1 were characterized as exposed and compared with a comparable but non-visited/non-exposed historical control cohort of 247 patients admitted between 1st January – 31st December 2018 . The orthogeriatric team consisted of an orthopaedic nurse specialist visiting the patients, preferably at day two and nine after discharge, and a hospital based geriatric medical specialist cooperating observations, treatment, and care decisions. Data were extracted form hospital medical records. Outcome was overall 30-day readmission defined as ≥12h length of stay, regardless of reason or place, within the first 30 days after discharge. Covariates included demographic, mental and physical functioning, medication, co-morbidity, severe complication, and residential status. Cox Regression models were used for analysis.
Results: The readmittance rate was reduced from 27% to 19% (p=0.03). Crude and fully adjusted Hazard Ratio in patients visited were 0.67 (CI95%: 0.46- 0.97) and 0.58 (CI95%: 0.39-0.85) compared with non-visited patients, respectively.
Interpretation / Conclusion: An orthogeriatric team visiting older discharged patients with hip fracture seems to be associated with overall reduced 30-day readmission.

7. Alcohol and drug use in patients younger that 60 years with hip fracture measured by validated instruments and the clinical eye

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Background: It is a common preconception that young individuals suffering hip fracture have alcohol- and/or substance use disorder (AUD/SUD). It is important to evaluate this for planning the rehabilitation, but previous studies have neither used validated questionnaires, nor investigated if the standard screening methods are sufficient.
Aim: The main objective was to describe the alcohol and drug consumption in adult hip fracture patients under 60 years using the validated AUDIT (Alcohol use disorder test) and DUDIT (Drug use disorder test) scores. We also investigated the correlation between the instruments and the physicians' standard reporting of usage.
Materials and Methods: This is a sub-study of 90 women (W) and 126 men (M) from a multicenter cohort study of patients with a non-pathological, acute hip fracture treated at 4 hospitals in Denmark and Sweden. To map alcohol and drug use AUDIT and DUDIT forms were filled in. In addition, the researchers made an evaluation of the patients' alcohol and drug use based on direct patient contact and medical chart information. AUDIT ranges 0-40 with 6 (W) and 8 (M) as the cut-off for hazardous/harmful use. DUDIT ranges 0-44 with a corresponding cut-off of 2 (W) and 6 (M).
Results: According to AUDIT scores, 19/76 W (25%) and 37/118 M (31%) had hazardous/harmful alcohol use. The clinical evaluation identified 23/90 W (25%) and 33/126 M (26%) to have AUD. The DUDIT scores equaled SUD in 4/79 W (5%) and 11/111 M (10%). The clinical evaluation depicted 4/90 W (4%) and 13/126 M (10%) to have SUD. There was a discrepancy between AUDIT/DUDIT and the "clinical eye". 8 W and 13 M alcohol use remained undetected by the clinical evaluation, even if they had AUDIT scores indicating hazardous/harmful use. Also, 4 W and 4 M with DUDIT indicating SUD were overlooked by clinical evaluation.
Interpretation / Conclusion: AUD and SUD were more common than what is reported from the general population. Still, "only" one fourth had AUD, hence gainsaying the belief that most hip fractures in adult life are caused by hazardous alcohol/drug use. Clinicians must be aware that the two screening methods do not identify the same individuals, and further investigation in clinical practice is needed.

8. How to spot osteonecrosis of the femoral head after internal fixation of femoral neck fractures in younger patients, with implants in situ? Conventional x-ray versus MARS-MRI.

Maria L Jönsson, Mikael Kindt*, Trine Torfing, Sebastian Strøm Rönnquist, Bjarke Viberg, Søren Overgaard, Cecilia Rogmark*

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Background: Osteonecrosis of the femoral head (ONFH) is a well-known complication after internal fixation of femoral neck fractures (FNF). Previous literature is inapplicable on the use of metal artifact reduction sequence (MARS) MRI, to diagnose post-traumatic ONFH with conventional metal implants present.

Aim: Our primary aim was to compare MARS MRI with conventional x-ray in diagnosing ONFH following internal fixation of FNFs, with implants in situ. Secondarily, we wanted to determine if signs of ONFH on MARS MRI correlates to patient reported outcomes (PROs) via Oxford Hip Score (OHS), and pain (visual analog scale (VAS)).

Materials and Methods: Between 2015-2018, 30 out of 44 adults under 60 years treated with internal fixation after FNF at Odense University Hospital or Skåne University Hospital, Malmö, were included in a prospective study. They were followed with x- rays and PROs at 4 months, 1 and 2 years while MARS MRIs were at 4 months and 1 year. OHS <34 and/or VAS pain score >20 mm was considered clinically relevant unfavorable outcome.

Results: At 1 year, 14 patients had a pathological MRI. 3 of them had ONFH on x-ray at 1 year, increasing to 5 at 2 years. 5/14 had unfavorable PROs. In the 5 patients with ONFH signs on both MRI and x-ray, 2 had unfavorable PROs. 10 patients had all normal MRIs, all of them had normal x-rays. 1/10 had unfavorable PROs at 2 year. 5 patients had inconsistent MRI results, of which 1 developed ONFH. 1 patient dropped out.

Interpretation / Conclusion: A normal MRI signals uneventful healing. In our cohort, information from a pathological MRI was not useful, as a majority remains free from radiological ONFH and symptoms. Furthermore, PROs did not correlate with imaging result. The findings from MRI MARS have to be better understood before taken into clinical practice.

9. Frailty is Associated with Increased Mortality and Re-admission in Geriatric Hip Fractures

Sagona Abigail, Ortega Carlos, Wang Liqin, Yeung Caleb, Selzer Faith, Zhou Li, von Keudell Arvind

Department of Orthopedic Surgery, Brigham and Women's Hospital Department of Internal Medicine, Brigham and Women's Hospital

Background: Frailty index (FI) is a tool used to help clinicians determine how well a patient may do after orthopedic trauma surgery. We evaluated the association between FI and both mortality and hospital re-admission in 316 patients who underwent surgery for a femoral neck or an intertrochanteric hip fracture. Our data suggests that FI stratification can help to identify a sub-set of patients at high risk for adverse outcomes following hip fracture. Our preliminary analyses appear to suggest that it may be a stronger risk factor of mortality than age alone.

Aim:

Materials and Methods: We identified patients who were ≥65 years old, underwent surgical repair of a femoral neck or intertrochanteric hip fracture, co-managed by the orthopedic trauma and geriatric services at BWH between May 2018 and August 2020. Demographic and clinical data were extracted from MGB's EDW and verified by chart review. FI scores were categorized as: Non-Frail/Pre-Frail (FI <0.21, n=62), Frail (0.21≤FI<0.45, n=185), and Severely Frail (FI > 0.45, n=69). One-year outcomes were calculated using Kaplan-Meier methods and compared using log-rank statistics.

Results: 316 patients with hip fractures who underwent surgical repair and had a frailty index score assigned were identified. At baseline the mean age was 83.8 (SD 7.9) years and the mean FI was 0.33 (SD 0.14). Patients were predominantly white 278 (88.0%) and female 221 (69.9%). Femoral neck fractures accounted for 129 (40.8%) of cases and intertrochanteric fractures accounted for 187 (59.2%) of cases. By one-year, freedom from readmission was 62.0%, 44.4%, and 25.8% (p=0.001) in the non/pre-frail, frail, and severely frail groups, respectively. One-year survival rates were 100%, 84.0%, and 51.2% (p<0.001) in the respective frailty groups.

Interpretation / Conclusion: In this analysis, we found that higher FI is associated with higher adverse outcomes at one-year. Specifically, freedom from hospital readmission and survival were associated with better frailty categories. Further analyses will evaluate the role of age itself in relation adverse outcomes following repair of hip fractures. Our findings suggest that FI has a role in identifying high risk surgical candidates and may help guide clinical decision making.

10. Active clinical issues at discharge predict readmission within 30 days and one year following hip fracture surgery

Christina Frølich Frandsen [1 2], Maiken Stilling [1 2 3], Eva Natalia Glassou [1 4], Anne Birgitte Langsted Pedersen [5], Torben Bæk Hansen [1 2]
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Background: Early readmission to the hospital may be seen as a preventable failure to ensure safe discharge following a hip fracture. Premature discharge may be evaluated based on vital signs at discharge and medical complications during the hospital stay collectively called active clinical issues (ACIs), which have received little attention. Furthermore, time to surgery's association to readmission have been investigated with conflicting results, however, none have investigated the impact of the reasoning for delaying surgery which may explain the inconsistent findings. There is a need for knowledge regarding such modifiable risk factors to prevent readmissions.
Aim: To explore any association between 1) medical issues that delay surgery and 2) ACIs at the time of discharge and 30-day readmission.
Materials and Methods: A consecutive cohort of hip fracture patients surgically treated from 2011 to 2017 had data collected prospectively during their hospital stay and 1 year postoperatively. ACIs were defined as unstable vital signs or antibiotic treatment at discharge. Risk factors for readmission were analyzed as time-to-event data, in a multivariable analysis with death as a competing risk using the pseudo- value approach. The following variables were selected for adjustment: age, sex, residence, ASA score, cognitive status, and NMS. Differences in patient characteristics between groups were analyzed using the chi-squared test. The attributable fraction of readmission due to medical issues delaying surgery and ACIs was calculated.
Results: 2,510 patients were included, of whom 14% were readmitted within 30 days and 39% within one year after hip fracture surgery. The most frequent causes of readmission within 30 days were medical causes unrelated to the hip fracture. ACIs were associated with an increased risk of readmission, especially due to medical and infectious causes. ACIs attributed to 46% of readmissions for medical causes. Medical issues resulting in surgery delays exceeding > 24 hours did not increase the risk of readmission within 30 days.
Interpretation / Conclusion: Readmission following hip fracture surgery is high, but some may be prevented. Resolving ACIs before discharge may reduce readmissions following hip fracture surgery.

SESSION 2: HAND/WRIST AND PEDIATRICS

16. november

09:00 - 10:30

Lokale: Vingsal 2

Chair: Janni K. Thillemann and Jan Duedal Rölfing

11. Pyrocardan Implant Arthroplasty for Carpometacarpal Osteoarthritis of the thumb: a comparative study with a historical control group

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Background: New and improved surgical techniques are warranted to treat osteoarthritis of the thumb carpometacarpal joint. The Pyrocardan® implant yields striking results but only few series exist making the evidence scarce.
Aim: The aim of this study was to conduct a prospective series using the Pyrocardan® implant.
Materials and Methods: We compared the outcomes to a matched historical control group of patients operated on with ligament reconstruction and tendon interposition. The hypothesis was that the Pyrocardan® implant would yield better patient reported outcomes. Moreover, that the procedure would be safe and effective in relieving symptoms of CMC-1 osteoarthritis. In total, 30 patients were included in the prospective series. These 30 patients were compared, in a 1:3 design, to a matched historical group.
Results: Results were promising with VAS 0.7 (rest), 2.1 (function), key-pinch 5.1 kg and Quick-DASH of 14.3 after one year when using the Pyrocardan® implant. The revision rate was 10%. We found no differences in patient reported outcomes between the two groups.
Interpretation / Conclusion: In conclusion, the Pyrocardan® implant is a viable option in the treatment of CMC-1 osteoarthritis but with a significant revision rate. When comparing the Pyrocardan® implant to a historical control group we failed to find any differences in patient reported outcomes.

12. Kinematics of the distal radioulnar joint before and at 1-year follow-up after open reinsertion of the foveal triangular fibrocartilage complex in comparison to normal joints

Janni K Thillemann[1 2], Sepp De Raedt[2], Emil T Petersen[2 3], Katriina B Puhakka[4], Torben B Hansen[1], Maiken Stilling[2 3]
Department of Orthopaedics, University Clinic for Hand, Hip and Knee Surgery, Gødstrup Hospital[1]; AutoRSA Research Group, Orthopaedic Research Unit, Aarhus University Hospital[2]; Department of Orthopaedic Surgery, Aarhus University[3]; Department of Radiology, Regional Hospital Horsens[4].

Background: Foveal triangular fibrocartilage complex (TFCC) lesion may cause distal radioulnar joint (DRUJ) instability. Dynamic radiostereometry (dRSA) has been validated for objective measurement of DRUJ kinematics.
Aim: We aimed to evaluate the stabilizing effect of open foveal TFCC reinsertion surgery in patients, by use of dRSA.
Materials and Methods: In a prospective cohort study, 21 patients (11 men) at mean age 34 years (range 22- 50) with arthroscopically confirmed foveal TFCC lesion were evaluated preoperatively, 6 and 12 months after open foveal TFCC reinsertion with QDASH, PRWE, pain on NRS, and dRSA imaging during a patient active Press test motion cycle, including a force-loaded downstroke and a release phase.
Results: Preoperatively, the force-loaded part (>2.3 kg (CI 1.6–3.0)) of the Press test motion cycle (from 15-75%) revealed increased volar position of the ulnar head in the sigmoid notch (DRUJ position ratio) and increased distance in DRUJs with foveal TFCC lesion compared to the patients' contralateral non-injured DRUJ ($p<0.05$). Six months postoperatively, the DRUJ position was generally normalized and remained normalized at 12 months. However, the DRUJ distance remained higher on the injured side 6 and 12 months after surgery. Twelve months postoperatively, patients reported less pain during activities, improved QDASH and PRWE scores ($p<0.007$).
Interpretation / Conclusion: DRUJs with foveal TFCC lesion revealed more instability during a patient active Press test using paired comparison with the contralateral non-injured DRUJ. Open foveal TFCC reinsertion had a stabilizing effect on DRUJ kinematics towards normalization, 6 and 12 months after surgery.

13. Biomechanical evaluation of an in situ customizable fixation composite in an ex vivo ovine phalanx fracture model

Thomas Colding-Rasmussen[1], Peter Schwarzenberg[2], Daniel Hutcinson[3], Dominic Mischler[2], Peter Horstmann[1], Michael Mørk Petersen[4], Christian Nai En Tierp-Wong[1], Peter Varga[2]
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Background: Traditional metal hardware is not easily customized for a specific fracture. Accordingly, an in situ customizable osteosynthesis material, AdhFix, might be an adjuvant in the treatment of specific complex bone fractures.
Aim: To investigate the biomechanical performance of AdhFix compared to a metal plate when loaded in torsion and four-point bending.
Materials and Methods: 41 ovine proximal phalanges were stripped of soft tissue and cut transversely before osteosynthesis with either AdhFix or a metal plate (1.5mm DePuy Synthes). 3D printed specimen specific cut/drill guides were used for standardization. AdhFix was applied around conventional 1.5mm bicortical screws for anchorage and UV-light cured in a plate- like construct, on an either perfect reduced fracture or with a 3mm gap. Groups were further defined by loading modality (see results). An Instron 5866 was used for biomechanical testing: 3mm/min until failure in bending and 6°/sec until failure in torsion. Descriptive statistics and One-Way ANOVAs were performed in SPSS 27 (IBM Corp.).
Results: In bending, AdhFix 0mm gap (N=8) was stiffer than 0mm gap metal plate (N=3); 1884.2 ± 415.8; 1246 ± 114.2N/mm, $p<0,05$. The metal plate 3mm gap (N=3) was stiffer than AdhFix 3mm gap: 795.5 ± 84.3; 372.6 ± 99.9 N/mm, $p<0,05$. In max bending load to failure, metal plate 0mm gap (N=3): 2634.7 ± 324.9N and 3mm gap (N=3): 3020.4 ± 71.9 N, was stronger than AdhFix in both 0mm gap (N=8): 731.2 ± 93.1N and 3mm gap (N=8): 168.5 ± 41.1, $p<0,05$. The torsional stiffnesses of AdhFix and metal plate constructs were 39.1 ± 6.2, and 16.2 ± 3.0 Nmm/° respectively, $p<0,05$. In max torque, AdhFix (N=8) was not as robust as the metal plate (N=3): 424 ± 72; 579 ± 20 Nmm, $p<0,05$. However, when AdhFix was applied as a wide patch (25x10mm) no significant difference was observed: 600 ± 120; 579 ± 20 Nmm, $p=0,76$.
Interpretation / Conclusion: The stiffness of the composite was higher than in metal plates in both the 0mm gap group in bending and in torsion. The max loads of metal plates were higher than in AdhFix. However, for specific complex fractures, such a high max load might not be necessary. Accordingly, AdhFix might be a valuable adjuvant in the management of specific complex bone fractures.

14. 1 and 2 Column Fusion vs. Proximal Row Carpectomy in the SLAC or SNAC Wrist treatment, a comparative cohort study

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Background: Comparing Proximal Row Carpectomy with Four Column Fusion, PRC results in a better range of motion, while 4CF gives better grip strength. Nevertheless, 4CF has far more complications due to hardware issues. Recently, 1 or 2CF techniques have been developed as a limited carpal fusion. A comparative study between PRC and 1/2CF was needed.
Aim: The present study compares the clinical, radiological, and patient-reported results between PRC and less invasive, 1/2 Column Fusion, in the treatment of SLAC and SNAC conditions of the wrist.
Materials and Methods: We included 45 1/2 Column Fusion patients and 15 Proximal Row Carpectomy patients. Besides gender proportions (1/3 in 1/2CF vs 2/3 in PRC group were female), no demographic differences existed between the groups. Postoperative outcomes for the pain, range of motion, grip strength, Quick-DASH, and satisfaction were assessed, and a radiological assessment was performed.
Results: With a mean age of 58 years (range 35-76), the 1&2 CF cohort had a mean follow-up of 35 months. With a mean age of 60 years (range 31-77), the PRC cohort had a mean follow-up of 42 months. The 1/2 CF group performed significantly better regarding pain, grip strength, radial-ulnar motion, and the q- DASH: (p-value = 0.002), (p-value = 0.008), (p-value = 0.003), (p-value = 0.002), respectively. Differences in volar-dorsal motion between the groups were insignificant (p-value = 0.525). A higher conversion rate to total wrist fusion was observed in the PRC Group. All the PRC patients had osteoarthritis at follow-up, whereas it was seen in 19% of the 1/2 CF patients. The patient-reported satisfaction was substantially better in the 1 & 2 Colum Fusion group.
Interpretation / Conclusion: The findings of pain, grip strength and qDASH are in favour of 1 and 2 Column Fusion compared to Proximal Row Carpectomy, among patients treated for SNAC and SLAC wrist conditions. The ROM for the radial-ulnar movement was superior in the 1 / 2 CF group, while the ROM for the volar-dorsal movement was surprisingly no different.

15. Incidence and epidemiology of distal forearm fracture - a Population-Based Study of 5426 fractures

Søren Sørensen[1], Peter Larsen [1 2], Lærke R Korup[1], Adriano A Ceccotti[1], Mia B Larsen[1], Jonas T Filtenborg[1], Karen P Weighert[1], Rasmus Elsøe[1]
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Background: Despite intensive investigation of the epidemiology of adult fractures of the distal forearm existing literature is limited.
Aim: The aim of this study was to provide a full overview of adult epidemiology including incidence, fracture classification, mode of injury and trauma mechanism in patients sustaining a distal forearm fracture, based on an accurate at-risk population with manually validated data leading to a high quality in data.
Materials and Methods: Population-based cohort study with manual review of X-rays and charts. The primary outcome measure was incidence of adult distal forearm fractures. The study was based on an average at-risk population of 522.607 citizens. A total of 5,426 adult distal forearm fractures were included during the study period. Females accounted for 4,199 (77%) and males accounted for 1,227 (23%) of fractures.
Results: The overall incidence of adult distal forearm fractures was 207,7/100.000/year. Female incidence was 323,4/100,000/year and male incidence was 93.3/100.000/year. A marked increase in incidence with increasing age was observed for female gender after the age of 50. The incidence of DRF incidence was 203.0/1000.000/year and incidence of isolated ulna fractures was 3.8/100.000/year. The most common fracture type was an extra articular AO type 2R3A(69%), and the most common modes of injury was fall from own height (76%). A small year-to-year variation <5% was observed during the 5-year study period.
Interpretation / Conclusion: Results show that adult distal forearm fractures are very common in women after the postmenopausal period. The overall incidence of adult distal forearm fractures was 207,8/100.000/year. Female incidence was 323,4/100,000/year.

16. Covering skin defects on the hand and forearm by only using island skin flaps and primary closure of the donor-site.

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Background: Treatment of large skin defects on the hand and the forearm varies depending on the localization of the injury. Different flap techniques have been introduced, most containing split-skin flap as a transplant or as a supplement for the donor site coverage.
Aim: The study aimed to evaluate the feasibility of several flap options without using the split skin, thus improving the cosmetic result, and minimizing donor- site morbidity.
Materials and Methods: Between November 2018 and February 2022, 15 patients, of these, six women were included. Three patients had skin cancer, one pyogenic granuloma. Seven patients sustained sharp lacerations, two patients had combustions, one patient had osteomyelitis in the finger, and one was bitten by a domestic cat. Overall, six patients had infections of the soft tissue before the flap surgery. 7/15 patients sustained additional injuries. The evaluation included the size of the defects, the type of the skin flap, the number of postoperative visits, an assessment of antibiotic uses, the necessity for the additional flap surgery and the complication rate.
Results: All 15 patients were eligible for the follow-up, with a mean of six months [1-14]. The size of the defects varied from 1.5 x 1.5 cm up to 7 x 8 cm. (mean, 14.6 cm2). Four Kite-, four Thenar-, three Brunelli – and one Homo-digital Adipo-, Tendo- Fascial Reversed Flap was used on the hand/digits. Two Becker flaps and a Reversed Adipo-Fascial Forearm Flap was used on the wrist/forearm. The mean number of postoperative visits was 10, (range 3-17). Eight patients needed postoperative antibiotics. Of these, six patients received prophylactic coverage, and two patients sustained postoperative infection. One patient with supplemental nerve injury still had neural pain, postoperatively. One patient sustained partial necrosis of the primary transplant and underwent revision surgery with split skin coverage. Poor health conditions and high comorbidity might have contributed to this outcome.
Interpretation / Conclusion: All presented skin grafting techniques allowed primary closure of the skin. Although this case series lacks a larger number of patients, the techniques can be successfully used for most skin defect conditions on the hand and forearm.

17. Danish advanced translation and linguistic validation of the LIMB-Q KIDS: A new patient-reported outcome measure (PROM) for children living with limb deformities

Christopher Emil Jønsson[1 2], Lotte Poulsen[1 2], Jan Duedal Rölfing[3], Harpreet Chhina[4], Anthony Cooper[4], Jens Ahm Sørensen[1 2]

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Background: Lower Limb deformities is a term that includes many conditions such as: Lower limb deficiency, leg length discrepancy, rotational and angular deformities of the hips, knees, ankles, and feet. Pain and physical limitations are often a part of the lives of children with these deformities. The ideal way to assess the impact of these deformities impact on a child's health-related quality of life, is by using a Patient Reported Outcome Measure (PROM). Such a disease- specific PROM is currently under development, called LIMB-Q Kids.
Aim: The aim of this study was to perform an advanced translation and cultural adapt (TCA) of the LIMB-Q Kids for use in Danish children.
Materials and Methods: To undertake a TCA of the LIMB-Q Kids, the guidelines from World Health Organization and the Professional Society for Health Economics and Outcomes Research were used. This process can be divided into: Two independent Forward translations, a reconciliation meeting, a Backward translation, assessment of the Backward translation, an expert meeting, Cognitive interviews with patients and a proof reading. As it is an advanced translation, results from this translation process will influence the development of the original LIMB-Q Kids.
Results: The different steps of the TCA process contributed to the Danish version of LIMB-Q Kids. The reconciliation meeting resulted in a Danish version, with no major discrepancies between the two forward translations. The revision of the backward translation compared with the original version resulted in 12 corrections to the Danish version and the expert meeting resulted in 26 changes. The results from the cognitive interviews will be presented at the congress.
Interpretation / Conclusion: The rigorous advanced translation process has led to a linguistically validated and cultural adapted Danish version of LIMB-Q Kids. Next step is international field-testing and using this data to look at the psychometric properties of LIMB-Q Kids and conduction of the item reduction.

18. Changing surgical preference in treatment of pediatric diaphyseal forearm fractures - a Danish nationwide register study of 36,244 fractures between 1997-2016

Nicolas Borghegn 1, Rasmus Hansen 1, Per Gundtoft 1,2, Katrine Nielsen 3, Andreas Balslev-Clausen 4, Bjarke Viberg 1,5

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Background: Diaphyseal forearm fractures in children have limited remodeling potential and the choice between surgery and no surgery can be difficult. The gold standard treatment has been closed reduction and casting for a long time, but studies suggest there is an upcoming trend in managing these fractures surgically.

Aim: This study investigates the trend in choice of treatment after a diaphyseal forearm fracture in children up to 15 years over a 20- year period and as a secondary aim trend in choice of treatment in relation to age.

Materials and Methods: This is a population-based register study with data retrieved from the Danish National Patient Registry between 1997 and 2016 using ICD-10 codes for diaphyseal ulna and/or radius fractures in children 0-15 years. Surgical treatment was defined as one of the following procedure codes within one week of fracture diagnosis: closed reduction and casting, intramedullary nailing (IN), and open reduction with internal fixation (ORIF). Non-surgical treatment was defined as no recorded code within one week of fracture diagnosis or with a code for casting. Age groups were determined to give the best representation of pediatric growth development. Groups were made of four- year age intervals as followed: 0-3 years, 4- 7 years, 8-11 years, and 12-15 years.

Results: A total of 36,244 diaphyseal forearm fractures were investigated yielding a mean fracture incidence of 172/ 100,000/year. The proportion between surgical and non- surgical treatment changed from 2007 to 2016, where surgery increased from 22% to 30%. Closed reduction and casting dropped from 83% of all performed surgery in 1996 to 22% in 2016. IN increased from 7% to 75% while ORIF decreased from 11% to 3%. The same changes were also evident in all four age groups with the largest change in 8-11 years and 12-15 years while the smallest changes were in the 0-3 years group.

Interpretation / Conclusion: This study found an increase in the surgical treatment of pediatric diaphyseal forearm fractures with intramedullary nailing becoming the predominant choice of surgical treatment. There are no RCT's supporting the advantage of more fractures being treated invasively and further studies of national guidelines are recommended.

19. The Who, When, and How of Children's Distal Forearm Fractures a population-Based Epidemiology Study of 4,316 Fractures

Lærke Riis Korup, Rasmus Elsoe[1], Peter Larsen[1 2], Kumanan Rune Nanthan [1], Marie Arildsen [1], Nikolaj Warming [1], Søren Sørensen [1], Hanne Dalsgaard [1], Ole Rahbek [1]

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Background: At present, the reported incidence and epidemiology of pediatric distal forearm fractures are inconsistent, and the literature lacks a large-scale population-based study of all distal forearm fractures, based on an accurate at-risk population including all children and adolescents, reporting fracture classifications, and associated mode of injury. Such accurate data are essential to identify potential safety issues and develop potential prevention strategies to reduce the risk of distal forearm fractures in children. Furthermore, accurate data is essential in the allocation of healthcare resources in the emergency department and may be a strong predictor in determining cost of injury and associated consequences in society.

Aim: The aim of the present study was to report a complete overview of both incidence, fracture distribution, mode of injury, and patient baseline demographics of pediatric distal forearm fractures to identify age of risk and types of activities leading to injury.

Materials and Methods: Population-based cohort study with manual review of X-rays and charts. The primary outcome measure was incidence of pediatric distal forearm fractures. The study was based on an average at-risk population of 116,950 citizens. A total number of 4,316 patients sustained a distal forearm fracture in the study period. Females accounted for 1,910 (44%) and males accounted for 2,406 (56%) of the fractures

Results: The overall incidence of pediatric distal forearm fractures was 738.1/100,000 persons/year (95%CI 706/100,000 persons/year to 770/100,000 persons/year). Female incidences peaked with an incidence of 1,578.3/100,000 persons/year at 10 years of age. Male incidence peaked at 13 years of age with an incidence of 1,704.3/100,000 persons/year. The most common fracture type was a greenstick fracture to the radius (48%), and the most common modes of injury were sports and falls from ≤1 m. A small year-to-year variation was reported during the 5- year study period but without any trends.

Interpretation / Conclusion: Results show that pediatric distal forearm fractures are very common throughout childhood in both genders, with almost 2% of boys aged 13 sustaining a forearm fracture each year.

20. Increased risk of re-fracture when treating pediatric forearm fractures by closed reduction and cast

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Background: The choice of management of paediatric forearm fractures has been associated with controversies. Most fractures are either managed by Elastic Stable Intramedullary Nails (ESIN) or Closed Reduction and Casting (CR). Neither option has proven to be superior to the other.
Aim: To estimate the re-fracture rate of pediatric forearm fractures managed by ESIN and CR.
Materials and Methods: Retrospective multi-center study of 0-16- year-old children sustaining a diaphyseal forearm fracture that was surgically treated with ESIN or CR at Aalborg or Aarhus University Hospital from 2012 until 2021. Patients were identified using the ICD-10 codes DS52*, KNCJ0* and KNCJ4/5/9*. Exclusion criteria were: Lack of follow-up, physeal closure, non-diaphyseal fractures (distal/proximal fractures, Monteggia/Galeazzi/Essex-Lopresti fracture luxations), other treatment modalities (LCP/k-wire). Re-fracture rates were estimated based on chart review of each patient's electronic patient journal and assessment of all related radiographs. The re-fracture rate of management by ESIN was compared to CR using Fischer's exact test.
Results: A total of 848 patients fulfilling these criteria were analyzed. 745 patients (88%) were treated by ESIN and 103 patients (12%) by CR. Mean age was 8.9 years (CI 95% 8.67; 9.1). The re-fracture rate of ESIN treatment was 6% and 22% for CR ($p<0.001$). Mean time from injury to re-fracture was 413 days (CI 95% 279; 548) for the children treated by ESIN compared to 117 days (CI 95% 47; 185) days for the children treated by CR ($p=0.03$). The mean age at re-fracture did not statistically significantly between the two groups ($p=0.3$). Mean age difference of children managed by ESIN and CR was 2.0 years ($p<0.001$).
Interpretation / Conclusion: Children treated with ESIN were significantly older than CR-treated children. The re-fracture rates were 6% vs. 22%, respectively. This indicates an increased risk of re-fracture when managing paediatric forearm fractures with CR. However, we did neither explore injury severity, initial fracture dislocation, nor quality and time of casting.

SESSION 3: HIP ARTHROPLASTY

16. november

09:00 - 10:30

Lokale: Vingsal 3

Chair: Ann Ganestam and Thomas Jakobsen

21. Cemented and cementless dual mobility implants show similar cup fixation, low polyethylene wear, and low serum cobalt-chromium in elderly patients with hip osteoarthritis. A randomized controlled radiostereometry study of 60 patients with 6 years FU

Peter Bo Jørgensen[1 2], Steffan Tabori-Jensen[3], Inger Mechlenburg[3 4], Morten Humilius[1] , Torben Bæk Hansen[1 4], Maiken Stilling[1 2 3 4]

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Background: Dual mobility (DM) articulation total hip arthroplasty (THA) is used increasingly due to dislocation safety. Recently, concerns were raised specifically for PE wear and metal debris of cementless DM implants due to coating and metal debris particles found in the instrumentation of cementless DM implants, which may be left in the joint during surgery and cause third body wear
Aim: The aim was to investigate cup fixation, polyethylene (PE) wear, serum chromium and cobalt, and their correlation to physical activity in patients with DM implants at 6-year follow- up.
Materials and Methods: In a patient-blinded RCT, 60 patients with hip osteoarthritis at a median age of 74 years (70– 82) were randomly allocated to cemented (n=29) or cementless hydroxyapatite-coated (n=30) fixation of Avantage DM THA with a highly-crosslinked vitamin-E PE liner. Cup migration and PE wear were measured with radiostereometry, chromium and cobalt ions were measured in serum, and physical activity was measured with accelerometers.
Results: PE liner bedding-in was higher for cementless than for cemented cups (p=0.046). The PE wear rate from 1- to 6-year follow-up of 0.06 (CI95% 0.04–0.09) mm/year for cemented cups was similar to 0.07 (CI95% 0.04–0.11) mm/year for cementless cups. At 6-year follow-up, proximal cup migration of 0.14 (CI95% 0.01–0.28) mm for cemented cups and 0.21 (CI95% 0.02–0.39) mm for cementless cups was similar. Serum metal ion levels were undetectable or very low. Physical activity was mainly low intensity and did not correlate to PE wear rate or cup migration.
Interpretation / Conclusion: The findings support that cemented and cementless DM implants with highly crosslinked vitamin E infused liners have similar performance when used for primary THA surgery in elderly patients.

22. Polyethylene liner motion in dual mobility hip prostheses: static and dynamic radiostereometry in 16 cases 1 year after operation

Peter Bo Jørgensen[1], Bart L. Kaptein[2], Kjeld Søballe[1 3], Stig S. Jakobsen[3] , Maiken Stilling[1 3]
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Background: Dual mobility hip arthroplasty utilizes a freely rotating polyethylene liner to protect against dislocation. As liner motion has not been confirmed in vivo, we investigated the liner kinematics in vivo using dynamic radiostereometry.
Aim: The aims of the study were; (1) to evaluate if liner movement occurred in DM cups 1 year after primary operation and (2) to describe the movement pattern and range of such movement
Materials and Methods: 16 patients with Anatomical Dual Mobility acetabular components were included. Markers were implanted in the liners using a drill guide. Static RSA recordings and patient reported outcome measures were obtained at post-op and 1-year follow-up. Dynamic RSA recordings were obtained at 1- year follow-up during a passive hip movement: abduction/external rotation, adduction/internal rotation (modified FABER- FADIR), to end-range and at 45° hip flexion. Liner- and neck movements were described as anteversion, inclination and rotation.
Results: Liner movement during modified FABER- FADIR was detected in 12 of 16 patients. Median (range) absolute liner movements were: anteversion 10° (5–20), inclination 6° (2–12), and rotation 11° (5–48) relative to the cup. Median absolute changes in the resulting liner/neck angle (small articulation) was 28° (12–46) and liner/cup angle (larger articulation) was 6° (4–21). Static RSA showed changes in median (range) liner anteversion from 7° (-12–23) postoperatively to 10° (-3–16) at 1-year follow-up and inclination from 42 (35–66) postoperatively to 59 (46–80) at 1-year follow-up. Liner/neck contact was associated with high initial liner anteversion (p=0.01).
Interpretation / Conclusion: The polyethylene liner moves over time. One year after surgery the liner can move with or without liner/neck contact. The majority of movement is in the smaller articulation between head and liner.

23. Time trends in use of Non-Steroidal Anti-Inflammatory Drugs and opioids one year after total hip arthroplasty due to osteoarthritis during 1996-2018: A population-based cohort study of 103,209 patients

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Background: Non-steroidal anti-inflammatory drugs (NSAIDs) and opioids are commonly used to treat acute pain after total hip arthroplasty (THA). Towards combating the global opioid epidemic, changes in opioid recommendations in general has occurred. However, it is unclear how these changes have affected analgesic prescription pattern in relation to THA.
Aim: To examine time trends in the use of NSAIDs and opioids for patients with osteoarthritis undergoing total hip arthroplasty (THA) over a 22-year period.
Materials and Methods: Using Danish population-based medical databases, we identified 103,209 THA patients. Proportions of NSAID and opioid use among preoperative users and non-users were calculated in four quarters (Q1-Q4) after THA by calendar periods (1996-2000, 2001-2006, 2007-2012 and 2013-2018). Prevalence rate ratios (PRR) were adjusted for age and gender.
Results: Among preoperative NSAID users and non-users, NSAID use in Q1 increased from 32.6% in 1996- 2000 to 48.0% in 2013-2018 (PRR=1.49, 95% CI: 1.42-1.55) and from 12.9% to 32.0% (PRR=2.49, CI: 2.32-2.67), respectively. Among preoperative opioid users and non-users, opioid use in Q1 increased from 42.7% in 1996-2000 to 76.9% in 2013-2018 (PRR=1.81, CI: 1.73-1.89) and from 15.2% to 58.2% (PRR=3.85, CI: 3.65-4.05), respectively. NSAID use in Q4 decreased from 24.5% in 1996- 2000 to 21.4% in 2013-2018 (PRR= 0.88, CI: 0.83-0.93) and from 6.9% to 5.6% (PRR=0.81, CI: 0.73-0.91) in preoperative NSAIDs users and non-users, respectively. Opioid use in Q4 increased from 26.6% in 1996-2000 to 28.6% (PRR=1.08, CI: 1.02-1.15) in 2013-2018 and from 4.1% to 5.0% (PRR=1.25, CI: 1.11-1.40) in preoperative opioid users and non-users, respectively.
Interpretation / Conclusion: Although we observed up to a 4-fold increase in NSAID and opioid use in Q1 after THA during 1996-2018, use of NSAIDs and opioids in Q4 did not change substantially since 1996. However, 5-6% of the preoperative non-users of NSAIDs and opioids were users in Q4 after THA, which might relate to inaccurate indication for or timing of THA and the post-surgical phasing out of analgesics use.

24. Vitamin E-Diffused Liners Showed Less Head Penetration Compared With XLPE In Primary Total Hip Arthroplasty: 10 Years Results Of A Multi-Arm Randomized Trial

Joseph El-Sahoury, Kristian Kjærgaard, Ole Ovesen, Christian Hofbauer, Søren Overgaard, Ming Ding

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Background: Wear of the acetabular polyethylene liner in total hip arthroplasty (THA) may lead to bone osteolysis, aseptic loosening and subsequently revision surgery. Wear may be reduced by using oxidatively stabilized, vitamin E-doped, cross- linked polyethylene (vE-PE) liners instead of annealed or remelted cross-linked polyethylene (XLPE).

Aim: The primary aim was to investigate differences in Head penetration between vE-PE and XLPE liners and between 32- and 36-mm head size. Secondary outcomes included cup migration and PROMs (EQ-5D, SF-36, HHS, UCLA Activity Score)

Materials and Methods: This study(NCT02196792) was comprised of 4 combined intervention groups in a 2X2 setup. Moreover the study was randomized, as patients were randomly assigned to receive a liner material (vE-PE or XLPE) and head size component (32 mm or 36 mm). The outcome of the study includes Head penetration and cup migration, both of these were obtained and measured by radiostereometric analysis (RSA). RSA was performed postoperatively at baseline, 3, 12, 24, 60, 84 and 120 months. Patient-reported outcome measures (UCLA Activity Score, Harris Hip Score, and EQ-5D) were acquired at baseline, 3, 12, 24, 36, 60, 84 and 120 months. The Outcomes were calculated by linear mixed-effect analysis. We aimed to include 100 patients in our study powered as a parallel-group design.

Results: A total of 220 patients were assessed for eligibility for this study, but 93 of the patients were excluded. Four patients received screws, 26 patients received cups smaller than 54 mm, 5 patients received other components, 1 patient underwent surgical complications, and 57 patients due to other reasons. 127 patients who underwent randomization into 4 groups and 116 patients received their allocated intervention. Ten years later, 34 patients were lost to follow- up and 82 patients were followed-up. Baseline data was similar between groups in. The following results will be intention-to-treat (ITT) data.

Interpretation / Conclusion: There was significantly lower head penetration in vE-PE compared to XLPE liners at 10 years, and No difference was found between 32 and 36 mm heads. The findings is of clinical importance and may reduce the risk of revision in the long run.

25. Time trends - Increasing risk of revision due to infection after total hip arthroplasty: a study on 575,502 primary THAs in the Nordic Arthroplasty Register Association's dataset from 2004 to 2018

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Background: Previous publications have suggested that the incidence of revisions due to infection after THA.

Aim: We explored trends of risk and timing of revision due to infection after primary THAs in the Nordic countries during the period 2004-2018.

Materials and Methods: Primary THAs reported to the Nordic arthroplasy registers (NARA) from 2004 to 2018 were included. Adjusted Cox regression survival analyses with the first revision due to deep infection after primary THA was performed. The risk of revision as a function of time was investigated. In addition, we explored changes in the time span from primary THA to revision due to infection.

Results: Of 575,502 primary THAs that met the inclusion criteria, 5,703 (1.0%) were revised due to deep infection. The risk of revision due to infection increased through the period studied. Compared to THAs implanted in 2004-2008, the risk of revision due to infection was 1.4 (95%CI 1.3-1.5) for 2009-2013, and 1.8 (1.7-2.0) for 2014-2018. We found an increased risk for all four nations. Compared to 2004-2008, for all THAs, the adjusted risk of revision due to infection 0-30 days postoperatively was 2.5 (1.8-2.8) for 2009- 2013 and 3.3 (2.9-3.8) for 2013-2018. The adjusted risk of revision due to infection 31-90 days postoperatively was 1.5 (1.2-1.9) for 2009- 2013 and 2.4 (2.0-2.9) for 2013-2018, compared to 2004-2008. Beyond 91 days postoperatively, the risk of revision due to infection was similar to 2004-2008 for all 3 time periods.

Interpretation / Conclusion: The risk of revision due to deep infection after THA increased 80% throughout the period 2004-2018. This increase was mainly due to an increased risk of early revisions. The cause for these changes may be multifactorial (patient selection, diagnostics, revision strategy, completeness of reporting, etc.), and are not possible to disclose in the present study.

26. Association between duration of anticoagulant thromboprophylaxis and revision rate in primary total hip arthroplasty: A Danish and Norwegian nationwide cohort study.

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Background: There are concerns that bleeding following primary total hip arthroplasty (THA) contributes to prolonged wound drainage and prosthetic joint infection (PJI) and inferior fixation.
Aim: We examined whether short (1-5 days), medium (6- 14 days), and extended (≥ 14 days) duration of thromboprophylaxis is associated with the 5 year revision rate after THA due to osteoarthritis.
Materials and Methods: Cohort study based on data from hip arthroplasty and administrative registries in Denmark and Norway (2008-2013). The outcome was revision surgery; due to PJI, aseptic loosening, any cause and death. Adjusted cause-specific hazard ratios (HRs) were analyzed with Cox regression analyses.
Results: Among 50,482 THA patients, 8,333 received short, 17,009 received medium, and 25,140 received extended thromboprophylaxis. The HRs for any revision were 1.0 (95% CI 0.9-1.2) and 1.0 (0.9-1.1) for short and extended vs medium thromboprophylaxis. The HRs for revision due to PJI were 0.9 (0.7-1.2) and 1.04 (0.9-1.3) for short and extended vs. medium thromboprophylaxis. The HRs for revision due to aseptic loosening were 1.1 (0.8- 1.5) and 1.3 (1.0-1.6) for short and extended vs. medium thromboprophylaxis. The absolute differences in cumulative incidences at 5 years were <0.5%.
Interpretation / Conclusion: Our data suggest no association between duration of anticoagulant thromboprophylaxis and revision rate within 5 years of THA. There is an indication that the extended thromboprophylaxis might be associated with increased revision rate due to aseptic loosening, but the mechanism of this association is not entirely clear and is a topic that requires further research.

27. Risk of total hip arthroplasty revision depending on different acetabular component fixation in patients 65 years of age and older operated with total hip arthroplasty due to primary hip osteoarthritis. A study of 203,301 primary total hip arthroplasties from the Nordic Arthroplasty Register Association (NARA).

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Background: Use of uncemented fixation of total hip arthroplasty (THA) components are increasing worldwide. Cemented femoral component fixation in THA has shown better results in older patients, but less is known about the result when focusing on the cup.
Aim: To compare the risk of THA revision due to any reason in patients with cemented or uncemented acetabular cups.
Materials and Methods: We used data from the NARA database; and included in total 174,536 patients divided into 107,320 cemented and 95,981 uncemented cups operated between 1995-2018. Only patients with primary osteoarthritis and 65 years of age or older were included. Metal-on-metal and ceramic-on-ceramic bearings were excluded. We used Cox regression analyses adjusted for period of primary surgery, type of stem fixation, femoral head size and type of bearing to estimate the hazard ratio (HR) of THA revision due to any reason. Data was stratified for sex and age groups of 65- 69,70-74,75-79 and 80+ years and is presented with hazard ratios (HR) and 95% confidence intervals (CI).
Results: Totally 10,427(5.1%) THAs were revised distributed in 4.5% of THAs with uncemented cups and 5.7% with cemented cups. Aseptic loosening was the most frequent cause of revision for cemented cups (45%) and dislocation was for uncemented cups (29%). The risks of revision for women between 65-69, 70-74, 75-79 and 80+ were HR=0.9 (0.7-1.0), HR=0.8 (0.7-1.0), HR=1.2 (1.0-1.3) and HR=1.3 (1.1-1.5) respectively. Risk of revision for male group in corresponding age groups were HR=0.9 (0.7-1.0), HR=0.8 (0.7-1.0), HR=0.9 (0.8-1.1) and HR=1.0 (0.8-1.2) respectively.
Interpretation / Conclusion: There is a slightly increased risk of THA revision for any reason when uncemented cups are used in women over the age of 75 years. Uncemented cups in elderly women should be used with care.

28. Occurrence of pseudotumors, metal ion levels and patient reported outcome in patients treated with resurfacing and stemmed metal-on-metal total hip arthroplasty compared to metal-on-polyethylene total hip arthroplasty a long-term follow-up study

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Background: Metal-on-metal (MoM) total hip arthroplasty (THA) and hip resurfacing arthroplasty (HRA) may cause adverse reaction to metal debris such as pseudotumors (PT), but PTs can also form around metal-on-polyethylene (MoP) THA. Little is known about the long-term natural history of PT in different types of hip arthroplasty which is important for postoperative follow-up.
Aim: We aimed to investigate how occurrence of PT, metal ion blood levels and patient reported outcome changed over time in HRA, MoM and MoP THA at 4 and 13 years after primary surgery.
Materials and Methods: We conducted a prospective cohort study based on a cohort consisting of 127 HRA, 38 MoM THA and 62 MoP THA who underwent primary surgery between 2005-2010. We included 58 HRA, 16 MoM and 24 MoP THA who twice underwent magnetic resonance imaging (MRI) and had their blood levels of cobalt and chromium and patient reported outcome measure (PROM) scores evaluated at a median of 4 and 13 years after surgery.
Results: There were no differences in PT prevalence between the types of hip arthroplasty at first ($p=0.348$) or second ($p=0.272$) MRI. Most PTs were Hauptfleisch type I (11) followed by type III (4) and type II (3) at second examination. 14 out of 26 PTs could not be diagnosed at the latest follow-up. Six new PTs were diagnosed between first and second MRI, 4 of these in MoP THA and 2 in HRA. Median PT volume were 48 cm3 (range 2-126) in HRA, 28 cm3 (range 24-32) in MoM THA and 16 cm3 (range 2-60) in MoP THA ($p=0.554$) at second examination. HRA had the highest median levels of cobalt and chromium (1.8 ug/L, range 0.24-83 and 1.6 ug/L, range 0.21-47), followed by MoM (1.3 ug/L, range 0.59-3.8 and 1.1 ug/L, range 0.52-2.8) and MoP THA (0.29 ug/L, range 0.12-5.8 and 0.52 ug/L, range 0.21-1.7) ($p<0.001$ and $p<0.001$) at second examination. We found no differences in the PROM scores.
Interpretation / Conclusion: PTs were just as common in HRA and MoM THA as in MoP THA. More new PTs were diagnosed in MoP THA. Blood levels of cobalt and chromium was higher in HRA and MoM THA compared to MoP THA, but type of hip arthroplasty and PT had no influence on PROMs. In perspective, we showed a clear change in PT incidence which is important to know when following these patients.

29. The presence of bacteria and their resistance pattern following revision of total hip or knee arthroplasty

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Background: ostoperative joint infections are a major complication that occur in 1-2% of all total hip arthroplasty and total knee arthroplasty (THA and TKA) leading to increased morbidity and mortality. The knowledge of these infective organisms and their resistance patterns is of great importance for the treatment of the patient and for future prophylactic strategy.
Aim: The main purpose of this study is to investigate the presence of bacteria cultured from revision surgery after THA and TKA. Additionally, we will investigate the phenotypic resistance patterns and describe multidrug-resistance of the different bacterial species.
Materials and Methods: The study is a retrospective review of the patient reports on all revisions of THA and TKA undertaken at Bispebjerg Hospital, Copenhagen, in 2018 and 2019. We noted the organism(s) in cultured biopsies in all cases and their antibiotic resistance patterns. We also investigated the difference in cultures between first-time and all later revisions.
Results: A total of 170 revisions were performed. Here 88 cases had positive culture from biopsies, of which 11% had polymicrobial findings. Staphylococcus aureus was identified in 31% of the cases with 79% of these resistant to Penicillin G. Staphylococcus epidermidis was identified in 11% of cases with high levels of resistance towards Dicloxacillin (75%), Cefuroxime (75%), and Gentamicin (73%). The percentages of S. epidermidis in the study increased from 5% at first-time revision to 16% at later revisions. Only four cases with positive cultures of Corynebacterium striatum (n=1), Enterococcus faecium (n=2) and Enterococcus casseliflavus (n=1) showed resistance to Vancomycin.
Interpretation / Conclusion: In conclusion, we showed that S. aureus and S. epidermidis were the most frequent species cultured from revision THA and TKA. However, importantly the proportion of S. epidermidis increasing when comparing first-time revision with second time and more. Also, the resistance patterns of S. epidermidis showed resistance to several antibiotics, including drugs used in common practice prophylaxis.

30. KKR: The use of dual mobility bearings in primary total hip arthroplasty

Morten Bøgehøj, Martin Lamm , Thomas Jakobsen
Danish Society for Hip and Knee Arthroplasty

Background: Operation with a total hip arthroplasty (THA) is a well-documented treatment, with a high probability for a good outcome and low risk of serious complications. Dislocation is one of the most frequent complications. Several conditions increase the risk of dislocation of a THA, femoral neck fracture, high age, lumbar fusion and neuromuscular disease. To reduce the risk of dislocation in these high-risk patients the dual mobility cups are often used as an anti-dislocation cup. Studies have reported the use of dual mobility designs as a standard component for patients the gets treated with a THA, in these cases the dislocation rate is reported to be low. A dual mobility cup is designed with two articulations and hence a big surface that is subject to wear. Furthermore, there have been described release of metal debris when the cup is inserted.
Aim: The aim of this short clinical guideline was to answer to PICO-question:" Does patients above the age of 70 years of age, with osteoarthrosis and indication for a THA have better effect when operated with a dualmobility cup than patients operated with a unipolar cup, regarding dislocation, reoperation and function?"
Materials and Methods: A systematic literature search based upon the PICO-question was conducted in Pubmed and Embase. 1283 records were screened. 22 full-text articles were assessed for eligibility. Three systematic reviews and four registry studies were included. Quality assessment of included studies was conducted using AMSTAR for systematic reviews and ROBINS-I for registry studies.
Results: In the literature the comparison of unipolar and dualmobility cup are with different sizes of unipolar heads from 22.2 to 36 mm, many studies compare with 22.2- and 28-mm heads. From the Danish hip registry, we know that the most common head sizes today is 36- and 32-mm and very few 28 mm. On reoperation after 1 and 5 years we find the same risk of revision, but for different reasons.
Interpretation / Conclusion: Dual mobility cups are only to be used after thorough evaluation of the individual patient case, as the benefit for the standard patient with osteoarthrosis is uncertain compared with the unipolar cup. The use of dual mobility cups can be relevant in patients with osteoarthrosis with low level of function and high risk of dislocation (risk of falling, neuromuscular disease or reduced spinopelvin mobility due to lumbar fusion).

SESSION 4: YODA BEST PAPER

16. november

11:00 - 12:00

Lokale: Centersalen

Chair: Christian Bredgaard Jensen and Claus Varnum

31. Accuracy of 18F-NaF PET/CT in the diagnosis of infection or aseptic or septic loosening of total knee and hip arthroplasty. A prospective study.

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Background: Infection and/or loosening are serious complications after total knee- and hip arthroplasty (TKA/THA). Bone scintigraphy (planar and SPECT/CT) may yield important information in the diagnosis, but the overall clinical value is limited by poor accuracy. Studies using 18F-sodium fluoride Positron Emission Tomography/Computed Tomography (18F-NaF PET/CT) have shown promising results; however, these findings need validation in larger populations.
Aim: To assess diagnostic accuracy of 18F-NaF PET/CT in patients suspected of infection and/or loosening of total knee- or hip arthroplasty.
Materials and Methods: The study was a prospective descriptive study. Included patients were examined with laboratory tests, conventional x-ray, SPECT/CT and 18F-NaF PET/CT. Here we only report results from the PET/CT part of the study. The PET/CT scans were interpreted by nuclear medicine specialists blinded to clinical findings. Patients with clinically suspected infection and/or loosening in TKA/THA were surgically revised. Perioperative findings or clinical follow up at 12 months for those that were not revised were considered the diagnostic gold standard.
Results: Our study included 58 patients (m:f 20:38) with a mean age of 67 years. Infection and/or loosening was suspected clinically in 15 TKA and 43 THA prior to the examinations. 18F-NaF PET/CT showed a sensitivity of 63% for finding infection and/or loosening and a specificity of 90% for correctly identifying those without infection and/or loosening. The fraction of true infection and/or loosening of the positive patients comprised the positive predictive value (PPV) of 71%. The negative predictive value (NPV) was 86%, thus showing the fraction of patients without infection and/or loosening with negative findings.
Interpretation / Conclusion: Our study shows good clinical value of 18F- NaF PET/CT for ruling out infection and/or loosening of total knee- and hip arthroplasty. 18F-NaF PET/CT was best to diagnose patients without infection and/or loosening meaning that a scan without typical uptake in 90% of the cases is correct. Low sensitivity and PPV show that a positive 18F-NaF PET/CT need to be assessed in conjunction with other examinations before a decision of revision is made.

32. High Cefuroxime Concentrations and Long Elimination in an Orthopaedic Surgical Deadspace-A Microdialysis Porcine Study

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Background: Deadspace is the tissue and bony defect in a surgical wound after closure. This space is presumably poorly perfused favouring bacterial proliferation and biofilm formation. In arthroplasty surgery, an obligate deadspace surrounding the prosthesis is introduced and deadspace management, in combination with obtaining therapeutic prophylactic antibiotic concentrations, is important for limiting the risk of acquiring a periprosthetic joint infection (PJI).
Aim: This study aimed to investigate cefuroxime distribution to an orthopaedic surgical deadspace in comparison with plasma and bone concentrations during two dosing intervals (8 h × 2). The primary endpoint was time above the cefuroxime minimal inhibitory concentration of the free fraction of cefuroxime for Staphylococcus aureus (fT > MIC (4 µg/mL)).
Materials and Methods: In a setup imitating shoulder arthroplasty surgery, but without insertion of a prosthesis, microdialysis catheters were placed for cefuroxime sampling in a deadspace in the glenohumeral joint and in cancellous bone of the scapular neck in eighteen pigs. Blood samples were collected as a reference. Cefuroxime was administered according to weight (20 mg/kg).
Results: During the two dosing intervals, mean fT > MIC (4 µg/mL) was significantly longer in deadspace (605 min) compared with plasma (284 min) and bone (334 min). For deadspace, the mean time to reach 4 µg/mL was prolonged from the first dosing interval (8 min) to the second dosing interval (21 min), while the peak drug concentration was lower and half-life was longer in the second dosing interval.
Interpretation / Conclusion: In conclusion, weight-adjusted cefuroxime fT > MIC (4 µg/mL) and elimination from the deadspace was longer in comparison to plasma and bone. Our results suggest a deadspace consolidation and a longer diffusions distance, resulting in a low cefuroxime turn-over. Based on theoretical targets, cefuroxime appears to be an appropriate prophylactic drug for the prevention of PJI.

33. Calf Muscles Atrophy and Tendon Elongation assessment using Magnetic Resonance Imaging after acute Achilles tendon rupture. A Randomized Controlled Trial investigating the Copenhagen Achilles Rupture Treatment Algorithm (CARTA).

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Background: Treatment of acute Achilles tendon rupture (ATR) is a subject of discussion. Individual treatment selection has been proposed as the key to optimized treatment for patients with an acute ATR.

Aim: The purpose of the present study was to investigate if calf muscle atrophy and Achilles tendon elongation measured on magnetic resonance imaging (MRI) was less affected when comparing patients treated according to Copenhagen Achilles Rupture Treatment Algorithm (CARTA) – an individualized treatment algorithm utilizing surgical or non-surgical treatment depending on ultrasound findings – to patients treated non-surgically or surgically.

Materials and Methods: 60 patients with ATR were randomized 1:1:1 in a three-armed design: 1) intervention group; patients treated according to CARTA, 2) control group; patients treated non-surgically, and 3) control group; patients treated surgically. Investigators were blinded to the intervention. At 1 year MRI of both lower limbs was performed and muscle volumes were calculated for the medial and the lateral head of the gastrocnemius muscle, the soleus muscle, and the deep flexors muscles (flexor hallucis longus, flexor digitorum longus and tibialis posterior). Length of the different parts of the Achilles tendon was measured from the top of the talus to each of the three muscle bellies in the triceps surae. Calf muscle atrophy and Achilles tendon elongation were investigated using the limb symmetry index (LSI) (injured / uninjured x 100%).

Results: One hundred and fifty-six patients were assessed for eligibility, 60 patients were included and 54 patients contributed data for the MRI analysis: 19 intervention group, 17 non-surgical treatment and 18 surgical treatment. No statistically significant differences were found between the intervention group and the two control groups regarding both calf muscle atrophy and Achilles tendon elongation. Comparison between the injured and the uninjured limb revealed significantly lower muscle volume of the triceps surae and significant tendon elongation of the injured leg.

Interpretation / Conclusion: The individualized treatment algorithm CARTA did not reduce calf muscle atrophy and Achilles tendon elongation compared to usual treatment.

34. Adjustable-Loop Devices are non-inferior compared to Fixed-Loop Devices for femoral fixation in Anterior Cruciate Ligament Reconstruction

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Background: Button implants with an Adjustable-Loop Device (ALD) are now used more often in Anterior Cruciate Ligament Reconstruction (ACLR). Clinical research comparing ALDs to Fixed-Loop Device (FLD) has mainly been investigated in small patient populations with short follow-up time. To investigate if ALDs are safe to use in ACLR a non-inferiority study with a large study population and long follow-up time would be beneficial.
Aim: This study investigated if ALDs demonstrated non-inferior revision surgery rates, knee stability and Patient-Reported Outcomes (PROMs) in ACLR compared to FLDs.
Materials and Methods: This was non-inferiority register-based cohort study, with data from the Danish Knee Ligament Reconstruction Registry (DKRR). 12.722 patients of >15 years of age with primary ACLR using hamstring tendon autografts and either a FLD or ALD for femoral fixation were included: 9.719 in the FLD group and 3.014 in the ALD group. The primary outcome was revision ACLR with a non-inferiority margin set to 2% difference. Secondary outcomes were anterior and rotatory knee stability and as well as PROMs with the Knee Injury and Osteoarthritis Outcome Score (KOOS) at 1- year follow-up. The non-inferiority margin for anterior stability was set to a difference of 2mm in the side-to-side difference, and for PROMs the non-inferiority margin was set to a 10 points difference.
Results: The crude cummulative revision rates for ALD implants at 2 and 5 years was 2.1% (95% CI: 1.62-2.68) and 5.0% (95% CI: 4.22-5.96). In the FLD group this was 2.2% (95% CI: 1.89-2.48) and 4.7% (95% CI: 4.31-5.20). The 1-year side-to-side difference was 0.97mm (95% CI: 0.90 – 1.03) in the ALD group and 1.45mm (95% CI: 1.41-1.49) in the FLD group. 13% had a positive pivot shift in the FLD group, and 6% in the ALD group. There were no differences in KOOS.
Interpretation / Conclusion: ALDs are non-inferior compared to FLDs regarding revision rates, knee stability and patient reported outcomes, and are therefore safe to use for femoral fixation in ACLR.

35. Thyroid Function and risk of fracture

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Background: Abnormal levels of thyroid stimulating hormone (TSH) and thyroid status is thought to be associated with increased risk of hip fracture and other fractures.
Aim: The aim of the present study was to test the association of abnormal levels of TSH and thyroid hormones with hip fracture, fragility fracture, and all fracture.
Materials and Methods: In total, 108,000 participants with measured TSH were included from the Copenhagen General Population study. Thyroid hormones were automatically measured if TSH was outside of reference range (0.4-4.5 mIU). Risk of fracture was estimated using proportional hazard models. Primary outcome was hip fracture. Multiple events analysis was performed for both fragility fracture and all fractures.
Results: Among 107,996 participants, 524(0.5%) had hypothyroidism, 3,279(3%) had subclinical hypothyroidism, 2,262(2%) had subclinical hyperthyroidism, 393(0.4%) had hypothyroidism. During 988,323 person years of follow-up 1,939 participants sustained a hip fracture, 6,639 had fragility fractures, and 11,522 had any fracture. Subclinical hyperthyroidism showed a strong association with increased risk of hip fracture, fragility fractures, and any fracture with multiple adjusted hazard ratios of 1.33 (95% Confidence Interval (95%CI) 1.08 - 1.64), 1.21(95%CI 1.06-1.39), and 1.31(95%CI 1.16- 1.47), respectively. Consistently, a TSH below reference range was associated with multifactorially adjusted hazard ratio of 1.31(1.05-1.62) for hip fracture, 1.23(1.07-1.41) for fragility fracture, and 1.30 (95% 1.15- 1.47) for any fracture. However, TSH did not follow a linear relationship with fracture risk. Severely depressed TSH (<0.10 mIU) was not associated with an increased risk of hip, fragility fracture, and any fracture.
Interpretation / Conclusion: Results from the present study indicated that subclinical hyperthyroidism is associated with an increased risk of hip, fragility, or any fracture. However, TSH did not follow a linear relationship with fracture risk.

36. True incidence of dislocation and associated risk factors in patients with a hip fracture operated with an uncemented hemiarthroplasty

Britt Aaen Olesen, Susanne Faurholt Närhi, Thomas Giver Jensen, Søren Overgaard, Henrik Palm, Michala Skovlund Sørensen
Department of Orthopaedic Surgery and Traumatology, Copenhagen University Hospital, Bispebjerg

Background: Several factors might be associated with risk of dislocating following uncemented hemiarthroplasty (uHA) due to hip fracture. Current evidence is limited with great variance in reported incidence of dislocation (1-15%).
Aim: Aim of this study was to calculate the true cumulative incidence of dislocation following uHA and to identify the associated risk factors.
Materials and Methods: We performed a retrospective cohort study of patients receiving an uHA (BFX Biomet stem) at Copenhagen University Hospital, Bispebjerg, in 2010-2016. Patients were followed until death or end of study (dec 2018). Dislocation was identified by code extraction from the Danish National Patient Registry. Variables included in the multivariate model was defined pre-analysis to include: age, sex and variables with a p-value <0.1 in univariate analysis. A regression model was fitted for 90 days dislocation as the assumption of proportional hazard rate (HR) was not met here after.
Results: We identified 772 stems with a mean follow- up of 24 mo (range 0-102). 58 stems suffered 90 dislocations during the observation period resulting in a 7% (CI 5-9) incidence of dislocation. 55 of the 58 stems (95%) experienced the first dislocation within 90 days after surgery. Dementia and residence status were found as independent risk factors in the subdistribution model (dementia: HR 0.46 (CI 0.22-0.92), residence other than home: HR 2.04 (CI 1.00-4.14)). Only absence of dementia was identified as an independent protective factor in the cause-specific model (HR 0.46 (CI 0.23-0.89)) resulting in a 2.4- fold cumulative risk of experiencing a dislocation in case of dementia. Several other variables such as age, sex, various medical conditions, surgery delay and surgical experience were eliminated as statistical risk factors.
Interpretation / Conclusion: The incidence of dislocation of uHA in patients with a hip fracture is found to be 7%. Due to the non-existing attribution bias, we claim it to be the true incidence. Dementia is among several variables identified as the only risk factor for dislocation. In perspective, we may consider treating patients with cognitive impairment by other methods than HA.

SESSION 5: TUMOR, INFECTION AND AMPUTATION

16. november

11:00 - 12:00

Lokale: Vingsal 2

Chair: Christina E. Holm and Christen Ravn

37. Rifampicin does not reduce moxifloxacin concentrations at the site of infection or improve treatment outcome of a one-stage exchange surgery protocol of implant-associated osteomyelitis lesions in a porcine model

Sofus Vittrup, Louise Kruse Jensen, Pelle Hanberg, Josefine Slater, Magnus Hvistendahl, Maiken Stilling, Nis Pedersen Jørgensen, Mats Bue

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Background: Rifampicin has for many years been considered a cornerstone in implant-associated osteomyelitis (IAO) treatment.

Aim: We conducted a randomised, one-stage exchange surgery protocol with either one-week treatment with moxifloxacin alone or co- administered with rifampicin in IAO porcine model to evaluate steady-state moxifloxacin concentrations in infected bone and soft tissue assess and the additive microbiological treatment effect of rifampicin.

Materials and Methods: 16 female pigs were included. On day 0, IAO was induced creating an implant cavity in the right proximal tibia using a moxifloxacin and rifampicin susceptible porcine Staphylococcus aureus strain. On day 7, the pigs underwent one-stage exchange surgery of IAO lesions and were randomly allocated to receive seven days of intravenous antibiotic treatment of either rifampicin 450 mg twice daily combined with moxifloxacin 400 mg once daily (Group RM) or moxifloxacin 400 mg once daily (Group M). Steady state concentrations were presumed for both drugs after seven days. On day 14, microdialysis was applied for continuous sampling of moxifloxacin concentrations during 8 h in five compartments: the implant cavity, cancellous bone in both the right (infected) and left (non-infected) proximal tibia, and adjacent subcutaneous tissue on both the right (infected) and left (non-infected) side. Venous blood samples were collected for reference. Microbiological analyses were performed post- mortem.

Results: Moxifloxacin AUC was lower in plasma in group RM, (mean;95% CI) 407; 315–499 min µg/mL vs Group M, 625; 536–724 min µg/mL (p=0.002). For the implant cavity, there was a trend toward a lower AUC in Group RM, 425; 327–524 min µg/ml vs Group M, 297; 205–389 min µg/ml, but not statistically different (p=0.06). For the other compartments, the remaining calculated pharmacokinetic parameters were similar between the groups. Comparable cure rates (sterilization of both implant and bone) were observed with 5/8 pigs in Group RM compared to 3/7 in Group M (p=0.62).

Interpretation / Conclusion: While moxifloxacin AUC was lower in plasma for animals co-treated with rifampicin, both the moxifloxacin concentrations at the site of infection and treatment outcomes were comparable between groups.

38. Piperacillin Bone Concentrations - a randomized porcine study comparing continuous infusion vs. short-term infusion

Hans Christian Rasmussen[1], Mats Bue[1], Andrea Jørgensen[3], Pelle Hanberg[4], Sara Tøstesen[5], Martin Knudsen[6], Maiken Stilling[7]
Department of Orthopaedic Surgery, Aarhus University Hospital [2 7] Orthopaedic Research Unit, Aarhus University Hospital [1 2 3 4 5 6 7] Department of Otorhinolaryngology, Head and Neck Surgery, Aarhus University Hospital [4]

Background: Osteoarticular infections caused by Pseudomonas aeruginosa have seen an increase in recent years. A central antimicrobial choice in the treatment of pseudomonal orthopaedic infections is piperacillin. Studies have indicated higher cure rate of pseudomonal infections with continuous infusion (CI) of piperacillin compared to intermitted short-term infusion (STI). However, due to practical reasons STI is still commonly used.
Aim: The aim was to assess time above the minimal inhibitory free concentration (f(T>MIC)) for piperacillin at steady state in tibial cortical bone, cancellous bone, the knee joint, and subcutaneous tissue following STI and CI using microdialysis in a porcine model.
Materials and Methods: 16 female Danish landrace pigs were randomized to either CI or STI of piperacillin/ tazobactam. Group STI received a bolus of 4g/0.5g every 6h and Group CI received 16g/2g daily. Microdialysis catheters were placed for sampling in the tibial cortical bone, cancellous bone, the knee joint, and subcutaneous tissue. Steady state was assumed at 12h and data collection of dialysates and blood samples preceded for the following 6h. The piperacillin f(T>MIC) was evaluated at MIC targets of 4 µg/mL, 8 µg/mL and 16 µg/mL.
Results: At steady state, with exclusion of cortical bone, CI resulted in a mean f(T>MIC) (4 µg/mL) target attainment of ≥99% across all compartments compared to ≥67% for group STI. Similar results were found for targets of 8 µg/mL (≥93%, ≥53%) and 16 µg/mL (≥64%, ≥35%). Mean f(T>MIC) in cortical bone was generally lower in group CI compared to group STI for all targets, but only statistically significant for the 8 µg/mL target (p=0.049).
Interpretation / Conclusion: For all tissue targets, except cortical bone, CI administration resulted in higher steady state piperacillin concentrations compared to STI administration. To obtain sufficient piperacillin concentrations in cortical bone, higher or more frequent dosing is needed.

39. Surgical offloading procedures for patients with non-healing diabetic foot ulcers. A National Clinical Guideline

Tue Smith Jørgensen
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Background: Patients with diabetes have a higher risk of developing a foot deformity or malposition in the foot due to bone collapse, neuropathy, tendon contracture and insufficient muscle strength. Deformities and misalignments can result in an increased local pressure load on the foot, and significantly increased risk of developing a diabetic foot ulcer. To promote wound healing, it is essential to offload the wound with insoles, footwear or a offloading bandage. If the external offloading (standard treatment) does not have an effect, or the misalignment of the foot and toes is too extensive, offloading surgery may be appropriate.
Aim: To review the litterature on surgical offloading procedures for patients with foot or toe malalignment and non-healing diabetic foot ulcers.
Materials and Methods: The study is a systematic review and metaanalysis, and the systematic litterature search was performed the 31. Of january 2020. The evidens consists of three randomised clinical trials (4 publications), one non randomised controlled trial and 4 case control studies. The intervention in the studies consisted of achilles tendon lengthening or metatarsal osteotomy. Patients in the control groups were treated with a non-removable cast or a specially made foot orthosis.
Results: Nine out of 63 patients in the surgical offloading group had a recurrent ulcer compared with 29 out of 60 patients who received standard wound care. The meta-analysis showed a lower risk of recurrence of wounds in patients who received offloading surgery, the relative risk was 0.30 (95% CI: 0.15, 0.58). None of the 52 patients in the group who received surgical offloading had a lower extremity amputation, whereas 2 out of 53 patients had an amputation in the group that received standard wound treatment. The meta-analysis showed a relative risk of 0.34 (95% CI: 0.04, 3.12)
Interpretation / Conclusion: Clinicians should consider surgical offloading with achilles tendon lengthening or metatarsal osteotomy in patients with foot or toe malalignment and non- healing diabetic foot ulcers.

40. Role of Sonication in Diagnosis of Orthopaedic Implant Associated Infections

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Department of Clinical Medicine, Aarhus University[1]; Department of Orthopaedic surgery, Aarhus University Hospital[2]; Department of Infectious diseases, Aarhus University Hospital[3]; Department of Biomedicine, Aarhus University[4]; Department of Orthopaedic surgery, Horsens Regional Hospital[5]

Background: Orthopaedic implant associated infections (OIAI) have high morbidity and mortality. In addition to aerobic bacteria like Staphylococcus aureus, slow growing Gram- positive anaerobic bacteria (SGAB) like Cutibacterium acnes are increasingly associated with OIAI. SGAB infections are difficult to diagnose because of their prolonged cultivation times as well as non- specific clinical, laboratory and radiologic features. Sonication of implants can help in the diagnosis of SGAB infections.

Aim: To identify the different bacteria, especially SGAB, isolated from sonication fluid of orthopaedic implants removed during revision surgeries.

Materials and Methods: Between August 2019 and September 2020, 100 implants that were removed during revision surgery at the Department of Orthopaedic surgery, Aarhus university hospital were collected and processed by the vortex-sonication method. The resultant sonication fluid (SF) was cultured aerobically and anaerobically. All isolated bacteria were identified by 16S rRNA sequencing. Bacterial growth >50 or >200 CFU/ml of uncentrifuged or centrifuged SF respectively was considered significant. In case of C. acnes, significance of the isolates was based on whole genome sequencing and amplicon based next generation sequencing. Relevant clinical details including tissue culture results were obtained from patients' records.

Results: SF from 21 implants showed significant bacterial growth. Only 11 of these implants had a prior diagnosis or suspicion of infection. C. acnes (n=8), S. aureus (n=4) and Staphylococcus epidermidis (n=2) were the most commonly isolated bacteria. Tissue culture were either not sent or had no bacterial growth in 33% (7/21) of implants.

Interpretation / Conclusion: Routine sonication of orthopaedic implants removed during revision surgeries can help to identify cases of OIAI that might otherwise be overlooked.

41. Hip Joint Stability After Hip Replacement Surgery due to Metastatic Bone Disease - A retrospective cohort study evaluating different hip joint options

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[1]Musculoskeletal Tumor Section, Department of Orthopedic Surgery, Rigshospitalet, Denmark

Background: Joint stability after hip replacement in patients with metastatic bone disease (MBD) is of special importance. Dislocation is the second leading cause of all-time implant revision. Expected survival after surgery among these patients is very poor, why avoidance of hospital re-admissions has a significant impact on end-of-life quality. Selecting the right joint solution is therefore paramount. Few studies have investigated the dislocation rate across different hip joint options in MBD patients. We therefore conducted a retrospective study on primary hip replacements for patients with MBD conducted at Rigshospitalet.
Aim: To evaluate the 1-year post-operative joint dislocation rate by type of hip joint.
Materials and Methods: We included patients ≥18 years with MBD who received hemiarthroplasty (HA), regular total hip arthroplasty (THA) or THA with a constrained liner (CL) at Rigshospitalet in 2014-2020. We excluded patients with dual mobility joints, partial pelvic reconstruction, total femoral replacement and endoprosthesis revision surgeries. Risk of dislocation was assessed by competing risk analysis (cumulative incidence function) with death and implant removal as competing risks. Only the first surgery was included in the analysis in case of bilateral surgery. The Kaplan- Meier estimator was used to assess the probability of survival.
Results: We identified 266 patients who received 277 joint replacements. Mean age was 68(SD:11) years. Median follow-up was 176(IQR: 54-503) days. The patients were treated with 101(36%) HA, 88(32%) THA and 88(32%) CL. Major bone resection (MBR) was performed in 75% of THAs, 64% of CLs and 55% of HAs. The 1-year patient survival was 44% (CI-95: 33-55) for THA, 29% (CI-95: 20-38) for HA and 38% (CI-95: 27-48) for CL. The 1-year dislocation risk was 8% (CI-95: 2-14) for THA, 5% (CI-95: 1-10) for HA and 6% (CI-95: 1-11) for CL (p=0.19). The 1-year dislocation rate by MBR was 5% (CI-95: 1-10) for non-resection and 7% (3-11) for resection (p=0.33).
Interpretation / Conclusion: Our study suggests a higher tendency for dislocation in THA. However, the finding was not statistically significant. Interpretation might be confounded by MBR and lower survival for HA. Further studies are needed.

42. Solitary vs. Multiple Bone Metastases in The Extremities: Are There Any Differences?

Thea Hovgaard Ladegaard, Michala Skovlund Sørensen, Michael Mørk Petersen
Musculoskeletal Tumor Section, Department of Orthopedic Surgery, Rigshospitalet, University of Copenhagen

Background: Patients with solitary metastatic bone disease in the extremities (MBDex) is believed to have better survival than patients with multiple MBDex. Metastasectomy is known to improve patient survival for renal cell cancer and maybe breast cancer in selected cohorts.
Aim: To evaluate 1-year survival for metastasectomy in patients treated surgically for MBDex.
Materials and Methods: We conducted a retrospective study including all MBDex-lesions treated surgically at orthopedic departments in the Capital Region (CR) 2014- 2016. We excluded patients with unknown status of bone metastases and unknown resection margin. Patients were followed until end of study (30 September 2021) or death. Kaplan-Meier analysis (with log-rank test) evaluated patient survival.
Results: We identified 506 MBDex-surgeries (459 patients), 22 surgeries were revisions. 122 surgeries (118 patients) were oligo metastatic and 384 surgeries (343 patients) were known with multiple metastases. Of the 122 surgeries, 72 surgeries (71 patients) had no/unknown status of visceral metastases (solitary-group) and 50 surgeries had visceral metastases. In the solitary-group, 44 surgeries had wide resection (44 patients).The most common primary cancer in this group was renal (15) and breast (9). 24 patients in the group had intralesional resection (24 patients). The most common primary cancer in this group was breast (6), lung (5), lymphoma (5) and myelomatosis (5). The 1-year patient survival was 48% (CI-95: 40-58) for the oligo MBDex and 34% (CI-95: 29-38) for the multiple MBDex ($p<0.001$). The 1-year patient survival was 65% (CI-95: 55- 77) for solitary MBDex without/unknown visceral metastases and 23% (CI-95: 14-39) for solitary MBDex with visceral metastases ($p<0.001$). The 1-year patients survival was 75% (CI-95: 63-89) for the solitary-group with wide resection and 42% (95% CI: 26-67) for the solitary-group with intralesional resection ($p<0.001$).
Interpretation / Conclusion: Our study suggests that aggressive treatment of solitary MBDex-lesions with wide resection improve patient survival regardless of primary tumor. Further, surgical treatment of patients with oligo metastatic disease results in better 1-year survival than patients with multiple metastatic disease.

43. Surgical treatment of metastatic bone disease in the extremities: a population-based epidemiologic study

Thea Hovgaard Ladegaard[1], Celine Sørensen[1], Rasmus Nielsen[2], Anders Troelsen[3], Dhergam AA. Al-Mousawi[4], Rikke Bielefeldt[5], Michael Mørk Petersen[1], Michala Skovlund Sørensen[1]
Musculoskeletal Tumor Section, Department of Orthopedic Surgery, Rigshospitalet, University of Copenhagen[1]; Department of Orthopedic Surgery, Herlev and Gentofte Hospital[2]; Department of Orthopedic Surgery, Amager and Hvidovre Hospital[3]; Department of Orthopedic Surgery, Nordsjællands Hospital[4]; Department of Orthopedic Surgery, Frederiksberg and Bispebjerg Hospital[5]

Background: Population-based studies of patients with metastatic bone disease in the extremities (MBDex) requiring surgery for complete or impending fracture is meagerly known.
Aim: We sought to determine possible time-related changes of the incidence of MBDex-surgery and examine differences between patients treated at different centers in a population-based cohort.
Materials and Methods: We examined a population-based cohort consisting of all MBDex patients treated in the Capital Region (CR) 2014–2019. Procedures were performed at 5 secondary surgical centers (SSC) or 1 tertiary referral Musculoskeletal Tumor Center (MTC). Patients were followed until end of study (Sep 30 2021) or death. No patients were lost to follow-up. Logistic regression was used to describe associations. Kaplan-Meier analysis was used for survival analysis.
Results: Four-hundred-fifty-seven patients (493 primary MBDex lesions, 482 procedures) were included. Annual incidence of MBDex-surgery was 46 MBDex lesions/million inhabitants/year. MTC- patients had a significant better preoperative status than SSC-patients considering factors known for survival. Patients with complete fracture experienced longer surgical delay when treated at MTC compared to SSC: 4 (1-9) and 1 (1-3) days ($p<0.001$), respectively. Overall survival for the entire cohort was 37% and 11% at 1 and 5 years (MTC and SSC 1- and 5-year respectively: 44% and 15% vs. 29% and 5%, $p<0.001$). In patients with debut or relapse of cancer, 8% and 9% had insufficient biopsies, and 21% and 12% had no biopsy, respectively. The majority of patients with insufficient/no biopsies were treated at SSC. Comparison showed no change over time.
Interpretation / Conclusion: Current study highlights the low awareness on treating MBDex at SSC and emphasizes the importance of caution in interpretation of studies not representing an entire population thus introducing selection bias. A need for more awareness of atypical fractures, concern of MBD and securing proper biopsies for histopathological examinations is essential, especially at SSC, since the majority of lesions without any biopsy were found here. Biopsies are valuable to exclude a second malignancy and as material for targeted oncological treatment postoperatively.

SESSION 6: FOOT AND ANKLE

16. november

11:00 - 12:00

Lokale: Vingsal 3

Chair: Marianne Vestermark and Kristian Behrndtz

44. Achilles tendon gait dynamics after rupture: A three-armed randomized controlled trial comparing an individualized treatment algorithm vs. operative or non-operative treatment

Maria Swennergren Hansen[1 2], Jesper Bencke[3], Morten Tange Kristensen [4 5], Thomas Kallemose[6], Per Hölmich[1] , Kristoffer Weisskirchner Barfod[1]

Sports Orthopedic Research Center – Copenhagen (SORC-C), Department of Orthopedic Surgery, Copenhagen University Hospital Amager-Hvidovre, Denmark[1]; Physical Medicine & Rehabilitation Research-Copenhagen (PMR-C); Department of Physical and Occupational Therapy, Copenhagen University Hospital Amager- Hvidovre, Denmark[2]; Human Movement Analysis Laboratory, Department of Orthopedic Surgery, Copenhagen University Hospital Amager-Hvidovre, Denmark[3]; Department of Physical and Occupational Therapy, Copenhagen University Hospital, Bispebjerg-Frederiksberg, Denmark[4]; Department of Clinical Medicine, University of Copenhagen, Denmark[5]; Department of Clinical Research, Copenhagen University Hospital Amager-Hvidovre, Denmark[6]

Background: Individual treatment selection has been proposed as the key to optimized treatment for patients with an Achilles tendon rupture.
Aim: The purpose of the present study was to determine if gait dynamics, Achilles tendon elongation, and patient-reported outcome measures differ between patients using the individualized treatment algorithm Copenhagen Achilles Rupture Treatment Algorithm (CARTA) and patients treated as usual (operatively or non- operatively by default).
Materials and Methods: This exploratory study was performed as a three-armed randomized controlled trial with the patients randomized in a 1:1:1 order to one of three parallel groups: 1) intervention group: participants treated according to the individualized ultrasound based treatment algorithm CARTA, 2) control group: participants treated non-operatively, and 3) control group: participants treated operatively. Patients aged 18-65 years were eligible for inclusion. The primary outcome was ankle peak power push off during walking at 12 months, measured in a 3D gait laboratory. Secondary outcomes were ankle plantar flexor moment, peak dorsal flexion during stance, tendon elongation and Achilles tendon Total Rupture Score (ATRS). Analysis was conducted as intention-to-treat.
Results: One hundred and fifty-six patients were assessed for eligibility from June 2018 to September 2019. Twenty-one were allocated to the intervention group, 20 and 19 to the two control groups. The results indicated no statistically significant differences between the intervention group and the two control groups at six- and 12-month follow-ups. Our results suggest statistically significant tendon elongation and deficits in ankle plantar flexor power during walking in the injured compared to the healthy leg 12 months after injury.
Interpretation / Conclusion: Individualized treatment using CARTA did not result in less affected gait dynamics, less tendon elongation, or a higher ATRS than usual care. However, being an exploratory study, the results should be interpreted with care.

45. No difference in treatment outcome between cast and walker the first 2-3 weeks after acute Achilles tendon rupture. A registry study of 1304 patients from the Danish Achilles Tendon Database.

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Background: Choice of bandage is intensively discussed in acute Achilles tendon rupture treatment. We hypothesized that patients treated with cast had 10 points higher Achilles tendon Total Rupture Score (ATRS) at 1-year follow up compared to patients treated with walker.
Aim: To investigate if choice of bandage in the first 2-3 weeks of treatment affected patient reported outcome (ATRS), tendon elongation (Achilles Tendon Resting Angle (ATRA) and Heel Rise Height (HRH)) and re-rupture (RR).
Materials and Methods: The study was a registry study in the Danish Achilles tendon Database (DADB). Patients treated with cast and patients treated with walker in the first 2-3 weeks of treatment were compared using a linear mixed effects model with choice of bandage and confounding variables (sex, age group, baseline ATRS (prior to rupture), comorbidities, treatment regime, and time from injury to treatment start) as fixed effects and treating hospital as the random effect. The primary outcome was ATRS at 1 year follow-up. The secondary outcomes of the study were ATRS at 6 months and 2 years follow up, re-rupture at 1 year follow up, Achilles Tendon Resting Angle (ATRA) difference at 1-year follow-up and Heel-rise height (HRH) difference at 1 year follow up.
Results: 2162 patients were registered in DADB in the study period. 1304 had full baseline and follow up data and were included in the study (Cast group n=540, mean baseline ATRS 91, mean age (SD) 49.5 (14), gender (m/f) 435/105; Walker group n=764, mean baseline ATRS 90, mean age (SD) 51 (15), gender (m/f) 605/159). No statistically significant nor clinically relevant between-group difference was found in any of the outcomes: Adjusted mean difference (using walker the whole period as reference) (95% CI) ATRS after 1 year = 0.1 (-3.0 ; 4.1), ATRS after 6 months = 2.0 (-4.5 ; 5.8), ATRS after 2 years = 3.0 (-0.7 ; 7.0), HRH difference = 0.6 (-6.6 ; 8.2), ATRA difference = 0.03o (-1.5 ; 1.6), Re-rupture (odds ratio) = 0.812 (0.4 ; 1.61).
Interpretation / Conclusion: Patients treated with cast the first 2-3 weeks after acute Achilles tendon rupture did not have better treatment outcome than patients treated with walker.

46. Collagen metabolism in acutely ruptured Achilles tendons

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Background: The etiology of acute Achilles tendon rupture (ATR) is unknown but is suggested to be associated with pre-existing pathological alterations similar to tendinopathic changes. Healthy Achilles tendons have limited collagen turnover. It is known that an abnormally high rate of collagen turnover precedes symptoms of tendinopathy, however this has not been studied in ATRs.
Aim: To describe the collagen metabolism (1) prior to an ATR, (2) in the days immediately after ATR, and (3) on the day of surgery.
Materials and Methods: The study was a prospective cross-sectional study including patients eligible for operation of ATR. At inclusion (<5 days after injury), patients ingested deuterium oxide ($^{2}H2O$). On the day of surgery (<15 days after injury), patients got a 3- hours flood-primed infusion of a ^{15}N-proline tracer. During surgery, patients had one biopsy taken from the ruptured part of the Achilles tendon and one biopsy from intact Achilles tendon tissue proximal to the rupture as a control. The biopsies were analyzed for level of carbon-14 (^{14}C), and incorporation of ^{2}H-alanine (from $^{2}H2O$) and ^{15}N-proline to calculate integrated and acute fractional synthesis rate (FSR).
Results: Eighteen patients were included. Both rupture and control samples showed consistently lower levels of ^{14}C (indicating increased collagen turnover) compared to previously published data from healthy Achilles tendons. There was no difference between the ruptured and the control site. Assuming the turnover leading to the lower ^{14}C levels occurred during the year preceding the rupture, 56% of the collagen tissue in average were newly synthesized. No difference was found between the ruptured and the control site in the FSR from inclusion to surgery or acutely on the day of surgery. The mean FSR on the day of surgery was 0.025%/hour (95% CI 0.020-0.029) and was comparable to the FSR found in previous studies of healthy tendons.
Interpretation / Conclusion: The results show a substantial proportion of newly synthesized collagen in ruptured Achilles tendons. The formation of collagen in the initial healing phase could not account for this finding. Therefore, the results suggest that ATR is preceded by an abnormally high level of collagen turnover in the tendon.

47. : Bacteria are unlikely involved in the pathological changes prior to rupture of the Achilles tendon. A prospective cross-sectional study investigating for 16s rDNA in 20 consecutive ruptures.

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Background: The source of the pathological changes that occur prior to an acute Achilles tendon rupture (ATR) is not fully understood. Bacterial DNA has previously been detected in samples from ruptured Achilles tendons, suggesting a pathogenic role of bacteria in ATR.
Aim: The purpose was to investigate if DNA from bacteria was present in acutely ruptured Achilles tendons. It was hypothesized that 20-30% of the samples from the rupture site and no samples from healthy tissue would be positive for bacterial DNA.
Materials and Methods: Twenty consecutive patients scheduled for surgical repair of an acute Achilles tendon rupture were included. Tendon biopsies were taken from the rupture site and from the healthy tendon tissue proximal to the rupture as a control. Samples were blinded to the technician and analyzed by 16S rDNA PCR and Sanger sequencing to identify the bacterial species present. A McNemars test for paired proportions was performed to test for statistically significant differences in the number of samples positive for bacterial DNA between the ruptured and control regions of the Achilles tendon.
Results: One of the 20 patients (5%) had a positive sample with bacterial DNA from the ruptured part of the Achilles tendon. The same patient also had a positive, but with different DNA, control sample. Additionally, one patient had a positive control sample. There was no statistically significant difference in the number of bacterial-DNA positive samples between the ruptured and control regions of the Achilles tendon ($p>0.05$). The bacteria found (Staphylococcus sp., Micrococcus sp., and Staphylococcus epidermidis) are normal commensal organisms on the human skin.
Interpretation / Conclusion: Bacterial DNA is infrequent in tissue from ruptured Achilles tendons and if identified, likely is a result of contamination. This suggests that bacteria are not involved in the pathological changes occurring prior to rupture of the Achilles tendon.

48. Validation of Postsurgical Venous Thromboembolism Diagnoses of Patients Undergoing Lower Limb Orthopedic Surgery in the Danish National Patient Registry

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Background: Healthcare databases can be a valuable source of epidemiological research regarding postoperative venous thromboembolism (VTE), ie, deep vein thrombosis (DVT) and pulmonary embolism (PE), following orthopedic procedures, but only if the diagnoses are valid.
Aim: We examined the validity of VTE diagnosis codes in the Danish National Patient Registry (DNPR) by calculating their positive predictive value (PPV) and negative predictive value (NPV) versus actual medical records
Materials and Methods: We identified patients who had undergone lower limb surgery during the period 2009– 2019 at a hospital in the North Denmark Region. Of these, 420 patients had at least one VTE diagnosis registered in the DNPR within 180 days after lower limb surgery. Each patient with a VTE diagnosis was matched with two patients on age and sex, as well as type, location and period of surgery. The entire medical record and diagnostic imaging were reviewed to confirm VTE diagnosis.
Results: The overall PPVs was 85.2% (95% CI: 81.5– 88.5%) for first time VTE diagnosis following lower limb surgery, 82.6% (95% CI: 77.5– 82.8%) for DVT, and 90.3% (95% CI: 84.3– 94.6%) for PE. We found improvement in PPV during the study period when stratifying for three periods of the whole period. There were no significant differences when stratifying for sex, age, or surgery site. All negative predictive values were higher than 99%. A total of 113 additional VTE diagnoses were registered among 88 VTE patients during follow-up. Only four of the suspected recurrent VTEs were confirmed to be true recurrent VTEs.
Interpretation / Conclusion: The VTE diagnosis codes in the DNPR after lower limb orthopedic surgery were highly valid against the actual medical records, and we observed better PPV over recent years.

49. Achilles tendon length one week post surgery

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Background: The optimal management of Achilles tendon ruptures remains an enigma, and various factors such as optimal tendon healing, muscle strength recovery and surgery technique probably affects the clinical outcome and the structure of the muscle and tendon.
Aim: To measure gastrocnemius and soleus tendon length on the injured and uninjured side within a week after surgery.
Materials and Methods: This was a preliminary analysis of 48 patients from an ongoing clinical trial. All patients were treated surgically and subsequently had a non-weightbearing below-knee plaster cast applied with the ankle in approximately 30o of plantar flexion. The surgeon sutured the tendon (modified Kessler) and aimed to restore the original anatomical length by tightening the sutures until both feet had an equal resting angle while in the prone position. A 3D magnetic resonance image was obtained within a week after surgery to measure gastrocnemius and soleus tendon length on the injured and uninjured side.
Results: The calcaneus-soleus length (uninjured- injured) was -19.4 mm (95%CI: -24.2 to -14.6), P value <0.0001. The calcaneus- gastrocnemius length (uninjured-injured) was -2.5 mm (95%CI: -7.3 to 2.3), P value = 0.415.
Interpretation / Conclusion: Measurements using 3D MRI within the first week after Achilles tendon repair revealed a significant elongation (38%) of the calcaneus-soleus ‘free’ tendon, while the calcaneus-gastrocnemius was not elongated.

50. Early versus late weight-bearing in operatively treated ankle fractures with syndesmotic injury: a systematic review

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Background: The past 30 years, several studies have compared early versus late weight-bearing (WB), following open reduction and internal fixation of ankle fractures. However, no review strictly including patients with ankle fractures and complete syndesmotic disruption has been performed.
Aim: The objective of this systematic review was to compare early versus late WB following surgery for ankle fractures with syndesmotic injury regarding clinical and functional outcomes.
Materials and Methods: A comprehensive search strategy was developed with the aid of a scientific librarian and applied to the Cochrane Library, MEDLINE, Embase, CINAHL and PubMed from their inception to the 17th of January 2022. The articles were screened independently by two blinded reviewers using the Covidence® software. Data were extracted by one author, then cross- checked and approved by the other. Early WB was defined as any WB within four weeks postoperatively. There were no comparative studies, therefore studies describing either early or late WB were included. It was therefore not possible to perform a meta-analysis. Risk of bias analysis were performed using tools from the Joanna Briggs Institute.
Results: Eleven studies and 751 patients were included. Three studies used an early partial WB protocol (253 patients) and eight studies (498 patients) a late. The early WB studies were primarily randomized controlled trials (RCT). Functional outcomes suggested that there were no clear differences between early and late WB after one year. None of the late WB studies had a shorter follow-up time than one year. There were 9-31% reoperations in the early and 0- 11% in the late WB group. Superficial wound infections occurred in four percent in the early and 1-3% in the late WB. There were similar results for loss of syndesmotic reduction, malreduction, infection and fixation failure. Overall, the studies had a moderate to high risk of bias.
Interpretation / Conclusion: There are pros and cons for early and late WB, but the evidence is very limited due to the noncomparative studies. High-quality comparative studies focusing on functional outcomes within six months postoperatively are needed.

SESSION 8: TRAUMA

17. november

09:30 - 11:00

Lokale: Vingsal 1

Chair: Per Gundtoft and Peter Toft Tengberg

51. How treatment of distal radius fractures in adults have changed over the years – a nationwide register study from Denmark of 276,145 fractures from 1997-2018

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Background: The recommended treatment of distal radius fracture (DRF) is an issue of debate and two guidelines have been published in the last two decades. The impact of the guidelines on the treatment of DRF have not been studied on a national level.
Aim: To assess the incidence, treatment and choice of surgery concerning DRF in the adult population. Secondarily, to assess the differences in age groups 18-64 and 65+ years.
Materials and Methods: This is a populations-based register study comprising all patients with DRF above 18 years registered in the Danish National Patient Registry from 1997-2018. Data was extracted using ICD-10 code for DRF (DS525*) and incidence was calculated using data from Statistics Denmark. Primary surgery was defined as surgical treatment within 3 weeks from fracture diagnosis. Procedure codes were used to define plate (KNCJ65), external fixation (ExFix – KNCJ25), k-wire (KNCJ45), and others (KNCJ35,55,75,85,95).
Results: A total of 276,145 fractures were included, depicting an overall incidence of 229/100,000/year. The mean incidence was 189 for 18-64 years compared to 679 for 65+ years. During the study period, the incidence of DRF increased from 209 to 249 with an increase of 31% in the total amount of DRF. This was primarily due to a 41% increase in the 65+ population. Surgical treatment increased from 8% in 1997 to 22% in 2010, after which the increase plateaued to 24% in 2018. There were no differences regarding this increase in the two age groups. In 1997, the treatment distribution of DRF were 59% ExFix, 20% plate, and 18% k-wire. In 2007, plate was the primary choice with 41%, which increased to 96% in 2018. The trends were similar in the two age groups, but with a slightly higher use of ExFix in the 65+ years from 1997- 2008 with a mean 59% compared to 48% in the 18-64 years.
Interpretation / Conclusion: This study found an increase in DRF, probably due to an increase in the elderly population. The surgical rate markedly increased from 1997- 2010 with no seeming difference between the two age groups. A change in trend of surgical method was found with volar plates being the predominant choice in 2018. There seems to be little impact of national guidelines and a surgical rate of 24% must be questioned.

52. Degree of articular injury as measured by CT is associated with poor physical function following the treatment of bicondylar tibial plateau fractures

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Background: Bicondylar tibial plateau are complex injuries that commonly require surgical repair. Bicondylar plateau fractures have been typically associated with worse reductions and outcomes. Optimal long- term clinical outcome is challenging due to leg alignment abnormalities, instability and difficulties restoring condylar width. While intuitive, the degree of direct articular injury has not been linked to outcomes in patients with bicondylar tibial plateau fractures.
Aim: The primary aim of the study was to quantify the articular surface disruption to assess for any correlation between the degree of articular injury and patient reported physical function.
Materials and Methods: We examined patients that had surgical repair for a bicondylar tibial plateau fracture at two level 1 trauma centers from 2013- 2016. Sixty patients with bicondylar plateau fractures were consecutively selected. Three patients did not have appropriate CT scans and were excluded. A total of 57 patients were analyzed CTs were evaluated by a blinded MSK radiologist. The intraclass correlation coefficient was calculated and Bland-Altman analysis was performed to determine inter- reader agreement PROMIS® scores were collected from patients in clinic at a minimum of 2 years post-operative. Pearson correlation was performed to assess associations between percentage of disrupted articular surface and PROMIS® scores.
Results: 57 patients included with an average age of 58 ± 14.3. Intraclass correlation coefficient for the CT measurement was 0.913 (95% CI 0.79 – 0.96). There was near-perfect inter- reader agreement, with no bias. There was a correlation between percentage of articular surface disruption and total PROMIS® scores (0.4, CI: 0.2- 0.5, p=0.007). There was also a correlation between surface damage and the physical function of the PROMIS® scores (0.4, CI: 0.2- 0.6, p<0.001)
Interpretation / Conclusion: The novel method of quantifying articular surface damage as a percentage of cross sectional area on CT in this study is easy and demonstrates high inter-reader reliability, and correlation with PROMIS® scores at minimum 2-year follow-up. It has potential to help determine classification, fixation strategies, and outcomes.

53. Evidence-based orthopaedic practice can be implemented in a structured way: the CEBO model

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Background: Background: Orthopaedic practice and clinical guidelines are not always updated with evidence from randomized clinical trials. The result can be an evidence- practice gap. Management of distal radius fractures (DRFs) in adults with open reduction and internal fixation (ORIF) using volar locking plate is common practice in Denmark. This is partly based on a national clinical guideline from 2014 which has not been updated despite substantial new high- quality evidence.
Aim: Purpose: To study the feasibility of changing surgeons' practice according to best evidence when treating DRF in a Danish university hospital.
Materials and Methods: Materials and methods: A new implementation model from Centre for Evidence-Based Orthopaedics (CEBO) was applied. It consists of 4 phases: 1) baseline practice is held up against best available evidence and barriers to change are assessed. 2) A consensus-based symposium actively involving all stakeholders discussing best evidence is held and agreement on a new local guideline is obtained. 3) The new guideline based on the consensus decisions at the symposium is prepared and implemented into daily clinical practice. 4) Changes in clinical practice are recorded. We applied the model on the clinical question of whether to use ORIF or closed reduction and percutaneous pinning (CRPP) in adults with dorsally displaced DRF.
Results: Findings: Prior to application of the model only ORIF was used in the department. Based on best evidence the symposium found that a change in practice was justified. A consensus-based local guideline stating CRPP as first surgical choice was implemented. If acceptable reduction could not be obtained the procedure was converted to ORIF. A year after implementation the rate of ORIF had decreased from 100% to 44 %.
Interpretation / Conclusion: Conclusions: It is feasible to change surgeons' practice according to best evidence using a structured implementation model.

54. The effect of plate working length on interfragmentary motion in a distal femoral fracture – A biomechanical study

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Background: Distal femoral fractures are typically treated by bridging with locking plates. The mechanical environment is influenced, among other things, by working length (WL). Theoretically, increasing the WL will increase the micromotion of the construct (and thereby movement across the fracture), but how the WL of modern locking plates affects micromotion at an approximated physiological load is not well established.
Aim: To quantify the effect of WL on micromotion in distal femoral fractures.
Materials and Methods: Fifteen fourth-generation composite femurs were sectioned to create a 10 mm transverse fracture gap. The fracture was fixed (leaving the 10mm gap) using a 13-hole locking plate with a short (95mm), medium (135mm) and long (175mm) WL. The constructs were mounted in an Instron machine and then axially loaded from 50-750 N 50,000 times. The primary outcome was the range of axial deformation (micromotion) of the implant-femur construct under cyclic loading. A simplified Bernoulli-Euler beam model analysis was performed to evaluate the contribution of plate deformation on the observed micromotion and serve as a control of the results.
Results: One sample from the long WL group was excluded due to technical errors during testing leaving 14 constructs for analysis. In the cyclic loading analysis, the median (min-max) deformation was 2.47 (2.24-2.53) mm for the short WL, 2.54 (2.18-2.73) mm for the medium and 2.53 (1.92-3.14) mm for the long WL ($p=0.817$). The range of deformation remained constant throughout the 50,000 cycles irrespective of the WL. In the beam model, which neglected large displacement effects, we found that the applied loads were several orders of magnitude below the critical buckling load of the plate. Thus, the contribution of axial plate compression to the observed deformation was negligible.
Interpretation / Conclusion: We found very small differences in fracture micromotion between the three WL when applying approximated physiological loading. We could not confirm the well-established theory that WL is an important contributor to micromotion (and thereby fracture healing) in locking plate bridging of distal femur fractures.

55. A multicenter cohort study of complication risk factors in intramedullary bone lengthening nails.

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Background: Lower limb lengthening with externally controlled bone lengthening nails has become increasingly popular. Today the FITBONE and the PRECICE lengthening nails are the most used and successful bone lengthening nails. There is, however, a lack of knowledge of the complication risk factors of these bone lengthening nails.

Aim: The study investigated complication risk factors in lower limb bone lengthening with the FITBONE and the PRECICE nail.

Materials and Methods: A retrospective chart review was performed from two limb lengthening hospitals of patients operated with externally controlled bone lengthening nails in the lower extremity. Only completed nail removal of the FITBONE and PRECICE nails were included. Recorded patient data were: complications, nail information, and patient demographics. Complications were assessed as (yes/no) per segment. Complication risk factors were evaluated with modified Poisson regression (relative risk (RR)).

Results: We found 257 patients with 314 segments. The femur was the most frequently lengthened segment (80%), and the predominantly used nail was the FITBONE (75%). Complications were identified in 144 patients (56 % of 257 patients) and 175 segments (56% of 314 total segments). The risk analysis showed an increased risk for complications for the tibia compared to the femur(RR: 1.6 CI(1.3-2)), decades age groups above 19 years compared to 10-19 years(RR range from 1.4 to 2.5 dependent on age group), acute deformity correction and lengthening compared with no deformity correction (RR: 1.3 CI(1.01-1.6)) and bone length gained per mm (RR: 1.01 (1.00-1.02)). The retrograde/antegrade femur approach did not show increasing risk (RR: 1 CI(0.6-1.5)). PRECICE nail showed a reduced risk of complication compared to the FITBONE(RR 0.7 CI(0.5-0.99)).

Interpretation / Conclusion: Patients and segments treated with bone lengthening nails should expect complications in 56 %, which is more common than earlier described. We have identified five risk factors that may be used for clinical risk assessment and further research into reducing complication rates.

56. Comparison of Injury Characteristics and Surgical outcomes after ORIF of Bicondylar Schatzker VI (AO Type C) Tibial Plateau Fractures in Young versus Elderly Patients

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Background: The surgical management of bicondylar tibial plateau (BTP) fractures in elderly patients aims to restore knee stability while minimizing soft tissue complications.
Aim: The purpose of this study was to compare injury characteristics and surgical outcomes after ORIF of BTP fractures (AO/OTA 41-C (Schatzker VI)) in young (< 50 years) versus elderly (> 65 years) patients.
Materials and Methods: A retrospective cohort study was conducted using data from two American College of Surgeons (ACS) level I trauma centers. Inclusion criteria were: (1) age 18 years or older, (2) bicondylar tibial plateau fracture (AO/OTA 41-C or Schatzker VI), (3) treatment with ORIF, and (4) minimum of 6 months follow-up. Patients between 50 and 65 years of age were excluded. Data collection was performed by reviewing electronic medical records, operative reports, and radiology reports.
Results: We identified 323 patients (61% male) with 327 BTP fractures and a median follow-up of 685 days. There were 230 young patients (71%) < 50 years and 93 elderly patients (29%) >6 5 years at time of presentation. Elderly patients were significantly more likely to have a low energy mechanism of injury (44.6 vs. 16.2%, $p < 0.001$), and present with diabetes (19.4 vs. 4.4%, $p < 0.001$) or coronary artery disease (12.9 vs. 1.3%, $p < 0.001$). Elderly patients were also significantly less likely to undergo staged management with initial knee-spanning external fixation followed by delayed ORIF (19.2 vs. 33.9%, $p = 0.008$). Elderly patients had a lower arc of motion at final follow-up (105 vs. 113°, $p < 0.001$) and reduced PROMIS-10 function scores (43.8 vs. 49.8, $p=0.013$). No differences were observed in rates of superficial infection, deep infection, reoperation, or EQ-5D scores between age groups.
Interpretation / Conclusion: This is the largest study to compare injury characteristics and outcomes after ORIF of BTP fractures according to age. The results of this study suggest that ORIF of BTP fractures in elderly patients is associated with similar complication rates and outcomes as in younger patients despite higher comorbidities and poorer bone quality in the elderly population.

57. Adverse events following bicondylar tibial plateau fractures – A systematic review

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Background: Tibial plateau fractures have a reported incidence of 10.3/100.000 per year. The complex tibial plateau fractures are bicondylar, and correspond to a Schatzker type V and VI and AO/OTA type 41-C. The accepted treatment of choice has been open or closed reduction followed by internal fixation. There are a wide range of known associated adverse events, but only limited information is offered in the literature on the rate at which these adverse events can be expected to occur.
Aim: To identify the risk of suffering an adverse event following surgical treatment with internal fixation of a bicondylar tibial plateau fracture of Schatzker type V and VI and/or AO/OTA type 41-C.
Materials and Methods: A systematic literature search was performed in PubMed, Embase and Cochrane Library. Literature screening and data extraction will be performed following the guideline of PRISMA. Duplicates were removed. Title and abstracts were reviewed by two unblinded co-authors. Bias were assessed using the Modified Newcastle-Ottawa Quality assessment Scale. To report on the approximated risk of suffering an adverse event, the average percentages of the adverse events will be calculated based on the percentages reported in the articles.
Results: The literature search yielded 7284 articles, 2401 duplicates were removed. 4883 articles were screened and 56 articles were considered for inclusion after review of title and abstract. After review of full text, 25 articles were included. 1 RCT, 2 case series, 10 retrospective-, 8 prospective- and 4 register based studies. The average risks identified were; 6.5% superficial wound infection, 6.2% deep wound infection, 13.7% DVT, 9.0% compartment syndrome, 2.1% amputation, 4.9% peroneal nerve palsy, 15.0% re-surgery for hardware related problems, 6.4% stiffness and manipulation under GA and 8.7% debridement to clear infection.
Interpretation / Conclusion: A bicondylar tibial plateau fracture is a complex and severe injury giving cause to development of a wide range of adverse events; wound infection, ligamentous and meniscal injury, deep vein thrombosis, hardware related problems requiring re- surgery and compartment syndrome being the ones with the highest reported risk of occurring in the existing literature.

58. Detection of hip fracture using deep learning artificial intelligence (AI). The algorithm increases accuracy of clinical readers

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Background: X-ray imaging is the recommended first-line imaging modality in patients with suspected hip fracture. The initial fracture detection is most often done by the frontline personnel in the Acute and Emergency (A&E) clinic. Recently, AI algorithms implementing deep-learning models have shown great promise in detecting fractures with radiologist-level performance, thus with the clinical potential to bring down the rate of missed fractures.
Aim: To investigate the change in diagnostic accuracy among young A&E doctors when using a decision support tool (RBfracture) for diagnosing non-obvious hip fractures.
Materials and Methods: In this diagnostic accuracy study a dataset of 1913 X-ray studies of patients with suspected hip fractures were available and 248 studies were included in the study. These studies were read by eight resident doctors of varying experience both with and without the fracture decision support of RBfracture. The change in diagnostic accuracy was evaluated by comparing the reader's sensitivity and specificity for fracture detection both with and without decision support. The fracture reference standard was established by two radiologists with more than ten years of experience. The success of the study required demonstration of both the superiority of the average patient-wise sensitivity and the noninferiority (margin 3%) of the average patient-wise specificity for studies read with support compared to no support.
Results: The average absolute change in sensitivity was 0.0514 (95%CI: 0.03,0.08), p=0.00450 (superiority) and the average change in specificity was 0.0121 (95%CI: -0.02,0.05), p=0.00038 (noninferiority, -3% margin). The false-negative diagnoses were reduced from 7 to 4 and the missed fractures were predominantly of type AO31A1 and Garden type I-II. The gain in sensitivity was consistent across reader experience. Readers with less than two years of experience consistently improved in specificity, whereas readers with more experience became less specific.
Interpretation / Conclusion: The diagnostic accuracy among young A&E doctors has shown to improve when using a decision support tool (RBfracture) for the detecting of non-obvious hip fractures on X-ray images resulting in a decrease of false negative diagnosis

59. Surgical Demographics of Acute Thigh Compartment Syndrome

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Background: Acute compartment syndrome is a surgical emergency, but there is a paucity of literature regarding acute thigh compartment syndrome, as it is less common than in other anatomic locations. Demographic, injury-related, treatment-related, and outcome-related characteristics for this entity remain poorly described.
Aim: The objective of this study was to identify demographic, injury-related, and treatment-related characteristics of patients who underwent decompressive fasciotomies for acute thigh compartment syndrome.
Materials and Methods: A cohort of 38 adult patients with acute thigh compartment syndrome treated with fasciotomy at two tertiary care referral centers over a 10- year time period from January 1, 2006 to June 30, 2015 was retrospectively identified. We searched the electronic medical record for patient-related variables (e.g., age, sex, race, smoking status, diabetes mellitus), injury-related variables (e.g., mechanism of injury, associated fractures, other traumatic injuries), treatment-related variables (e.g., delay of treatment, compartments released, number of debridements, use of split-thickness grafts), and outcomes (e.g., amputation, death, sensory/motor impairments at final follow up).
Results: The mean age of our cohort was 47 years, and 35 patients (92%) were male. There were varying mechanisms of injury, but the most common mechanisms were spontaneous hematoma (21%), followed by motor vehicle accidents (16%). Associated leg fractures were present in 15 (39%) patients. Delay between time of injury and fasciotomy was greater than 24 hours in 27 patients (71%), 12 to 24 hours in 6 patients (16%), and less than 6 hours in 3 patients (8%). The most frequently released compartment was the anterior compartment only (68%). Six patients (16%) had motor impairment, and 2 patients (5%) had sensory impairment at final follow-up.
Interpretation / Conclusion: Delays to fasciotomy are frequent in the treatment of acute thigh compartment syndrome. The demographics of acute thigh compartment syndrome demonstrate a strong male predominance. Treating providers should recognize spontaneous hematoma and motor vehicle accident as the most common causes of acute thigh compartment syndrome.

60. A possible explanation of early failure following tension band osteosynthesis of patella fractures

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Background: The risk of early failure following surgical treatment of patella fractures are in recent research reported to be between 4.7 and 14.4%. Although this potentially represents a serious impairment to the outcome of treatment, the etiology lacks evidence. At our clinic, we have observed several cases of similar early failure following tension-band osteosynthesis of simple two part patella fractures, where the distal fragment seems to refracture in the coronal plane during the first six weeks of surgery. This could easily be attributed to overlooked fractures preoperatively but could also represent a biomechanical issue regarding the surgical method.

Aim: The aim was to establish a biomechanical model exploring how tension forces are transferred through the intact patella and following osteosynthesis of a two-part patella fracture using Finite Element Analysis.

Materials and Methods: A 3D computer assisted design (CAD) model of a knee joint was established based on a CT-scan of an adult male without prior knee problems. Distal femur and proximal tibia geometries are included for determining proper boundary conditions. Surface count of the model is reduced to 25% for mesh- simplification. The 3D model was assembled in SolidWorks, and the finite element analysis was completed in ANSYS Mechanical. Load was gradually applied via the quadriceps tendon to show non-linear effects, increasing to 500 N, in 0°, 30°, 60° and 90° of flexion.

Results: When load is applied tensions within the patella bone following tension-band surgery increases up to 10 times compared with the intact patella bone. Especially in the z-axis, representing shearing forces, tensions increased from 8,48 MPa in the intact patella, to 87,2 MPa after tension band surgery.

Interpretation / Conclusion: The biomechanical properties of tension band osteosynthesis of a two part patella fracture creates tensions within the porous trabecular bone, loading the patella from the inside, opposed to how the intact patella handles loading. This could potentially override the strength of the patella bone. This study may serve as one explanation for the high risk of early failures following surgical treatment of patella fractures.

SESSION 9: KNEE ARTHROPLASTY

17. november

09:30 - 11:00

Lokale: Vingsal 2

Chair: Martin Lindberg-Larsen and Anders Troelsen

61. Early Migration of Medial Congruent compared to Cruciate Retaining Total Knee Arthroplasty – Results from A Randomized Controlled Trial

Kristian Mortensen[1], Lina Holm Ingelsrud[1], Omar Muharemovic[1 2], Kirill Gromov[1], Anders Troelsen[1]

Clinical Orthopedic Research Hvidovre (CORH), Dept. of Orthopedic Surgery, Copenhagen University Hospital Hvidovre[1]; Department of Radiologi, Center for Functional and Diagnostic Imaging and Research[2]

Background: Medial Congruent (MC) kinematics in Total Knee Arthroplasty (TKA) aims to enhance knee function by mimicking the native knee, possibly altering force translations on the tibia compartment.

Aim: Our primary aim was to compare early migration of a MC TKA to a well-established Cruciate Retaining (CR) TKA. Additionally, complications and patients' pain and function was compared 2 years post- surgery.

Materials and Methods: In a double-blinded RCT, 60 patients (mean±SD age 69.2±8.2 years, 63% female) were allocated to a Persona Total Knee System with a MC or CR liner. Early tibial migration was measured by Maximal Total Point Motion (MTPM) with Radiostereometric Analysis 2 years post-surgery. Complications were registered. Pain and function was measured with Oxford Knee Score (OKS). Difference in MTPM was analyzed with the Mann-Whitney U-test. OKS was analyzed with an independent t-test and as the proportions achieving the Patient Acceptable Symptom State (PASS) (OKS >=30) and Minimal Important Change (MIC) (OKS improvement >=8).

Results: Primary outcome was available for 52 patients (MC:27, CR:25). Median Tibia MTPM was 0.601 [IQR 0.391-0.969] mm for MC and 0.481 [IQR 0.316-0.779] mm for CR, p=0.167. One patient in the MC-group had arthroscopic removal of cement fragment 13 months post-surgery and one patient (CR-group) suffered a deep venous thrombosis and superficial infection 2 weeks post-surgery. Mean 2-year OKS was 41.90 [95CI 39.86-43.93] for MC and 42.15 [95CI 40.57- 43.73] for CR, p=0.844. One patient (MC-group) did not achieve the PASS, all CR-patients did. Mean OKS improvement was 18.69 [95CI 15.91– 21.47] for MC and 19.22 [95CI 16.28–22.16] for CR, p=0.788. OKS improvement was smaller than the MIC for 3 patients with MC while all with CR improved more than the MIC.

Interpretation / Conclusion: We found no significant difference in MTPM, complications or OKS between patients treated with MC and CR TKA. The MC variant provided similar safe fixation and complication-rate, however no advantage in self-reported function.

62. Polyethylene wear in mobile- and fixed-bearing unicompartmental knee arthroplasty; a randomized controlled RSA study with 5 years follow-up.

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Background: The main cause of knee revision surgery is aseptic loosening. Polyethylene (PE) wear can result in osteolysis, which can lead to aseptic loosening. Differences in design features between implants, may influence PE wear. The mobile-bearing (MB) UKA design has a fully congruent bearing, which reduces contact stress, PE wear can though occur on both the articular side and the backside of the bearing of the MB UKA. The fixed-bearing (FB) UKA design is incongruent, which may result in a high point contact on the bearing and increased PE wear.
Aim: To compare PE wear of a MB UKA and a FB UKA using RSA with 5 years follow-up.
Materials and Methods: A patient-blinded, randomized controlled RSA study with 60 months follow-up was performed. Patients were randomized to either a MB UKA (N = 33) or a FB UKA (N = 32). Weight-bearing stereoradiographs with the knee in extension and in 20° flexion were obtained at 4, 24, and 60 months post-operatively. Polyethylene thickness (mm) was calculated as the perpendicular distance between the articular surface of the tibial component and the closest point to the femoral component. Linear polyethylene wear was calculated at 12 and 60 months, with the 4 months measurement as reference. Mixed model analysis (MMA) was used for statistical evaluation.
Results: Knee flexion 20 degrees The MB and FB UKA showed no difference in PE wear over time (MMA, p=0.35). At 60 months follow-up, mean PE wear in the MB group was 0.35 mm (95% CI 0.29 – 0.42), and 0.25 mm (95% CI 0.18 – 0.32) in the FB group. The wear rate was 0.07 mm/y in the MB group and 0.05 mm/y in the FB group. Full knee extension The MB and FB UKA showed no difference in PE wear over time (MMA, p=0.13). At 60 months follow-up, mean PE wear in the MB group was 0.24 mm (95% CI 0.13 – 0.34), and 0.23 mm (95% CI 0.12 – 0.34) in the FB group. The wear rate was 0.05 mm/y in the MB group and 0.05 mm/y in the FB group.
Interpretation / Conclusion: Despite the difference in prosthesis design, the MB UKA and FB UKA showed equal and low polyethylene wear during a period of 5 years in both 20 degrees of knee flexion and in full knee extension. The mean polyethylene wear rate was 0.05-0.07 mm/y, which is comparable to reported wear rates of UKAs.

63. The surgeon effect: a failure analysis of a national cohort of patellofemoral arthroplasty performed in the 8-year period 2008-2015

Louise Østergaard Rasmussen[1], Frederik Khallouk Vognsen[2], Tobias Freyberg Justesen[3], Lasse Enkebølle Rasmussen[4], Anders Odgaard[1]

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Background: Arthroplasty registers show that patellofemoral arthroplasty (PFA) has a high revision rate at 3-4 times that of TKA. In a Danish RCT, the 6-year PFA revision rate was no different from that of TKA. The conflicting findings suggest that results of PFA performed by some surgeons trained specifically for the procedure may be different from results otherwise obtained. Age and sex may also be confounders.

Aim: To examine the effects of age, sex and surgeon affiliation (participating or not participating in the Danish RCT on PFA vs. TKA) on revision rates in a national cohort of PFA patients.

Materials and Methods: All PFA operations done in 2008-15 were identified through the Danish Knee Arthroplasty Register and the National Patient Register. All later knee procedures were identified similarly. Deaths were determined through the Civil Personal Register. Hospital notes of all patients were studied, and wrongly coded procedures were excluded, resulting in a cohort of 470 operations. We performed competing risk analyses on revisions with death as a competing event. We assessed the effects of sex, age (above/below the median) and surgeon affiliation (RCT/non-RCT).

Results: Seventy-two percent of patients were female. Median age was 60 years (range 17-93). The surgeon affiliation and patient age affected revision rates ($p<0.001$ and $p=0.001$, respectively), while sex had no effect ($p=0.064$). The estimated 6-year revision rates for RCT and non-RCT surgeons were 8.4% (95% CI:5.5%-12.1%) and 29.6% (23.4%-36.1%), respectively. Revision rates for young and old patients were 20.9% (16.0%-26.4%) and 13.6% (9.6%-18.3%). Of 470 cases, 274 (58%) were done by 8 surgeons, who were part of the RCT, while 196 (42%) were done by 32 non-RCT surgeons. The median number (range) of procedures in the groups during the eight years were 28.5 (11-83) and 4.5 (1-27), respectively. Patients operated by RCT surgeons were older (median=64, range:17-92 vs. 56, 26-93,$p<0.001$).

Interpretation / Conclusion: Patients operated by non-RCT surgeons had a 3.6-fold higher 6-year revision rate than RCT surgeons. Indication differences for both primary procedure and revisions are a likely explanation for the findings. Effects of indication patterns on outcomes should be pursued.

64. Long-term results after weight loss intervention in knee arthroplasty patients with obesity. A post-trial follow-up.

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Background: Obesity is a well-known problem in patients undergoing total knee arthroplasty (TKA). We have previously shown that it is feasible and safe to implement an intensive weight loss program shortly before TKA. Preoperatively, the program resulted in an average weight loss of 10.7 kg, improved body composition and cardiovascular risk factors. One year after TKA, the patients in the weight loss program managed to maintain their weight loss, whereas there was no change in the control group. Both groups showed major improvement in health-related quality of life (QoL) and knee function.
Aim: The aim of this study was to investigate the long- term effect of a weight loss intervention in patients with obesity undergoing TKA.
Materials and Methods: This study was a seven-year follow-up from a randomized controlled trial. Body weight, blood pressure and waist circumference were measured. Additionally, patient-reported outcome, range of knee motion (ROM), hypertension and diabetes status were collected.
Results: Forty-nine patients were examined at the follow-up. There were no differences between the intervention and the control group on body weight, hypertension, diabetes, waist circumference and knee ROM. The intervention group had increased their mean weight significantly more than the control group (Difference: 3.1, 95%CI:1.3;4.8). 66% had hypertension and 38% had diabetes type II. Pain, function and QoL were improved for both groups.
Interpretation / Conclusion: The patients in the intervention group were unable to maintain their preoperative weight loss when measured seven year after TKA.

65. In vivo kinematic comparison of Medial Congruent and Cruciate Retaining polyethylene designs in total knee arthroplasty - A randomized controlled study of gait using dynamic radiostereometry

Emil Toft Petersen[1 2 3], Søren Rytter[2 3 4], Daan Koppens[1 4], Jesper Dalsgaard[1], Torben Bæk Hansen[1 2], Michael Skipper Andersen[5], Maiken Stilling[2 3 4]

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Background: New total knee arthroplasty implant designs attempt to normalize kinematics patterns that may improve functional performance and patient satisfaction.
Aim: We hypothesized that a more medial congruent (MC) anatomic design 1) influences the tibiofemoral kinematics, and 2) that it enhances articular congruency compared to a standard symmetrical cruciate retaining (CR) bearing design.
Materials and Methods: In this double-blinded randomized study, 66 patients with knee osteoarthritis were included randomly in two groups: MC (n=31) and CR (n=33). Clinical characteristics such as knee ligament lesion and knee osteoarthritis score were graded on preoperative magnetic resonance imaging and radiographs, respectively. Dynamic radiostereometric analysis was used to assess tibiofemoral joint kinematics and articulation congruency at one-year follow-up. Patient-reported outcome measures, Oxford Knee Score, the Forgotten Joint Score, and the Knee Osteoarthritis Outcome Score, were assessed preoperatively and at one-year follow-up.
Results: Compared to the CR bearing, the MC bearing displayed an offset with approximately 3 mm greater anterior tibial drawer ($p<0.001$) during the entire motion, and up to approximately 3.5 degrees more tibial external rotation ($p=0.004$) from mid- swing to the end of the gait cycle at one-year follow-up. Further, the congruency area in the joint articulation was larger during approximately 80% of the gait cycle for the MC bearing compared with the CR. The patient-reported outcome measures improved ($p<0.001$), but there were no differences between groups. In addition, there were no difference in clinical characteristics and there were no knee revisions or recognised deep infections during follow-up.
Interpretation / Conclusion: The study demonstrates that the MC bearing design changes tibiofemoral kinematics and increases the area of congruency towards more native knee kinematics compared with the CR bearing. In perspective this may contribute to a more stabilized knee motion, restoring patient's confidence in knee function during daily activities.

66. Comparison between cemented and trabecular metal fixation of total knee arthroplasty with asymmetrical tibial component design followed for 2 years and evaluated using MBRSA in a randomized controlled trial design

Müjgan Yilmaz[1 2 3], Thomas Lind[2], Gunnar Flivik[3], Christina Holm[1], Anders Odgaard[1], Michael Mørk Petersen[1]

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Background: Radiostereometric analyses (RSA) are recommended in the phased introduction of new orthopedic implants to assess the risk of late revision due to aseptic loosening.
Aim: Two-year migration measured with MBRSA.
Materials and Methods: Patients (n=66, F/M= 44/22, mean age 62 years (range: 50-71)) scheduled for a TKA due to OA at Gentofte Hospital between September 2018 to October 2019 were included and randomized (1:1) to receive either: A: Persona® (Zimmer Biomet, Warsaw) trabecular metal (TM) TKA or B: Persona® Fully cemented TKA. Patients with an age<40 or >70 years, diseases influencing the bone metabolism and those who couldn't comprehend were excluded. Tree patients (did not get the allocated treatment n=2, withdrawal of contest n=1), dropped out early, leaving 63 patients for follow-up, 2 patients were excluded at 1-year follow-up (revision n=2, due to infection and instability). A total of 7 revision were performed (change of insert n=3, revision TKA n= 2, brisement n=1, debridement n=1). RSA at 1 week (used as a baseline), 3, 6, 12, and 24 months postoperative, and at 12 months double examinations were performed. MBRSA was used to evaluate migration and segmental motion, the primary endpoint was maximal total point motion (MTPM) after 24 months and a comparison between groups was performed using a non-parametric test for unpaired data (Mann-Whitney U test).
Results: The mean (range) MTPM of the cemented tibial component at 3, 6, 12 and 24 months were 0.70mm (0.20-2.23), 0.66mm (0.16- 2.28), 0.72mm (0.11-1.65) and 0.72mm (0.11-2.03) and for the TM 0.76mm (0.19- 2.23), 0.80mm (0.36-2.07), 0.79mm (0.22- 1.89) and 0.78mm (0.18-1.92). No difference in mean MTPM between the two tibial groups after 24 months (p= 0.21) Corresponding values for cemented femoral component were 0.41mm (0.14-0.91), 0.47mm (0.14-1.18), 0.49mm (0.12-1.05) and 0.51mm (0.21-1.03) and TM 0.65mm (0.13-1.89), 0.76mm (0.20-2.67), 0.79mm (0.11-2.75) and 0.83mm (0.25-2.19). Significant difference in mean MTPM between the two femoral groups after 24 months (p= 0.019) were found.
Interpretation / Conclusion: All implants stabilize after 3 months. A statistically significant difference after 2- years between the two fixation modes for the femoral component was found.

67. Temporospatial gait changes following medial unicompartmental and total knee arthroplasty in a randomized controlled trial

Julius Tetens Hald, Jacob Fyhring Mortensen, Emil Gleipner-Andersen, Leah Lehmann, Anders Odgaard

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Background: Medial unicompartmental knee arthroplasty (mUKA) is used in about 25% of primary knee arthroplasties. Some advantages of mUKA over TKA are well accepted, although no RCT data is currently available. Analyses of gait patterns will add new knowledge that may further qualify the debate.
Aim: This study's purpose is to examine possible changes in gait patterns between mUKA and TKA at 4 and 12 months postoperatively in a double-blinded randomized study.
Materials and Methods: 42 patients from the mUKA vs TKA double-blinded RCT were included. Patients (25 mUKA and 17 TKA) were pragmatically included from the Gentofte branch of the RCT. Patients were measured preoperatively using inertial sensors and a treadmill, with level and uphill walking at their self-chosen comfortable and maximal speed. 30 patients completed 4- and 12-months follow-ups. 36 gait parameters were assessed. Comparisons between pre- and postoperative measurements and between implants were performed.
Results: Patients were faster as a result of greater stride length and frequency at 12 months, with no difference between the groups, showing a 34% increase for the mUKA group (p=0.011) and a 65% increase for the TKA group (p=0.013). The ROM of the operated knee increased by a median of 3o (range -6 o to 24 o) and 13o (-6 o to 27 o) for the mUKA and TKA groups, respectively, and the average time-weighted knee angle increased significantly for both groups. At uphill comfortable speed, the TKA group walked significantly faster than the mUKA group at 4 months (p-value 0.044) but no difference was found at 12 months. The angular acceleration of flexion at heel strike increased after both 4 and 12 months for both groups with no difference between implants.
Interpretation / Conclusion: We found postoperative improvements in several temporospatial gait parameters following KA. Patients walked faster and had greater active ROM and greater acceleration at heel-strike suggesting that walking was easier and more comfortable. No persistent differences were found between the mUKA and TKA groups.

68. Interpretation threshold values for the Oxford Knee Score in patients undergoing Unicompartmental Knee Arthroplasty

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Background: Unicompartmental Knee Arthroplasty (UKA) is deemed a viable alternative to total knee arthroplasty for patients with knee osteoarthritis with a certain wear pattern. The Oxford Knee Score (OKS) is frequently used to assess pain and function scores from a patient-centered perspective. However, meaningful interpretation of the OKS values can be challenging, as statistical significant improvements are not necessarily clinically meaningful. Therefore, interpretation threshold values are needed to advance the clinical use of OKS in patients undergoing UKA.
Aim: To determine the Minimal Important Change (MIC), Patient Acceptable Symptom State (PASS), and Treatment Failure (TF) values as meaningful thresholds for the OKS at 3-, 12-, and 24-month follow-up in patients undergoing UKA.
Materials and Methods: A cohort study with data from patients undergoing UKA collected at a hospital in Denmark between February 2016 to September 2021. Data included 3-, 12-, and 24-month postoperative responses to the OKS and 3 anchor questions. Interpretation threshold values were calculated with the anchor- based adjusted predictive modeling method. Non- parametric bootstrapping was used to derive 95% confidence intervals (CI).
Results: Complete 3-, 12-, and 24-month postoperative data was obtained for 331 of 543 (61%), 340 of 479 (71%), and 235 of 338 (70%) patients, median age of 68-69 years (58-59% females). Adjusted OKS MIC values were 4.7 (CI 3.3–6.0), 7.1 (CI 5.2–8.6), and 5.4 (CI 3.4–7.3), adjusted OKS PASS values were 28.9 (CI 27.6–30.3), 32.7 (CI 31.5–33.9), and 31.3 (CI 29.1–33.3), and adjusted OKS TF values were 24.4 (CI 20.7–27.4), 29.3 (CI 27.3–31.1), and 28.5 (CI 26.0–30.5) at 3-, 12-, and 24-month postoperatively, respectively. All values significantly increased from 3 to 12 months but not from 12 to 24 months.
Interpretation / Conclusion: The UKA specific measurement properties and clinical thresholds for the OKS can improve the interpretation of UKA outcome and assist quality assessment in institutional and national registries.

69. Postoperative patient dissatisfaction declines in the years after medial unicompartmental knee arthroplasty: 3-year follow-up interviews and questionnaires in the SPARK patient cohort

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Background: Medial unicompartmental knee arthroplasty (mUKA) is a common treatment for knee osteoarthritis (OA). Yet, proper patient selection remains a challenge.
Aim: Through comprehensive patient data and qualitative interviews, this study sought to identify pre- and postoperative factors to differentiate successful from unsuccessful mUKA surgery.
Materials and Methods: A sub-analysis of 336 mUKA patients participating in a prospective cohort study ("SPARK") of primary knee arthroplasty surgery in three Danish hospitals (Farsø, Aarhus and Gentofte, inclusion 2016-18) identified patients who were dissatisfied 1 year after surgery. They were invited for semi-structured 20-minute interviews and answered Hospital Anxiety and Depression Scale (HADS), Pain Catastrophizing Scale (PCS) and Oxford Knee Score (OKS). Each patient was matched with a satisfied patient by hospital, sex and age (<5 y.).
Results: At 1 year, 298 (89%) had replied. 6 patients (2.0%) claimed very unsatisfied, 13 (4.4%) unsatisfied, 20 (6.7%) in-between, 80 (27%) satisfied and 179 (60%) very satisfied. Of the 19 dissatisfied patients, 11 agreed to participate in interviews (22 including matches) after mean 3.4 years. Ahlbäck classification differed among the two groups (higher in satisfied patients, P=0.021), and surgeon ID's were unevenly distributed (P=0.029). Age, sex and BMI were no different. Noticeably, 8 of the 11 patients, who were dissatisfied at 1-year, had become satisfied at follow-up. OKS had improved more in the dissatisfied group from 1 to 3 y (3.6 vs. 1.9). However, the difference in OKS was not significant, when compared to the satisfied group (p=0,676). Dissatisfied patients recalled less participation in preoperative decision- making (P=0.011) and had higher depression scores (P=0.035).
Interpretation / Conclusion: Very high rates of patient satisfaction (87%) were noted 1 year after mUKA. Among dissatisfied patients, 8 of 11 had become satisfied at 3 years. This study points to patient involvement, degree of osteoarthritis and surgeon-specific matters as factors that may influence short-term mUKA results.

70. KKR: Antibiotic prophylaxis in total hip and knee arthroplasty

Thomas Jakobsen , Thomas Lind-Hansen, Morten Boye Petersen, Jeppe Lange , Mats Bue, Claus Østergaard
DSHK; DSOI; Dansk Selskab for Klinisk Mikrobiologi

Background: Periprosthetic joint infection is a serious complication to total hip or knee arthroplasty. Infection can by caused by bacterial contamination during surgery. The use of systemic preoperative antibiotic prophylaxis can reduce the risk of infection. The most common used antibiotics in Denmark for prophylaxis are penicillinase-resistant penicillins (cloxacillin or dicloxacillin) or second-generation cephalosporin (cefuroxime).
Aim: The aim of this short clinical guideline was to answer the PICO-question: "Does patients with arthritis receiving a total hip or knee replacement have lower risk of postoperative infection, re-operation and adverse events when using penicillinase-resistant penicillins as preoperative antibiotic prophylaxis compared to second-generation cephalosporins?"
Materials and Methods: A systematic literature search based upon the PICO-question was conducted in Pubmed and Embase. 1057 records were screened. Only randomized studies were included comparing penicillinase-resistant penicillins with second-generation cephalosporin. Two full-text articles were assessed for eligibility but excluded due to small sample size.
Results: No randomized studies comparing penicillinase-resistant penicillins with second-generation cephalosporins for preoperative antibiotic prophylaxis in the setting of arthroplasty surgery were found.
Interpretation / Conclusion: It is good clinical practice to use either penicillinase-resistant penicillins or second-generation cephalosporin as antibiotic prophylaxis before implantation of a total hip or knee replacement.

SESSION 10: PEDIATRICS

17. november

09:30 - 11:00

Lokale: Vingsal 3

Chair: Marie Fridberg and Julie L. Erichsen

71. Stryde - the Danish Experience

Jan Duedal Rölfing [1], Søren Kold [2], Tobias Nygaard [3], Mindaugas Mikuzis [2], Michael Brix [4], Christian Faergemann [4], Martin Gottliebsen [1], Michael Davidsen [1], Juozas Petruskevicius [1], Ulrik Kähler Olesen [3]

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Background: Observing serious adverse events during treatment with the Precice Stryde bone lengthening nail (NuVasive, San Diego, CA, USA), we conducted a nationwide cross- sectional study.

Aim: To report the prevalence of adverse events from all 30 lengthened bone segments of the 27 patients treated in Denmark.

Materials and Methods: Radiographs of all bone segments were evaluated regarding radiographic changes in February 2021. We determined the number of bone segments with late onset of pain and/or radiographically confirmed osteolysis, periosteal reaction, or cortical hypertrophy in the junctional area of the nail.

Results: In 30 bone segments of 27 patients we observed radiographic changes in 21/30 segments of 20/27 patients, i.e., 19/30 osteolysis, 12/30 periosteal reaction (most often multi-layered), and 12/30 cortical hypertrophy in the area of the junction between the telescoping nail parts. Late onset of pain was a prominent feature in 8 patients. This is likely to be a prodrome to the bony changes. Discoloration (potential corrosion) at the nail interface was observed in multiple removed nails. 15/30 nails were still at risk of developing complications, i.e., were not yet removed.

Interpretation / Conclusion: All Stryde nails should be monitored at regular intervals until removal. Onset of pain at late stages of limb lengthening, i.e., consolidation of the regenerate, should warrant immediate radiographic examination regarding osteolysis, periosteal reaction, and cortical hypertrophy, which may be associated with discoloration (potential corrosion) of the nail. We recommend removal of Stryde implants as early as possible after consolidation of the regenerate.

72. A novel plate concept for rotational guided growth of the femur – An experimental porcine pilot study

Ahmed Abood [1], Ahmed Halloum [1], Søren Kold [1], Marie Arildsen [1], Ole Rahbek [1], Jan Duedal Rölfing [2]

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Background: The use of guided growth to correct rotational lower limb deformities in children has been increasingly investigated. Alternative use of eight-plates and cable connected cannulated screws suggest the possibility of applying guided growth to correct rotational deformities. Still, there is no commercially available device for this purpose. We have developed a novel plate concept for rotational guided growth, which has proven effective in a cadaverous model, however large animal studies are lacking.

Aim: To proof the concept of the novel plate by rotating porcine femora through guided growth.

Materials and Methods: Six female porcines (n = 6) with a mean weight of 43 kg (38 - 47) were included in a paired design. The 3D printed titanium plates were inserted at baseline on the medial and lateral aspect of the left distal femoral physis. Each plate was attached using two 4.5 mm titanium screws. The animals were housed for 12 weeks before undergoing MRI, radiographs, and euthanasia. Change in femoral version and length between the right femur and left femur was determined on MRI. Clinical torsion was assessed using standardized photographs with the animal placed supine on a levelled table.

Results: The surgery was well tolerated by all animals, and they were ambulatory on the first post-operative day. A torsional difference was created in all operated femora. Mean change in femoral version was 12.5 degrees (9 - 16). Mean length of the operated femur was 2.9 mm (0 - 7) shorter than the non-operated. Mean clinical change in rotation was 10.3 degrees (7 - 14).

Interpretation / Conclusion: The plates were able to rotate all operated femora as intended. However, a decrease in axial growth due to the rotational guided growth cannot be ruled out. We did not assess possible changes in joint morphology. More comprehensive large animal studies investigating the precision of rotational potential of the plates in addition to detailed growth analyses including alignment in the coronal and sagittal plane are planned.

73. Midwives can measure the pubo-femoral distance reliably in ultrasound screening for developmental dysplasia of the pediatric hip.

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Background: Ultrasound screening for developmental dysplasia of the hip (DDH) is conventionally based on the Graf ultrasound technique which necessitates an experienced ultrasound user to be interpreted correctly. The pubo-femoral distance (PFD) has been proposed as a highly sensitive ultrasound screening tool for DDH, with low variability.
Aim: The aim of this study was to examine if midwives undergoing minimal training, could reliably perform pediatric hip ultrasound and measure PFD and to evaluate the learning curve of the midwives.
Materials and Methods: We recruited eight midwives with no prior experience in hip ultrasound for training in PFD measurements. They participated in a two-hour theoretical seminar on DDH screening and the PFD measurement. All midwives performed two rounds of independent blinded measurements on 15 static ultrasound images seven days apart and participated in four supervised live scanning sessions over two weeks. The midwives were compared to a group of three experienced musculoskeletal radiologists. Reliability and agreement were evaluated using interrater correlation coefficients (ICC) and Bland Altman plots. Linear regression was used to quantify the learning curve of the midwives as a group with absolute difference between midwife and radiologist as a function of number of scans.
Results: There was near complete intra- and interrater agreement (ICC > 0.89) on static ultrasound images across both rounds of rating and across both groups of raters. The midwives scanned a mean of 29 hips (range 24-35). Mean difference between midwife and supervising radiologists was 0.36mm 95% CI (0.12-0.61) for the first session which decreased to 0.2mm 95% CI (0.04-0.37) in the final session. ICC for PFD measurements between radiologist and midwives increased from 0.59 95% CI (0.37;0.75) to 0.78 95% CI (0.66;0.86) across sessions. The mean absolute difference between midwife and radiologist PFD measurements decreased by 0.1mm (95% CI 0.02-0.17) for every ten scans the midwives gained in experience (p=0.008).
Interpretation / Conclusion: Midwives reliably perform PFD measurements of pediatric hips, with minimal training, and with clinically insignificant differences compared to experienced musculoskeletal radiologists.

74. Preparing an automatic pin site infection detection tool with machine learning for home-based surveillance

Marie Fridberg [1] , Sowmya Annadatha [2], Qirui Hin [2], Tobias Jensen [2], Jianan Liu [2], Søren Kold [2], Søren Rahbek [2], Ming Shen [2]
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Background: To detect early signs of pin site infection infrared thermography has been suggested to provide quantitative information of clinical signs of pin site infection.
Aim: Our vision is to invent a pin site infection thermographic surveillance tool for patients at home. A preliminary step to this goal, is to automate the process of locating the pin and detecting the pin sites in thermographic images efficiently, exactly, and reliably for extracting the pin site temperatures.
Materials and Methods: Images (digital conventional and thermographic) were obtained in a controlled clinical setting and in an uncontrolled home setting. The total number of images of pin-sites used for developing the machine learning algorithm (images of pin sites) before augmentation was n=1708. The images was augmented, in to totally n=10.409. Randomly divided into a training set (n=8325), a validation set (n=1040) and a test set (n=1044) of images. The Pin Detection Model (PDM) was developed as follows: A You Only Look Once (YOLOv5) based object detection model with a Complete Detection Intersection over Union (CDIoU) was pre-trained by the hospital dataset and fine tuned by the home dataset through transfer learning. The performance was compared with other conventional models (FCOS and YOLOv4) for deep and transition learning to improve performance and precision. Maximum Temperature Extraction (MTE) Based on Region of Interest (ROI) for all pin sites was generated
Results: An automatic tool that can identify and annotate pin sites on digital images using bounding boxes was established. An obstacle was shifting, solved by calibration and image registration with a transformation matrix that converted every pixel on the digital images to a coordinate system of the thermographic image. The PDM algorithm was built on YOLOv5 with CDIoU and has a precision of 0.976 and it offers the pin site detection in 1.8 milliseconds. The PDM algorithm enabled MTE at an automatically detected ROI on the skin surface.
Interpretation / Conclusion: These results enable automatic pin site annotation on thermography with a precision of 0.976 in 1.8 milliseconds. This work, paves the way for future research on infection assessment using thermography.

75. Reliability of thermography in a clinical setting to detect skin temperatures at pin sites. A test-retest study

Marie Fridberg[1], Malene Engesgaard Christensen[2], Mathias Sørensen[2], Bente Madsen[2], Ole Rahbek[1] , Søren Kold[1]
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Background: Thermography has been suggested to objectify clinical signs of pin site infection by measuring skin surface temperatures.
Aim: The aim was to test the reliability of thermography by investigating reproducibility in a test retest setup and the intra- and inter-rater reliability using two different temperature extraction methods (TEM).
Materials and Methods: Thermography was obtained of 216 pin sites in a test-retest setup using a FLIR T540 infrared camera. Session A (n=216) and B (n=216) were conducted in a standardized realistic clinical setting with 30 min. in between. The test-retest setup was similar according to photographer, patient, position, acclimatization, pins and environmental conditions. Minor variations in angle (random) and distance (40-60cm) to the pin site reflected the realistic random variations introduced by the photographer. All images (n=432) were analyzed using two different TEM in FLIR tools software: The 3-point method and the MaxROI method. Intra-rater reliability: 20 pins were analyzed twice by the same rater with one week in between. Inter-rater: 20 pins were analyzed by 3 raters blinded. ICC was calculated using a two-way mixed effects model with absolute agreement and 95% confidence intervals.
Results: Test -retest reliability of the 216 pin sites: 3-point (ICC=0.9, CI 0.88-0.93) and MaxROI method (ICC=0.91CI 0.88-0.93). The intra-rater reliability test of the two different TEM of 20 pin sites: 3-point (ICC=0.65 CI 0.30-0.84) and MaxROI method (ICC=0.91CI 0.78-0.96). The inter-rater reliability test performed by using three different raters extracting temperatures of 20 pin sites: 3-point (ICC=0.86 CI 0.76-0.92) and MaxROI method (ICC=1,00 (0.996) CI 0.99- 0.99).
Interpretation / Conclusion: Thermographic imaging used to measure skin temperatures at pin sites using a FLIR T540 infrared camera was found reproducible in a realistic clinical setting. We found an excellent test-retest reliability for both TEM despite minor variations in distance and angle. The MaxROI had the best intra-and inter-rater reliability.

76. Pubo femoral distances in hip ultrasound do not vary between lateral and supine examination positions in newborns.

Hans-Christen Husum, Christian Klitt Jensen, Mads Henriksen, Michel Bach Hellfritszch, Bjarne Møller-Madsen, Ole Rahbek
Interdisciplinary Orthopaedics, Aalborg University Hospital; Department of Radiology, Aarhus University Hospital; Department of Children's Orthopaedics, Aarhus University Hospital; Danish Paediatric Orthopaedic Research

Background: Ultrasound screening for developmental dysplasia of the hip (DDH) is conventionally based upon the method developed by Graf. In 2013 the pubo-femoral distance (PFD) was proposed as a new ultrasound screening measurement, defined as the minimally measurable distance between the medial aspect of the femoral head and the pubic bone with a PFD above 6.0 mm considered pathological. No consensus exists on the positioning of the child when performing the PFD examination.
Aim: Our aim was to examine the agreement of the PFD when measured with the child in the lateral versus supine position.
Materials and Methods: We included a consecutive series of children referred for hip ultrasound suspect of DDH during a period of two months. The PFD measurement was obtained for each child for both hips in the lateral position, afterwards the child was placed in the supine position and the PFD measurement was repeated on both sides. Ultrasound examinations were performed by two experienced pediatric musculoskeletal radiologists Mean PFD values for lateral and supine positioning were compared using Student’s paired t-test and agreement was analyzed using Bland Altman plot.
Results: We included 30 children (15 boys), mean age at examination was 34 days (range 13-83). Mean PFD in lateral position was 3.5 mm 95%CI (3.2; 3.7) and mean PFD in supine position was 3.6 95%CI (3.4 ; 3.9). Mean difference in PFD between examination positions was 0.16 mm 95% CI(-0.01 ;0.31) p=0.04. Inspection of the Bland Altman plot did not reveal a systematic difference in PFD between examination positions with increasing average PFD value.
Interpretation / Conclusion: Shifting from lateral to supine examination positions during hip ultrasound had no clinically significant impact on PFD measurements. These findings underline the versatility of the PFD measurement as a screening tool for DDH.

77. Complications of Orthopedic Treatment in Patients Diagnosed with X-linked Hypophosphatemic Rickets.

Søren Kold, Carl Paludan, Kristoffer Thomsen, Ole Rahbek
Department of Orthopaedics, Aalborg University Hospital

Background: X-linked Hypophosphatemic Rickets (XLHR) in children with a Rickets Severity Score ≥ 2 can now be treated with the new fibroblast growth factor 23 (FGF23) antibody drug which prevents bone deformities and increases gait endurance. This study illustrates the extend and complications in the traditional orthopedic treatment in XLHR patients. The impact of surgery and severity of complications in this patient population has not been systematically assessed before. These data are needed to justify the very expensive antibody treatment
Aim: This study reviews systematically the complications of orthopedic treatment in XLHR patients
Materials and Methods: The search strategy resulted in 215 studies in which data were collected from 19 eligible studies and complications were categorized.
Results: XLHR patients without FGF23 antibody treatment undergo multiple surgeries. 168 complications were reported in 172 patient. One complication occurred in average per surgical procedure for XLHR in the published literature. The 168 reported complications were categorized as follows: Type 1 (n=79): Complications with minimal intervention required and treatment goal still achieved, Type II (n=41): Complications with substantial change in treatment plan and treatment goal still achieved, Type IIIA (n=23): Complications with failure to achieve treatment goal and no new pathology or permanent sequelae, Type IIIB (n=25): Complications with failure to achieve treatment goal and/or new pathology or permanent sequelae
Interpretation / Conclusion: In average one complication occurred per surgery and the severity of complications was remarkable. The treatment goal was not achieved in 28 % of surgeries whereof half of these resulted in permanent sequalae or new pathology. Complications were possibly underreported in current literature and complications of surgery in XLHR may therefore be underestimated. Our findings support the use of FGF23 antibody for treatment of the skeletal changes in XLHR instead of surgery as the reported side effects of antibody treatment is negligible compared to the impact of surgeries and related complications

78. The incidence of physeal fractures in the lower limb and the frequency of premature physeal closure, limb length discrepancy, and angular deformity: A cohort study of 236 physeal fractures.

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Background: Pediatric fractures is a common injury among children and adolescents. Physeal fractures constitute a particular concern because of the risk of accompanying growth disturbances.
Aim: The aim of this study was to estimate incidence rates (IR) of physeal fractures in the lower limb and the frequency of premature physeal closure (PPC) leading to limb length discrepancy (LLD) and angular deformity (AD).
Materials and Methods: This retrospective cohort evaluated 236 children between 2013-2020 treated for a physeal fracture in either tibia, distal femur, or distal fibula. All medical records and radiographs/CT-scans were reviewed to obtain information regarding type of physeal fracture and the development of growth disturbances. Furthermore, we investigated relevant predictive risk factors.
Results: The total incidence rate of physeal fractures was 36.4 (CI:30.3-39.3) per 100.000 person-years, with 1.2 (CI:0.50-23.1) of distal femur, 5.7 (CI:3.1-7.8) of proximal tibia, 14.1 (CI:11.4-17.2) of distal tibia, and 13.6 (CI:11.0-16.7) of distal fibula. The overall frequency of growth disturbance was 9.7%. Within distal femur, proximal tibia, distal tibia, and distal fibula the frequency of growth disturbance was 37.5%, 15.4%, 13.5%, and 1.1%, respectively. The highest frequency of growth disturbances was in Salter-Harris type II and IV fractures (60.9 % and 34.9%). We found a significant higher risk of developing growth disturbances if the patient was treated operatively ($p<0.001$), sustained the fracture from a high-energy injury ($p=0.02$), or if the initial displacement was ≥ 3 mm ($p=0.01$).
Interpretation / Conclusion: Despite a relatively low incidence of physeal fractures, we found that a recognizable part eventually develops growth disturbance, particularly children presenting with certain risk factors. We accentuate the importance of consistent and uniform growth evaluations after sustaining a physeal fracture.

79. Surgical procedures in infants with early diagnoses of developmental dysplasia of the hip. A prospective 4-year follow-up study.

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Background: To detect unstable dysplastic hips early, neonatology specialists routinely screen all new- borns in Denmark. Infants with detectable risk factors or clinical signs of dysplasia are referred to a combined pediatric orthopaedic and radiologic examination. A previous study has shown that 17% of all infants referred for this combined examination meet the diagnostic criteria of dysplasia. Four per cent have unstable hips that need treatment. Dysplastic hips may normalize spontaneously without any intervention due to the natural growth. However, some infants need one or more surgical intervention to achieve stable and non-dysplastic hips.
Aim: To determine the proportion of infants with early dysplasia of the hips undergoing surgical procedures and to determine the type and number of surgical procedures.
Materials and Methods: A prospective and consecutive study of all infants aged 0-6 months diagnosed with dysplasia of the hips in the combined pediatric orthopaedic and radiologic examination in the Region of Southern Denmark 2013-2017. From medical records, we obtained information about all surgical procedures in the hips including open or closed reductions, arthrographies, tenotomies, and pelvic osteotomies before the age of 4 years.
Results: Overall, 281 infants with hip dysplasia were included. The median age at first examination was 48 days. In 254 (90%) of the infants, the hips resolved spontaneously, and 27 (10%) needed one or more surgical interventions. Overall, the 27 infants had 47 surgical interventions as 12 infants had more than one intervention. One infants had five surgical interventions. The most frequent surgical procedures were closed reduction and arthrography with or without adductor tenotomy (58 %) and pelvic osteotomy (27%). Among infants with surgical interventions, 23 (8.2%) had unstable hips, and four (1.4 %) had stable hips. All four infants with stable hips had an arthrography and none required a pelvic osteotomy.
Interpretation / Conclusion: This study supports the propensity for spontaneous normalization of early dysplasia of the hips in infants. Only a small proportion of the infants needed surgical interventions to achieve stable and non-dysplastic hips.

80. The proportion of hip dysplasia in infants referred for combined pediatric orthopedic and radiologic examination in Region of Southern Denmark 2013-2019

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Section for Pediatric Orthopaedics, Department of Orthopaedics and Traumatology, Odense University Hospital.

Background: To detect developmental hip dysplasia (DDH) early, all newborns in Denmark are examined postnatally by a pediatrician and by a primary care physician at 5 weeks and 5 months of age. Suspect findings are referred to a combined pediatric orthopedic examination and ultrasonography. This combined examination is resource demanding, and studies have found variating effects of the screening. Previous studies have described variating proportions of DDH among infants referred for the combined examination. Furthermore, only few studies have examined which causes most commonly lead to referral and the association between different causes of referral and DDH.
Aim: To determine the proportions of infants with DDH and hip dislocation in infants referred for a combined pediatric orthopedic and radiologic assessment, and to describe the association between DDH and different reasons of referral.
Materials and Methods: A prospective study of all infants aged 0-6 months referred for a combined pediatric orthopedic and radiologic examination of the hips at Odense University Hospital or Kolding Hospital 2013-2019. We calculated the overall proportion of DDH and hip dislocations and the proportions stratified by different reasons of referral. We considered an acetabular index > 30° on radiographs or Graf Type 2b or worse on ultrasonographies diagnostic of DDH.
Results: Of the 1,989 infants included, 334 (17%) were diagnosed with DDH and 94 (4.7%) had hip dislocations. The proportions of infants with DDH among infants with a single reason of referral were 36% for breech position, 25% for familial disposition, 14% for hip click, 8% for asymmetry, and 3% for twins. The proportions of infants with unstable hip(s) were 14% for familial disposition, 12% for breech position, 3% for hip click, 3% for twins, and 1% for asymmetry.
Interpretation / Conclusion: The study demonstrates that a considerable proportion of infants referred for the combined examination have DDH and that some reasons of referral are clinically more important. The study showed that in infants with hip click and asymmetry, a considerable proportion had DDH. We recommend that infants with hip click or asymmetry should be referred for a the pediatric orthopedic and radiologic examination.

SESSION 11: SHOULDER/ELBOW

17. november

13:30 - 15:00

Lokale: Vingsal 2

Chair: Rie Nyholm and Lars H. Frich

81. Minimal early functional gains after operative treatment of midshaft clavicular fractures. A meta-analysis of 10 randomized controlled trials including 1333 patients.

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Background: There is substantial evidence that operative treatment of displaced midshaft clavicular fractures reduces the risk of non- union, but the summarized data from randomized studies has failed to demonstrate long term functional gains compared with nonoperative treatment. In some studies, however, the advantage of faster functional recovery is used as an argument for operative treatment.
Aim: The aim of this meta-analysis of randomized controlled trials was to investigate the possible early functional gains (≤ 6 months) after operative treatment of displaced midshaft clavicular fractures compared with non- surgical treatment.
Materials and Methods: A systematic search was performed to identify randomized controlled trials comparing plate osteosynthesis with nonoperative treatment. We evaluated shoulder function outcomes measured by Constant Score (CS) or Disability of the Arm, Shoulder, and Hand (DASH) questionnaire. Other outcomes of interest were sick leave and return to previous activity (work, leisure).
Results: 10 studies including 1333 patients were included. The mean difference in DASH score after 6 weeks was 9.4 points (95% Confidence Interval (CI) 13.7 to 5.1) in favor of operative treatment. At 3 months the difference was 3.6 points (95% CI 6.9 to 0.4) and at 6 months the difference was 3.2 points (95% CI 5.2 to 1.1), both in favor of operative treatment. Results for CS were similar to that of DASH score.
Interpretation / Conclusion: This meta-analysis shows that there is an early functional gain at six weeks following plate fixation of midshaft clavicular fractures compared with nonoperative treatment. The gain, however, is barely clinically relevant for the average patient. At three and six months, the functional gain is lesser and not clinically relevant.

82. Previous rotator cuff repair increases the risk of revision surgery for periprosthetic joint infection after reverse shoulder arthroplasty

Marie Louise Jensen, Steen Lund Jensen, Matthijs Bolder, Klaus Hanisch, Anne Kathrine Belling Sørensen, Bo Sanderhoff Olsen, Thomas Falstie-Jensen, Jeppe Vejlgaard Rasmussen
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Background: Previous studies have indicated an increased risk of periprosthetic joint infection in patients treated with reverse shoulder arthroplasty. The reason for this may be related to a high prevalence of previous rotator cuff repair in these patients.
Aim: The purpose was to determine the risk of periprosthetic joint infection for patients with previous rotator cuff repair compared to patients with no previous surgery and report the rates of revision due to infection after reverse shoulder arthroplasty for cuff tear arthropathy or osteoarthritis.
Materials and Methods: Data was retrieved from the Danish Shoulder Arthroplasty Registry and medical records. We included 2,217 patients who had reverse shoulder arthroplasty for cuff tear arthropathy or osteoarthritis between 2006 and 2019. Periprosthetic joint infection was defined as at least 3 out of 5 tissue samples positive for the same bacteria or as definite or probable infection evaluated from the International Consensus Meeting. The Kaplan-Meier method was used to illustrate the unadjusted 14-year cumulative rates of revision. The Cox regression model was used to report hazard for revision due to periprosthetic joint infection. Results were adjusted for previous non-arthroplasty surgery, gender, diagnosis, and age.
Results: Revision was performed in 88 (4.0%) shoulders of which 40 (1.8%) were due to periprosthetic joint infection. There were 272 (12.3%) patients who had previous rotator cuff repair of which 11 (4.0%) were revised due to periprosthetic joint infection. The 14- year cumulative rate of revision due to periprosthetic joint infection for patients with previous rotator cuff repair was 14.1% and for patients without previous surgery it was 2.7%. The adjusted hazard ratio for revision due to periprosthetic joint infection for patients with previous rotator cuff repair was 2.2 (95% CI 1.04 to 4.60) compared to patients without previous surgery
Interpretation / Conclusion: There is an increased risk of revision due to periprosthetic joint infection after reverse shoulder arthroplasty for patients with previous rotator cuff repair. We recommend that patients with previous rotator cuff repair to be regarded as high-risk patients when considering reverse shoulder arthroplasty.

83. Patient reported outcome after non-surgically treated displaced proximal humeral fractures: short term outcome in a consecutive prospective cohort of 141 geriatric patients

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Background: Randomized trials have failed to demonstrate superiority of surgical management in displaced proximal humeral fractures (PHF). Little is known about patient reported outcome after non-surgical management outside control groups in randomized trials.
Aim: To report short-term outcome in a large consecutive cohort of geriatric patients with displaced PHF managed non-surgically.
Materials and Methods: A prospective cohort study performed at a Danish university hospital. All patients aged 60 years or above with an acute (< 3 weeks from injury) displaced PHF (according to Neer's definition) were followed for 6 months with Oxford Shoulder Score (OSS) and health-related quality of life (EQ 5D-3L). Patients were offered usual rehabilitation in their municipalities. Minimally displaced fractures were referred to primary care and not included in the cohort.
Results: Within a 10-month period 141 patients (77% females) with a displaced PHF were managed. Median age was 75 (interquartile range (IQR) 70- 81). The most common fracture patterns were 2- part (n=75), 3-part (n=40) and 4-part (n=12). We excluded 50 patients: 12 (8.5%) managed surgically (4 primary surgeries, 8 secondary, all with reverse arthroplasty), 11 with concomitant fractures, 9 referred to local hospital, 7 deaths, 6 suffering dementia, 5 other specified reasons. We lost 3 patients to follow-up leaving 88 for final evaluation. Median Oxford Shoulder Score was 37 (IQR 29- 43) which equals 77% of a full shoulder function. Median EQ 5D-3L was 0.60 (IQR 0.43-0.71). A ceiling effect was found for both outcomes. No statistically significant difference in outcome was found between 2-, 3-, and 4-part fractures for either OSS (p=0.22) or EQ 5D-3L (p=0.67) (Kruskal-Wallis test).
Interpretation / Conclusion: Short-term outcome in a large consecutive cohort of geriatric patients with displaced PHF managed non- surgically was reported. Data can be used in patient counseling, clinical decision making and future research.

84. Retained Myogenic Potency Of Supraspinatus Muscle Stem Cells In Tear Condition

Lars Henrik Frich (1,2), Julie Dybdal (1), Marie Nolsøe Helles (1), Eva Kildall Heibøl (1,2), Stephanie Carlsen (1), Henrik Daa Schrøder (3), Kate Lykke Lambertsen (1),
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Background: The success of rotator cuff tendon repair is dependent of both tendon healing and muscle recovery. The regenerative capacity of the muscle is primarily driven by muscle stem cells, also known as satellite cells (SCs) that are quiescent cells located under the basal lamina of muscle fibers. The SCs express the transcription factor paired box protein pax7 (Pax7). When a muscle is exposed to injury the SCs break quiescence and reenter the cell cycle in which Pax7 is involved in myogenic cell lineage determination and specification. When SCs are activated, primary myogenic regulatory factors (MRF) like MyoD1 and the secondary MRF myogenin function downstream in terminal differentiation. Pax7+, MyoD1+ and myogenin+ cells in a muscle fiber can therefore be interpreted as an expression of the SC's presence, activity and stage of differentiation
Aim: to quantify stem cell markers Pax7, MyoD1 and Myogenin+ as an expression of the regenerative potential of the supraspinatus (SS) muscle in RC tear conditions
Materials and Methods: Biopsies were obtained from the SS muscle in 26 patients undergoing surgery for RC tear (RCT). Control biopsies were harvested from the deltoid (DT) muscle. Biopsies were immunohistochemically processed for detection of myogenic precursor marker proteins (Pax7+, MyoD1+ and myogenin+ cells) and analyzed using stereological principles. Total number of Pax7+, MyoD1+ and myogenin+ cells/mm2 was counted to estimate the myogenic potential of the muscle. Statistical adjustments were made for age, lesion age and gender
Results: Our results revealed an unchanging number of satellite cells (Pax7+ expression) in all age groups. However, we showed increased expression of MyoG and MyoD1 in younger patients. A lesion age dependent influence was indicated by a rise in MyoG expression up to 6 month after lesion
Interpretation / Conclusion: The difference in the expression of stem cell markers between the SS muscle and the ipsilateral DT muscle indicates a preserved myogenic potential in the RC muscle during early tear conditions. Treatment opportunities in elderly patient with RCT needs rethinking and enhancement of the myogenic potential of the supraspinatus muscle is a possible therapeutic target to improve rotator cuff repair

85. Surgical versus non-surgical treatment for displaced proximal humeral fractures: key messages from an updated Cochrane review

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Background: Fractures of the proximal humerus are common injuries, especially in older people. The indication for surgery remains a key treatment question for displaced fractures - surgical interventions are still used widely despite accumulating evidence that surgery may not result in a better outcome. We updated our Cochrane review to include the new evidence for non-pharmacological interventions for treating these fractures. This presentation focuses on surgical versus non- surgical treatment comparison.
Aim: To assess the benefits and harms of surgical versus non-surgical treatment for proximal humeral fractures.
Materials and Methods: A systematic review and meta-analysis. We conducted a comprehensive search in multiple bibliographical databases in November 2021. We considered all randomised and quasi-randomised controlled trials that compared non-pharmacological interventions for treating acute proximal humeral fractures in adults. Pairs of review authors independently selected studies, assessed risk of bias and extracted data. We pooled data where appropriate and used GRADE for assessing the certainty of evidence for each outcome.
Results: We included 47 randomised trials (3,179 participants) that tested one of 26 comparisons. Ten trials, (717 participants) evaluated surgical versus non-surgical treatment for displaced fractures. We found high-certainty evidence of no clinically important difference between surgical and non-surgical treatment in patient-reported shoulder function at one year (SMD 0.10, 95% CI -0.07 to 0.27; 552 participants, 7 studies) and two years (SMD 0.06, 95% CI -0.13 to 0.25; 423 participants, 5 studies). We found high-certainty evidence of no clinically important between- group difference in quality of life at one year (EuroQol: MD 0.01, 95% CI -0.02 to 0.04; 502 participants, 6 studies). Low-certainty evidence of a higher risk of additional surgery in the surgery group was found (RR 2.06, 95% CI 1.21 to 3.51; 667 participants, 9 studies).
Interpretation / Conclusion: There is high-certainty evidence that, compared with non-surgical treatment, surgery does not result in a better outcome at one and two years after injury. Surgery may increase the need for subsequent surgery.

86. *Abstract and presentation withdrawn*

87. The accuracy and reliability of a new non-invasive model for dynamic measurements of scapular kinematics

Catarina Malmberg[1], Kristine R Andreasen[1], Stefan E Jensen[1], Benjamin Michaud[2], Per Hölmich[1], Kristoffer W Barfod[1], Jesper Bencke[1 3]
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Background: Primary or secondary scapular dyskinesis is characterized by abnormal scapular rotations. It can be painful and impair the shoulder function. A skin marker-based motion capture model providing information about the rotations of the scapula was recently developed and can potentially be used to diagnose and monitor scapular dyskinesis.
Aim: To investigate the concurrent validity and the interrater reliability of a new model for analysis of scapular kinematics.
Materials and Methods: Twelve infrared cameras were used to track reflections from moving skin markers in the motion capture model. A strict protocol for placement of the skin markers was followed. Shoulder range of motion (ROM) and activities of daily living (ADL) were tested. To investigate the validity, the skin marker-based model was compared to gold standard through simultaneous data collection from markers fitted to an intracortical pin in the scapula of healthy volunteers. Reliability was tested by comparing two investigators performing the skin marker-based protocol in a different group of healthy volunteers. The mean Root Mean Square Error (RMSE) was calculated for each tested motion to determine the validity. The interrater reliability was determined as Intraclass Correlation (ICC2,1) for each tested motion.
Results: Eight subjects were included in the validity test: F/M=2/6, mean age 34 (range 29-38), mean BMI 23.4 (SD3.3). The mean RMSE of all scapular rotations ranged 2.4-7.6° during shoulder ROM and 2.2-8.7° during ADL. The highest errors were seen for movements in front of the body: sagittal/scapular plane flexion, hair combing and eating. In the reliability test, 20 subjects were included: F/M=8/12, mean age 31 (range 23-37), mean BMI 22.9 (SD1.74). ICC for measuring protraction ranged 0.64-0.83 during ROM and 0.71-0.76 for ADL. Correspondingly, ICC ranged 0.15-0-70 and (-0.01)-0.72 for upward rotation, and 0.37-0.77 and 0.57-0.76 for anterior tilt.
Interpretation / Conclusion: Our results indicate that the model's validity and reliability are task dependent and interpretation should be made with caution. Taking the inherent limitations of the method into consideration, the model is promising for clinical use.

88. Subacromial decompression surgery in adults with subacromial pain syndrome who have completed a structured exercise program without satisfactorily effect: a systematic review and meta-analysis.

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Background: No reviews have investigated the effect of artroscopic subacromial decompression (ASAD) in patients who have failed best evidence non- operative treatment

Aim: To investigate the effect of artroscopic subacromial decompression (ASAD) in adult patients with long- lasting subacromial pain syndrome (SAPS) (more than 6 months), and not responding to structured exercise therapy (minimum 3 months).

Materials and Methods: A systematic review and meta-analysis. Certainty of evidence was evaluated using GRADE. Data sources were: Embase, MEDLINE, Cochrane Library, Cinahl, and Pedro (inception to March 2020). Eligible studies were randomised controlled trials comparing ASAD with a) non-surgical treatment or b) no treatment.

Results: No studies fulfilled the inclusion criteria. Four studies (n=487) provided indirect information as a majority of the included populations was assumed to have had long-lasting SAPS and have failed non-surgical treatment. ASAD compared to non-surgical treatment showed a satistically significant but clinically irrelevant effect on pain (3 RCTs; n = 315; mean difference (MD) 0.69, 95% CI 0.08;1.3 (on a 0- 10 visual analogue scale (VAS) MCID 1.5), and function (constant score (CS)) (3 RCTs; n=314; MD 5.53, 95% CI 2.09;12.79 (on a 0-100 scale, MCID 8.3) at 6 months. No difference was found for risk of serious adverse events. ASAD compared to no treatment showed no satistically significant nor clinically relevant effect on pain at 6 months (1 RCT; n = 120; MD 0.02, 95% CI -0.85;0.89 (on a 0-10 VAS,), and a statistically significant, but clinically irrelevant negative effect on function (CS) at 6 months (1 RCT; n=120; std. MD -6.2, 95% CI -12.02;-0.38. No difference was found in the risk of serious adverse events.

Interpretation / Conclusion: No trial has been limited to patients failing non- operative treatment why research is needed to establish the value of ASAD in this population. Based on indirect evidence, ASAD was not superior to non-surgical treatment (very low certainty of evidence) or no treatment (low certainty of evidence). These findings support a weak recommendation against the use of ASAD in this group of patients.

89. Epidemiology and trends in management of acute proximal humeral fractures in adults: a more than 20 year observational study from the Danish National Patient Register

Stig Brorson[1 2], Bjarke Viberg[3], Per Gundtoft[3 4], Bamo Jalal[1], Søren Ohrt-Nissen[5]
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Background: Proximal humeral fractures (PHF) can be managed surgically or non-surgically. Locking plates has been the preferred head-preserving surgical technique while hemiarthroplasty (HA) or reverse shoulder arthroplasty (RSA) have been used in joint replacement surgery.
Aim: To describe the epidemiology and trends in management of acute PHF in adults in Denmark from 1996 to 2018 with focus on changes in 1) incidence of PHF, 2) proportion of surgical and non-surgical cases, and 3) preferred surgical techniques.
Materials and Methods: This is a national registry-based study with data on diagnoses and interventions retrieved from The Danish National Patient Register. Patients aged 18 years and above were included. Surgical treatment was defined as diagnosis code on PHF (DS422) combined with a surgical procedure code within 3 weeks of injury. HA was defined as KNBB0* and KNBB1* while RSA was defined as KNBB20, 30, 40, or 59. Plating was defined as KNFJ60 and other techniques as other KNB* procedures. Non-surgical was defined as no surgical procedure code within 3 weeks or KNBJ0*. Statistics Denmark provided background population data for incidence estimation.
Results: Between 1996 and 2018, 137,429 PHF were registered. Women accounted for 72%. The overall incidence was 139/100,000/year (497 for women 60 years or above). The incidences were stable over the period. Non-surgical treatment accounted for 119,966 (87%) of the fractures. The 17,470 surgical procedures included 7,331 (42%) locking plates, 5,850 (34%) arthroplasties and 4,289 (25%) other techniques (K-wires, intramedullary nails, screws and combined techniques). In 2013, 17% of all PHF were treated surgically, the rate gradually declined to 11% in 2018. In patients above 60 years, the rate of locking plates remained stable (51%) from 2013 to 2018 while the use of RSA increased from 1% to 13% and the rate of HA decreased from 38% to 24%.
Interpretation / Conclusion: The incidence of PHF has remained stable between 1996 and 2018. The approach to PHF remains predominantly non-surgical and the number of surgeries in Denmark have decreased since 2013. RSA is increasingly used in acute PHF.

90. KKR: Radial head prosthesis or excision for Mason type III radial head fractures not amenable to internal fixation

Christian Cavallius, Kenneth Quaade Szkopek, Theis M. Thillemann, Steen Lund Jensen
DOT, DSSAK

Background: ..
Aim: The aim of this short clinical guideline was to assess the evidence for treatment of isolated Mason type III fractures of the radial head not amenable for osteosynthesis: which is better; substitution with a metallic radial head prosthesis or a simple radial head resection?
Materials and Methods: A systematic search of relevant literature for guidelines, systematic reviews and randomized controlled trails (RTC) was conducted on Pubmed on March 8th, 2022. The evidence was rated by standardized forms (AMSTAR2, Cochrane Risk of Bias-tool and GRADE).
Results: From a total of 292 studies, 258 were excluded based on titles and abstracts, and 29 studies were excluded after reading full text by at least two of the authors. Of the remaining five studies, three were excluded due to a low score on AMSTAR2. Finally, two studies were included: a network meta-analysis and a quasi-randomized controlled trial. Both studies assessed functional outcome by Mayo Elbow Performance Index, but disagreed as to which treatment was better. Rate of reoperation was not reported in either study, but overall, radial head resection led to fewer complications compared to arthroplasty. This finding was not statistically significant.
Interpretation / Conclusion: It is not recommended to use radial head arthroplasty instead of simple radial head excision in isolated Mason type III fracture not amenable to internal fixation if there are no associated lesions. The evidence to support the conclusion is very weak.

SESSION 12: SPORTS ORTHOPEDICS

17. november

13:30 - 15:00

Lokale: Vingsal 3

Chair: Annika Winther and Bjarne Mygind

91. Ten years with a standard treatment algorithm for patellofemoral instability and trochlea dysplasia in a Danish population – general experience and 5 years outcome

Christian Dippmann[1], Peter Lavard[1], Volkert Siersma[2], Anette Kourakis[1], Michael Rindom Krogsgaard[1]

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Background: Patellofemoral instability is often caused by predisposing factors, of which trochlea dysplasia is the most common. Patellar instability leads to impaired function and increased risk of osteoarthritis. The treatment of trochlea dysplasia has been centralized in Denmark during the last decade at two hospitals. At Bispebjerg Hospital the treatment has been based on a algorithm and more than 350 trochleoplasties have been performed during this period.
Aim: The purpose of this study was to report our experience 10 years after introducing a treatment algorithm in this prospective patient series, including long-term results at 5-years follow-up.
Materials and Methods: Prospectively collected data from August 2009 to August 2016 for all patients undergoing open trochleoplasty (TP) as well as the combinations of accompanying surgical procedures, such as MPFL reconstruction (MPFL-r), medialization/distalization of the tibial tuberosity (ET), femoral/tibial osteotomy, etc., was analyzed. Before surgery patients had clinical examination and MRI-scan and completed four patient-reported outcome measures (PROMs) (Kujala, KOOS, Lysholm and IKDC). One, two, five and ten years after surgery all patients were scheduled for clinical control, MRI-scan and completion of the four PROMs. We report data for the 5-year follow-up.
Results: During the period, 115 TP were performed in 106 patients (36 males, 70 females). Average age: 22 yrs (range 12-41yrs). 3 knees had TP+ET (2,6%), 3 knees (2,6%) had an isolated TP. 49 knees (42,6%) had TP + MPFL-r, while 60 knees (52,2%) received TP+MPFL+1 other procedures. 40 knees (34,8%) had further surgery (19 brisement force, 4 isolated MPFL-r, 8 isolated amotio atellae and 9 other). Following our algorithm only one patient (1%) suffered from re-dislocation of the patella. After five years there was a significant improvement in all PROMS ($p<0.01$), when adjusted for age, treatment before and treatment after operation.
Interpretation / Conclusion: 10-years after introduction a standard treatment algorithm for patella instability excellent 5-yr results can be seen with high patient satisfaction and a very low dislocation rate.

92. Incidence of arthroscopic resection of cyclops lesions within two years after an ACL reconstruction and the influence of surgical technique changing. An analysis of 2,608 patients in the period 2005-2019.

Lene Lindberg Miller[1 3], Torsten Grønbech Nielsen[1 3], Inger Mechlenburg[1 2], Martin Lind[1 2]
Department of Orthopedics, Aarhus University Hospital, Denmark[1]; Department of Clinical Medicine, Aarhus University, Denmark[2]; Department of Physiotherapy and Occupational Therapy, Aarhus University Hospital[3]

Background: After an ACL reconstruction (ACLr) scar tissue/arthrofibrosis may develop. This type of arthrofibrosis is named cyclops lesion and was first described in the 1990's. The cyclops lesion is situated anterior to the reconstructed graft and may cause knee extension deficit, pain, oedema, clicking and reduced knee function.
Aim: To determine the incidence of arthroscopic resection of cyclops lesion within two years after ACLr through a period of 15 years. Furthermore, to investigate which patient demographics and changes in surgical techniques in this period that could be related to the need of arthroscopic resection of cyclops lesion.
Materials and Methods: This cohort study was based on patients who had a primary ACLr with adult surgical technique from 2005-2019 at Aarhus University Hospital. The cohort was identified in the Danish Ligament Reconstruction Register. To identify patients who had resected a cyclops lesion within the first two years after ACLr patients' surgical records were reviewed. The results will be presented as incidence with a 95% CI.
Results: In the period from 2005-2019 2,608 patients had primary ACLr with two-year follow-up. During the follow-up period, 177 patients had a cyclops lesion arthroscopically resected, equivalent to an incidence of 6.8% (95%CI 5.9;7.8). The incidence in females was 8.3% (95%CI 6.7;10.0) and in men 5.7% (95%CI 4.6;7.0) with a risk ratio of 1.44 (95%CI 1.1;1.9). The incidence of resected cyclops lesion in patients who had ACLr with an anteromedial technique was 8.9 % (95%CI 7.7;10.3) and transtibial technique 1.9% (95%CI 1.0;3.1) with a risk ratio of 4.7 (95%CI 2.8;7.9). The incidence of arthroscopic resection of cyclops lesion was similar among patients with different choice of graft, and with or without cartilage or meniscal lesions.
Interpretation / Conclusion: The incidence of arthroscopic resection of cyclops lesion after ACLr was 6.8%. Females have 44% higher risk of getting resection of a cyclops lesion compared to men. When using the anteromedial technique compared to transtibial technique the risk is almost 5 times higher of receiving an extra arthroscopy with resection of cyclop lesion. These findings are important when deciding on ACLr technique, especially in females.

93. Epiphyseal drilling in Femur reduces growth Disturbance in Pediatric ACL Reconstruction

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Sports Trauma, Dept of Orthopedics, Aarhus University Hospital.

Background: Anterior Cruciate Ligament Reconstruction (ACLR) in skeletally immature patients can result in growth plate injury, which may cause growth disturbances
Aim: The aim was to evaluate radiological tibial and femoral length and axis growth disturbances as well as clinical outcome in skeletal immature ACLR patients treated with a femoral growth plate sparing ACL- reconstruction technique.
Materials and Methods: Sixty-five skeletal immature patients, who had ACL reconstruction in the period 2013- 2019 were investigated with radiology, knee stability measurements and patient-reported outcomes measures after growth plate closure with a minimum 29 months follow- up. Patients were evaluated with full extremity radiographs, measuring leg length discrepancy and malalignment compared to contralateral leg. Clinical evaluation with KT1000 measurements and KOOS and Tegner scores. The follow-up time was 68 (29-148) months.
Results: There was a statistically significant angular deformity at distal femur compared to contralateral leg. No limb-length discrepancy or angular deformity at tibia was found. We found 2,4 mm side to side difference laxity at follow-up and IKDC score of 86,2.
Interpretation / Conclusion: The present hybrid physis sparing technique did not affect limb-length discrepancy. Despite crossing of tibial physis, no angular deformity at tibia was seen. A small femoral angular deformity was seen despite no crossing of femoral physis.

94. Revision rates and clinical outcomes between fixed- and adjustable-loop devices for femoral fixation in anterior cruciate ligament reconstruction – A systematic review and meta-analysis

Simone Elmholt, Torsten Nielsen, Martin Lind
[1] Department of Orthopedics, Aarhus University Hospital

Background: Button implants with either fixed-loop device (FLD) or adjustable-loop device (ALD) are used frequently in Anterior Cruciate Ligament Reconstruction (ACLR). Since revision, ACLR is associated with poorer clinical outcomes, investigating the difference in risk of revision between FLDs and ALDs is important.
Aim: To systematically assess the risk of revision ACLR between ALDs and FLDs, as well as secondary outcomes of knee stability and patient-reported outcomes (PROMs).
Materials and Methods: The online databases Embase, Medline (PubMed) and SPORTDiscus were searched to identify studies, comparing FLDs and ALDs for femoral fixation in patients undergone primary ACLR with hamstring autografts. Risk of bias was assessed with the Robin-I tool for non- randomized studies. The risk of revision ACLR is presented as an Odds Ratio (OR). The mean difference (MD) in knee side-to- side stability (SSD) was assessed at 2- years follow-up. The MD in PROMs was evaluated with the Lysholm score and the International Knee Documentation Committee (IKDC) score at 2-years follow- up. A random-effect meta-analysis were performed for the secondary outcomes and the quality of evidence was evaluated by the GRADE approach.
Results: Fifteen cohort studies were included with a total of 2686 patients. One study with 1654 patients compared the risk of revision ACLR with an OR of 0.521 (95% CI: 0.240-1.132) lower for the ALD. Four studies with 357 patients reported the knee SSD at 2-years follow-up and the ALDs had an SSD of -0.15mm lower (95% CI: -0.54-0.24) compared to FLD. The MD in IKDC score was 0.48 points higher for ALDs reported by six studies with 446 patients. For the Lysholm score the ALDs had a 0.17 points higher score compared to the FLDs reported by seven studies with 563 patients. The quality of evidence was either low or very low due to study designs, risk of bias and heterogeneity.
Interpretation / Conclusion: There was no difference in knee stability and PROMs between the ALDs and FLDs, however, the interpretation of these results is challenging due to low quality of evidence. More studies investigating the risk of revision ACLR between ALDs and FLDs are needed.

95. Knee-related Quality of Life, Symptoms, Pain, and Function in Sport and Recreational activities in adults with a history of adolescent Osgood-Schlatter: A registry-based cross-sectional study

Amalie Bjerre Jørgensen[1,2], Per Hölmich[2,3], Kristian Thorbrg[2,3], Lasse Christensen[4], Mathias Nielsen[2], Kasper Krommes[2]

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Background: Osgood-Schlatter is a common growth-related injury in adolescence and can cause persistent pain, decreased function, and reduced participation in physical activity. However, little is known about the long-term consequences for knee-related health for these patients in adulthood
Aim: To investigate long-term consequences for self- reported knee health of adults diagnosed with Osgood-Schlatter in adolescence compared to normative values from healthy age-matched populations
Materials and Methods: We included patients aged 18-55y, diagnosed in Danish secondary care with Osgood-Schlatter during the years 1977-2020, from the Danish National Patient Registry. They were invited to complete a survey. Knee-related health was self- reported on the Knee Injury and Osteoarthritis Outcome Score (KOOS) on four subscales: Quality of Life (QoL), Symptoms, Pain, and Sport/Rec. Mean responses were grouped according to pre-specified age groups (18-24, 25-34, 35-44, 45-55 years) and compared to age-matched normative KOOS values derived from a healthy cohort (Williamson et al., 2015, n=1000)
Results: 400 participants completed the survey (mean age 33.8±13y, 65% men). All mean subscale scores were lower for the surveyed group compared to the healthy cohort. Mean differences between the two groups were (female/male): QoL subscale: 36/19 points (18-24y), 25/27 points (25-34y), 26/33 points (35-44y), 25/23 points (45-55y); Symptom subscale: 15/8 points (18-24y), 8/9 points (25-34y), 18/11 points (35-44y), 10/11 points (45-55y); Pain subscale: 19/9 points (18-24y), 11/12 points (25- 34y), 13/15 points (35-44y), 16/10 points (45-55y); Sport/Rec subscale: 36/19 points (18-24y), 30/28 points (25-34y), 38/31 points (35-44y), 33/26 points (45-55y)
Interpretation / Conclusion: People diagnosed with Osgood-Schlatter in adolescence have decreased self-reported knee health in adulthood when compared to healthy populations. Clinically relevant differences were seen, especially in terms of Quality of Life and Function in Sport and Recreational activities. Future studies should address the need for mitigating the potential long-term consequences of this condition and investigate a potential causal relationship between exposure from Osgood-Schlatter and long-term outcomes

96. Factors increasing the risk of ACL-reconstruction after ACL-injury

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Background: Knee trauma resulting in anterior cruciate ligament (ACL) injury are treated with inter- disciplinary rehabilitation (based on exercise and information) or ACL-reconstruction (ACLR) followed by rehabilitation.
Aim: To identify factors associated with increased risk of ACLR after an ACL-injury and evaluate patient satisfaction.
Materials and Methods: Included patients were offered a 6-weeks in- hospital rehabilitation at Herlev & Gentofte Hospital. The factors investigated included patient characteristics (age, sex), specific tests (Rolimenter, Lachmans test, pivot shift test, anterior drawer test) and patient reported outcomes (Patient Specific Function Score (PSFS), Knee Injury and Osteoarthritis Outcome Score (KOOS), Lysholm, Tegner and functional test (single leg hop test and side-hop test). Risk of ACLR was investigated in a univariate logistic regression analysis and presented as Odds Ratio (OR) with 95% CI. Patient satisfaction was evaluated as the patient acceptable symptom state (PASS) and treatment failure (TF).
Results: From February 2015 to February 2017, 152 participants were included in the cohort. Of these 49 received ACLR. The ACLR group was younger (29 vs. 37 years, were predominately male (61 vs. 39 %), had higher pre-injury activity (Tegner 6.82 vs 6.22), higher laxity (Rolimeter 4.1 mm vs 3.0 mm), had more often swelling after the in- hospital evaluation (58% vs. 33%) compared to the non-ACLR group. There was increased risk of ACLR being male (OR: 2.49, 95% CI 1.24 to 5.00), had higher pre- injury activity (Tegner) (OR: 1.37, 95% CI 1.06 to 1.77), had higher laxity (Rolimeter) OR: 1.27, 95% CI 1.07 to 1.50) and reduced risk with increasing age (OR: 0.93, 95% CI 0.90 to 0.96). The PASS was 61% after rehabilitation and 65% after ACLR. The corresponding values for TF was 5 and 8%. Only 3 of the 103 in the exercise-based intervention changed decision and received ACLR at follow-up (after 1-2 years).
Interpretation / Conclusion: Younger age, male sex, higher pre-injury activity level, higher laxity and swelling at 6 weeks (follow-up after rehabilitation) increase the risk of ACLR in participants with ACL injury following a 6 weeks in-hospital rehabilitation and evaluation. Similar patient satisfaction was achieved

97. Objectively measured knee instability during Pivot-shift test. An experimental Dynamic RSA study

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Background: The Pivot-shift test is a clinical test for knee instability for patients with Anterior cruciate ligament (ACL) lesions, however the test has low inter-observer reliability. Dynamic radiostereometry (dRSA) imaging is a highly precise non-invasive method for objective evaluation of joint kinematics.
Aim: The aim of this study was to quantify precise knee kinematics by use of dRSA imaging during Pivot-shift test in knees with intact ligaments, in knees with ACL lesion, and in knees with a combined ACL and ALL lesion.
Materials and Methods: Eight human donor legs with hemipelvis were evaluated. Ligament lesion intervention of the ACL was performed during arthroscopy and anterolateral ligament (ALL) section was performed as a capsular incision. Pivot-shift test examination was recorded with dRSA on ligament intact knees, ACL-deficient knees and ACL+ALL-deficient knees.
Results: A Pivot-shift pattern was identifyable after ligament lesion as a change in tibial posterior drawer velocity from 7.8 mm/s (CI95 3.7; 11.9) in ligament intact knees, to 30.4 mm/s (CI95 23.0; 38.8) after ACL lesion, to 35.1 mm/s (CI95 23.4; 46.7) after combined ACL-ALL lesion. The anterior- posterior drawer excursion increased from 2.8 mm (CI95 2.1; 3.4) in ligament intact knees, to 7.2 mm (CI95 5.5; 8.9) after ACL lesion, to 7.6 mm (CI95 5.5; 9.8) after combined lesion. Furthermore a change in tibial rotation was found, with increasing external rotation at the end of the Pivot-shift motion going from intact to ACL+ALL- deficient knees.
Interpretation / Conclusion: This experimental study demonstrates the feasibility of dRSA to objectively quantify the kinematic laxity patterns of the knee during the Pivot-shift test. The dynamic parameters found through dRSA displayed the kinematic changes from ACL to combined ACL-ALL ligament lesion.

98. Microfragmentation for processing stem cells from adipose tissue is promising when compared to enzymatic digestion for the treatment of osteoarthritis

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Background: Intraarticular treatment of knee osteoarthritis with adipose tissue-derived stem cells has shown promising results. Until now, standard processing of lipoaspirates for therapeutic use consists of enzymatic digestion (ED) and cell expansion prior to injection. However, complex regulatory issues related to the application of enzymatically treated and expanded cells have led to development of microfragmentation (MF) to harvest stem cells ready for treatment.
Aim: To assess quantity and viability of stem cells from abdominal adipose tissue (AT) when processed with MF compared to ED.
Materials and Methods: Abdominal AT from knee osteoarthritis patients was processed with MF and ED, respectively. Cell type, quantity, and viability was investigated using trypan blue staining and flow cytometry. Statistical analysis was performed using paired t- tests. p-values <0.05 were considered statistically significant.
Results: AT from 15 patients, age (mean (SD) 50.9 (8.5)), were analyzed. ED provided more nucleated cells 3.9x10^6/mL (2.5x10^6) than MF 1.0x10^6/mL (0.5x10^6), p<0.01. Also, ED gave higher nucleated cell viability 90% (4%) compared to MF 80% (6%), p<0.01. Using flow cytometric gating on stem cells, equally high viability was identified for ED 82% (4%) and MF 84% (3%), p=0.17. There was higher stem cell content per total nucleated cell count for MF 10% (2%) compared to ED 6% (2%), p<0.01. Adventitial stem cells (CD31-/CD45-/CD34+/CD146-), pericytes (CD31-/CD45-/CD34-/CD146+), mesenchymal stem cells (CD34-/CD45-/CD146-/CD90+/CD105+), and CD271+ stem cells (CD31-/CD45-/CD90+/CD271+) were identified in microfragmented AT.
Interpretation / Conclusion: Microfragmentation is a promising method to harvest clinically relevant stem cells from adipose tissue for treatment of osteoarthritis.

99. Prolonged effect (>1 day) after ultrasound guided intraarticular injection with local anesthesia and glucocoricosteroids prior to hip arthroscopy for femoro-acetabular impingement syndrome (FAIS) is not associated with suboptimal outcome

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Background: Ultrasound guided intraarticular injection (UGII) with local anesthesia (LA) is frequently used to confirm joint related hip pain in patients with femoro- acetabular impingement syndrome (FAIS). In combination with glucocorticosteroid (GCS) a prolonged pain relief (>1 day) can be seen, which may indicate concomitant inflammatory or degenerative joint pathologies.
Aim: In a previous study we could show that individuals with a steroid effect presented a significant higher prevalence of severe cartilage injuries (IKDC grad 3+4) intraoperatively. The purpose of this study was to analyze if a pre-operative steroid effect prior to hip arthroscopy is associated to a less favorable outcome.
Materials and Methods: From June 2016 to June 2021 194 consecutive patients with clinical and/or radiological signs of FAIS and a positive UGII with LA and GCS underwent hip arthroscopy. 184 patients (68 males, 116 females) were included in this study. Two patients did not meet the inclusion criteria. For 8 patients the HAGOS scores at 1-year follow-up were disregarded as they had new surgery within the one year post-operatively. Intraoperative findings were documented and all patients completed HAGOS pre- and 12 months post-operatively.
Results: 112 patients had a prolonged UGII effect, while 72 patients had an isolated LA effect. Intraoperatively patients with a prolonged UGII had a significantly higher prevalence of severe cartilage injuries (IKDC 3+4) compared to those with an isolated LA effect. However, adjusted for age, sex and underlying pathologies no clinical difference in HAGOS (n.s.) could be seen 1 yr after surgery.
Interpretation / Conclusion: Pain relief beyond the effect of local anesthesia after an UGII with local anesthesia and glucocorticosteroid may indicate severe cartilage injuries. However, this seems not to affect the clinical outcome after one year.

100. Screw resorption and tibial tunnel changes after Biosure Regenesorb absorbable interference screw hamstring graft fixation for anterior cruciate ligament reconstruction

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Background: Absorbable interference screws for graft fixation during anterior cruciate ligament reconstruction (ACLR) can lead to tunnelwidening and cyst formation due polymer degradation. A novel absorbable Interference screw Biosure Regenesorb (Smith&Nephew) has been developed with an optimized calcium phosphate/polymer composition to promote bone formation during its resorption.

Aim: The present study aims to investigate bone formation, tunnel geometry and screw resorption in tibial tunnels after ACLR.

Materials and Methods: The study is a prospective single-center case series of 11 patients with ACL lesion and with objective symptomatic knee instability treated with ACL reconstruction using hamstring tendon autograft with Biosure Regenesorb tibial fixation with 1 year follow-up. The Biosure Regenesorb consist of 65 % PLGA poly, 20 % calcium sulphate, 15 % tricalciumphosphate. The primary endpoint: Tunnel volume, Implant volume and new bone formation in the tibial tunnel is evaluated by quantitative CT scanning. The secondary endpoints: Objective Lachman knee side-to-side laxity measured by KT- 1000 arthrometry, subjective outcome by IKDC and KOOS scores, and Tegner Activity scale.

Results: Tunnel volume increased 1 % after one year. Only minor amount (< 1 % of tunnel volume) of new bone formation in the screw remnants and screw treads was see. The screw volume decreased to 46 % with in the first year. For secondary outcomes sagittal knee laxity at one year was 0.9 mm. IKDC score increased 15 points and KOOS sport and KOOS QoL scores increased 25 and 26 points respectively.

Interpretation / Conclusion: ACLR with tibial graft fixation using Biosure Regenesorb does not result in tunnel widening with a screw resorption of 46 % after one year and with only minor new bone formation. Knee stability and subjective outcome improvements are excellent and reflects best results after other ACLR methods.

SESSION 13: DOS BEST PAPERS

17. november

15:30 - 16:30

Lokale: Centersalen

Chair: Michael M. Petersen and Kristoffer W. Barfod

101. The association between any previous infection and prosthetic joint infection (PJI) after total hip arthroplasty (THA): A Register-based cohort study on 58,421 patients with osteoarthritis

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Background: PJI after THA is a severe complication and is associated with increased risk of death. Little is known about the impact of any previous infection prior to THA on revision due to PJI or any revision.
Aim: We investigated the risk of revision due to PJI and any revision for patients with any hospitalised or community treated infection compared to patients without any infection 0-6 and 7-12 months prior to THA.
Materials and Methods: 58,421 patients with primary unilateral THAs were retrieved from 2010 to 2018 from the Danish Hip Arthroplasty Register (DHR) with 1 year follow-up. Information on infection diagnoses, reimbursed prescription antibiotic treatment, culture of intraoperative samples and cohabitation from Danish health registries (years 2009-2019) was obtained. The primary outcome was revision due to PJI with at least two positive cultures for the same microorganism. The secondary outcome was any revision. Their cumulative incidences were estimated and adjusted relative risk (RR) with 95 % confidence intervals (CI) was calculated treating death as competing risk.
Results: Previous infection 0-6 months prior to THA: The cumulative incidence of revision due to PJI was 1.9% (CI 1.7-2.1) vs. 1.5% (CI 1.4- 1.6) for patients with previous infection vs. no previous infection and 3.1% (CI 2.8-3.4) vs. 2.4% (CI 2.3-2.5) for any revision. The RR for PJI was 1.17 (CI 1.00 – 1.37) and for any revision 1.25 (CI 1.10-1.40) for patients with previous infections vs. no previous infection. Previous infection 7-12 months prior to THA: The cumulative incidence of revision due to PJI was 1.8% (CI 1.6-2.0) vs. 1.5% (CI 1.4- 1.7) for patients with previous infection vs. no previous infection and 3.1% (CI 2.8-3.4) vs. 2.4% (CI 2.3-2.6) for any revision. The RR for PJI was 1.15 (CI 0.98 – 1.35) and any revision 1.26 (CI 1.11-1.43) for patients with previous infections vs. no previous infection.
Interpretation / Conclusion: Previous infection within 1 year prior to THA increases the risk of revision due to PJI and any revision after THA. This new information may be taken into consideration when discussing indication for surgery.

102. Knee function and pain in patients treated with Persona® Total Knee System compared to patients treated with NexGen® Complete Knee Solution 2 years post-surgery – results from a blinded, multi-center Randomized Controlled Trial.

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Background: Persona is a novel Total Knee Arthroplasty (TKA) system offering additional opportunities for surgeons to fit the implant to the anatomy of the patient. Introduction of new designs calls for thorough follow up to ensure treatment quality and safety.
Aim: Purpose of our study was to compare knee function and pain and number of reoperations/revisions in patients operated with the novel TKA system to patients operated with a traditional, well-proven TKA system.
Materials and Methods: In a single-blinded RCT (NCT03073941), 311 patients (mean±SD age 68.4±8.7 years old, 61% female) were allocated to Persona or NexGen TKA. Knee function and pain was measured by Oxford Knee Score (OKS) 3 months, 1 year and 2 years post-surgery. As data was not normally distributed, differences in OKS were tested using Mann-Whitney U-test. Association between group and proportion of patients reaching the Patient Acceptable Symptom State (PASS) (OKS>=27 at 3M, OKS >=30 at 1 & 2 years), Minimal Important Change (MIC) (OKS improvement >=8 at 1 year) and number of reoperations/revisions was tested using a $\chi 2$- test.
Results: 2 years post-surgery data was available for 289 patients (93%, Persona: 142, NexGen: 147). Median OKS improved from 22 [IQR 17-27] pre- surgery to 43 [IQR 36-47] in the Persona-group and from 22 [IQR 18-26] pre-surgery to 43 [IQR 37-46] in the NexGen-group 2 years post-surgery. No difference was found between group medians pre- or 2 years post-surgery (p=.809, p=.544 respectively). Proportion of patients reaching the PASS for Persona and NexGen respectively was 84% (n=130) and 80% (n=121) at 3 months (p=.327), 89% (n=132) and 87% (n=132) at 1 year (p=.755), 92% (n=130) and 94% (n=138) 2 years post-surgery (p=.446). Proportion of patients reaching MIC for Persona and NexGen respectively was 89% (n=133) and 83% (n=126) 1 year post-surgery (p=.142). 6 patients had reoperations/revisions in the Persona group vs. 8 patients in the NexGen group (p=.576).
Interpretation / Conclusion: We found no differences between knee function and pain, number of patients reaching PASS and MIC or reoperations/revisions in patients operated with Persona or NexGen TKA. Results indicate a safe short-term performance of the Persona Total Knee System.

103. Topical Zoledronate improves fixation of cementless total knee arthroplasty by suppression of bone resorption. A randomized, double-blinded RSA study of 51 patients with 5 years follow-up

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Background: Cementless tibial implants migrate initially until osseointegration. Bisphosphonates inhibit osteoclast activity and are assumed to enhance early stable fixation and preserve periprosthetic bone.
Aim: We hypothesized that topical zoledronate (ZOL) decreases early migration and improves fixation of cementless tibial implants.
Materials and Methods: A prospective, double-blinded, randomized study including 51 patients operated with a total knee arthroplasty (TKA) using a cementless tibial implant (Regenerex). Patients were randomized to either soaking of the cut off tibia plateau for 60 sec with ZOL (0.6 ml ZOL (0.8 mg/ml) diluted in 1.4 ml NaCl (9mg/ml)) (ZOL group) or 2 ml NaCl (9mg/ml) (placebo group). We compared Maximum Total Point Motion (MTPM) and subsidence (Y-translation) using Radiostereometry Analysis (RSA) and measured biochemical markers of bone turnover in blood samples (CTX and P1NP). RSA and blood samples were obtained postoperative and at 2-, 6-, 12- and 24 weeks and at 1-, 2-, and 5-years follow-up.
Results: The ZOL group had statistically significantly less tibial implant subsidence than the placebo group at all follow-ups from 6 weeks to 5 years after surgery. At 1 year, mean tibial implant subsidence was -0.02 mm (95% CI: -0.12; 0.09) in the ZOL group and -0.34 mm (95% CI: -0.57; -0.12) in the placebo group ($p=0.01$). Subsidence from 1- to 2- years follow-up and from 2- to 5-years follow-up was similar between groups ($p>0.14$). Between 2- and 5-years, the MTPM implant migration pattern was stable in both groups. Bone resorption measured by CTX was lower at 2 weeks follow-up in the ZOL group than in the placebo group ($p<0.001$), bone formation (P1NP) was similar between groups throughout follow-up ($p>0.05$).
Interpretation / Conclusion: Compared with placebo topical administration of ZOL on the cut tibial bone surface during TKA surgery improves fixation in cementless tibial implants indicated by an early and lasting lower tibial implant subsidence, which may be explained by suppression of bone resorption after surgery. The migration pattern from 2- to 5-years follow-up was stable and similar in both groups suggesting stable long-term fixation and safety with ZOL treatment.

104. Physiotherapist-supervised exercises versus non-supervised home-based exercises after non-surgically treated proximal humerus fracture: A multicenter randomized controlled trial

Helle K. Østergaard[1], Antti P. Launonen[2], Marianne T. Vestermark[1], Tore Fjalestad[3], Bakir O. Sumrein[2], Kaj V. Døssing[1], Mette H. Axelsen[4], Sidsel S. Noe[1], Tone Wagle[3], Kaia B. Engebretsen[3], Minna K. Laitinen[5], Ville M. Mattila[2], Inger Mechlenburg[6]

Department of Orthopaedic Surgery, Viborg Regional Hospital, Denmark[1]: Department of Orthopaedic Surgery, Tampere University Hospital, Finland[2]: Department of Orthopaedic Surgery, Oslo University Hospital, Norway[3]: Department of Orthopaedics, Aalborg University Hospital, Denmark[4]: Department of Orthopaedics, Helsinki University Central Hospital and University of Helsinki, Finland[5]: Department of Orthopaedic Surgery, Aarhus University Hospital and Department of Clinical Medicine, Aarhus University, Denmark[6]

Background: Proximal humerus fracture (PHF) is a common fragility fracture in older adults that can have a substantial impact on upper limb function. Although most patients with PHF can be treated non-surgically, it is unknown whether older adults benefit from supervised exercise therapy after PHF.

Aim: To investigate whether 10 weeks of physiotherapist-supervised exercises once a week was superior to10 weeks of non- supervised home-based exercises in older adults with a non-surgically treated displaced 2-part PHF.

Materials and Methods: The trial was an assessor-blinded, prospective, randomized controlled trial conducted in 3 Nordic countries. 72 non- operatively treated 2-part PHF patients age 60 years or older were randomized to either 10 weeks of physiotherapist-supervised exercises or 10 weeks of unsupervised home-based exercises. Follow-up visits took place 3 and 12 months after the fracture. The primary outcome measure was the Disability of the Arm, Shoulder and Hand (DASH) with a primary endpoint at 3 months. Secondary outcomes were the Constant-Murley Score (CS), the 15D-instrument, the Visual Analog Scale (VAS), the General Self-Efficacy scale (GSE) and the Pain Catastrophizing Scale (PCS). Non-union and patient death were counted as complications.

Results: At 3 months follow-up, the mean DASH score in the supervised group was 25.9 (SD 16.0) compared to 22.4 (18.9) in the non-supervised group. The mean between-group difference (3.5, 95% CI -5.0 to 12.5) was not clinically relevant. None of the secondary outcome measures presented any clinically relevant or statistically significant between-group differences at 3 or 12 months follow-up. One patient in the supervised group and three in the non-supervised group were diagnosed with non-union. One patient from each group died before 3 months follow-up.

Interpretation / Conclusion: This trial provides no evidence that supervised exercises are superior to non-supervised home-based exercises in improving functional outcome or quality of life in older patients with a non-surgically treated 2-part PHF. Our results suggest that most older adults with a non- surgically treated 2-part PHF can perform exercises without supervision from a physiotherapist.

105. Randomized Controlled Trial of Instrumented Versus Uninstrumented Posterolateral Fusion for Lumbar Spondylolisthesis

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Background: Although instrumented posterolateral fusion is the standard of care in North America, in Scandinavia uninstrumented fusion is often the treatment of choice for degenerative spondylolisthesis in patients aged above 60 years. The main argument for this procedure is to minimize surgical stress and reduce operating time and blood loss, as well as reduce the risk of reoperations due to implant failure.
Aim: Our primary objective was to investigate whether there is a difference in patient reported outcome measures between patients treated with instrumented fusion versus uninstrumented fusion, in patients who undergo surgery for degenerative spondylolisthesis. Secondary objectives was to investigate any differences in fusion rates and reoperation rates.
Materials and Methods: A randomized controlled, single center, open label trial was conducted on patients with symptomatic single-level degenerative spondylolisthesis of 3mm or more. All patients had undergone at least 12 weeks of unsuccessful conservative treatment prior to enrollment. Patients were randomly assigned 1:1 to decompression and fusion with or without supplementary instrumentation. The primary outcome measure was the Oswestry Disability Index (ODI), secondary outcome measures were duration of surgery, length of stay in hospital and reoperation rates within 2 years. Fusion rates were evaluated by fine-slice CT-scans at 1-year post-operative.
Results: 108 patients were included in the study. Mean age at time of surgery was 72 and 85% were women. The mean change in ODI at 2 year follow up was -22.1, -21.8 in the instrumented and -22.3 in the uninstrumented group, mean difference of 0.5 (95% CI, -7.7;6.8). A successful fusion was achieved by 94.3% of patients in the Instrumented group, and 31.4% in the un-instrumented group, we found one re-operation (1.9%) in the Instrumented group and 7(13.2%) in the uninstrumented group p=0.031.
Interpretation / Conclusion: In this trial comparing the outcome and complications in patients who underwent lumbar fusion with or without supplementary instrumentation, we found no difference in patient reported outcomes. Patients in the uninstrumented group had a significantly lower fusion rates and higher reoperation rates after 2 years.

106. An assessor-blinded randomized controlled trial investigating complications and functional outcome of non-operative vs. operative treatment of unstable distal radius fractures in patients older than sixty-five years

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Background: The national clinical guidelines (NKR) stipulate treatment with volar locking plate of distal radius fractures (DRF) based on radiological criteria after fracture reduction. The superiority of operative treatment vs. non-operative treatment has been questioned in recent years.
Aim: Primary aim: to compare complications of operative vs. non-operative treatment of unstable DRF fulfilling NKR-criteria for operative treatment with a volar locking plate. Secondary aim: to compare the functional outcome
Materials and Methods: Single-center, assessor-blinded randomized controlled trial of unstable DRF. 50 patients: volar locking plate, 2 weeks casting + 3 weeks orthosis. 50 patients: 5 weeks casting. Primary outcome measure: complications were assessed after 2, 5 weeks, 6, and 12 months. Secondary outcome measures: Quick-Dash, PRWHE, range of motion (ROM), EQ5D. Published protocol: PMID: 31253145, ClinicalTrials: NCT03716661
Results: 148 patients were screened from Nov 2019 – March 2021. 48 patients either did not want to participate, were cognitively unable, or did not live in the area. Of 100 randomized patients, 84 patients were available for full analysis. Median age was 74 years (range 65-92), 81 women/19 men, 42 right/58 left side, 87 retired, 86 ASA class 1 or 2. Complication rates did not statistical significantly vary between the operative and nonoperative groups, 20.9% (9/43) vs. 16.6% (7/42), p=0.78 (Fisher's exact test). Complications were driven by sensory disturbances. 4 reoperations were performed: 2 non-operative group: carpal tunnel syndrome, 2 operative group: 1 carpal tunnel syndrome, 1 protruding screw causing extensor tendon irritation. Mean difference in Quick-DASH varied from -2.1 (-7-6) pre-injury to -4.4. (-13-4) at 12 months. At no timepoint the Quick-DASH and PRWHE was clinically relevant different between groups. Analyses of other secondary outcome measures were not included in this abstract.
Interpretation / Conclusion: Complication rates after operative and conservative treatment of DRF were similar. Volar plating did not statistical significantly improve the functional outcome after 6 and 12 months. These findings are in line with recent international RCTs and mandate a revision of NKR towards more conservative treatment.

SESSION 14: TRAUMA

18. november

9:00 - 10:00

Lokale: Vingsal 1

Chair: Rikke Bielefeldt and Rasmus Stokholm

107. Risk of Reoperation due to Deep Surgical Site Infection in 74,771 Hip Fracture Patients aged 65 years or older. A Nationwide, Population based, Cohort Study.

Nicolai K. Kristensen[134], Jeppe Lange[13], Trine Frøslev[2], Alma B. Pedersen[2]
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Background: Surgical Site Infection (SSI) after hip fracture surgery is a feared condition. Moreover, mortality rates in patients with a registered reoperation due to SSI have been reported to be 2.9 times higher than in patients with no SSI event.
Aim: To investigate the incidence and time-trend in reoperation due to deep SSI following hip fracture surgery.
Materials and Methods: This was a population-based, nationwide, cohort study. We included 74,771 patients from the Danish Multidisciplinary Hip Fractures Register consisting of patients 65 years of age or older, who underwent surgery between January 1st 2005 and December 31st 2016 for all types of hip fracture. Cross-linkage with the Danish National Patient Register and The Danish Civil Registration system was made. Demographic data extracted included vital status, civil status, gender, age, Body Mass Index (BMI), fracture classification and surgical procedures binary registered as joint replacement or internal fixation as well as Charlson comorbidity index (CCI). Outcome was reoperations due to deep SSI in accordance with the definition from Centre for Disease Control. We computed cumulative incidence rates and risk ratios (RR) by calendar year periods and by different risk factors, considering death as competing risk and adjusting for age, gender, CCI, fracture type and surgery type.
Results: One year from primary surgery 2.1% of all hip fractures had undergone reoperation due to deep SSI. During the period 2005-2016, the incidence of reoperation due to SSI decreased from 2.7% to 1.7%, Patients aged above 85 had 50% lower risk of being reoperated compared with the youngest age group; 65-74 years (RR: 0.5; 95% CI: 0.4:0.6). The RR for reoperation due to deep SSI was lower for patients with pertrochanteric or subtrochanteric fractures versus femoral neck fractures, RR was 0.7 (95%CI: 0.7:0.8). However, RR for surgery type (joint replacement vs internal fixation) at 365 days was significantly lower for joint replacement, RR: 0.6 (95% CI: 0.6:0.7).
Interpretation / Conclusion: We believe we contribute to evaluate “the true” deep SSI reoperation rate, regarding the exceptional validity of the danish registers. More research is necessary to confirm and elaborate the results

108. Risk factors for infection following surgically managed tibial fractures; A systematic review and meta-analysis

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Background: Infection is a severe complication in the treatment of fractures and evidence on risk factors for infection following surgically managed tibial fractures is limited.
Aim: To systematically review and assess risk factors for postoperative infection following surgically managed tibial fractures.
Materials and Methods: A search string was developed with aid from a scientific librarian and used in Medline, Embase, Scopus, and Cochrane. No date restrictions were made and title+abstract were screened independently by two authors using Covidence, then full text was read for final inclusion. Eligible study data was extracted and random-effects-meta-analyses were performed if potential risk factors were found in five or more studies. Infection 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 3.901 records screened, 33 were included in the meta-analyses, totaling 22.103 patients. Three studies were prospective, the remaining were retrospective. High energy trauma and diabetes were not significant risk factors for infection, however, patients with open fractures or compartment syndrome had a four times higher risk of infection. Male sex, higher Gustilo or ASA grade, smoking, and polytrauma were also significant risk factors for infection ($p<0.05$).
Interpretation / Conclusion: Establishing compelling evidence on risk factors for postoperative infection is challenging due to the heterogeneity and complexity of infections, and because the current studies are predominantly retrospective. However, with this study, we can conclude that male sex, high Gustilo or ASA grading, smoking, open fracture, polytrauma and compartment syndrome are significant risk factors for infection following surgically managed tibial fractures.

109. Adding glue to the surgical site after surgery for lower extremity fractures – temporary results

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Background: Surgical site infection continues to be an issue after surgery for lower extremity fractures and can lead to serious complications. Oozing from the surgical wound has been proposed as a risk factor for surgical site infections, and a method to reduce oozing is adding glue to the wound.
Aim: To compare the rate of adhesive patch (AP) change in surgical treated lower extremity fractures with and without glue added to the surgical wound.
Materials and Methods: On the 1st of February 2022, a new treatment protocol was introduced regarding requirements for change of AP. All AP used for surgery after lower extremity fractures were labelled with the number 1, and should be changed during admission if more than 50% of the AP were filled or if it leaked. If the AP were changed, the forthcoming number should be written on the AP. On the 1st of March 2022, an addition was made and all surgical wounds should have glue added. At discharge, the number on each AP were recording. A sample size based on a 10 percentpoint reduction in AP use was 398 (alpha 0.05, power 0.80). Group comparison was performed using Wilcoxon rank-sum or chi-square test.
Results: There were 157 lower extremity fractures, 64 treated without glue and 93 had glue added. The median age was 77 (range 22-100), there were 53% females, and the predominant fracture was in the hip. There were no difference between the groups regarding age, sex, comorbidity or length of admission. There were 29% in the non-glue group with change of the AP compared to 18% in the glue group ($p=0.156$). The median AP use in the non-glue group was 2.5 (range 1-14) compared to 2 (range 1-12) in the glue group ($p=0.640$). When subanalysing hip fracture surgery, there were 53% with AP change in the non-glue group compared to 22% in the glue group ($p<0.045$), while there were no statistical differences for arthroplasty, plate, or screw surgery.
Interpretation / Conclusion: We found no effect in AP change when adding glue to the surgical wound. However, these are temporary results, as the calculated sample size has not been reached yet. Data from the full sample size is expected to be collected in June 2022.

110. Tibial bone and soft-tissue concentrations following combination therapy with vancomycin and meropenem – evaluated by microdialysis in a porcine model: Should patients with open fractures have higher doses of antibiotics?

Sofus Vittrup, Pelle Hanberg, Martin Bruun Knudsen, Sara Kousgaard Tøstesen, Josephine Olsen Kipp, Jakob Hansen, Nis Pedersen Jørgensen, Maiken Stilling, Mats Bue
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Background: The nature of open fractures introduces an obligate bacterial contamination of the wound. The reported infection rates following open fractures vary from 0% to 50% reflecting the broad contamination profile necessitating empirical antibiotic Gram-positive and Gram- negative coverage.When administering antibiotics to prevent infection of a contaminated open fracture, antibiotic target site concentrations should, as a minimum, reach and remain above relevant bacteria's minimal inhibitory concentrations (MICs) for a sufficient amount of time.
Aim: To evaluate vancomycin and meropenem T>MIC in tibial compartments for the bacteria most frequently encountered in open fractures. Low and high MIC targets were applied: 1 and 4 µg/ml for vancomycin, and 0.125 and 2 µg/ml for meropenem.
Materials and Methods: Eight pigs received a single dose of 1,000 mg vancomycin and 1,000 mg meropenem simultaneously over 100 minutes and 10 minutes, respectively. Microdialysis catheters were placed for sampling over eight hours in tibial cancellous bone, cortical bone, and adjacent subcutaneous adipose tissue. Venous blood samples were collected as references.
Results: Across the targeted epidemiological cut-off values, vancomycin displayed longer T>MIC in all the investigated compartments in comparison to meropenem. For both drugs, cortical bone exhibited the shortest T>MIC. For the low MIC targets and across compartments, mean T>MIC ranged between 208 and 449 minutes (46% to 100%) for vancomycin and between 189 and 406 minutes (42% to 90%) for meropenem. For the high MIC targets, mean T>MIC ranged between 30 and 446 minutes (7% to 99%) for vancomycin and between 45 and 181 minutes (10% to 40%) for meropenem.
Interpretation / Conclusion: The differences in the T>MIC between the low and high targets illustrate how the interpretation of these results is highly susceptible to the defined MIC target. To encompass any trauma, contamination, or individual tissue differences, a more aggressive dosing approach may be considered to achieve longer T>MIC in all the exposed tissues, and thereby lower the risk of acquiring an infection after open tibial fractures.

111. Prepping In The Ex-Fix To Facilitate ORIF Of Complex AO/OTA 41-C Bicondylar Tibial Plateau Fractures: Is Infection Risk Increased?

Derek Stenquist, Yeung Caleb , Guild Theodor , Weaver Michael , Harris Michtel, Arvind von Keudell

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Background: The effect of prepping in external fixator devices into the surgical field is unknown.
Aim: To compare the risk of deep infection and unplanned reoperation after staged ORIF of bicondylar tibial plateau (BTP) fractures whether elements of the temporizing external fixator were prepped into the surgical field or completely removed prior to definitive fixation.
Materials and Methods: Two Academic Level One Trauma Centers.Patients/Participants: 147 OTA/AO 41-C (Schatzker 6) BTP fractures treated with a two-stage protocol of acute spanning ex-fix followed by definitive ORIF between 2001-2018.78 fractures had retained elements of the original ex-fix prepped in situ during surgery for definitive internal fixation and 69 had the ex-fix construct completely removed prior to prepping and draping.
Results: Among 147 patients treated with staged ORIF, the overall deep infection rate was 26.5% and reoperation 33.3%. There were high rates of deep infection (26.9% vs 26.1%, p=0.909) and unplanned reoperation (30.8% vs 36.2%, p=0.483) in both groups but no difference whether the ex-fix was prepped in or completely removed. Within the retained ex-fix group, there was no difference in infection with retention of the entire ex-fix compared to only the ex-fix pins (28.1% vs 26.1%, p=0.842).
Interpretation / Conclusion: We observed high complication rates in this cohort of OTA/AO 41C bicondylar tibial plateau fractures treated with staged ORIF, but prepping in the ex-fix did not lead to a significant increase in rates of infection or reoperation. This study provides the treating surgeon with clinical data about a common practice used to facilitate definitive fixation of unstable BTP fractures.

112. Host Factors And Risk Of Pin Site Infection In External Fixation: A Review Examining Age, Body Mass Index, Smoking, Comorbidities Including Diabetes

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Background: External fixation is widely used for initial and final treatment of complex fractures as well as for limb lengthening and reconstruction of bone deformities including infection with good and reliable results. The incidence of pin site infection varies widely in the literature from 0-100 %. Most pin site infections are superficial, but it can cause loosing of fixation or development of osteomyelitis.
Aim: The aim was to report the frequency of studies reporting the specific host factor as a significant association with pin site infection.The host factors to be assessed were: age, smoking, BMI and any comorbidity, diabetes, in particular. Data was extracted if feasible, however no meta-analysis was performed.
Materials and Methods: This systematic literature search was performed according to the PRISMA guidelines. The protocol was registered before data extraction in PROSPERO (ID: CRD42021273305). The search string was based on the PICO (Population, Intervention or Exposure of interest, Comparison, Outcomes) criteria. The host factors to be assessed were: age, smoking, BMI and any comorbidity, diabetes in particular. The literature search was executed Embase MEDLINE (1111 hits), CINAHL (2066 hits) and Cochrane Library CENTRAL (387 hits). Inclusion and exclusion criteria was defined and followed during the screening and selection process using Covidence.
Results: A total of 3564 titles was found. 3162 records were excluded by title and abstract screening. 140 studies were assessed for full text eligibility. 11 studies were included for data extraction. All included studies was designed retrospective and generally assessed to have a high risk of bias. Individual retrospective studies reported significant associations between pin site infection for following host factors: a) increased HbA1C level in diabetic patients; b) congestive heart failure in diabetic patients; c) less co- morbidity; d) preoperative osteomyelitis.
Interpretation / Conclusion: This systematic literature search identified a surprisingly low number of studies examining for risk of pin site infection and host factors. This review demonstrate a gap of evidence about correlation between host factors and risk of pin site infection.

113. KKR: Kamme Lindberg biopsies in fracture-related infections and periprosthetic infections.

Martha Ignatiussen, Peter T. Tengberg, Mathias Bæk Rasmussen
DSOI, DOT, DSHK

Background: Accurate diagnostics is important when dealing with infections related to fracture-related infections (FRI) and periprosthetic infections (PJI). Accurate diagnostics plays a big part when choosing a patient's treatment when it comes to choosing the right surgery or getting the right antibiotics. Evidence shows that tissue sample culturing is the gold standard when diagnosing FRI and PJI. But how many, where and how is debated.
Aim: The aim of this guideline is to update the current guideline from 2017. The guideline from 2017 investigates three main subjects: How many culture samples are needed, where should the samples be taken from and how should the tissue samples be handled.
Materials and Methods: A new search on pubmed was conducted on the 08.03.2022 with the help from a research librarian. New literature from 2017 and forward was evaluated.
Results: 934 new titles were available. We found 73 relevant abstracts and after reading though these 16 relevant studies were found. In the end 12 studies were included. One systematic review, four primary studies and seven expert opinions of high quality.
Interpretation / Conclusion: In between 4-6 tissue samples should be taken when suspecting an infection during an operation preferably from inflammatory tissue. The sample should be taken from the tissue-implant interface and not from a sinus or fistula. Do not use swaps. The tissue samples should be taken before debridement. Use separate sterile instruments for each tissue sample and transfer direct to sample container.

SESSION 15: KNEE ARTHROPLASTY

18. november

09:00 - 10:00

Lokale: Vingsal 2

Chair: Andreas Kappel and Lasse E. Rasmussen

114. Patellofemoral Arthroplasty Results in Better Time-weighted Patient-reported Outcomes After 6 Years than TKA: A Randomized Controlled Trial

Anders Odgaard[1], Andreas Kappel[2], Frank Madsen[3], Per Wagner Kristensen[4], Snorre Stephensen[5], Amir Pasha Attarzadeh[6]

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Background: We previously reported 2-year results of an RCT of patellofemoral arthroplasty (PFA) vs. TKA for patellofemoral osteoarthritis. We found advantages of PFA for range of movement (ROM) and knee- related quality of life (QOL). Registers show increases in PFA revision rates from 2 to 6 years after surgery when TKA revision rates are decreasing, suggesting rapidly deteriorating knee function in PFA patients.
Aim: We aim to examine whether early advantages of PFA over TKA have deteriorated in our RCT and whether revision rates differ after 6 years.
Materials and Methods: Hundred patients were randomized to PFA or TKA between 2007 and 2014. Patients were seen for 5 follow-ups and completed 10 sets of questionnaires during the first 6 postop. years. The primary outcome was SF36 bodily pain. Other outcomes were reoperations, revisions, ROM, and PROs (SF36, OKS, and KOOS). Average PRO improvements over the 6 years were determined by the area under the curve divided by the observation time. PRO improvements at individual postop. times and ROM changes from baseline were compared using paired t-tests. Reoperation and revision rates were compared using competing risk analysis.
Results: PFA patients had a larger improvement in SF36 bodily pain during the first 6 years than TKA patients (35±19 vs. 23±17; mean diff. 12 [95% CI 4-20]; p=0.004). The same was true for SF36 physical functioning (p=0.008), KOOS symptoms (p=0.002), KOOS sport/rec. (p=0.048), and OKS (p=0.002). No PRO was in favor of TKA. At 6 years, only SF36 vitality differed between the groups, in favor of PFA (p=0.04). At 5 years, ROM had decreased less from baseline for PFA than TKA (-4°±14° versus -11°±13°; mean diff. 7° [95% CI 1°-13°]; p=0.02). Revision rates did not differ between the groups at 6 years with estimates of 0.10 and 0.04, respectively (p=0.24). Reoperation rates were also no different at 0.10 and 0.12, respectively (p=0.71).
Interpretation / Conclusion: The 2-year outcomes did not deteriorate from 2 to 6 years. PFA patients had better QOL throughout the postoperative years based on several PROs. When evaluated by the 6-year observations alone, we found no consistent difference for any PRO. Our findings cannot explain the high PFA revision rates observed in registers.

115. Readmissions following day case versus overnight hip and knee arthroplasty

Christian Bredgaard Jensen[1], Anders Troelsen[1], Christian Skovgaard Nielsen[1], Martin Lindberg-Larsen[2], Kirill Gromov[1]

Dept. of Orthopaedic Surgery, Clinical Orthopaedic Surgery Hvidovre (CORH), Copenhagen University Hospital Hvidovre[1]; Dept. of Orthopaedic Surgery, Orthopaedic Research Unit (ORU), Odense University Hospital[2]

Background: Day case hip and knee arthroplasty is used increasingly in Danish hospitals and is proposed as a possible way to meet future demands for arthroplasty surgery. Previous studies have found day case hip and knee arthroplasty to be safe and feasible in selected patients. However, few studies compare day case patients to patients with an overnight stay in a larger patient population.
Aim: The aim of this study was to investigate differences in the 90-day readmission and complication rate between day case patients and patients with one overnight stay following THA/TKA/UKA.
Materials and Methods: Day case (dc) patients and patients with an overnight stay (on) following a primary unilateral THA/TKA/UKA between 2010-2020 were identified from the Danish National Patients Registry. Any overnight admission within 90 days of surgery was registered as a readmission. Complications were defined as overnight admissions due to diagnoses associated to complications after THA/TKA/UKA. Differences between groups were investigated using mixed effect models adjusted for patient characteristics, year of surgery and surgical centre as a random effect.
Results: We included 29,651 THAs (1,452 dcTHA and 28,203 onTHA), 15,251 TKAs (694 dcTKA and 14,559 onTKA), and 6,448 UKAs (1,534 dcUKA and 4,914 onUKA). The readmission rates of day case and overnight patients were as follows: dcTHA= 13.9% vs. onTHA=9.1% (odds-ratio(OR): 1.6 [95% confidence interval(CI): 1.3–2.0]), dcTKA= 10.1% vs. onTKA= 6.9% (OR: 1.6 [CI: 1.2–2.2]), dcUKA= 4.7% vs. onUKA = 5.2% (OR: 0.87 [CI: 0.65–1.2]). Complication rates were: dcTHA= 4.5% vs. onTHA= 3.4% (OR: 1.4 [CI: 1.1–1.8]), dcTKA= 2.3% vs. onTKA= 2.2% (OR: 1.0 [CI: 0.58–1.8]), dcUKA= 2.1% vs. onUKA= 1.7% (OR: 1.3 [CI: 0.85–2.0]).
Interpretation / Conclusion: DcTHA and dcTKA patients were more likely to be readmitted compared to overnight patients. DcTHA patients were also more likely to be readmitted due to arthroplasty complications compared to onTHA patients. DcUKA and onUKA patients had no significant differences in readmission or complications rates. This suggests that vigorous patient selection is important for day case THA and TKA to avoid increased readmission.

116. Opioid and analgesics use before and after revision knee arthroplasty for the indications "pain without loosening" versus "aseptic loosening" – a Danish nationwide study

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Background: It is uncertain if patients undergoing revision knee arthroplasty for "pain without loosening" are relieved of pain.
Aim: This study aimed to compare pre- and postoperative analgesic consumption by patients undergoing revision for "pain without loosening" versus "aseptic loosening" and to determine predictors for postoperative long-term opioid use.
Materials and Methods: A retrospective nationwide study of 1,037 revsions for "pain without loosening" and 2,317 revisions for "aseptic loosening" during 1997- 2018 from the Danish Knee Arthroplasty Register. Analgesic use was defined by prescription reimbursement, and long-term opioid use by prescription reimbursement in four consecutive quarters.
Results: In the preoperative year, 37% and 29% of patients revised for "pain without loosening" and "aseptic loosening" were opioid users compared to 32% and 30% in the postoperative year. Non-steroidal anti- inflammatory use was significantly lower postoperatively for both indications (35% vs 28% for "pain without loosening" and 33% vs 25% for "aseptic loosening"). Use of other analgesics was unchanged. Long-term opioid use increased postoperatively by 4% for patients with "pain without loosening" ($p=0.029$) and by 3% for "aseptic loosening" ($p=0.003$). New long- term opioid users (without preoperative long- term use) were 9% for "pain without loosening" and 8% for "aseptic loosening". Predictors of new long-term opioid use were other opioid-requiring diagnoses or procedures within the first postoperative year, Charlson Comorbidity Index ≥3, and preoperative long-term NSAID use.
Interpretation / Conclusion: Opioid consumption decreased slightly after revision for "pain without loosening" but not for "aseptic loosening". A large proportion of new long-term opioid users was generated postoperatively after revision for both indications.

117. Predictors of knee pain and function 12 months after total knee arthroplasty – a prospective cohort study of 915 patients

Mette Garval[1] , Charlotte Runge[1] , Carsten Holm[1] , Lone Ramer Mikkelsen [1 2], Asger Roer Pedersen [1 3], Trine Vestergaard[1], Søren Thorgaard Skou[4 5]

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Background: Total knee arthroplasty (TKA) is considered a successful procedure and is frequently offered for end-stage knee osteoarthritis. However, approximately 20% of patients experience knee pain and up to 30% are lacking functional improvements in the long term.
Aim: Our aim was to identify baseline predictors of knee pain and function 12 months after TKA.
Materials and Methods: The study was a part of a large cohort study (SIlkeborg Knee replacement cohort Study (SIKS)) designed as a single-center cohort study with prospective data collection of 1.026 TKA patients between 2018 and 2020 at the Elective Surgery Centre, Silkeborg Regional Hospital, Silkeborg, Denmark. Main outcome was Oxford Knee Score (OKS) measured at 12 months postoperatively. Potential predictors included age, sex, OKS, pain catastrophizing scale, EQ-5D-5L, previous surgery, body mass index, ASA classification, preoperative opioid consumption, living-, employment- and educational status, all obtained at baseline. Ordinal logistic regression models were used to identify predictors of OKS, categorized in intervals of 10 points.
Results: 915 patients completed 12 months' follow-up (89%). 784 patients' (88%) reached ≥30 points of OKS at follow-up, defined as the Patient Acceptable Symptom State (PASS). With higher baseline score, more patients reached the PASS. Patients with a baseline OKS between 20-29 and 30-39 had 1.6 (CI 1.1;2.2) and 2.5 (CI 1.6;4.0) higher odds of getting a better outcome of OKS, respectively, compared to patients with a baseline score between 10-19. Male patients had 1.5 (CI 1.1;2.0) higher odds of a better outcome of OKS, and patients, who had retired, had 2.3 (CI 1.2;4.2) higher odds of a better outcome compared to patients on social benefits.
Interpretation / Conclusion: Higher baseline pain and function, male sex and being retired were identified as predictors of getting a better pain and function outcome 12 months after TKA, and the odds of a better outcome increased significantly for every 10- point greater OKS at baseline.

118. Feasibility, safety, and patient-reported outcome 90 days after same-day total knee arthroplasty; a matched cohort study

Anne Mette Schmidt[1], Mette Garval[1], Kirill Gromow[3], Carsten Holm[1], Jens Rolighed Larsen [1 4], Morten Vase[1] , Lone Ramer Mikkelsen[1 4], Louise Mortensen[1 5 6], Søren Thorgaard Skou[7 8]

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Background: Despite increased attention and acceptance of fast-track procedures, there is a lack of studies of discharge on the day of surgery (DOS) following total knee arthroplasty (TKA).
Aim: The purpose of this study was to evaluate the feasibility of same day TKA surgery (SD-TKA), and to compare safety, and patient-reported outcomes (PROs) at 90-day follow-up between patients undergoing SD-TKA and patients undergoing standard TKA.
Materials and Methods: Patients were included from a prospective cohort study including 1026 consecutive patients who underwent TKA at the Elective Surgery Center, Silkeborg Regional Hospital, Denmark between February 2018 and March 2020. A SD-TKA group (n=101) was matched 1:1 to a standard TKA group (n=101) on sex, age, and American Society of Anesthesiologists (ASA) score. Feasibility (being discharged on the day of surgery (DOS)), safety (unplanned contacts and complications evaluated by telephone calls (2 weeks), outpatient visits (2 weeks), and readmissions (90 days)) were assessed. Further, Oxford Knee Score (OKS; 0-48) and pain at rest and activity measured with a Visual Analogue Scale (VAS; 0-100 mm) were reported (90 days).
Results: 89 of 101 (88 %) SD-TKA patients were discharged on DOS. We obtained complete data on follow-up on unplanned contacts and complications. The number of telephone calls (SD-TKA=83 and standard TKA=81) and outpatient visits (12 in both groups) were similar in the 2 groups. 3 patients were readmitted (SD-TKA=1 and standard TKA=2), only 1 of the readmissions (from the SD-TKA group) was related to TKA surgery. The 90- day follow-up rate for PROs was 87%. No differences were found between patients undergoing SD-TKA and patients undergoing standard TKA at 90-day follow-up in terms of OKS means (34 in both groups) or medians of VAS (pain in rest: SD-TKA=7 mm and standard TKA=8 mm; pain in activity: SD- TKA=17 mm and standard TKA=15 mm).
Interpretation / Conclusion: Our data suggest that the SD-TKA procedure is feasible in a selected group of patients. Further, our data suggest similar rates of unplanned contacts and complications, and similar PROs at 90-day follow-up when comparing a SD-TKA group and a standard TKA group.

119. Effects of resistance training prior to total hip or knee replacement on postoperative recovery in functional performance: A systematic review and meta-analysis

Stian Langgård Jørgensen, Signe Kierkegaarf, Per Aagaard, Marie Bagger Bohn, Inger Mechlenburg
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Background: Twenty percent of patients receiving total hip or knee replacement (TJR) report non-optimal postoperative outcome. Increasing preoperative lower-limb- strength prior to TJR may improve postoperative functional performance
Aim: To evaluate the effectiveness of preoperative resistance training in patients allocated to TJR surgery on selected post-operative outcomes, via a meta-analysis of studies using exercise modalities and loading intensities objectively known to promote gains in muscle size and strength in adults of young- to-old age.
Materials and Methods: Design: A systematic review and meta-analysis. Literature Search: Cochrane Central, MEDLINE, EMBASE, and PEDro were searched on August 4th 2021. Study Selection: Randomized Controlled Trials (RCTs) were included if (i) they compared preoperative lower-limb-exercises before TJR with standard care, (ii) explicitly reported the exercise intensity, and (iii) reported data on functional performance. Data Synthesis: This systematic review and meta-analysis is reported in accordance with the PRISMA reporting guidelines. A random effects model with an adjustment to the confidence interval was performed for pooling the data
Results: One thousand studies were identified. After applying exclusion criteria, five RCTs were located including 256 participants (mean age ranged from 61 to 72 years, 54% women). Moderate-to-large improvements in functional performance and maximal knee extensor strength were observed at three months after surgery along with small-to- moderate effects 12 months post-operatively. For patient-reported outcomes, small-to-moderate improvements were observed at three months post- operatively with no-to-small improvements at 12 months.
Interpretation / Conclusion: Prehabilitation efforts involving progressive resistance training provides an effective means to improve postoperative outcomes related to functional performance, knee extensor strength and patient-reported outcome in patients undergoing TJR. Due to large methodological diversity between studies, an optimal loading intensity remains unknown.

120. Readmissions and mortality after outpatient vs inpatient unicompartmental knee arthroplasty in Denmark – A propensity score matched study of 5,384 procedures

Kristine B. Arndt[1], Claus Varnum[2], Martin Lindberg-Larsen[1], Christian B. Jensen[3], Lasse E. Rasmussen[2]

Department of Orthopaedic Surgery and Traumatology, Odense University Hospital[1]; Department of Clinical Research, University of Southern Denmark, Denmark; Department of Orthopaedic Surgery, Lillebaelt Hospital – Vejle[2], Denmark; Department of Orthopaedic Surgery, Clinical Orthopaedic Research Hvidovre[3], Copenhagen University Hospital Hvidovre, Denmark.

Background: Limited nationwide data on the development of outpatient unicompartmental knee arthroplasty (UKA) practice and patient safety exist.

Aim: The primary objective of this study on patients receiving a medial or lateral UKA was to investigate 7-, 30- and 90-day readmission risk and 90-day mortality in outpatient vs inpatient surgeries. Secondary to investigate the nationwide development of outpatient UKA surgery in 2014-2018.

Materials and Methods: Included patients received a medial or lateral UKA in the period January 1, 2014 to December 31, 2018 in any Danish hospital. Data were collected from the Danish National Patient Register. The cohort consisted of 1,059 outpatient and 4,325 inpatient surgeries, hereof 5,182 medial and 202 lateral UKA. After propensity score matching (1:1) 1,057 patients were included in each group.

Results: We found a 7-day readmission risk of 1.5% vs 1.4% (p=0.8), 30-day readmission risk of 2.6% vs 3.2% (p=0.3), and 90-day readmission risk of 4.2% vs 4.8% (p=0.4) after outpatient vs inpatient UKA. Similar results were found after matching. We found no significant differences in 90-day mortality for the unmatched or matched cohorts. The amount of outpatient UKA surgeries in Denmark increased from 86 in 2014 to 214 in 2018.

Interpretation / Conclusion: Outpatient medial or lateral UKA seem to be as safe as inpatient UKA on a nationwide basis.

SESSION 16: SPINE

18. november

09:00 - 10:00

Lokale: Vingsal 3

Chair: Ane Simony and Søren Ohrt-Nissen

121. Stand-alone ALIF versus TLIF in patients with low back pain – a propensity matched cohort study with two-year follow-up

Ali A. Toma [1], Dennis W. Hallager [1], Peter Udby [1+2], Rune D. Bech [1], Mikkel Ø. Andersen [2], Leah Y. Carreon [2]

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Background: Instrumented lumbar fusion performed by an anterior or a transforaminal approach has theoretically different advantages and disadvantages. Few studies have compared Patient Reported Outcomes (PROs) between stand alone anterior lumbar interbody fusion (ALIF) and transforaminal lumbar interbody fusion (TLIF)

Aim: The aim of the study was to compare Patient Reported Outcomes (PROs) at two-year follow-up after ALIF and TLIF in patients with degenerative spine conditions.

Materials and Methods: We performed a dual-center registry-based cohort study over a nine-year period (2010-19) on patients with degenerative spine condition undergoing single-level L5/S1fusion surgery, with ALIF or TLIF registered in the Danish National spine-registry (DaneSpine). Prospective data was collected preoperatively and at one and two-year follow-up. Propensity score matching was performed. Primary outcomes were Oswestry Disability Index ODI, visual analog scale (VAS) and quality of life (QoL) measured by European Quality of Life-5 Dimensions (EQ-5D) index score. Patient satisfaction was measured as secondary outcome. Data are mean±SD.

Results: A total of 92 patients were matched, 46 ALIF and 46 TLIF. Both groups obtained statistically significant improvement in the ODI. At two years ALIF reported improvement from 45±15 to 30±19 (-15(95%CI:-20;-10) and TLIF 46±19 to 36±23 (-10(95%CI:-16;-5). No significant difference was observed between the two groups in change from baseline (DC): -5(95%CI -12;2). We found improvement in QoL at two years compared to baseline but no statistically significant differences in EQ-5D score between the groups (ALIF:0.65±0.35vs.TLIF:0.59±0.26, DC 0,01(95%CI:-0.12;0.12)). VAS score for leg pain (40±31vs.39±33, DC 3(95%CI:-11;17) and back pain (45±31vs.50±28, DC -6(95%CI: -19;7)) at two years shows no significant difference between the two groups. At two years 58% ALIFs vs. 49% TLIFs stated that they are generally satisfied with the treatment, while 18% vs 27% were dissatisfied.

Interpretation / Conclusion: Patients treated with ALIF and TLIF had significant mean improvements in ODI, back and leg pain and EQ5D index score at two years compared to baseline. We found no significant differences in improvement between the groups.

122. The effectiveness of antibiotic in treating patients with chronic low back pain and Modic changes: A systematic review.

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Background: Chronic low back pain (CLBP) affects millions worldwide. Despite the high prevalence, many treatments for CLBP only display small-to- moderate effects on pain and disability. Some magnetic resonance imaging studies identify a subgroup of patients with CLBP who demonstrate Modic changes (MCs) extending from the endplate. It is hypothesized that MCs are related to low-grade discitis caused by hematogenic transmission of Cutibacterium acnes to the adjacent damaged lumbar disc.
Aim: This systematic review aimed to summarize evidence regarding the effectiveness of oral antibiotic intervention for CLBP.
Materials and Methods: Five databases were searched. Randomized controlled trials (RCTs) or non-RCTs that investigated the effectiveness of oral antibiotics in treating patients with CLBP were eligible for inclusion. Studies were independently evaluated using the Version 2 of the Cochrane risk-of-bias tool for randomized trials, and the Risk Of Bias In Non- randomised Studies of Interventions, respectively. The strength of evidence for the treatment effectiveness was appraised by GRADE.
Results: A total of 148 potential articles were identified. Four RCT articles and four case series were included. Moderate-quality evidence supported that Amoxicillin-clavulanate or Amoxicillin was significantly better than placebo in reducing Roland Morris Disability Questionnaire in patients with CLBP at the 1-year follow-up. Low- quality evidence from an RCT substantiated that Amoxicillin was significantly superior to placebo in improving Oswestry Disability Index scores at 1-year follow-up. Very low-quality evidence from non-RCTs suggested that three months of oral Amoxicillin-clavulanate significantly improved LBP and leg pain intensity, number of days with LBP, and LBP-related disability. Patients receiving oral antibiotics also reported significantly more adverse effects.
Interpretation / Conclusion: While low to moderate-quality evidence supports that oral Amoxicillin-clavulanate or Amoxicillin is better than placebo in reducing LBP-related disability in a subgroup of patients with CLBP and concomitant type 1 MC, it remains uncertain whether oral antibiotics can yield clinically meaningful improvements in patients with CLBP.

123. Subtherapeutic perioperative Cefuroxime concentrations inside cannulated pedicle screw commonly used in spine surgery – Results from an experimental animal study

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Background: Despite minimal invasive surgical spine techniques, postoperative implant associated vertebral osteomyelitis remains a risk of great morbidity for the patient. Perioperative antibiotic prophylaxis is an important preventive measure and local tissue concentration can be quantified with microdialysis. Insertion of spinal implants induce tissue trauma and inflammation, which may affect the proximate implant concentrations of antibiotics.
Aim: We compared perioperative cefuroxime concentrations inside a cannulated pedicle screw to the adjacent non-instrumented vertebral pedicle of the same lumbar vertebra.
Materials and Methods: Microdialysis catheters were placed inside a cannulated pedicle screw commonly used in minimal invasive spine surgery and the adjacent non-instrumented vertebral pedicle of the same vertebra (L1) in 8 female pigs through a surgical posterior open lumbar approach. Following a single-dose intravenous cefuroxime administration (1.5 g), microdialysates and plasma were dynamically sampled over 8 hours. The primary endpoint was the time above cefuroxime clinical breakpoint minimal inhibitory concentration for Staphylococcus aureus of 4 µg/mL (T>MIC4).
Results: T>MIC4 (95% CI) was 123 min (110-136) in plasma, 0 min (-13-13) inside the cannulated pedicle screw and 101 min (88- 114) in adjacent the non-instrumented vertebral pedicle.
Interpretation / Conclusion: A single-dose intravenous cefuroxime administration provided subtherapeutic concentrations for prevention of infection inside a cannulated pedicle screw in the lumbar spine. Sufficient concentrations were achieved in the adjacent non-instrumented vertebral pedicle for up to 1.5-2 hours. Therefore, alternative dosing regimens seems relevant in minimal invasive spine surgery lasting longer than 1.5 hours and additional prophylactic strategies should be considered in high-risk patients.

124. Curve progression in idiopathic scoliosis – 40-year follow-up from diagnosis

Casper Dragsted, Ragborg Lærke, Ohrt-Nissen Søren, Andersen Thomas, Gehrchen Martin, Dahl Benny
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Background: Treatment of idiopathic scoliosis in childhood is mainly guided by curve size and aims to prevent curve progression and long term effects of larger deformities. It is generally accepted that curves >50° will progress throughout adulthood, but less well described what happens with mild to moderate curves after the end of observation or non-surgical treatment.
Aim: The purpose was to asses long-term curve progression in non-operated patients with idiopathic scoliosis and compare curve progression in thoracolumbar and lumbar (TL/L) curves with thoracic curves.
Materials and Methods: We identified 177 patients diagnosed with a pediatric spinal deformity and treated at our institution from 1972 through 1983. 104 of all eligible patients completed follow-up (69%), 91 of these were diagnosed with juvenile (n=5) or adolescent idiopathic scoliosis (n=65). We excluded patients with infantile, neuromuscular, syndromic and congenital scoliosis. Patient files from childhood were reviewed including detailed descriptions of main curve, type and magnitude from diagnosis to end of treatment/observation at skeletal maturity. Patients were examined with long standing full spine radiographs.
Results: Mean follow-up was 40.8(2.6) years and 86/91 patients (95%) were female. 18 patients underwent Harrington rod instrumentation in adolescence and additional 3 patients underwent surgery later in adulthood leaving 70 patients for analysis of curve progression, 43 (61%) of them had been treated with a Boston brace. For curves <30° at skeletal maturity (n=32), mean curve progression was 10° (SD 12, range -5 to 44); for curves 30-50° (n=28) mean progression was 19° (SD 12, range -3 to 49); and for curves >50° (n=7) mean progression was 17° (SD 6, range 10-25). This corresponds to a curve progression of 0.3°/year, 0.5°/year and 0.4°/year, respectively. For curves 30- 50° we found a greater curve progression for TL/L curves (mean 22°) than for thoracic curves (mean 17°), but this was not statistically significant [95%CI for mean diff: -17 to 2].
Interpretation / Conclusion: We found substantial curve progression for curves 30-50° at skeletal maturity comparable to curves >50° and curve progression tends to be larger for TL/L than for thoracic main curves.

125. The effect of Risser stage on the risk of curve progression in patients with adolescent idiopathic scoliosis treated with night-time bracing

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Background: Risser stage is widely used as a marker for skeletal maturity (SM) and thereby an indirect measure for the risk of progression of AIS. The SRS recommendations for bracing Risser stage 0-2 as Risser stage 3 or above is considered low-risk. Very few studies have assessed the risk of progression in Risser 3-4.
Aim: To determine if Risser stages 3-4 provide a meaningful cut-off in terms of progression risk in patients with adolescent idiopathic scoliosis (AIS) treated with night-time bracing.
Materials and Methods: AIS patients treated with night-time brace from 2005 to 2018 with a Cobb angle between 25-40 degrees and Risser 0-4 were included. We recorded age and menarche status at initiation of treatment. Curve progression (>5 degrees increase) was monitored until surgery or SM.
Results: One hundred thirty-five patients were included (Risser 0-2: n=86, 3-4: n=49). Radiographic progression occurred in 52% and 35% had progression beyond 45 degrees. Twenty-six percent of the patients underwent fusion surgery at SM and additionally 8% more underwent fusion surgery within 2 years after SM. Progression rate in the Risser 0-2 group was 60% and 38% in the Risser 3-4 group (p=0.013). Univariate logistic regression analysis of progression showed statistically significance in Risser group (OR: 0.38, 95%CI: 0.18-0.78), pre- menarche status (OR: 0.23, 95%CI: 0.10-0.51) and age (OR: 0.63, 95%CI 0.47-0.84). However, in multivariate logistic regression analysis only premenarchal status showed a statistically significant association (OR: 0.37, 95%CI: 0.15- 0.93).
Interpretation / Conclusion: Risser stage does not provide a clinically meaningful differentiation of progression risk as the progression rate was high in the Risser 3-4 group. Risk assessment should likely include multiple SM factors such as age and menarche status. Additionally, other skeletal markers, such as hand, wrist and proximal humerus radiographs, should also be considered.

126. Health Related Quality of Life in patients with Idiopathic Scoliosis 40 years after diagnosis

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Background: Few studies have investigated the very long-term Health Related Quality of Life (HRQoL)in patients with idiopathic scoliosis. It has been suggested that patients with Thoracolumbar or Lumbar TL/L scoliosis suffers from increased disability compared with thoracic scoliosis (Th)
Aim: To investigate if patients with TL/L have lower HRQoL at long-term follow-up compared with patients with Th curves . Moreover, that HRQoL reflects the severity of the scoliosis
Materials and Methods: Full medical records including radiograph descriptions from patients referred to our institution between 1972 and 1982 for a pediatric scoliosis were reviewed. In total, 177 were identified and of all eligible patients, 104 (69%) participated in the study. Of these, 91 had Juvenile (n=5) or Adolescent Idiopathic Scoliosis (n=86). Patients were followed-up with full-spine radiographs and HRQoL questionnaires (SRS- 22r). We analyzed HRQoL for patients with no treatment (n=27), bracing (n=46) and surgical treatment (n=18), respectively, and compared outcomes between Th and TL/L curves
Results: Mean follow-up time was 40.8±2.6 years, and the mean age at follow-up was 54±2.7 years. Eighty- six (95%) were female, and 51(53%) had a main thoracic curve. Main Cobb angle was significantly larger for Th curves compared with TL/L at end of treatment/observation, 36 ±14° and 29± 14° respectively (p=0.02), and larger at follow-up 51±17° and 38±21° (p=0.003). We found a SRS22r Subscore=3.9 (95% CI; 3.7-3.9) in our cohort, which is lower compared to an age-matched population SRS-22r Subscore= 4.4 (95 % CI; 4.2-4.5). We did not find any difference in SRS-22r Subscore between TL/L 3.8±0.7 and Th curves 4±0.7 (p=0.2). There was no difference in SRS22r Subscore between treatment groups; no treatment 4.1±0.7, bracing 3.8±0.7 and surgery 3.8±0.7 (p=0.2). We found a significantly lower Self-image score for braced 3.5±0.7 and surgically treated 3.6±0.8 patients compared with no treatment 4.0±0.9, but no difference was found between the treatment groups for the remaining subdomains
Interpretation / Conclusion: We found no difference in SRS22r subscores between TL/L and Th scoliosis despite differences in curve size. Moreover, overall HRQoL was not related to treatment in adolescence

127. MRI Proxies for Segmental Instability in Degenerative Lumbar Spondylolisthesis Patients

Signe Forbech Elmose[1], Mikkel Østerheden Andersen[1], Freyr Gauti Sigmundsson[2], Leah Yacat Carreon[1]
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Background: Patients with lumbar degenerative spondylolisthesis (LDS) occasionally have a dynamic component of segmental instability. Studies have shown that Magnetic Resonance Imaging (MRI) can indicate instability.
Aim: To investigate whether findings on MRI can be proxies (MRI proxies, MRIPs) for segmental instability in patients with degenerative lumbar spinal stenosis (LSS) and/or LDS.
Materials and Methods: Retrospective cohort study on patients with LSS or LDS at L4/L5 undergoing decompressive surgery +/- fusion from 2010-17 at Middelfart Hospital. Patients divided into two groups according to presence of instability; defined as radiographic slip of >3mm. Outcome measures: Radiograph: sagittal slip (mm). MRIPs for instability: sagittal slip >3mm, facet joint angle (FJA,°), facet joint effusion (mm), disc height index (DHI, %) and vacuum phenomena. Thresholds for MRIPs were determined by Receiver Operating Characteristic (ROC) curves and area under the curve (AUC). Logistic regression to investigate association between instability and MRIPs.
Results: 232 patients: 47 Stable group and 185 Unstable group. The two groups were comparable with regard to baseline Patient Reported Outcome Measures. Thresholds for MRIPs: bilateral FJA ≥46° (AUC: 0.6, 95%CI:0.6-0.7), bilateral facet effusion ≥1.5mm (AUC: 0.6, 95%CI:0.5-0.7) and DHI ≥13% (AUC: 0.6, 95%CI:0.5-0.7). Logistic regression showed statistically significant association between instability and >3mm slip on MRI (OR:221.5, 95%CI(37.4-1311.5), p<0.001), bilateral FJA ≥46° (OR:5.6, 95%CI(1.9-16.1), p=0.002), bilateral facet effusion ≥1.5mm (OR:4.5, 95%CI(1.5-13.7), p=0.009) and DHI ≥13% (OR:9.1, 95%CI(1.8-46.0), p=0.007). ROC curve AUC: 0.95. By absence of MRI slip logistic regression showed statistically significant association between instability and remaining MRIPs: bilateral FJA ≥46° (OR:3.1, 95%CI(1.3-7.3), p=0.008), facet effusion ≥1.5mm (OR:2.4, 95%CI(1.2-4.9), p=0.017) and DHI ≥ 13% (OR:12.7, 95%CI(1.7-96.1), p=0.014). ROC curve AUC: 0.76.
Interpretation / Conclusion: Presence of MRIPs showed excellent ability to predict instability on standing radiograph. Even in the absence of slip on MRI the MRIPs had a good ability to predict presence of instability.

SESSION 17: TRAUMA

18. november

12:45 - 13:45

Lokale: Vingsal 1

Chair: Bjarke Viberg and Jeppe Barckman

128. Prevention of severe events in patients admitted to an orthopaedic department
Lonnie Froberg

Background: Orthopedic surgeons are not necessarily aware of patients who gradually derange, until the patient experiences a severe event (cardiac arrest, admit to ICU or dies). Early warning score (EWS) is a part of the early recognition and response to patient deterioration. The system allocate points based on the derangement of patients' vital signs variables. The sum of the allocated points is used to direct care, e.g. to increase vital signs monitoring, involve more experienced staff or call a rapid response team. Our department discovered several problems in the use of early warning score: Vital signs were not measured, nurses did not orientate the surgeons of increased score, the surgeon did not initiate or initiated insufficient care. .
Aim: To prevent severe events in orthopaedic patients.
Materials and Methods: From June to August 2020 an increased focus on EWS including education in measuring of vital signs, orientation in case of increased EWS, examination and treatment of acute medical conditions were initialized. The number of patients experiencing severe event in a 5 months period before intervention (January-May 2020) and a 5 month period 1 year after implementation (August- December 2021) were analyzed.
Results: The majority of patients experiencing severe events suffered from low energy fractures. Before intervention, 947 patients were hospitalized and 28 (3.0%) experienced a severe event. Thirteen patients died, for 8 patients (62%) a decision had been taken not to start cardiopulmonary resuscitation (CPR) and 1 patient was found dead without initiating CPR. Two patients succeeded CPR but had a new cardiac arrest, 2 patients had unsuccessful CPR. Fifteen patients were admitted to ICU. One year after intervention 1.058 patients were hospitalized and 17 patients (1.6%) experienced a severe event. Fifteen patient died, in all cases (100%) a decision not to start CPR had been taken. Two patients were admitted to ICU.
Interpretation / Conclusion: A significant reduction of severe events ($p=0.04$) one year after implementation of a simple intervention was found. Furthermore, active decision on whether to start CPR or not before cardiac arrest occurred was done in all cases.

129. Patients with Bleeding Disorders are at an Increased Risk of Major Complications in Operative Fixation of Pelvis and Acetabulum Fractures

Christian Pean[12], Michael Gustin[12], Michael Weaver[1], Thuan Ly[2], Arvind von Keudell[1]
Brigham and Women's Hospital, Boston, MA[1]; Massachusetts General Hospital, Boston, MA [2]

Background: Pelvic ring and acetabular fractures are commonly seen and treated by orthopaedic surgeons. Surgical treatment is associated with a 1.5-14% and 4.8% mortality rate for pelvic ring and acetabular fractures, respectively. There is limited data with regards to the effect of congenital, acquired and anticoagulant induced bleeding disorders on post-operative complications and mortality in surgically managed pelvic ring and acetabular fractures, which may contributed to associated morbidity and mortality.
Aim: To assess and compare short-term (≤30 days) outcomes of pelvis and acetabulum fractures in patients with and without bleeding disorders.
Materials and Methods: Patients with operatively managed pelvis and acetabulum fractures were identified from the National Surgical Quality Improvement Program database from 2012 to 2019 using CPT codes 27215, 27217, 27218, 27226, 27228, and 27254. Major complications, readmission, length of stay, and reoperation were compared as primary outcomes between those with and without bleeding disorders.
Results: A total of 1,449 patients underwent pelvis and acetabulum ORIF during the study period assessed and 10.7% had a bleeding disorder. Patients with bleeding disorders were at higher risk for discharge location other than home (OR 4.49, CI 2.68-7.53), major complications (OR 2.13, CI 1.38-3.28), reoperation (CI 2.03, CI 1.03-4.00), mortality (OR 2.34, CI 1.17-4.64), postoperative blood transfusion (OR 1.97, CI 1.40-2.77). In a logistic regression analysis controlling for multiple comorbidities, smoking, race, obesity and age, bleeding disorder remained significantly associated with major complications (B=1.60, CI 1.02-2.51, p=0.04) and intraoperative or postoperative blood transfusion (B=1.46, CI 1.02-2.08). Patient with bleeding disorders also exhibited a longer length of stay (8.05 +- 5.43 vs 6.88 +- 6.96, p=0.044) than patients without a bleeding disorder.
Interpretation / Conclusion: Patients with bleeding disorders undergoing ORIF for pelvis and acetabular fractures have higher rates of major complications, mortality, and readmission. Surgeons can use this to guide patient expectations and inform future interventions to mitigate the deleterious effects of bleeding disorders post- operatively.

130. Effective Risk Stratification for 30-day Readmission and Complications Using the Modified Frailty Index for Operative Fixation of Pelvis and Acetabulum Fractures

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Background: The modified frailty index has yet to be studied in patients undergoing surgical treatment of pelvic and acetabular fractures.
Aim: We hypothesized that patients with a modified frailty index greater than 2 will be subject to an increased rate of infection, readmission, length of stay, mortality and overall complications after surgical treatment of pelvic and acetabular fractures.
Materials and Methods: Hospitals participating in American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database were included for analysis of outcomes. Patients: Patients undergoing open reduction internal fixation (ORIF) of pelvic and acetabular fractures were identified from the NSQIP database between 2012 to 2019. Intervention: ORIF for pelvic and acetabular fractures. Main Outcome Measurements: Major complications, mortality, readmission, length of stay, and reoperation were primary outcome measures in this study.
Results: A total of 1,449 patients underwent pelvis and acetabulum ORIF during the study period assessed and 24.3% had a mFI-5 of two or greater. In a multivariate regression analysis controlling for numerous patient comorbidities including, race, BMI, preoperative hypoalbuminemia, and ASA greater than 2, patients with a mFI-5 of two or greater were at higher risk for discharge other than home (OR=1.96, CI=1.32-2.91), infectious complications (OR =1.56, CI 1.03- 2.37), and readmission (OR=1.72, CI 1.10- 2.69). Patients with a mFI-5 greater than two also had a significantly longer length of stay compared to other patients (8.4 vs. 6.6, $p<0.001$)
Interpretation / Conclusion: In this study, the mFI-5 was seen to correlate with 30-day postoperative incidence of infectious complications, readmission, and discharge other than home in patients undergoing ORIF for pelvis and acetabular fractures. Orthopedic trauma surgeons can use this information in concert with geriatricians to influence surgical decision making, improve perioperative management and anticipate complications in this patient population.

131. Evaluation of initial diagnosis and treatment for minor trauma at a level II trauma center in Denmark: a retrospective cohort study

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Orthopedic Department, Horsens Regional Hospital

Background: Images and charts from emergency departments are typically evaluated the following weekday at a radiographic conference, in some cases leading to re-contact of the patients: when there is a change of diagnosis and treatment plan or need for additional examinations.
Aim: To evaluate the quality of trauma center service by retrospectively investigating the incidence and reasons for re-contact of patients after initial treatment for minor trauma in the emergency department at Horsens Regional Hospital
Materials and Methods: A random sample of 1000 patient charts from 1 October 2021 to 31 December 2021 from the trauma center were reviewed. Re-contacts were identified, and time of visit, diagnosis, treatment, and patient age and gender were compared to the cohort. Reasons for re-contacts were counted and explored qualitatively.
Results: The overall incidence of re-contacts was 33 (3.3%). Reasons for re-contact were missed injury 11 (1.1%), need for additional examinations 6 (0.6%), diagnostic error 5 (0.5%), change of treatment plan without change of diagnosis 5 (0.5%), uncertainty about treatment or diagnosis 5 (0.5%), other 1 (0.1%). The most common site for missed injury and diagnostic error was hand/wrist (n=6), followed by foot (n=3), shoulder (n=2) and elbow (n=2) cases. The re-contact rate varied throughout the day: day time 08:00- 18:00: 2.1%, evening 18:00-23:00: 4.6%, and night 23:00-08:00: 5.4%. This could be a reflection of the availability of a specialist orthopedic surgeon (08:00-18:00 on site, 18:00-08:00 on call), a newly graduated doctor (on site 08:00-23:00), and an orthopedic doctor in training (on call 08:00- 18:00, on site 23:00-08:00).
Interpretation / Conclusion: The incidence of re-contacts was 3,3 %. The missed injury rate was 1.1%, which is relatively low compared with misse dinjury rates in other studies (ranges from 1.39 to 14.5%). The missed injury and diagnostic errors are mainly due to misinterpretation of radiological images, which can be improved by training. In the day time, when 60% of patients vists the trauma center, we found a 50% lower re-contact rate compared to evening and night. The working system at trauma center Horsens Denmark is well functional and can achieve a low missed injury rate.

132. Metabolic Syndrome Increase Risk of Readmission and Complications in Operative Fixation of Pelvis and Acetabular Fractures

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Background: Metabolic syndrome is an increasingly prevalent condition affecting 1 out of 3 Americans and has been tied to elevated risk of poor surgical outcomes. Pelvis and acetabular fractures are inherently challenging fractures fraught with a higher risk of complications than many injuries. As shifts to value-based care occur, it is critical to properly risk-stratify patients to develop policy and prevent patient complications when possible.
Aim: This study sought to assess the impact of metabolic syndrome on short term outcomes of pelvis and acetabulum ORIF.
Materials and Methods: Patients who underwent ORIF for pelvis and acetabular fractures from 2012 to 2019 were identified in the American College of Surgeons National Surgical Quality Improvement Program database. Patients with metabolic syndrome (MetS) were compared to other patients for rates of adverse events and readmission in the 30- day postoperative period for the overall cohort. All statistical analyses were conducted using SPSS (IBM SPSS Statistics for Windows, Version 26.0, Armonk, NY: IBM Corp). Paired student t- tests were used to assess continuous variables. Pearson’s Chi-square and odds ratios were used for categorical variables.
Results: A total of 1,005 patients met inclusion criteria for this study. In total, 51 MetS patients were identified in the cohort. MetS patients were more likely to have a history of congestive heart failure (OR 3.39, CI 1.62-7.10) and pre-operative kidney disease (OR 9.69, CI 1.73-54.22), MEtS patients did not have significantly different rates of infectious complications, major complications, or readmission than other patients.
Interpretation / Conclusion: Patients undergoing ORIF for pelvis and acetabular fractures with MetS are not at higher risk of 30-day major complications, infection, and readmissions. Although other comorbidities are often considered in isolation as risk factors for patients with pelvis and acetabular fractures, MetS patients do not appear to have an increased risk for poorer outcomes in the 30-day postoperative period.

133. Traffic incident classification for passenger car drivers varies with sex, age and severity

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Background: We found no formal guideline to assist in clinical decision on driving ability following immobilization due to orthopaedic acute injury or fractures. Few studies mention simple metrics like brake force or reaction time. A more realistic assessment could be a driving simulator, where obstacles and sudden situations arise based on analysis of injury statistics. Analysis of a larger number of traffic injury situations is hypothesized to reveal a classification potential, which could then allow driving simulator developers to implement high- risk situations in virtual driving.
Aim: To propose a list of traffic incidents that occur frequently (Fx) or result in severe personal injury (Sx) based on empirical traffic incident data the basis for implementation for driving simulation and estimate variation of this with sex and age.
Materials and Methods: We included patients injured in traffic incidents while driving a passenger car and treated at the emergency department at Odense University Hospital between Jan 2014 and Jun 2021. Key variables were extracted from the routine registration (age, sex, severity of injury, and incident variables: counterpart, direction of counterpart, place of incident) and grouped into scenarios according to resemblance.
Results: We analyzed 4,017 incidents for 2074 male and 1943 female drivers with age grouped as 18-24 (n=1,138), 25-49 (n=2,009), 50-64 (n=550), 65-74 (n=167), or 75+ years (n=153). Six Fx scenarios and seven Sx scenarios were extracted from the dataset, covering 89% and 81% of respective incidents. The rank order was markedly different between Fx and Sx scenarios, between age groups for Fx and Sx scenarios, and between sexes for Sx scenarios.
Interpretation / Conclusion: The variation of ranking between Fx and Sx scenarios with age and sex indicates that incorporation of real life traffic situations in driving simulators is not simple. Developers of a screening tool for individual guidance in driving ability after orthopaedic surgery should take this into consideration.

134. KKR: Non-operative treatment or plate fixation of displaced fractures of the middle third of the clavicle

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[1]DSSAK;[2]DOT

Background: Displaced fractures of the middle-third of the clavicle are a common injury. This type of injury is commonly treated non-operatively. However, with the development of anatomical plates an increase in operative treatment was seen. In 2017 Dansk Ortopædisk selskab released "Korte Kliniske Retningslinjer" (KKR) based on current knowledge to guide Danish orthopaedic surgeons in the choice of treatment.
Aim: To update the current KKR with evidence published after 2017.
Materials and Methods: All relevant databases and grey literature were searched for metanalyses and randomized clinical trials (RTC) published from 2017 to 2022 comparing plate fixation of displaced midclavicular fractures with non-operative treatment. RCTs were assessed for bias using the Cochrane Risk-of-bias tool and metanalyses were assessed using the AMSTAR tool. Finally, the level of evidence was assessed using the GRADE tool. Using the prior PICO (Population, Intervention, Comparator, Outcome) question, the new evidence was evaluated.
Results: The search revealed 92 new metanalyses of which 2 network metanalyses covered the PICO question and were included. Similarly, 146 new RTCs were identified. After assessment 2 RCT, not included in the metanalyses and with low risk of bias, were included. Three studies found a statistical and just clinically relevant increase in Disabilities of the hand and shoulder score (DASH) among the operated patients after six weeks. This effect diminished over time and all studies showed no significant difference in functional outcome measured by Constant Score or DASH after one year. All studies found a significant higher risk of non-union after non-operative treatment (≈16%) compared to ORIF (≈1,5%).
Interpretation / Conclusion: Displaced middle-third clavicular fractures should mainly be treated non-operatively since no difference in functional outcome is found after one year. Plate fixation reduce the risk of non-union and may lead to a minimal and temporary functional improvement after six weeks. Consequently, plate fixation should only be performed in selected cases and after thorough consideration.

SESSION 18: HIP ARTHROPLASTY

18. november

12:45 - 13:35

Lokale: Vingsal 2

Chair: Stig Storgaard Jakobsen and Martin Kirkegaard

135. Effectiveness of a bandage to prevent re-dislocation after total hip arthroplasty in patients with a previous hip dislocation. A randomized controlled trial with 12-week follow-up

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Background: Hip dislocation is a frequent and costly complication after total hip arthroplasty and patients are at increased risk of re-dislocations and morbidity. It is unknown if the use of a hip bandage can prevent re-dislocation in this group of patients.
Aim: To investigate if using a hip bandage is more effective than standard care in the prevention of total hip arthroplasty re-dislocation in patients with a previous total hip arthroplasty dislocation.
Materials and Methods: At two regional hospitals, 99 patients, 51 women, mean 70.7 (SD 9.9) years were enrolled in an un-blinded, clinical randomized controlled trial. Participants with at least one previous total hip arthroplasty dislocation were randomized to either wearing a bandage reducing flexion, adduction, and internal rotation of the hip (intervention group) or to standard care (control group). The participants were followed for 12 weeks. Main follow-up measures were as follows: number of re- dislocations (primary outcome), hip disability measured with the Oxford Hip Score (0-48, 48 best), quality of life measured with the 36- Item Short Form Survey (0-100, 100 best), satisfaction with treatment and serious adverse events. Statistical analyses followed the intention-to-treat principle.
Results: No significant group differences were observed for the primary outcome re-dislocations (9 versus 15, P = 0.143) or for disability (11.3 versus 14.4, P = 0.161), quality of life (57.7 versus 48.3, P = 0.050) or satisfaction with treatment (P = 0.562). There were 3 serious adverse events leading to total hip arthroplasty revision in the intervention group and 4 in the control group.
Interpretation / Conclusion: We found that a hip bandage is not superior to standard care in the prevention of total hip arthroplasty re-dislocation in those with a previous total hip arthroplasty dislocation.

136. The effect of iliotibial band surgery at the hip: a systematic review

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Background: Current literature presents a variety of surgical interventions aimed at modifying the iliotibial band (ITB) at the hip to relieve the symptoms of Coxa Saltans Externa (CSE) and Greater Trochanteric Bursitis (GTB). The surgical procedures are internationally widely performed, although very little information exists on the long-term clinical as well as patient reported outcomes.
Aim: The hypothesis of this systematic review was that patients with GTB without clear description of snapping would not benefit from ITB surgery, whereas patients with CSE would. The purpose of this systematic review was to evaluate ITB surgery in Greater Trochanteric Pain Syndrome patients with CSE or GTB in relation to pain, snapping, use of non-surgical treatments postoperatively and repeated surgery following ITB surgery at the hip.
Materials and Methods: The study was reported in accordance with PRISMA. A systematic search of literature on PubMed and Embase as well as bibliography screening, included 21 studies, mainly smaller retrospective case-series, of adult patients undergoing isolated ITB- surgery with or without additional bursectomies.
Results: 360 patients were considered eligible for inclusion. The CSE and GTB cohort consisted of 150 and 210 patients, respectively. The mean follow-up time in the CSE group was 30 months, and the GTB group was 19 months. Complete pain relief was not achieved in 12% of patients in the CSE cohort, and 36% of the patients in the GTB cohort. In the CSE cohort snapping was eliminated in 95% of patients. Five of 150 patients (3%) in the CSE-cohort had repeated surgery. Eight of nine GTB studies reported information regarding repeated surgery, in which seven of 205 patients (3%) received repeated surgery.
Interpretation / Conclusion: In the CSE cohort, current literature indicates a positive short-term outcome regarding elimination of snapping, pain reduction, reuse of non-surgical treatment and repeated surgery. Contrary to the CSE cohort, we found limited evidence supporting ITB surgery in the GTB cohort, indicating ITB surgery in GTB patients with no CSE may not be warranted. This systematic review shows that high quality research is severely needed to access the value of ITB surgery at the hip in general.

137. A deep learning model to diagnose hip dysplasia on radiographs

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Background: Hip dysplasia (HD) is a leading cause of hip pain in young patients and may lead to osteoarthritis. Initial diagnosis is typically based on measurements from pelvic radiographs. Algorithms based on artificial intelligence (AI) have been shown reliable for measuring angles on knee radiographs. An algorithm for radiographic measurements of adult HD has not been described
Aim: To assess reliability of an algorithm designed to read pelvic radiographs and estimate agreement between algorithm and human observers for measuring: lateral center edge angle (LCEA), acetabular index angle (AIA), and Alpha angle (AA)
Materials and Methods: 78 pelvic radiographs were retrospectively collected. 2 orthopedics, 2 radiologists and 1 radiographer (8, 5, 21, 3 and 12 years of experience) measured LCEA, AIA, and AA. Agreement between algorithm and human observers were estimated by Bland-Altman (BA) with limits of agreement (LoA)
Results: The algorithm was able to read 71 of the radiographs, and was highly reliable offering consistent measurement outputs. Agreement between algorithm and manual measurements ranged from good to poor. Bias (95% Confidence interval (CI) and [LoA] for right LCEA ranged from 0.37° (95% CI: -0.61 to 1.36) [LoA: -7.79 to 8.53] for the senior orthopedic, to 9.56° (95% CI: 8.14 to 10.97) [LoA: -2.16 to 21.27] for the senior radiologist. Bias and LoA for right AIA ranged from -0.58° (95% CI: -1.32 to 0.16) [LoA: -6.69 to 5.5] to 1.70° (95% CI: 0.88 to 2.53) [LoA: -5.11 to 8.53], junior radiologist and senior orthopedic respectively. Systematic discrepancy was evident, for right LCEA were specialists consistently reported higher values than algorithm output but only 0.4° for the orthopedic specialist (Not of clinical significance). Mean measured LCEA for specialists ranged from 25.8 to 35.0° versus 25.4° as measured by the algorithm
Interpretation / Conclusion: Agreement between algorithm and specialists was varying. The algorithm was consistent and displayed the highest agreement with the senior orthopedic. With further development, the algorithm may be a good alternative to humans when diagnosing HD

138. Hip Survival after Periacetabular Osteotomy in Patients with Acetabular Dysplasia, Acetabular Retroversion, Congenital Dislocation of the Hip or Calvé-Legg-Perthes Disease

Anne Rosendahl Kristiansen[1], Anders Holsgaard Larsen[1], Morten Bøgehøj[1], Søren Overgaard [2], Martin Lindberg-Larsen[1], Ole Ovesen[1]

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Background: Periacetabular osteotomy (PAO) is a wellknown procedure for acetabular dysplasia (AD), however it is also used for other diagnoses; acetabular retroversion (AR), congenital dislocation of the hip (CDH) and Calvé-Legg- Perthes disease (CLPD). No studies have included all these diagnoses and compared the outcome after PAO.

Aim: The primary aim was to report the hip survival of PAO with total hip arthroplasty (THA) as primary endpoint. Secondary, to report the risk of subsequent hip related operations other than THA.

Materials and Methods: We reviewed the entire consecutive cohort of 1501 hips (1203 patients) who underwent PAO from the introduction of the procedure in 1997 to December 2021 in a single center (Odense University Hospital). We identified conversions to THA and other subsequent hip related operations through patient files and the Danish National Patient Registry (DNPR). Hip related operations were defined as potentially related to PAO surgery (e.g. removal of screws, arthroscopy, re- PAO).

Results: 98(6.5%) of the total cohort of 1501 hips were converted to THA within the study period. For the total cohort, the Kaplan-Meier hip survival rate was 78% (95% CI 69-85) at 20 years with a mean follow-up of 7.8 years (0.02-24.6). The individual Kaplan-Meier hip survival rates at 15 years were 87% (95% CI 83-90) for AD, 95% (95% CI 92-97) for AR, 84% (95% CI 66-93) for CDH and 71% (95% CI 54-83) for CLPD. The risk of additional hip related operations was 48% for screw removal, 4% for arthroscopy and 1% for re-PAO.

Interpretation / Conclusion: Encouraging, overall PAO preserved 78% hips at 20 years. We found that AR patients presented with the highest (95%) PAO survivorship at 15 years compared to the other indications. AD and CDH patients had lower (87% and 84%) but also acceptable PAO survival thus, PAO is a valid procedure also for these patients. In a clinical perspective CLPD patients had a poorer (71%) outcome after PAO. Almost half of PAO patients may undergo other additional surgeries, with screw removal as the largest risk, which is also relevant and important information to the patients.

139. Objectively-quantified hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty: the PHETHAS-1 pragmatic cohort study

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Background: Postoperative rehabilitation exercise is commonly prescribed after total hip arthroplasty (THA), but its efficacy compared to no or minimal rehabilitation exercise has been questioned. Preliminary efficacy would be indicated if a dose-response relationship exists between the amount of performed exercise and degree of postoperative recovery.
Aim: To indicate the preliminary efficacy of home-based rehabilitation using elastic band exercise on performance-based function after THA, based on the relationship between performed exercise dose and change in performance-based function (gait speed) from 3 (start of intervention) to 10 weeks (end of intervention) after surgery.
Materials and Methods: A pre-registered prospective cohort study was conducted (registry: NCT03109821, protocol: PMID 31448107). Patients scheduled for primary THA were consecutively recruited and postoperatively performed home-based rehabilitation exercise using elastic bands. Performed exercise dose (repetitions/week) was objectively measured using attached sensor technology. Primary outcome was change in gait speed (40m fast-paced walk test). Secondary outcomes included patient reported hip disability (Hip disability and Osteoarthritis Outcome Score (HOOS)). In primary analysis, a linear regression model was used.
Results: Ninety-four patients (39 women) with a median age of 66.5 years participated. They performed a median of 339 repetitions/week (range: 28-1812). Across outcomes, significant improvements from 3 to 10- week follow-up were found. There were no significant association between the number of performed repetitions/week (in hundreds) and the change in gait speed (0.0086 m/sec [95% CI: -0.0053; 0.0225]) or HOOS (subscale ADL) (0.58 [-0.11; 1.26]).
Interpretation / Conclusion: Preliminary efficacy of home-based rehabilitation exercise using elastic bands was not indicated, as we found no significant associations between performed exercise dose and changes across outcomes. We did not include a non-exercise comparator, and trials using non-exercise comparators are needed to assess confirmatory exercise efficacy.

140. Trajectory for 66 patients treated with periacetabular osteotomy (PAO) and subsequent total hip arthroplasty. A follow-up study including 1378 hips from the Aarhus PAO database.

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Background: Outcomes for patients treated with PAO and subsequent total hip arthroplasty (THA) remain unclear. We evaluated patient-reported outcomes among patients treated with PAO and subsequent THA and investigated differences in the number of additional surgical procedures after PAO among patients treated with PAO and subsequent THA and patients treated with PAO only.
Aim: The aim of this study was to investigate patient- reported outcome scores among patients treated with PAO and subsequent THA. Furthermore, to describe additional surgery performed after PAO up to conversion to THA. Finally, to compare any differences in the number of additional hip surgeries performed after PAO among patients treated with PAO and subsequent THA and patients treated with PAO only.
Materials and Methods: 1378 hips underwent PAO and subsequently 66 hips were treated with THA. The Hip disability and Osteoarthritis Outcome Score (HOOS) and physical activity questions were completed for those. Additional surgery after PAO was identified through inquiry to the Danish National Patient Registry.
Results: 13% undergoing PAO and subsequent THA reported a HOOS pain score ≤50 indicating a clinical failure. The risk difference for hip arthroscopy after PAO within 2 and 4 years was 14% (CI 5%-23%) and 26% (CI 15%-38%) in favor of hips treated with PAO only. Similarly, the risk difference for screw removal within 2 and 4 years was 19% (CI 8%-29%) and 23% (CI 12%-34%).
Interpretation / Conclusion: 87% of patients undergoing PAO and subsequent THA had little or no hip pain. However, these patients received a high number of additional surgeries after PAO. Surgeons and patients may consider if additional surgery after PAO may be the first choice in a series of actions leading to conversion to THA.

141. Patient Safety after Treatment with Periacetabular Osteotomy in Patients with Acetabular Dysplasia, Acetabular Retroversion, Congenital Dislocation of the Hip or Calvé-Legg-Perthes Disease

Anne Rosendahl Kristiansen[1], Anders Holsgaard Larsen[1], Morten Bøgehøj[1], Søren Overgaard[2], Ole Ovesen[1], Martin Lindberg-Larsen[1]

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Background: Limited data exists on patient safety after periacetabular osteotomy (PAO).
Aim: The aim of this study is to describe the safety after PAO defined as risk of postoperative complications resulting in prolonged length of hospital-stay (> 4 days) (LOS) and readmission ≤ 90 days after PAO.
Materials and Methods: We identified patients who underwent PAO between 1997 and 2021 in a single institution (Odense University Hospital). We assesed patient characteristics, LOS, in-hospital complications, and readmissions ≤ 90 days postoperatively from our institutional database and patient files.
Results: A total of 1203 patients (1501 hips) underwent primary PAO. The mean patient age at the time of surgery was 29.7 years (range 11-63 years) and 77% were females. Initially, the mean length of stay (LOS) was 3.9 days (SD 2.7), but decreased over time to 2.6 days (SD 1.7) in 2021. 373 patients (hips) (25%) had a LOS >4 days. Prolonged LOS were seen in 246 hips (16%) after the PAO procedure. Most frequent causes were pain (n=90, 6%), nausea and vomiting (n=89, 6%) and low haemoglobin (n=64, 4%). The 90-day readmission risk was 3.2% (95% CI 2-4). The most frequent causes of readmission were wound problems (n=19, 1%) and pain (n=12, 1%). Only 4 (0.3%) major complications leading to additional surgery within 90 days of PAO were observed.
Interpretation / Conclusion: The PAO is a safe procedure with short and decreasing LOS, and only few readmissions within 90 days after surgery of which only 0.3% suffered from major complications leading to additional surgery.

SESSION 19: SPORTS AND SHOULDER/ELBOW

18. november

12:45 - 13:35

Lokale: Vingsal 3

Chair: Christian Dippmann and Jeppe Vejlgaard Rasmussen

142. Level of pain catastrophizing determines if patients with longstanding subacromial impingement benefit from more resistance exercise: pre-defined secondary analyses (SExSI-Trial)

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Background: More resistance exercise does not improve nonoperative care for subacromial impingement (SIS) but further analyses are needed to explore the impact of exercise adherence, facilitated or disrupted pain mechanisms and catastrophizing.
Aim: To investigate 1) if adding a large resistance exercise dose to usual care is superior to usual care alone for improving pain mechanisms and catastrophizing in patients with longstanding SIS, 2) the modifying effect of pain mechanisms and catastrophizing on intervention effectiveness in improving shoulder strength and disability, and 3) the impact of strengthening exercise dose and pain mechanisms on changes in shoulder strength and disability from baseline to four-month follow up.
Materials and Methods: 200 consecutive patients with longstanding SIS were randomly allocated to usual exercise-based care or the same plus additional elastic-band exercise to increase total exercise dose. Completed add-on exercise dose was captured using a sensor. Outcome measures included Shoulder Pain and Disability Index (SPADI), pain catastrophizing (PCS), and pain mechanisms (local pressure pain threshold at the deltoid (PPT-deltoid), temporal summation of pain (TSP), conditioned pain modulation (CPM) assessed at the lower leg).
Results: Additional elastic band exercise was not superior to usual care in improving pain catastrophizing or pain mechanisms (TSP, CPM and PPT-deltoid). Interaction analyses showed that pain catastrophizing (median split) modified the effectiveness of additional exercises (effect-size 0.95, P=.0029), with superior results in the additional exercise group compared to the usual care group in patients with less pain catastrophizing. Within-group analyses showed that for every hour completed of the additional elastic-band exercise, SPADI improved by 3 points (95%CI -4.1 to -1.1, P<.001).
Interpretation / Conclusion: Additional resistance exercise added to usual care is not superior to usual care alone in improving pain mechanisms or catastrophizing. Additional exercise is, however, superior in improving self-reported disability in patients with lower levels of pain catastrophizing at baseline. Larger completed add-on exercise dose is associated with larger improvements in shoulder disability.

143. 91% satisfactory results after non-operative treatment of type II-V Acromioclavicular dislocation – a prospective cohort study

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Background: Acromioclavicular (AC) joint dislocations account for 9-12% of all injuries to the shoulder girdle. The injuries are, according to Rockwood, classified in type I-VI depending on the severity.
Aim: To evaluate non-operative treatment of acute acromioclavicular joint dislocation and identify prognostic factors.
Materials and Methods: This was a prospective cohort study of patients with acute (< 3 weeks) AC joint dislocation type II-V. Patients, aged 18-60 years with no concomitant injury to the upper extremity, were identified through review of x-rays from the emergency departments at 3 hospitals. Patients were treated non-operatively with a 3 months supervised training program. Follow up was at 6w, 3m, 6m and 1y. Patients with unsatisfactory progression (i.e. decreased ROM and/or reduced ADL) at 6 weeks or later were referred for surgery (OP-group). The primary outcome measure was the Western Ontario Shoulder instability Index (WOSI (%)) at 3 months. Outcome in patients with a satisfactory result from non- OP treatment was compared with the OP- group using appropriate statistics.
Results: More than 7000 x-rays were screened, 104 patients were eligible, 100 patients mean (SD) age 39 (13), male/female 11/89 were included and 96 patients contributed data for the primary outcome analysis. There were 5 type II, 57 type III and 38 type V injuries. 91/100 patients had a satisfactory result without surgery. 9 patients (7 type III and 2 type V injuries) were referred for surgery. A statistically significant between- group difference was found at 6w (mean difference 31 [95% CI 18;44], p<0.001) and 3m (32 [19;46], p<0.001). Patients with a satisfactory result from non-operative treatment had significantly higher WOSI 3 months after the injury compared to 3 months after surgery in the OP-group with mean WOSI scores of 74% (20) and 57% (22), respectively (p=0.048). There was no significant difference in WOSI between patients with type III and V injuries at any time-point.
Interpretation / Conclusion: Non-operative treatment of AC joint dislocation was successful in 91% of cases. Patients referred for surgery had an average of 31% and 32% lower WOSI at 6 and 12 weeks, respectively. The Rockwood classification was not prognostic for the result.

144. Interrater and intrarater reliability of four classification methods for evaluating acromial morphology on standardized radiographs

Thomas Wagenblast Mayntzhusen[1], Adam Witten[1], Jens Gramkow[1], Sanja Somodi[2], Shefali Anup Chatterjee[2], Per Hølmich[1], Kristoffer Weisskirchner Barfod[1]
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Background: Three classification methods exist for evaluation of acromial morphology: Bigliani, Modified Epstein, and The acromial angle classification. Their reliability varies considerably across studies, and have not yet been compared in a single clinical study, or using standardized radiographs. Consequently, the evaluation of acromial morphology is currently not validated though its widespread use in clinical decision- making across the world. We have developed a novel evaluation: the Acromial curve classification.
Aim: To investigate the interrater and intrarater reliability of the three known classifications, and the novel Acromial curve classification.
Materials and Methods: Three experienced clinicians (one senior orthopedic shoulder surgeon and two senior radiologists) classified 102 standardized supraspinatus outlet view radiographs. Each radiograph was rated with the four classification methods by all raters in two separate and blinded sessions a month apart. Reliability was assessed using Kappa and ICC statistics for the categorial and continuous classification methods, respectively. With an expected kappa and ICC > 0,7 (+/- 0,15), the target sample size was 87 radiographs.
Results: The Bigliani classification had interrater and intrarater reliability ranging from fair to good (Kappa 0.32-0.41 and 0.26-0.62). The modified Epstein classification had fair to good interrater and intrarater reliability (Kappa 0.24-0.69 and 0.57-0.63). The acromial angle classification had moderate to good interrater and intrarater reliability (Kappa 0.53-0.60 and 0.59-0.72). The novel Acromial curve classification showed moderate to good interrater and intrarater reliability (ICC 0.66-0.71 and 0.75-0.78, respectively).
Interpretation / Conclusion: The novel Acromial curve classification method met, as the only of the four tested classification methods, our hypothesis with an ICC value > 0.7. The popular Bigliani method had the worst reliability. The Acromial curve classification yields numerical data, as opposed to the other three classification methods. This could potentially be utilized in future research to establishing cut-off values for treatment stratification.

145. Patient-reported outcomes of Hip Arthroscopy after Periacetabular Osteotomy (PAO) in dysplastic patients compared with a matching femoroacetabular impingement (FAIS) cohort. A minimum of two-year follow-up data from the Danish Hip Arthroscopy Registr

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Background: In theory, the purpose of the osteotomy is to reorientate the acetabulum and thereby unloading the acetabular rim and resolve symptoms from the intraarticular abnormalities. Unfortunately, the risk of additional hip arthroscopy after the PAO procedure, due to intraarticular symptoms, has been reported between 2-11%.
Aim: The purpose of this study was to report a minimum of two-year follow-up of additional hip arthroscopy after PAO and compare patient-reported outcome with a matched cohort of patients treated with hip arthroscopy due to FAIS with data from DHAR.
Materials and Methods: Inclusion criteria in the study cohort were PAO-surgery resulting in an additional hip arthroscopy procedure. The control group consisted of FAIS patients in DHAR undergoing primary FAIS hip arthroscopy procedure, defining the FAIS cohort. The FAIS patients were assessed for eligibility according to radiological findings such as cam, pincer, or mixed type impingement. In the two cohorts, the Copenhagen Hip and Groin Outcome Scores, HAGOS, were evaluated. Other non-FAIS patients treated with hip arthroscopy or other hip related surgery, previous hip conditions such as Legg-Calvé-Perthes disease, avascular necrosis, patients without baseline and/or two-year follow-up patient-reported outcome measures or otherwise lost to follow-up, were excluded.
Results: A total of 65 patients were included in the study cohort and the FAIS cohort consisted of 260 patients after matching. HAGOS improved significantly in all subscales from preoperatively to two-year follow-up between 8.3 and 15.7 points in the study cohort. The improvement was inferior to FAIS improvements, 15.8 and 25.9 points. According to HAGOS subscales, 44.6- 56.9% and 24.6-36.9% achieved Minimal Important Clinical Difference, MCID, and Patient Acceptable Symptom State, PASS respectively and inferior compared to FAIS cohort.
Interpretation / Conclusion: This study demonstrates, in PAO treated patients, significant HAGOS improvements after additional hip arthroscopy. Unfortunately, only 50% and 30% achieved MCID and PASS respectively. These results are inferior to results after FAIS surgery.

146. Strength, function and overall health before and after surgical or conservative treatment of proximal hamstring avulsion.

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Department of Physio and Occupational Therapy, Horsens Regional Hospital(1) Department of Orthopedic Surgery, Horsens Regional Hospital(2)

Background: Proximal Hamstring Avulsion (PHA) is a rare injury and happens with hyperextended knee and hyper flexed 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 and surgical repair is a treatment option. The effect of the treatment 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 and conservative treatment of PHA.
Materials and Methods: Patients with MRI-verified PHA were included and had either surgery or training. At baseline, at 6- and 12-months follow-up, all patients answered Perth Hamstring Assessment Tool (PHAT), Hip Sports Activity Scale (HSAS), an overall-health Visual Analog scale and had their knee flexion strength measured at 30 degrees using a handheld dynamometer.
Results: 13 patients had surgery (mean age 51±15, 46% females, 15 days after injury) and 13 patients had supervised training (mean age 50±17, 46% females, 64 days after injury). In the surgical group, the median PHAT score increased from 41 to 70 to 82 ($p<0.001$), their overall health: 50 to 80 to 80 ($p=0.025$) and their HSAS: 0 to 3 to 3 ($p<0.01$). In the training group, the PHAT score increased from 51 to 68 to 77 ($p<0.001$). Overall health improved from 69 to 75 to 80 ($p=0.025$), while HSAS went from 0 to 1 to 1 ($p<0.01$). Median knee strength improved in the surgical group from 0.22 to 0.67 to 1.07 Nm/kg (<0.001) and in the training group from 0.24 to 0.44 to 0.48 Nm/kg ($p<0.001$).
Interpretation / Conclusion: At 12 months follow-up, both groups improved PHAT and overall health. However, the surgical group improved more in knee flexion strength and were able to participate in sports at a higher level than the conservative treated group.

147. Is the Femoral-Epiphyseal Acetabular Roof (FEAR) index associated with hip pain in patients with hip dysplasia?

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Background: Micro instability of the hip joint has been suggested to cause pain in patients with hip dysplasia. Recently, the Femoral-Epiphyseal Acetabular Roof (FEAR) index has been developed to evaluate hip instability in patients with dysplasia.
Aim: To investigate associations between the FEAR index and patient-reported outcomes before and six months after periacetabular osteotomy (PAO).
Materials and Methods: Radiographs of patients with hip dysplasia who underwent PAO between 2018 and 2020 were retrospectively assessed by a radiologist and an orthopedic surgeon. Radiographic measurements indicative of hip instability (Shenton's line, FEAR index, centre-edge angle of Wiberg, acetabular index of Tönnis and the femoral neck-shaft angle) were measured. Data on hip pain, function, and quality of life were collected prospectively using the Hip dysfunction and Osteoarthritis Outcome Score (HOOS).
Results: A total of 222 patients were included in the study. All radiographic measurements and patient- reported outcomes improved significantly from preoperative to 6 months postoperative ($p<0.001$). There were no differences in the change score of patient-reported outcomes between patients with a FEAR index >2o (indicative of hip instability) and patients with a FEAR index ≤2o.
Interpretation / Conclusion: The FEAR index was not associated with hip pain, function, and quality of life among patients with hip dysplasia. This study did not find evidence supporting that instability defined by the FEAR index caused pain in patients with hip dysplasia.

148. Impaired hip muscle strength, function and patient reported outcomes in patients with hip abductor tendon tears: a cross sectional study of 69 patients and 25 healthy volunteers

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Background: In patients with hip abductor tendon tears (HAT), knowledge of hip muscle strength is lacking. We investigated isometric hip muscle strength in patients with magnetic resonance imaging (MRI) verified HAT scheduled for surgical reconstruction and compared them with age and gender matched healthy volunteers.
Aim: The aim of the study was to investigate the functional impairments in patients with magnetic resonance imaging (MRI) proven tears of the hip abductor (gluteus medius and/or minimus) tendon(s) scheduled for surgery, and compare these findings with healthy volunteers without current hip pain or previous hip or spine surgery.
Materials and Methods: Isometric hip muscle strength was assessed with a handheld dynamometer in 69 females with MRI verified HAT before surgery and in 25 healthy female volunteers. Copenhagen Hip and Groin Outcome score (HAGOS) and Oxford Hip Score (OHS) was used to measure self-reported outcome. The 30second sit-to-stand test (STS) was used to assess functional capacity.
Results: Patients and healthy volunteers had a mean±SD age of 56±13 and 53±6 years, respectively. Both the affected and contralateral hip of the patients demonstrated lower isometric hip muscle strength compared with healthy volunteers. A significant association between number of completed STS and isometric hip abduction ($p<0.001$), extension ($p=0.008$) and external rotation strength ($p=0.018$) was found. Furthermore, there was a clear association between number of completed STS's and HAGOS pain ($p=0.006$) and activities of daily living ($p=0.007$) together with OHS total score ($p=0.011$). We found no association between patient reported outcomes and maximal hip muscle strength.
Interpretation / Conclusion: Compared with age and gender matched healthy volunteers, patients with HAT demonstrate substantial impairments in hip strength, function and self-reported outcomes.

POSTERS

16. november
17:00 - 18:00

Poster Walk 1: Lower extremity

Poster Walk 2: Hip arthroplasty

Poster Walk 3: Hip trauma and infection

Poster Walk 4: Knee

Poster Walk 5: Upper extremity

Poster Walk 6: Paediatrics

Poster Walk 7: Trauma

Poster Walk 8: Tumor – Spine

Poster Walk 1: Lower extremity

16. november
17:00 - 18:00

Chair: Louise Lau Simonsen / Kristian Behrndtz

149. Optimization of MRI Measurements of Calf Muscle Atrophy Following Acute Achilles Tendon Rupture

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Background: Calf muscle atrophy is a major concern following acute Achilles tendon rupture (ATR). Muscle compartment size can be evaluated with magnetic resonance imaging (MRI) either by cross section area (CSA) or volumetric measurement. Volumetric measurement yields the actual size of the muscle compartment but is time consuming.
Aim: The aim of the study was to investigate if CSA measurement could be used as a surrogate for volumetric measurement in evaluation of muscle atrophy of the calf muscles after ATR. Five different models for CSA measurement were proposed. We hypothesized that atrophy estimated with CSA measurement had an R-square value above 0.7 when compared to volumetric measurements.
Materials and Methods: This was a cross-sectional study of patients one year after ATR. MRI of both calves was performed one year after ATR using a Simens 1.5T MRI system with a 3D gradient echo sequence. Evaluated muscles were: Soleus, medial gastrocnemius, lateral gastrocnemius, and the deep flexors (flexor hallucis longus, flexor digitorum longus and tibialis posterior) as one conjoined muscle group. For each muscle, the CSA was measured manually on axial slides for every 2 cm. The muscle volume was calculated as cones with irregular bottoms. Atrophy was estimated using the limb symmetry index (LSI) (injured / uninjured x 100%). Comparison between the 5 proposed models for CSA measurement and volumetric measurement was performed fitting a linear regression model and calculating the R-squared value.
Results: Fifty-four patients were included in the study. The best correlation between CSA and volumetric measurement was obtained when measuring CSA of triceps surae (R2=0.782), soleus (R2=0.642), medial gastrocnemius (R2=0.603), and lateral gastrocnemius (R2=0.559) 26 cm above talus, and the deep flexors 14 cm above talus (R2=0.493).
Interpretation / Conclusion: CSA measurement on MRI can be used as a surrogate for volumetric measurements when investigating atrophy of m. triceps surae. Investigation of atrophy of the individual muscles of the calf by use of CSA measurements should be done with caution.

151. Development and initial validation of the descriptive numeric rating scale for postoperative pain

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Department of Orthopaedic Surgery, Horsens Regional Hospital

Background: For clinical trials of surgery, the intensity and resolution of pain is an important outcome just as disability. In daily clinical practice, individual change over time and pain treatment is handled well by the numeric rating scale (NRS) 0-10 or visual analogue scale (VAS) and in conversation with patients. However, these scales reach ”worst possible pain” or ”pain as bad as you can imagine”, leaving ample room for subjective interpretation of the scale, which impairs the comparisons necessary in trials.
Aim: We aimed to develop a scale measuring sensory pain intensity for clinical trial use, which minimized the influence of individual imagination, previous experience, and coping skills, to facilitate web-based data collection and comparison of surgical groups.
Materials and Methods: A literature review and qualitative interviews of 10 patients and 10 clinicians as well as a questionnaire regarding placement of wording on the 0-10 scale were the basis of the wording chosen. The scale was pilot tested using RedCap in two rounds (10 patients each), with interviews concerning content validity in orthopaedic day surgery patients. Initial validation with assessment of test-retest reliability, sensitivity to change, known-groups comparison, comparison to NRS and VAS, differential item functioning, and MCID is underway.
Results: Categories (and examples) for description of pain intensity collected from literature and interviews were: Intensity (mild, strong), affective (distressing, terrible), evaluative (acceptable, unbearable), cognitive impact (distracting, demands full attention), sleep impact, activity impact, treatment (need morphine), discriminative (shooting, throbbing), physical signs (sweating, pale), and examples (like bumping your head). Content validity pilot testing improved the questions and scale to be understandable and relevant as well as comprehensive. Results of the remaining initial validation are pending.
Interpretation / Conclusion: The descriptive scale specifies “what is meant by 5” etc., improving precision and validity for this hard to measure but very important outcome. Further studies will establish whether this scale improves pain trajectory modelling and comparison of surgical pain outcomes.

162. Non-removable vs. removable offloading in patients with plantar diabetic foot ulcers. A National Clinical Guideline

Tue Smith Jørgensen,
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Background: In Denmark, different types of offloading devices are used to treat diabetic foot ulcers, depending on patient and clinician preference, wound location and etiology. It is not clear whether removable or non-removable offloading has a greater effect on wound healing or increases harmful effects. The great variation in clinical practice in Denmark may lead to a regional difference in wound healing success. The 2015 NICE guideline and IWGDF guideline from 2019 recommended a non-removable bandage as offloading for plantar diabetic foot ulcers (except for ischemic and infected wounds).
Aim: To investigate the effect of non-removable or removable offloading devices in plantar diabetic foot ulcers
Materials and Methods: The study is a systematic review and metaanalysis and the systematic litterature search was performed the 31. Of january 2020. The evidens consists of 12 randomised clinical trials. Patients had an average age between 52-73 years and the average duration of diabetes was 8-17 years. The wound size was between 1.3-13.1 cm2 and the intervention period lastet 4, 12 and 16 weeks or until total wound closure.
Results: Among the patients who received treatment with a removable offloading, 144 out of 264 patients achieved wound healing compared with 188 out of 236 in the patients who received a non-removable offloading. The meta-analysis showed that, non- removable offloading is likely to increase wound healing (total wound closure) significantly compared to removable offloading. The relative risk was 0.72 (95% CI: 0.61, 0.85). Two out of 85 patients who received removable offloading underwent an amputation compared to two out of 93 patients who received non removable offloading. The meta- analysis showed no clinically relevant differences, as the relative risk was 0.99 (95% CI: 0.17, 5.87).
Interpretation / Conclusion: Clinicians should consider non-removable offloading rather than removable offloading in patients with plantar diabetic foot ulcers.

208. Experimental treatment of insufficiency fractures in RA patients – a new treatment algorithm in the making?

Mette Sørensen Studstrup[1], Peter Larsen[1 2], Søren Kold[1], Rasmus Elsøe[1]
Department of Orthopaedic Surgery, Aalborg University Hospital, Aalborg, Denmark[1]; Department of Occupational Therapy and Physiotherapy, Aalborg University Hospital, Aalborg, Denmark[2]

Background: Patients diagnosed with rheumatoid arthritis (RA) often have substantial pain and disability related to the affected joints. Increased RA activity may result in articular or periarticular pain. Such pain may also be related to juxta- articular insufficiency fractures which initially are seldom detected by conventional x-ray but only visualized by MRI often causing a delay in diagnosis. Conservative treatment of these fractures may be prolonged as especially pain, but also intraosseous edema and fracture healing assessed by MRI resolves exceedingly slow resulting in an extended immobilization period. Cerament V (CV) is a hydroxyapatite and calcium sulfate-based bone void filler with vancomycin used in trauma- and reconstructive surgery.
Aim: We report a small case series including the first 4 patients diagnosed with RA and insufficiency fractures treated experimentally with inforation and injection of CV.
Materials and Methods: This study includes patients in the North Region of Denmark diagnosed with RA insufficiency fractures that did not respond satisfactorily to conservative treatment. All patients are referred with either increased periarticular pain or MRI verified insufficiency fractures in the lower limb. So far 4 patients have received experimental surgical treatment and 2 awaits surgery. Surgery is performed minimally invasive. A small incision is made, depending of the site treated. A large- gauged cannula is used to inforate and inject CV. Postoperative patients are allowed full weight bearing without restrictions.
Results: 4 patients were treated surgically. Follow-up time was 1 – 5 months. 3 patients became pain- free, 1 patient had residual pain, 1 patient experienced leakage of CV, but no sign of infection.
Interpretation / Conclusion: This case series presents a method that may alleviate pain related to insufficiency fractures in patients with RA where conservative treatment has not been sufficient. Inforation and injection of CV may be an option to treat these patients. This procedure is minimal invasive with no immobilization requirements and may be performed in an out-patient setting. Further studies are warranted before this treatment algorithm can be implemented as a standard care for this patient group.

206. The Isolated Posterior Malleolus fracture

Thomas Colding-Rasmussen[1] , Benjamin Presman[1] , Ilija Ban[1]
[1]Dep. of orthopedic surgery, Hvidovre Hospital, Denmark

Background: The surgical treatment of fractures in the posterior malleolus as part of bi- or tri-malleolar fractures are investigated extensively, and studies show that involvement of the posterior malleolus often indicate severe trauma and increase the risk of prolonged pain and arthrosis. However, very few studies investigate the rare isolated posterior malleolus fracture (IPMF).
Aim: To describe the fracture mechanism, diagnosis and treatment of the IPMF through a case report and a literature review
Materials and Methods: A 26-year-old healthy female twisted her ankle on a skateboard and presented herself in the emergency room with discrete diffuse swelling of the ankle and unable to bear weight. 3 plane x-ray showed a non- displaced IPMF. On CT-scan the diagnosis was confirmed, and concomitant fracture/displacement excluded. The patient was treated with a weight bearing orthosis and subsequent weight bearing x-rays 10 days later showed no displacement. The patient was discharged with no further follow-up. A literature review identified one review of 75 cases from 2017
Results: IPMF account for 0.5-4% of all ankle fractures and occur most frequently in adults (31.6 ± 5,7 years). The trauma mechanism is either a twisting motion or an axial loading where talus is pushed against the posterior malleolus. The mechanism is important in the evaluation of potential soft-tissue damage. In up to 75% of the cases, the diagnosis was initially overlooked due to diffuse symptomology and difficult visualization on plain x-rays. Delayed diagnosis can increase the risk of persistent pain and arthrosis. The choice of treatment depends on the size of the fragment and displacement but the indication for surgery is still under debate. 85% of the cases were treated conservatively, and 15% operatively; all successfully with no significant sequelae.
Interpretation / Conclusion: However rare, the IPMF fracture may indicate a complex ankle injury and therefore warrant extra attention when diagnosed. The diagnosis is difficult due to diffuse symptoms and limited visualization on plain x-rays. A CT scan should be performed to determine the fracture pattern and potential concomitant injury. When diagnosed in time and treated properly the risk of sequelae is low.

200. Percutaneous intramedullary screw or rush pin fixation of unstable ankle fractures in fragile people – retrospective study of 80 cases.

Simon Oksbjerre Mortensen[1], Per Hviid Gundtoft[2], Jeppe Barchmann[2]
Department of Orthopaedics, Aarhus University Hospital[2] Department of Orthopaedics, Regionshospitalet Randers[1]

Background: Patients with unstable ankle fractures and fragile soft tissues have often been treated with an intramedullary screw or rush pin.
Aim: To evaluate the re-operation rates of patients with unstable ankle fractures treated with fixation of the distal fibula with an intramedullary screw or rush pin.
Materials and Methods: This was a retrospective cohort study. We identified all patients above 18 years of age, who were surgically treated for an ankle fracture at Aarhus University Hospital, Denmark between January 1st, 2012 to December 31th, 2018. All postoperative x- rays of the cohort were assessed and all patients treated with either a 3.5 screw or rush pin were included. From the patients' medical record we retrieved information on: re-operation, comorbidity, and complications. Major complications were defined as re-operation within 3 month. All x-ray obtained at the outpatient clinic at 6 weeks' follow-up were retrospectively evaluated for loss of reduction and whether the medial clear space (MCS) were larger than 4 mm or were 1 mm larger than the superior clear space above talus (SCS).
Results: A total of 80 patients were included of which 55 were treated with a screw and 25 with a rush pin. The majority was females (59 patients) and the average age was 75-years (24-100 years). A total of 20 suffered from osteoporosis and 65 had one or more comorbidities. Three patients were re-operated within 3 months due to either fracture displacement (2) or hardware cutout (1). Additionally, one more patient was described in the medical record with fracture displacement, but was treated conservatively due to comorbidity. Early complications were found as superficial wound infection (4) and delayed wound closure (6). In addition to the 3 patients, where fracture displacement was described in the medical record, we identified 9 patients that had loss of reduction at follow-up. A MCS larger than 4 mm was seen in 15 patients and 11 had a MCS that was more than 1 mm larger than the SCS.
Interpretation / Conclusion: Intramedullary fixation of distal fibula fractures, with either a screw or rush pin, has low re-operation rates. However, there is a worrying high proportion with radiological loss of reduction.

196. Complication classification grading in intramedullary bone lengthening nails. A reliability study with an inter-and intra-rater assessment.

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Background: Lower limb lengthening with intramedullary bone lengthening nails has been reported with varying complication rates. The absence of consensus on how to report complications might influence the variability seen in complication rates. Four different severity classification systems have to our knowledge, been used. Since bone lengthening affects different tissue types individually, both the complication severities and tissue origin are essential. However, no known complication severity classifications account for the complication origin or have been tested for reliability.
Aim: The study aims to evaluate a severity and origin complications classification system in bone lengthening nail for inter-and intra-rater agreement.
Materials and Methods: Complication severity was classified according to Black et al. 2015. (I, II, IIIA, IIIB). Complication origins were classified into eight main groups (soft tissue, joint, vascular, bone, neurological, infection, device-related, others) and 33 sub-groups. Four orthopedic surgeons assessed the 48 complications retrieved from patient charts, and 49 reported complications from published literature. The cases were evaluated in a blinded independent set up with at least six weeks apart. Inter-and intra-rater agreement was estimated with Cohen/Congers kappa. Svanholm et al. were used to interpret the kappa values. CI: 95 % confidence intervals.
Results: For the cohort cases, the kappa value of severity and origin was .68 CI(.56-.79) and .63 CI(.53-.73) respectively, giving good inter-rater agreement. A good inter-rater agreement were also observed with a kappa value on the severity of .64 CI(.53-.75) and origin of .74 CI(.65-.83) in the literature retracted cases. A poor to excellent intra-rater agreement was observed for the cohort and literature cases.
Interpretation / Conclusion: This first reliability-tested complication classification system that incorporates severity and origin grading for bone lengthening nails has shown good inter- rater agreement for literature and cohort cases. Differences among intra-rater agreement indicated that the classification system might improve with better reviewer rules and guidance.

163. Concentrations of co-administered vancomycin and meropenem in the internal dead space of a cannulated screw and in cancellous bone adjacent to the screw – evaluated by microdialysis in a porcine model

Sofus Vittrup, Maiken Stilling, Pelle Hanberg, Sara Kousgaard Tøstesen, Martin Bruun Knudsen, Josephine Olsen Kipp, Mats Bue

Aarhus Denmark Microdialysis Research (ADMIRE), Orthopaedic Research Laboratory, Aarhus University Hospital; Department of Clinical Medicine, Aarhus University; Department of Orthopaedic Surgery, Aarhus University Hospital

Background: Cannulated screws are often used in the management of open lower extremity fractures. These fractures exhibit broad contamination profiles, necessitating empirical antibiotic Gram- positive and Gram-negative coverage. To ensure full antibiotic protection, target tissue antibiotic concentrations should, as a minimum, reach and remain above relevant epidemiological cut-off minimal inhibitory concentrations (T>MIC) for a sufficient amount of time.
Aim: To evaluate vancomycin and meropenem target site T>MIC values for bacteria most frequently found in infections following open lower extremity fractures
Materials and Methods: 8 pigs received single doses of vancomycin (1000 mg) and meropenem (1000 mg) simultaneously. Microdialysis catheters were placed in the internal dead space of the cannulated screw, in tibial cancellous bone adjacent to the screw, and in cancellous bone on the contralateral leg for sampling of vancomycin and meropenem concentrations over 8 h. MIC targets ranged from 1-4 µg/mL for vancomycin and 0.125-2 µg/mL for meropenem.
Results: For both drugs, and for all MIC targets investigated (except for the high vancomycin target: 4 µg/mL), the internal dead space of the cannulated screw had the shortest T>MIC. For the high MIC targets, T>MIC ranged between 3- 446 min for vancomycin (4 µg/mL) and 17-181 min for meropenem (2 µg/mL). Vancomycin displayed longer T>MIC (2 and 4 µg/mL), higher area under the concentration time curve (AUC0- last) and peak drug concentration in the proximal tibial cancellous bone without a screw nearby. For meropenem, only the cancellous bone AUC0-last was significantly higher on the side with no screw.
Interpretation / Conclusion: We found short T>MIC, particularly for the high MIC targets for vancomycin and meropenem, both inside the cannulated screw and in cancellous bone adjacent to the screw. The presence of a cannulated screw impaired the penetration of especially vancomycin into cancellous bone adjacent to the screw. More aggressive or different vancomycin and meropenem approaches may be considered to encompass contaminating differences and to ensure a theoretically more sufficient antibiotic protection of cannulated screws when used in the management of open lower extremity fractures.

Poster Walk 2: Hip arthroplasty

16. november

17:00 - 18:00

Chair: Ann Ganestam / Christian Skovgaard Nielsen

155. Perioperative preventive use of antibiotics, how much is necessary? Effect of single versus multiple prophylactic antibiotic doses on prosthetic joint infections following primary total hip arthroplasty (THA). Protocol for the Pro Hip Quality Trial

Armita Armina Abedi, Claus Varnum, Alma Becic Pedersen, Kirill Gromov, Jesper Hallas, Pernille Iversen, Thomas Jakobsen, Espen Jimenez-Solem, Kristian Kidholm, Anne Kjerulf, Jeppe Lange, Anders Odgaard, Nanna Kæstel Petersen, Flemming Schønning Rosenvinge, Søren Solgaard, Kim Sperling, Andrea Søe-Larsen, Robin Christensen, Søren Overgaard

Department of Orthopedic Surgery and Traumatology, Copenhagen University Hospital, Bispebjerg, Denmark & Department of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark; Department of Orthopedics, Lillebaelt Hospital, Vejle, Denmark; Department of Clinical Epidemiology, Aarhus University Hospital, Aarhus, Denmark & Department of Clinical Medicine, Aarhus University, Aarhus, Denmark; Department of Orthopedic Surgery, Copenhagen University Hospital Hvidovre, Copenhagen, Denmark; Clinical Pharmacology, Department of Public Health, University of Southern Denmark, Odense, Denmark; The Danish Clinical Quality Program– National Clinical Registries (RKKP); Department of Orthopedics, Aalborg University Hospital, Farsø, Denmark & Department of Clinical Medicine, Aalborg University Hospital, Denmark; Department of Clinical Pharmacology, Bispebjerg and Frederiksberg Hospital, Copenhagen, Denmark; CIMT-Centre for Innovative Medical Technology, Odense University Hospital and University of Southern Denmark, Odense, Denmark; Infectious Disease Epidemiology & Prevention, Statens Serum Institut, Copenhagen, Denmark; Department of Orthopedic Surgery, Horsens Regional Hospital, Denmark; Department of Orthopaedic Surgery, Centre of Head and Orthopedics and University of Copenhagen, Rigshospitalet, Copenhagen, Denmark; Patient Representative; Department of Clinical Microbiology, Odense University Hospital, 5000 Odense C, Denmark; Department of Hip and Knee Surgery, Herlev-Gentofte University Hospital, Hellerup, Denmark; Department of Orthopedic Surgery, Næstved Hospital, Denmark; Patient Representative; Section for Biostatistics and Evidence-Based Research, the Parker Institute, Bispebjerg and Frederiksberg Hospital, Copenhagen, Denmark & Research Unit of Rheumatology, Department of Clinical Research, University of Southern Denmark, Odense University Hospital, Denmark; Department of Orthopedic Surgery and Traumatology, Copenhagen University Hospital, Bispebjerg, Denmark & Department of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark.

Background: A feared complication after THA is periprosthetic joint infection (PJI), associated with high morbidity including prolonged hospitalization, reduced quality of life, increased health-care costs and high mortality. Using antibiotics is one of the main modifiable factors for prevention of PJIs. There is no consensus on the dosages, and current recommendations are based on low- level evidence. No randomized controlled trial (RCT) has compared one preoperative dose with additional doses of antibiotic prophylaxis.
Aim: To compare the effect of a single versus multiple prophylactic antibiotic doses administered within 24 hours on PJI.
Materials and Methods: The study is designed as a cross-over, cluster randomized, non-inferiority trial. All clinical centers use both regimes (one year of each intervention), but the order in which they use the regimes is randomized. In principle all Danish orthopedic surgery departments will be involved. Over two years, app. 18,000 primary THAs conducted at app. 45 public and private hospitals will be included, corresponding to a statistical power of >99.9%. Inclusion criteria: age ≥18 years, all indications for THA except bone tumor and metastasis. The primary outcome is PJI within 90 days after primary THA. Secondary outcomes include (i) serious adverse events, (ii) potential PJI, (iii) length of stay, (iv) thromboembolic complications, (v) hospital-treated infections, (vi) community-based antibiotic use, (vii) redeemed prescriptions for opioids, (viii) acetaminophen and NSAIDS. The primary analyses will be based on the Intention to Treat (ITT) population. Non-inferiority will be met if the upper limit of two- sided 95% confidence interval around the absolute difference in risk is less than 2.0 percentage points. Outcome measures will be extracted from national databases: The Civil Registration System, The Danish Hip Arthroplasty Register, The Danish National Patient Registry, The Hospital Acquired Infections Database and The Danish National Prescription Database.
Results: Expected in ultimo 2024.
Interpretation / Conclusion: We believe, that results of this RCT will deliver necessary evidence to change clinical practice on antibiotic prophylaxis dosages in the future.

156. Early periprosthetic fracture in cementless total hip arthroplasty - A long term follow-up of 129 cases

Tobias Bak Skov, Mikkel Rathsach Andersen, Peter Frederik Horstmann, Christian Benned Fagernæs, Anne Grete Kjersgaard, Søren Solgaard
Department of Orthopaedic Surgery, Gentofte Hospital

Background: Periprosthetic fracture (PPF) following total hip arthroplasty (THA) puts the patient at risk for an outcome with pain and lower functional level. In the literature uncemented operative technique is associated with a higher risk of PPF.
Aim: To analyze the incidence of perioperative and early PPFs at Gentofte Hospital, and evaluate functional outcome. The incidence of PPFs is compared to data from the Danish Hip Arthroplasty Register (DHR).
Materials and Methods: In the period 2013 to 2019, a total of 6101 patients were treated with THAs at Gentofte Hospital, and uncemented technique was used almost exclusively. Patients with perioperative fractures, or early fractures within 3 months of primary surgery with an uncemented THA, were eligible for inclusion. Data were obtained by lookup in the patients' medical records. Fractures were classified by the Vancouver classification. Functional outcome was evaluated after a mean of 5.1 years follow-up (2-9 years) using the Oxford Hip Score (OHS) and the Forgotten Joint Score-12 (FJS-12).
Results: The incidence of perioperative and early PPF was 2.1%. Perioperative fractures occurred in 0.9% (n=54) and early fractures in 1.2% (n=75). During the period, the incidence of perioperative and early fractures decreased from 1.3% and 1.6% to 0.4% and 0.9%, respectively. Revision surgery within 3 months due to PPF was performed in 0.7% (n=45). Six patients were revised two or more times. From 2013 to 2018, the DHR reported a mean incidence of perioperative PPF of 1.1%. The mean OHS was 39.1 (15-48). Subclassified in pain and function scale, patients reported a mean of 80.1 (20.8- 100) in pain subscale and 82.9 (33.3-100) in function subscale. The mean of FJS-12 was 64.9 (0-100). Overall, patients undergoing revision surgery reported a lower score of OHS and FJS- 12 compared to non-revised fractures.
Interpretation / Conclusion: Our findings indicate a lower incidence of perioperative PPF compared to the data by DHR, despite the use of uncemented technique. However, the DHR data are not subdivided into fixation technique. Patients tended to report a lower FJS-12, though the relatively high OHS indicates that it is possible to achieve a well-functioning THA after a PPF.

157. Biomechanics of a collum-fixated short stem in total hip arthroplasty.

Anders Tjønneland, Poul Torben Nielsen, Thomas Jakobsen
Department of Orthopedics, Aalborg University Hospital.

Background: Total hip arthroplasty with a short femoral stem component have been developed and used intermittently dating back to late 1930'ies. However, short stem designs have never been widely accepted. A potential benefit of a short stem include more physiologic loading of the proximal part of the femur, resulting in preservation of bone stock in the calcar region. Biomechanical reconstruction of the hip has a significant impact on the clinical outcome and survival of implants. To our knowledge little is known about the ability of a neck stabilized prosthesis to restore the biomechanics of the hip.
Aim: The overall aim of the present study was to evaluate a collum fixated stem, PrimorisTM, effect on hip biomechanics. We hypothised that the biomechanics of the hip can be restored, especially the hip parameters global offset and leg length difference within an acceptable range. The primary outcomes were measurable hip parameters on x-rays after THA using the PrimorisTM stem.
Materials and Methods: Between July 2011 and June 2015, 1294 patients were treated with THA at the Farsoe Clinic and 152 of them had a total hip replacement, with a collum fixated stem, PrimorisTM. 25 patients were excluded (13 contralateral hip prosthesis, 2 peroperative and 5 revision change to metaphyseal / diaphyseal stabilized stem, 5 x-ray not suitable for measurements). The epidemiological data for the remaining 127 patients: mean age of 52 (SD 8.7) and female/male ratio of 16/111. Biomechanical parameters were measured post- operatively at the arthroplasty side, as well as for the native contralateral side on the same x-ray, taken 1 year after surgery: 1. Global offset (GO) 2. Leg length discrepancy (LLD) 3. Neck shaft angle (NSA)
Results: Our findings were a mean GO of -3.4 mm (SD 7.2). A mean LLD of +3.8 mm (SD 6.4). The NSA had a mean increase of 14 degrees (SD 7.4)
Interpretation / Conclusion: In THA a neck stabilized stem, enables restoration of hip anatomy within a beneficial range, in terms of the global offset and the leg length discrepancy where the mean difference is within ±5mm. However the Primoris stem had a tendency being implanted in valgus.

158. Preclinical custom made 3D-CT interpositional intraarticular HipCap implant for patients with osteoarthritis

Jes B Lauritzen, Engin Y Kurt, Sune Lund Sporring, H Martin Kjer
Department of Orthopaedic Surgery and Radiology, Bispebjerg Hospital, University of Copenhagen
Department of Applied Mathematics and Computer Science, Technical University of Denmark

Background: An intraarticular hip joint spacer (1,2) has been developed to reduce pain and improve motion in hip joints in patients with osteoarthritis. The implant has a smooth metallic surface with low friction and thereby reduces transferred peak force across the joint from bone to bone, where cartilage has been lost.
Aim: To verify and document the process from 3D-CT imaging to construct a custom made implant that fits properly into the diseased joint in femoral head specimens from patients undergoing operation with insertion of a total hip arthroplasty.
Materials and Methods: 3D-CT scans of patients with arthritis and osteoarthritic femoral specimens were performed to develop the implant size. A 3-dimensional circle measuring was done in 4 steps. Shape evaluation. Alignment. Circle measuring. Extracting the dimensions and creation of a 3D implant model. Six tests were involved in a laboratory study to determine implant fit of the femoral osteoarthritic head, including assessment of circumference, thickness of implant and aperture of the cap to obtain snapping of the implant over the femoral head, so the cap does not dislocate. Test caps were printed in plastic by KAPACITET A/S (Nikolaj S Stauning & Thomas O Christensen). The metal cup implant was constructed of 316LMV steel by ELOS MEDTECH A/S (Ole Z Andersen).
Results: Joint space in arthritic joints was determined to be around 0.75 mm to 1.00 for the desired implant design. The accuracy of the implant size goes down to 0.03 mm. The inner diameter was 46.70 and the aperture cut was 44,50 mm, and the . The method allows for assessing proper thickness of implant to resist deformation. The 3D-CT gives precise information of patients who will not be able to benefit from the implant in cases where the roundness of the femoral head is disturbed.
Interpretation / Conclusion: The 3D-CT based assessment for implant sizing was able to achieve a precise fit. The results from the preclinical studies will be followed by a clinical test study in patients with diseased hip joints. References 1. Lauritzen JB, Sporring SL. Medical implant for reducing pain in diseased joints. WO 2014094785A3. 2. Lauritzen JB. Custom made hip implant WO 2019/025546 A 1.

159. Body mass index related disparities of hip fracture care in Denmark – a population-based cohort study.

Nanna Sofie Astrup Pedersen[1], Inger Mechlenburg[1 2], Pia Kjær Kristensen[1 2]
Department of Orthopaedics, Aarhus University Hospital[1]; Department of Clinical Medicine, Aarhus University[2]

Background: Hip fracture is the leading cause of fall-related mortality in older people. Adherence to the guideline recommended treatment are in Denmark continuously monitored through process performance measures (PPM). Unwarranted variation in fulfillment of the PPM, reflecting guideline recommended hip fracture treatment exist. Patients with either high or low body mass index (BMI) may require extra resources in care e.g. mobilization of an overweight patient often takes more staff, assistive devices, time, and space.
Aim: The aim of this study was to examine the association between patients' BMI and quality of in-hospital care among patients with hip fracture.
Materials and Methods: A nationwide, population-based cohort study using prospectively collected data from the Danish Multidisciplinary Hip Fracture Registry. The study population consisted of 39,835 patients ≥65 years admitted with a hip fracture and discharged between 1st of January 2012 and 29th of November 2017. Binomial regression was used to estimate the relative risk for fulfillment of the individual measures with 95% confidence interval (95% CI). Multiple imputation method was applied to handle missing BMI values.
Results: The overall fulfillment of the PPM ranged from 43% for pre¬operative optimization to 95% for receiving a post-discharge rehabilitation program. Patients with missing data on BMI (17%) had the lowest fulfillment of the process performance measures. The obese patients had a lower fulfillment of operation within 36 hours compared to patients with normal weight (82% vs. 85%) corresponding to a RR of 0.85 (95% CI 0.72-0.998). No differences in quality of care were found among patients with underweight or overweight compared to patients with normal weight.
Interpretation / Conclusion: Patients with hip fracture who are underweight or overweight receives the same quality of in-hospital care during admission as patients with normal weight. The obese patients had a slightly higher risk of waiting for surgery than patients with normal weight. The overall fulfillment of PPM was lower than the standards recommended in the national guidelines and future improvements of the quality of in-hospital care should benefit all patients with hip fracture regardless BMI level.

161. Preclinical assessment study of a custom made 3D-CT HipCap implant for dogs with osteoarthritis

James E Miles, Parisa Mazdarani, Berendt Berendt, Sune L Sporring, Jes Bruun Lauritzen
University Hospital for Companion Animals, University of Copenhagen. Department of Orthopaedic Surgery, Bispebjerg Hospital, University of Copenhagen.

Background: An intraarticular hip joint spacer (1,2) was developed to reduce pain and improve motion in hip joints in dogs and human patients with hip joint disease. The implant has a smooth metallic surface with low friction and thereby reduces transferred peak force across the joint from bone to bone, where cartilage has been lost. The first dog has been operated with a fixed sized HipCap implant that needed reaming of the femoral head and acetabulum. The effect of the operation has been successful.
Aim: To verify and document the process from 3D-CT imaging to construct a custom-made implant that fits properly into the diseased joint in cadaver dogs, so reaming can be avoided.
Materials and Methods: Canine cadaver studies were performed to develop the implant size, instrumentation for insertion, and the surgical technique. 3- dimensional circle measuring was done in 4 steps: Shape evaluation; Alignment; Circle measuring; Extracting the dimensions and creation of a 3D implant model. Four tests were involved in a cadaver study to determine joint space in the diseased joint, including assessment of circumference, thickness of implant and aperture of the cap to obtain snapping of the implant over the femoral head, so the cap does not dislocate. Test caps were printed in plastic by KAPACITET A/S (Nikolaj S Stauning & Thomas O Christensen). The metal cup implant was constructed of 316LMV steel by ELOS MEDTECH A/S (Ole Z Andersen).
Results: Joint space in arthritic joints was determined to be around 0.20 to 0.75 mm for dogs for the desired implant design. The accuracy of the implant size goes down to 0.03 mm. Aperture cut was 0.952 of the inner radius of the implant.
Interpretation / Conclusion: The 3D-CT based assessment for implant sizing was able to achieve a precise fit. The results from the preclinical studies in dogs will lead to a clinical test study in dogs with diseased hip joints. The implant can be used independently of the size of the dog. References
1. Lauritzen JB, Sporring SL. Medical implant for reducing pain in diseased joints. WO 2014094785A3. 2. Lauritzen JB. Custom made hip implant WO 2019/025546 A 1.

Poster Walk 3: Hip trauma and infection

16. november

17:00 - 18:00

Chair: Bjarke Viberg / Mats Bue

183. Physical activity in adult patients with hip fracture under 60 years of age is associated with health-related quality of life and strength; Results from the HFU-60 multicenter study

Anna Gaki Lindestrand[1], Sebastian Strøm Rönnquist [2] , Bjarke Viberg[3] , Søren Overgaard[1] [4], Henrik Palm[1], Cecilia Rogmark [2] , Morten Tange Kristensen[5] [6]
Department of Orthopaedic Surgery and Traumatology, Univeristy Hospital Bispebjerg[1] ; Department of Orthopaedics Lund University, Skåne University Hospital Malmö Sweden [2] ; Department of Orthopaedic Surgery and Traumatology, Lillebælt Kolding Hospital[3]; Department of Clinical Medicine, Faculty of Health and Medical Sciences University of Copenhagen[4]; Departments of Physiotherapy and Orthopedic Surgery, Copenhagen University Hospital – Amager and Hvidovre, Hvidovre, Denmark[5]; Department of Physical and Occupational Therapy, Copenhagen University Hospital – Bispebjerg and Frederiksberg & Department of Clinical Medicine, University of Copenhagen, Copenhagen, Denmark[6] .

Background: Younger hip fracture patients are often assumed less active than the general population, but knowledge on physical activity (PA), health-related quality of life (HRQOL) and muscle strength in these patients is limited. The World Health Organization (WHO) recommends a minimum of 150 min of moderate intensity aerobic physical activity (PA) per week or 75 min of vigorous-intensity PA weekly for adults older than 18 years.
Aim: We investigated 1) the variation in pre-fracture PA for adult patients with hip fracture under the age of 60; and 2) quantified the association between PA, and patient characteristics, HRQOL and handgrip strength.
Materials and Methods: A prospective multicenter study (4 hospitals) of 207 adult hip fracture patients (85 women and 122 men, median (IQR) age of 53 (48-57) years) admitted 2015-2018. Data was collected through medical records, questionnaires, physical tests, and interviews. PA level was assessed using a validated questionnaire from the Swedish National Board of Health and Welfare, providing a total score from 3 to 19. A score ≥11 corresponds to fulfillment of the WHO recommendation for weekly PA. Handgrip strength was measured in kilograms using a handheld dynamometer following a standardized protocol. Recall pre-fracture HRQOL was assessed using the EQ-5D-3L questionnaire.

Results: 59% had a PA score below 11, of whom 46% had an ASA grade of 3 or 4, 38% had a BMI over 25 and 81% had a low energy fracture. A PA score <11 points was for both sexes associated with a significantly lower HRQOL versus those with a PA score>11. Correspondingly, a PA score <11 points was associated with weaker hand grip strength and a worse health status (higher ASA-grade, $p<0.001$).
Interpretation / Conclusion: We found that close to two-thirds of patients had a pre-fracture PA level below WHO recommendations. Being more active was associated with better health status, handgrip strength and HRQOL. Our findings indicate that individuals under 60 years who sustain a hip fracture form a heterogeneous group, some severely comorbid and others highly active and healthy. This suggests a more nuanced understanding of this patient group when it comes to rehabilitation and physical demands.

197. Exploratory study of the OR team's perception of barriers and facilitators in connection with procedure shifts: uncemented hemi-arthroplasty to cemented in patients with acute hip fractures - a case study

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Background: DOS has in a Short Clinical Guideline recommended to change from uncemented hemiarthroplasty (HA) to cemented in the treatment of patient with femoral neck fracture. The overall aim was to develop a safe and successful introduction of the new procedure by uncovering all team members' perspectives on the challenges of changing procedure. This is in accordance with implementation science, demonstrating the necessity to prepare all stakeholders prior to procedure change.

Aim: The aim of this study was to explore all operation room (OR) team members´ (surgeons, surgical nurses, anesthesiologists, and anesthesia nurses) perspectives of barriers and facilitators in introducing a change in procedure.

Materials and Methods: Four semi-structured group interviews were conducted with the team. Interviews were transcribed, and anonymized. Data analysis was performed in accordance with Braun and Clarkes approach to reflexive thematic analyses using thematic maps to define themes and sub-themes.

Results: The team contributed with barriers and important needs for training, and supervision. We found several themes regarding barriers and potential fear related to procedural related factors and organizational challenges. Subthemes were lack of time to do the procedure before cementation and uncertainty regarding maintenance of the competencies. Moreover, the team expressed their needs for a “safety package” including both training and a psychological safe learning space. We also found overall themes of more cultural and relational nature, which transcends the other themes, and works as both barriers and facilitators: "myths", “time”, “culture”, giving voice to the importance of the atmosphere in the OR. The concept of "time" and the maintenance of “myths” about difficulties handling cement have a huge impact on the team leading potential fear for the procedure. The team agreed on most, although some points differed specific to professions.

Interpretation / Conclusion: The team’s need for evidence-based training in psychological safe space was evident and should be secured. Time and myths as contributing factors in driving fear needs special notice. All factors should be considered when implementing the new procedure in a training protocol.

199. Intramedullary nail versus dynamic hip screw with stabilising trochanteric plate in the treatment of unstable intertrochanteric fractures

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Background: Intertrochanteric fractures are typically treated with internal fixation. However, despite extensive research, the best choice of implant for intertrochanteric fractures remains controversial, especially for unstable intertrochanteric fractures. Intramedullary nails (IMNs) have shown better results than dynamic hip screws (DHS), which lead to the development of the trochanteric stabilising plate (TSP). The TSP should stabilise the greater trochanter and lateral femoral wall, however, few have compared it to IMNs.
Aim: The study aimed to compare long IMNs and dynamic hip screw with a trochanteric stabilising plate (DHS-TSP) in the treatment of unstable intertrochanteric fractures with the primary outcome being reoperation within three years.
Materials and Methods: A prospective cohort study included 156 patients treated for an unstable intertrochanteric fracture (AO-type: 31A2.2-3 and 31A3.1-3) with IMN or DHS- TSP. The primary outcome was reoperation within three years. Secondary outcomes were measured during the hospital stay (operation time, total blood loss, blood transfusions, mobilisation and length of stay) and at a one-year postoperative follow-up (pain, patient-reported outcome measures (PROM) and regaining pre-fracture function). Differences between the two groups were analysed using the chi-squared test or Fisher exact test.
Results: The two groups were similar concerning baseline characteristics, expect for IMN being used more frequently in osteosynthesis of AO-type 31A3 fractures ($p<0.01$). The IMN group had a higher total blood loss ($p<0.01$) and a lower frequency of mobilisation within 24 hours ($p=0.02$). However, this was not reflected in the number of blood transfusions ($p=0.73$) or a decreased walking ability at the one-year follow-up ($p=0.09$). After one year, the IMN group had less pain ($p=0.04$) but similar results in terms of all other outcomes, including regaining pre-fracture function ($p=0.86$), PROM ($p=0.35$) and reoperation rates ($p=0.61$).
Interpretation / Conclusion: The findings suggest that both long IMN and DHS- TSP may be used to treat unstable intertrochanteric fractures with similar results regarding regaining function, PROM and reoperation rates.

191. Risk Factors And Influence Of Surgical Skill On Reoperation After Treatment Of Acute Femoral Neck Fracture With Uncemented Hemiarthroplasty

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Background: According to national guidelines, it is recommended that a patient with a femoral neck fracture (FNF) eligible for a hemiarthroplasty (HA) should have the stem implanted with cementation, nevertheless the use of uncemented HA is still ongoing.
Aim: Primary aim: Evaluate risk factors of reoperation after treatment of FNF using an uncemented HA. Secondary aim: Evaluate surgeon/supervisor skill level in association with intraoperative complications and risk of conversion to a cemented stem.
Materials and Methods: This is a retrospective study of a consecutive, population-based cohort of patients with FNF treated with HA (BFX stem) in 2010-2016. Variables and preoperative complications were identified from patient files and reoperations were identified from the Danish National Patient Registry. Death was considered a competing event for reoperation in a fitted Cox model. Chi2 test was used to address intraoperative complications and conversion to cemented stem between surgeon skill levels.
Results: 772 stems were implanted as uncemented, 24 were intraoperatively converted to cemented stems (185/550 M/F, mean age 84). There were 37 reoperations occurring (mean) after 37 (0-126) months. The cause specific analyses showed that absence of dementia was a protective factor of reoperation (HR 0.45(CI:0.22-0.90)) and smoking a risk factor (HR 2.30 (CI: 1.11- 4.77). In subdistrubution model dementia failed to be prognostic (HR 0.53 (CI: 0.26- 1.07). Intraoperative complications were seen in 82 stems out of 761, with no significant difference in surgeon skill level. Main reason for complication were fissure treated with a cable. We found that leading surgeon with less than one year of orthopedic training was less likely to convert to cemented stem, compared to those with longer training (p=0.048).
Interpretation / Conclusion: We found that dementia and smoking were the sole predictors for risk of reoperation. Additionally, it was noticeable that if death was not taken into consideration, dementia will not be seen as a risk for reoperation. Less trained leading surgeons had a lower risk of conversion to cemented stem. This may be biased, as more trained personnel are summoned to complications leading to cementation.

203. Computer assisted navigation for cephalomedullary nailing of hip fractures: A prospective usability analysis.

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Background: The STRYKER ADAPT computer-assisted navigation system provides intraoperative feedback to the surgeon regarding implant placement of the gamma3 nail. The usability of the ADAPT system has not been evaluated.
Aim: To study the surgeons' perceived usability of the ADAPT system.
Materials and Methods: This was a descriptive study with prospectively collected data. The ADAPT system was introduced at Aarhus University Hospital in February 2021. Prior to introduction, all surgeons were invited to a general introduction of the system. Furthermore, ADAPT was introduced to the surgical nurses and was on display at the surgical ward at more than one occasion. Following the introduction, it was mandatory to use ADAPT when using the Gamma3 nail to treat intertrochanteric femur fractures. After each procedure, primary and secondary surgeon answered the System Usability Scale (SUS) questionnaire. The SUS is a ten-item questionnaire regarding the perceived usability of a system. SUS scores were translated to adjectives, describing user experience on a 7-point adjective scale (worst imaginable, awful, poor, ok, good, excellent, best imaginable). User acceptability, defined as "not acceptable", "marginal" or "acceptable", was used to interpret the SUS scores.
Results: ADAPT was used in 50 procedures by 29 different surgeons, with varying skill-level. 61 of 79 sent questionnaires, were answered. Median SUS-score after first-time use of ADAPT for all 29 surgeons was 43 (range: 5-60), which translated to "poor" and "not acceptable". For surgeons who performed >=3 ADAPT-assisted procedures, there were no statistically significant difference in their first to latest SUS- score (median difference: 4.3, p=0.5). In free text comments ADAPT was positively described as helpful in placement of K-wire and providing educational opportunities for inexperienced surgeons and negatively as inconsistent, slow, time consuming, and causing excessive fluoroscopy.
Interpretation / Conclusion: Usability of the ADAPT system was ranged as "poor" and "not acceptable" by the majority of operating surgeons. Although the majority found it unnecessary and time-consuming some stated that it might be a useful supplemental tool for inexperienced surgeons.

207. Rehabilitation for life: the effect on physical function of rehabilitation and care in older adults after hip fracture - study protocol for a cluster-randomised stepped-wedge trial

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Background: Hip fractures are the most frequently surgically treated trauma and it has serious consequences for older adults. About 50% do not regain usual physical function and mortalityplus readmissions rates are high. The gap in healthcare delivery might be a cause of inferior rehabilitation and care.

Aim: 'Rehabilitation for Life' trial has been developed to challenge this gap and assess the effect of continuous and progressive rehabilitation and care across sectors for older adults after hip fracture.

Materials and Methods: 'Rehabilitation for Life' is designed as a stepped wedge cluster randomised trial. The study populations are non-institutionalised, cognitively able, and older patients and health care professionals in both sectors. One regional hospital and all municipalities within the catchment area participate. Patients receive a trolley containing rehabilitation regime, exercise equipment, and a guide, targeted patient and next-of-kin to a digital healthcare app. Health professionals are taught how to facilitate empowerment. The rehabilitation intervention consists of 12 weeks of resistance exercises initiated 1-2 days after discharge. Videoconferences involving, hospital and municipal physiotherapists and patients to enable knowledge transfer. The care intervention consists of a medical assessment including measurement of vital signs conducted by municipal nurses in patients' own home. A medical hotline enables direct confer with hospital nurses and doctors. Data collection at discharge and follow-up 8, 12, 26 weeks post-surgery include physical measurements. The primary outcome is Timed Up and Go test 8 weeks post-surgery. Among secondary outcomes are 30 day and 1 year mortality rates, readmissions and cost-effectiveness.

Results: So far, 702 patients has been screened, 476 excluded (189 institutionalised, 75 young, 58 non inhabitants of catchment area, 30 fast discharge, 52 other reasons, 72 reclined to participate) and 182 has been included.

Interpretation / Conclusion: The interventions delivered are evidence-based, simple and reproducible. Thus if effective, it can impact usual rehabilitation and care after hip fractures nationwide, especially if it is cost- saving.

188. Comorbidity burden and the risk of infection among hip fracture patients: a Danish population-based cohort study

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Background: Although both the risk of postoperative infection and comorbidity burden have increased among Danish hip fracture patients during the last decade, the impact of comorbidity on infection risk is unknown.

Aim: We aimed to examine the magnitude of the association between comorbidity burden and any infection after surgery for hip fracture.

Materials and Methods: Utilizing Danish population-based medical registries, we identified patients undergoing hip fracture surgery between 2004-2018 (n=92,600). Comorbidity was categorized using the Charlson comorbidity index (CCI) as low (CCI score = 0), moderate (CCI score = 1-2), or severe (CCI score =>3). Outcome was any hospital treated infection within 30 days and 1 year of surgery. We estimated cumulative incidences considering death a competing risk and, by Cox regression, hazard ratios (HR) with 95% confidence interval (CI) adjusting for age, sex, and surgery year.

Results: Cumulative incidence of any infection increased with increasing comorbidity burden, from 12.6% (CI: 12.2-12.9%) to 19.5% (CI: 18.9-20.1%) and 22.2% (CI: 21.7-22.6%) to 36.6% (CI: 35.9- 37.3%) among patients with low to severe comorbidity within 30 days and 1 year after surgery. Compared to patients with low comorbidity, those with moderate and severe comorbidity had adjusted HRs of 1.3 (CI: 1.3-1.4) and 1.6 (CI: 1.5-1.7) for any infection within 30 days, and 1.4 (CI: 1.4-1.5) and 1.9 (CI: 1.9-2.0) within 1-year of surgery.

Interpretation / Conclusion: Among hip fracture patients, a higher comorbidity burden was associated with increased hazards for hospital treated infection. Focus on in-hospital care of most comorbid hip fracture patients, screening, and more aggressive prevention of infection could potentially reduce infection risk.

Poster Walk 4: Knee

16. november

17:00 - 18:00

Chair: Julie R. Brandt / Mikkel R. Andersen

164. The 10-year evolution of day case hip and knee arthroplasty

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Background: Investigations have reported decreasing length of stay following hip and knee arthroplasty in multiple nations, without increased risk of readmission. Studies have also found day case arthroplasty surgery to be safe and feasible in selected patients. However, no previous study has reported the trend in use of day case arthroplasty surgery on a national scale.
Aim: The aim of this study was to investigate the use of day case surgery in total hip (THA), total knee (TKA), and unicompartmental knee (UKA) arthroplasty from 2010 to 2020.
Materials and Methods: Primary unilateral THAs, TKAs, and UKAs performed as treatment for osteoarthritis were identified in the Danish National Patient Register using procedure and diagnoses codes. Day case surgery was defined as discharge on the day of surgery. Systematic utilization of day case surgery was defined as >5% day case surgery. Any unplanned overnight admissions within 90 days of surgery was registered as readmissions.
Results: From 2010-2020 Danish hospitals performed 86,070 THAs, 70,323 TKAs and 10,440 UKAs. From 2010-2014, less than 0.5% of THAs and TKAs were day case procedures. This increased to 5.4% of THAs and 2.8% of TKAs in 2019. From 2010-2014, 11% of UKAs were day case procedures, but this increased to 20% in 2019. 0% of public hospital performed day case THA and TKA from 2010-2014. This increased to 33% and 13% of hospitals performing THA and TKA, respectively in 2019. 14% of public hospitals performed day case UKA in 2010 - this increased to 63% in 2019. The overall 90-day readmission rate decreased from 10.3% in 2010 to 8.9% in 2019. In 2010 10%, 11%, and 6.7% of THAs, TKAs and UKAs, respectively, were readmitted. This decreased to 9.1% and 9.2% of THAs and TKAs in 2019. Readmission rates after UKA fluctuated between 5-7%, with 6.6% being readmitted in 2019.
Interpretation / Conclusion: From 2010-2020 the usage of day case surgery in THA, TKA and UKA increased. The number of hospitals performing day case surgery increased. Despite the increasingly elderly and comorbid arthroplasty population, increased use of day case surgery does not appear to increase readmission rates on a national level.

165. Validation of the indication ”pain without loosening” for revision of knee arthroplasties in the Danish Knee Arthroplasty Register.

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Background: 13% of revisions of knee arthroplasties registered in the Danish Knee Arthroplasty Register (DKR) are for the indication “pain without loosening. However, the indication is not validated and might cover other hidden indications as well.

Aim: The aim of this study was to investigate the indication “pain without loosening” in the DKR, and screen for other possible indications hidden in this category.

Materials and Methods: We included patients undergoing first-time revision knee arthroplasty for the indication “pain without loosening” as the only registered indication in the DKR. Revisions performed in the time period January 1, 2016 to December 31, 2018 at five Danish centers were included in the study. Medical records and radiographs were reviewed for all patients and CT scans for those available (29 patients).

Results: 86 patients were included in the study. The distribution of Kellgren-Lawrence arthrosis grade up to the primary knee arthroplasty were grade 1 (1%), grade 2 (18%), grade 3 (41%) and grade 4 (20%). The primary knee arthroplasties were TKA (56 patients), unicompartmental knee arthroplasty (27 patients) and patellofemoral prosthesis (3 patients). All were revised to a total knee arthroplasty (TKA). We did not find any hidden indication in 60% of the cases assessed from medical records, radiographs and CT scans. We found hidden indications in 40% of cases; stiffness, malposition of components, instability, progression of arthrosis, liner dislocation and aseptic loosening. The hidden indications were existing in the DKR in 9% of the cases. Radiographic deviations were present in 50% of cases revised for pain without other hidden indications and in 79% of cases where another indication was present.

Interpretation / Conclusion: We did not find other hidden indication for 60% of cases other than the registered indication “pain without loosening”. Stiffness and malposition of components were hidden indications and may lack in the DKR.

166. Usage of guideline-adherent core treatments and different treatment pathways among patients with knee osteoarthritis: a prospective cohort study

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Background: A large variety of treatments for knee osteoarthritis (OA) exists and patients often undergo treatments not in accordance with clinical guidelines.
Aim: To present 1) the proportion of patients receiving guideline-adherent core treatments and 2) the most common treatment pathways that patients with primary referral to an orthopaedic surgeon due to knee OA pursue before and after consulting an orthopaedic surgeon.
Materials and Methods: This cohort study consecutively invited patients with primary referral to an orthopaedic surgeon due to knee OA from October 2018 to December 2020. At inclusion, patients selected which treatments they had received for knee OA from a pre-defined list of 18 treatments before consulting the orthopaedic surgeon. After six months, patients selected from the same list, which treatments they received since the consultation or until surgery. The proportion of patients receiving the recommended combination of guideline-adherent core treatments (education and exercise) was described. Additionally, we investigated which three treatment pathways that were the most common.
Results: Out of 5,251 eligible patients, 3,507 were included and 2,574 had complete six months data. Responders' (58% female) mean (SD) age was 66.1 (10.1) years and mean (SD) BMI 29.5 (5.7) kg/m². The proportion of patients receiving guideline- adherent core treatments was 35% (899). 10% (245) received no treatment. Out of 797 patients undergoing knee arthroplasty, 37% (297) received guideline-adherent core treatments, and 7% (59) received no treatments before surgery. The most common treatment pathways were: 1) No treatment 7% (n=186), 2) no treatment initially followed by exercise after consultation 3% (n=88), 3) pharmacological treatment initially, followed by no treatment after consultation 2% (n=65). The number of unique pathways was 1,289.
Interpretation / Conclusion: In only one third of the patients with knee OA, treatment pathways adhered to clinical guidelines. In addition, the proportion of patients receiving no treatments and the large number of different treatment pathways suggests a need for a more structured effort to increase the use of guideline- adherent core treatments. Registration: NCT03746184, protocol:
PMCID: PMC8264876

167. Concurrent validity of linear accelerations measured by low sampling frequency accelerometers during overground walking in elderly patients with knee osteoarthritis

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Background: The tendency towards using sensors for remote monitoring of the patients at home is increasing. One of the most important characteristics of the sensors is their sampling rate. Higher sampling rate results in higher quality data and lower noise. However, higher sampling frequency comes with a cost regarding handling the data.

Aim: To determine the validity of measurements performed by low sampling frequency (12.5 Hz) accelerometers (SENS) in patients with knee osteoarthritis compared to a previously validated system (Xsens). We also determined the test-retest reliability of SENS.

Materials and Methods: Participants were patients with unilateral knee osteoarthritis referred to Aalborg University Hospital, Farsø. Gait analysis was performed simultaneously by using Xsens and SENS in two repetitions of over-ground walking at a self-selected speed. After processing, the signals from SENS and VirtualSENS were compared in different coordinate axes in time and frequency domains. ICC for SENS data from first and second trials were calculated to assess the repeatability of the measurements.

Results: We included 32 patients (18 females) with median age 70.1[48.1 – 85.4]. Mean height and weight of the patients were 173.2 ± 9.6 cm and 84.2 ± 14.7 kg respectively. The correlation between accelerations in time domain measured by SENS and VirtualSENS in different axes was r = 0.94 in y-axis (anteroposterior), r = 0.91 in x-axis (vertical), r = 0.83 in z-axis (mediolateral), and r = 0.89 for the magnitude vector. In frequency domain, the value and the power of fundamental frequencies (F0) of SENS and VirtualSENS signals demonstrated strong correlation (r = 0.98 and r = 0.99 respectively). The result of test-retest evaluation showed excellent repeatability for acceleration measurement by SENS sensors. ICC was between 0.89 to 0.94 for different coordinate axes.

Interpretation / Conclusion: Low sampling frequency accelerometers can provide valid and reliable measurements especially for home monitoring of the patients, in which handling big data and sensors cost and battery lifetime are among important issues.

168. Is postoperative urinary retention a new problem after surgery or an unknown chronic disorder in men undergoing elective hip, knee or shoulder arthroplasty; a pilot study

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Background: Postoperative urinary retention (POUR) is a common complication in total joint arthroplasty surgery. A routine procedure for pre-operative bladder scan of patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), uni-compartmental knee arthroplasty (UKA) or total shoulder arthroplasty (TSA) is not established in many departments. Consequently, when POUR is found, it is unclear whether it is a new problem or an unknown chronic urinary retention (CUR). CUR can be an unknown medical disorder, and the risk of CUR increases with age. The risk of POUR is associated with CUR and spinal anesthesia.
Aim: To determine if residual urine (> 150ml pre- and postoperatively) is a problem in elective orthopedic surgery in men >65 years undergoing THA, TSA, TKA or UKA.
Materials and Methods: A pilot test, performing bladder scans on all men aged >65 years undergoing THA, TKA, UKA or TSA surgery during a four-week period in 2021. Bladder scans were performed before surgery and after recent voiding, and repeated postoperatively after voiding if residual urine was ≥150ml preoperatively. The limit for post void residual urine is defined as ≥150ml and CUR as ≥300ml. Data was collected retrospectively from the medical records.
Results: 72 men aged >65 years underwent surgery during the four-week period of testing. 5 men were excluded because of known urinary disorder treated with catheterization. 12 men eligible for inclusion were not scanned. 55 were scanned preoperatively: 5 (9%) had residual urine, 2 (4%) had CUR. 2 of the patients with residual urine described symptoms of residual urine in the outpatient clinic. 11 (20%) of the 55 men were re-scanned postoperatively: 6 of those had >150ml residual urine, additionally 1 had >300ml. 1 of the patients with CUR preoperatively was treated and discharged with an indwelling urinary catheter.
Interpretation / Conclusion: 9% (5/55) in this pilot test had residual urine and 4% (2/55) patients had CUR preoperatively. 11 of 55 patients were bladder scanned postoperatively, 6 had >150ml and 1 >300ml. A collaboration with urologists has been established to form a local guideline for men with residual urine to improve the quality of treatment.

169. Reliability of Teitges test

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Background: High Tibial Osteotomy (HTO) is used in treatment of patients with medial knee osteoarthritis (OA). A simple clinical test to select the patients most likely to benefit from the procedure is suggested by MD Robert Teitge - the 'grand old man' of osteotomy.
Aim: To investigate the interrater reliability of 'The Teitge test'.
Materials and Methods: The study was performed as a reliability study with two experienced orthopedic surgeons performing the Teitge test blinded to each other's results. The Teitge test consists of a varus stress test to provoke the patient´s known symptoms followed by a valgus stress test to relieve pressure from the medial compartment of the knee and to simulate the realignment achieved by HTO. The test is considered positive if valgus stress relieves pain and/or makes the knee move mechanically smoother. Prior to enrolment the investigators practiced together, by performing the test on 5 healthy individuals. Testing was standardized following a written procedure. Inclusion criteria were: unicompartmental knee arthrosis, pain at the medial joint line, varus malalignment on long weight bearing x-rays, BMI 20-40, age 30-70 and English or Danish proficiency. Reliability was determined using Cohens kappa (κ).
Results: A total of 18 patients, mean age (SD) 56.7 (8.6), male/female 6/12 were included resulting in 18 knees tested. Positive/negative agreement between investigators was found in 12 out of 18 cases, resulting in $\kappa = 0.2$, 95% CI = [- 0.29,0.72]. Due to a weighted number of positive test results (11/18 and 15/18 respectively) prevalence adjusted bias adjusted kappa (PABAK) was applied, reaching $\kappa = 0.3$, 95% CI = [-0.1,0.76].
Interpretation / Conclusion: Slight to fair agreement was found for the Teitge test. Clinicians should be careful when interpretating the test due to the low agreement between raters.

170. Patient reported outcome for the medial Oxford knee is better for younger specialist than super seniors

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Background: Our unit consist of surgeons with different levels of experience as dedicated knee replacement surgeons. The 3 super seniors have more than 20 years of experience and the younger surgeons has less than 5 years' experience. This study describes the forgotten joint score (FJS) and revision for the medial oxford unicompartmentel knee replacement for patients treated by the super seniors and the less experienced younger sugerons. All surgeons had participated in an education program provided by the manufacturer (Zimmer)
Aim: To determine if FJS is dependent on experience for the medial Oxford knee.
Materials and Methods: Retrospective cohort study from our institution with all patients treated with a medial uni in 2018-2020. Preoperative, 1 year oxford knee score and 1 year FJS was measured and compared between the two groups. Revisions for any cause within the first postoperative year was compared between the two groups.
Results: Usage, measured as percentage of medial oxford primary knee replacements, was similar between the groups (Seniors 31%; Young 30%). No difference was observed regarding ASA score, BMI and age as no difference was observed in preoperative oxford knee score between the groups. Surgical duration was significantly faster for the seniors (40 min vs. 51 mins; t-test; P = 0.0003). Median FJS after 1 year was significantly higher for Young consultants (79 points vs. 69 points, P = 0.0001; Mann Whitney test). Revision for any reason was similar between the groups. No difference in FJS was observed for total knee replacements when comparing outcome for Super Seniors versus Young Consultants (60 points vs. 63 points, P = 0.3, Mann Whitney test).
Interpretation / Conclusion: Since the patients operated in both groups appears to be similar, it is doubtful that the faster operation time by the seniors results in poorer outcome, since the risk of revision is also equal in the two groups. Yet, surgical technique could account for part of the difference, but more likely patient approach and shared decision making could be the main factor in understanding the better outcome for patients operated by a young specialist.

181. Failure of meniscal suture and predictive factors

Christopher Holst Hansen[1], Bjørn Borsøe Christensen[1], Anders El-Galaly[2], Martin Lind[2]
Department of Orthopaedics, Horsens Regional Hospital[1]; Department of Orthopaedics, Aarhus University Hospital[2]

Background: This study was made as a pilot project to identify potential predictors for failure of meniscal suture.
Aim: The aim of the study was to see if predictors such as body mass index (BMI), smoking status at time of operation, sex and age had any correlations to failure of meniscal repair by suture.
Materials and Methods: This study is a single center retrospective study. Patients, who had undergone operation with arthroscopic meniscal repair at the department of orthopedic surgery at Horsens Hospital were identified through data on operations during a period from 2014 to 2022. Each individual surgical protocol was reviewed and the data was collected. The study endpoint was failure of meniscal repair defined as a need for reoperation with meniscal resection. The data was analyzed by cox regression and a Kaplan-Meier analysis was made to estimate meniscal repair survival.
Results: This study is a single center retrospective study. Patients, who had undergone operation with arthroscopic meniscal repair at the department of orthopedic surgery at Horsens Hospital were identified through data on operations during a period from 2014 to 2022. Each individual surgical protocol was reviewed and the data was collected. The study endpoint was failure of meniscal repair defined as a need for reoperation with meniscal resection. The data was analyzed by cox regression and a Kaplan-Meier analysis was made to estimate meniscal repair survival.
Interpretation / Conclusion: This study showed a 5 year failure rate of 32,2% for arthroscopic meniscal repair. This study showed no significant correlation between age, sex, BMI or smoking status on failure of meniscal repair.

Poster Walk 5: Upper extremity

16. november

17:00 - 18:00

Chair: Eske Brand / Jens-Christian Vedel

152. The prevalence of concurrent musculoskeletal complaints in elbows, shoulders, and neck in patients after an isolated hand and forearm complaint.

Lukasz Maciej Winiarski[1] , Jane Dorthea Livoni[1] , Poul Verner Madsen[2] , Michael Skovdal Rathleff[1 3] , Peter Larsen[1 2]

Physiotherapy and Occupational Therapy Department, Aalborg University Hospital, Aalborg, Denmark[1];Department of Orthopaedic Surgery, Aalborg University Hospital, Aalborg, Denmark[2];Department of Health Science and Technology, Faculty of Medicine, Aalborg University, Aalborg, Denmark[3].

Background: Isolated hand and forearm complaints are common in the emergency and orthopedic departments. So far, little is known about whether these patients suffer from concurrent musculoskeletal complaints (MSCs) besides their hand and forearm complaints. Neglecting concurrent MSCs in the upper limbs and neck could hamper rehabilitation and prolong the time taken to return to daily activities.
Aim: The aim of this study was to investigate the prevalence of self-reported concurrent MSCs in the elbow, shoulder, and neck in patients with common hand and/or forearm complaints.
Materials and Methods: This cross-sectional study included 600 patients with any type of diagnoses referred to hand therapy in relation to a hand and/or forearm complaint. Eligibility was determined based on clinical interviews and self-report questionnaires. Patient characteristics, diagnoses, and location of symptoms were registered and analyzed.
Results: The patient group consisted of women (68%, mean age 53 (18 SD)) and men (32%, mean age 48 (16 SD)). The largest diagnostic groups were distal radius and ulna fractures (25%), ligament lesions and ruptures in fingers (16%), and finger fractures (14%). The overall prevalence of concurrent MSCs was 40% (95% CI: 36%-44%). The most common location of concurrent MSCs was the shoulder, 62% (95% CI: 56%-68%), followed by the elbow, 49% (95% CI:43%-55%), and the neck 32% (95% CI: 26%-38%). Thirty- eight percent (95% CI: 32%-44%) of all patients reported concurrent MSCs in two or three regions of the upper limb or neck. Twenty-eight percent (95% CI: 24%-31%) of the whole sample developed concurrent MSCs after the hand and forearm complaint.
Interpretation / Conclusion: The present results suggest, that MSCs from the elbows, shoulders, or neck are very common in patients with hand and/or forearm complaints. Clinicians managing patients with isolated hand and forearm complaints should be aware of the high prevalence of concurrent MSCs. Future research should investigate if specific management strategy, addressing concurrent MSCs, may improve the outcome in this population.

153. Intratendinous ganglion and synovial cysts in the extensor digitorum communis tendon: A case report

Trine Brønden Kongensgaard, Niels Henrik Søe
Department of Hand Surgery, Herlev/Gentofte University Hospital of Copenhagen, Hellerup, Denmark.

Background: Introduction: Intratendinous ganglion cyst is a rare condition and only a few cases are described in literature.
Aim: We present, to our knowledge, the first case report of both intratendinous ganglion and synovial cyst in the extensor digitorum tendon to the 3th finger.
Materials and Methods:
Results: Case report: A 71-year old woman presented with left-sided localized swelling on the dorsal site of the hand and a hard nodule in relation to EDC 3-tendon. Ultrasound and MRI scans describe tenosynovitis in the 4th extensor compartment with two intratendinous cysts in EDC 3. Open surgical synovectomy and excision of four cysts in total, one cyst proximal to RC joint and three distal at the level of os capitatum; one large and two minor. The cysts resulted in longitudinal tendon split without the need of repair. Histological analysis showed that that two types of cysts were present; ganglion cyst and synovial cyst. Post-operative recovery proceeded according to plan.
Interpretation / Conclusion: Intratendinous ganglion cysts are a rare condition, and most frequently described in the extensor tendon. As in other cases the patient present with tenosynovitis as localized swelling. The previously described cases find only ganglion cysts, and this case is to our knowledge the first report of two types of cysts in the same tendon; ganglion and synovial. The pathogenesis of intratendinous cysts are still unknown and different theories have been suggested, accordingly further investigation into the origin of intratendinous cysts are required.

154. Management of everyday life after a hand operation – a qualitative study of patients with a weak sense of coherence

Alice Ørts Hansen[1 2 3], Kamilla Kielsgaard[3], Stina Meyer Larsen[2 3 4]
Department of Orthopaedic Surgery and Traumatology, Odense University Hospital and Svendborg Hospital, Odense, Denmark[1] Department of Clinical Research, University of Southern Denmark, Odense, Denmark[2] Competence Centre for Rehabilitation, REPHA, Danish Centre for Rehabilitation and Palliative Care, Odense University Hospital, Odense, Denmark[3] Health Sciences Research Center, UCL University College, Odense Denmark[4]

Background: Psychosocial factors, such as sense of coherence (SOC) are thought to influence rehabilitation outcomes in hand therapy, including functioning. A greater impact on participation in everyday life occupations has also been found for patients with a weak SOC compared to those with a strong SOC.
Aim: To explore how patients with hand-related disorders and a weak SOC experience and manage everyday life after an operation.
Materials and Methods: In-depth interviews were conducted with five women and three men between the ages of 48 and 65 operated for a hand-related disorder who had a weak SOC (SOC-13 score < 52). Participants were enrolled from a large cohort study. All eligible patients operated from December 2020 - March 2021 were invited. Participants were interviewed once between six and 13 weeks after operation. Data were analysed based on a hermeneutic approach.
Results: The preliminary analyses resulted in two themes, the first of which was Feeling sort of impaired with the subthemes lots of small streams make a big river and challenges in everyday living. Besides the hand-related disorder, participants had several other circumstances that challenged their everyday life. Some participants did not mention 'loss of roles'; they had already adapted and simplified life because of life circumstances beyond the hand disorder. The participants mentioned several strategies that they used to manage everyday life, such as: adapt the environment, ask for help, postpone activities, spread activities throughout the day and compensatory solutions. The second theme was Uncertainty and confident, with the subthemes expectations and information. The participants felt uncertain and insecure about the future and whether they are doing things right, e.g., their rehabilitation. This was set in contrast to the feeling of confident and security in getting adequate information about what to do and what to expect after the operation and for the future.
Interpretation / Conclusion: The conclusion and the final results will be presented at DOS 2022.

192. Complications after volar locking plate fixation of distal radius fractures: a retrospective study in 822 patients

Søren Perregaard, Rasmus Wejnold Jørgensen, Marcus Landgren
Department of Orthopedic surgery, Hand Surgery Unit, Herlev and Gentofte, Gentofte, Denmark

Background: With the current routine use of volar locking plates as the preferred surgical treatment method of distal radial fracture the purpose of this work was to investigate the complication rate following surgery.
Aim: The aim was to investigate the incidence of complications following surgery using a volar locking plate for a distal radial fracture.
Materials and Methods: A retrospective review of the medical records of all patients treated with open reduction and internal fixation with volar locking plate (VLP) for a distal radial fracture. Nine-hundred and nine distal radial fractures, in 902 surgically treated patients were identified between year 2017 and 2019 at Herlev and Gentofte Hospital. Eighty- seven patients were excluded mainly due to incorrect coding and surgically treated with other methods than a VLP. Hence, 822 patients were deemed eligible for inclusion and postoperative complications attributable to the surgical treatment were recorded with a mean follow-up time of 2.8 years
Results: The mean age of the study population was 63 years (18 to 94) and 81% were female. We identified an overall postoperative complication incidence was 14.2% (116 in 822 patients). With 8.2% (67/822) major complications and 6.0% (49/822) defined as minor complications. The most frequently observed complications was pain and reduced range of motion leading to hardware removal (n = 23, 2.8%), skin adherence not requiring surgical revision (n = 18, 2.2%), and carpal tunnel syndrome (n = 16, 1.9%), 13 underwent carpal tunnel release. Secondary surgery was performed in 9.9% (81 procedures in 87 patients), including preoperatively planned removal of hardware.
Interpretation / Conclusion: The incidence of complications following open reduction and internal fixation of distal radial fractures was low, however patients are at risk of developing both major and minor complications postoperatively. Despite being a safe and efficient treatment for distal radius fractures where surgery is deemed necessary, there is a need for a better understanding of subpopulations at risk of experiencing complications following surgery.

205. Exploring patient experiences after treatment of humeral shaft fractures: A qualitative study

Dennis Karimi[1], Line Houkjær[2], Anders Skive[3], Camilla Holmenlund[3], Stig Brorson[2], Bjarke Viberg[1], Charlotte Abrahamsen[4]
Department of Orthopaedics, Kolding Hospital[1]; Department of Orthopaedics, Zealand University Hospital[2]; Department of Orthopaedics, Hvidovre University Hospital[3]; Department of Regional Health Research, University of Southern Denmark[4]

Background: Humeral shaft fracture treatment can induce serious morbidities, and fractures are notoriously difficult to handle in the emergency department as well as in the outpatient clinic. It is unclear how patients experience their treatment course and how different morbidities impact patients.
Aim: To gain in-depth knowledge, we explored how patients experience humeral shaft fractures and the subsequent treatment course.
Materials and Methods: A qualitative study was performed using semi- structured individual interviews. A purposive sampling approach was conducted to recruit patients with traumatic isolated humeral shaft fractures; the patients' ages, genders, primary treatments, and complications varied. Data saturation was met after the data of 12 patients were analyzed using Malterud Systematic Text Condensation.
Results: Eight women and four men with a median age of 48.5 years (range: 22–83 years) were interviewed. The median time from injury to interview was 12.5 months (range: 8–18 months). Ten out of twelve patients were treated non-surgically; of those ten, four patients experienced major complications from the primary treatment. During the analysis, five overarching themes were identified: expectations, physical changes, support and independence, psychological impact, and the specific treatment and recovery. Within these themes patients experienced feeling trivialized by personnel, lacked quality information, and were severely impaired in their mobility and independence.
Interpretation / Conclusion: First, patients with humeral shaft fractures expressed frustration with treatment in the emergency department. Second, gross fracture movement and pain were central symptoms that led to the loss of basic capabilities. Third, patient preferences were included in the treatment decision-making process and could change throughout the treatment course. Fourth, patients required massive support to perform basic activities of daily living.

180. Accuracy and reliability of a new non-invasive model for dynamic measurements of glenohumeral translation

Catarina Malmberg[1], Stefan E Jensen[1], Benjamin Michaud[2], Per Hölmich[1], Kristoffer W Barfod[1], Jesper Bencke[1 3]

Sports Orthopedic Research Center – Copenhagen (SORC-C), Department of Orthopedic Surgery, Copenhagen University Hospital Amager & Hvidovre, Denmark[1]; Laboratoire de simulation et modélisation du mouvement (S2M), École de kinésiologie et des sciences de l'activité physique, Université de Montréal, Québec[2]; Human Movement Analysis Laboratory, Department of Orthopedic Surgery, Copenhagen University Hospital Amager & Hvidovre, Denmark[3]

Background: Shoulder conditions are often directly connected to glenohumeral joint pathology and can lead to abnormal joint kinematics, described as glenohumeral translation. A skin marker-based motion capture model for measurements of glenohumeral translation was recently developed.
Aim: To investigate the concurrent validity and the interrater reliability of a new model for analysis of glenohumeral translation.
Materials and Methods: Twelve infrared cameras were used to track reflections from moving skin markers in the motion capture model. A strict protocol for placement of the skin markers was followed. Shoulder range of motion (ROM) and activities of daily living (ADL) were tested. To investigate the validity, the skin marker-based model was compared to gold standard through simultaneous data collection from markers fitted to intracortical pins in the humerus and the scapula of healthy volunteers. Reliability was tested by comparing two investigators performing the skin marker-based protocol in a different group of healthy volunteers. The mean Root Mean Square Error (RMSE) was calculated for each tested motion to determine the validity. The interrater reliability was determined as Intraclass Correlation (ICC2,1) for each tested motion.
Results: Four subjects were included in the validity test: F/M=2/2, mean age 35 (range 31-38), mean BMI 23.2 (SD2.70). The RMSE for anterior-posterior translation ranged 5.8-8.1 mm during ROM and 5.5- 8.0 mm during ADL. For superior-inferior translation, the RMSE ranged 3.3-6.8 mm during ROM and 3.4- 4.8 mm during ADL. In the reliability experiment, 20 subjects were included: F/M=8/12, mean age 31 (range 23-37), mean BMI 22.9 (SD1.74). The ICC for anterior-posterior translation ranged 0.13-0.51 during ROM, 0.25-0.63 during ADL. Correspondingly, the ICC for superior-inferior translation ranged 0.08-0.50 and 0.05-0.55.
Interpretation / Conclusion: The inaccuracy of the skin marker-based model exceeded physiological values of glenohumeral translation for all tested movements. The reliability of the model was task dependent, but the limited study sample complicates interpretation of data. The skin marker-based model cannot be recommended for measurements of glenohumeral translation.

175. Stemmed hemiarthroplasty with a suture collar and a common platform system for acute proximal humeral fractures

Jeppe Vejlgaard Rasmussen[1], Alexander Amundsen[1], Marc Randall Nyring[1], John Kloth Petersen[2], Zaid Issa[2], Bo Sanderhoff Olsen[1]
Department of Orthopedic Surgery, Herlev-Gentofte Hospital[1]; Department of Orthopedic Surgery, Zealand University Hospital, Køge[2]

Background: Hemiarthroplasty for acute proximal humeral fractures gives disappointing results, often due to rotator cuff insufficiency. Better tuberosity fixation might improve results.
Aim: Therefore, the aim of this study was to: 1) report the outcome of a stemmed hemiarthroplasty with a common platform system and a modular suture collar; 2) to compare the outcome with that of a standard stemmed hemiarthroplasty; 3) to report the feasibility of revision arthroplasty with retention of the stem and; 4) to evaluate the association between tuberosity healing and functional outcome.
Materials and Methods: Forty-four fractures that were deemed not suitable for non-surgical treatment or open-reduction and internal fixation were treated with the Global Unite fracture system between January 2017 and July 2019. The functional and radiographic results at 2 years were compared with the results of 44 Global Fx arthroplasties. The results of patients who had adequate healing of the greater tuberosity were compared with the results of patients who had severe malunion or non-union (resorption).
Results: Mean Oxford Shoulder Score (OSS), Constant- Murley Score (CMS) and Western Ontario Osteoarthritis of the Shoulder index (WOOS) was 33 (range 10 to 48), 40 (range 10 to 98), and 68 (range 18 to 98) at 2 years. There were no differences in functional outcome scores or in the risk of inadequate healing of the greater tuberosity between the Global Unite and the Global Fx systems. Five (11%) patients underwent revision surgery with retention of the stem. Inadequate tuberosity healing was associated with an inferior CMS (mean difference: 6; 95% CI: 1 to 10, P=0.01) and an inferior OSS (mean difference: 9; 95% CI: 1 to 16, P=0.03).
Interpretation / Conclusion: The use of stemmed hemiarthroplasty with a suture collar did not improve healing of the greater tuberosity nor the functional outcome. Five arthroplasties were revised with retention of the stem and the common platform system could be arguments for using the Global Unite system when a stemmed hemiarthroplasty is used for acute proximal humeral fractures.

Poster Walk 6: Paediatrics

16. november

17:00 - 18:00

Chair: Martin Gottliebsen / Peter Buxbom

171. Construct validity of a novel simulator for pinning of supracondylar humeral fractures

Jan Duedal Rölfing[1 2], Steven Long [3], Ahmed Abood [2], Emily Connor [3], Emily Wagstrom [4], Geb Thomas [5], Donald Anderson [3], Heather Kowalski [3]

[1] Corporate HR, MidtSim, Central Denmark Region [2] Dept. of Orthopaedics, Aarhus University Hospital, [3] Dept. of Orthopedics and Rehabilitation, University of Iowa, USA [4] Dept. of Orthopedics, University of Minnesota, Minneapolis, USA [5] Department of Industrial and Systems Engineering, University of Iowa, USA

Background: Dislocated supracondylar humerus fractures (SCH) in children are often treated by diverging Kirschner wires across the fracture to provide stable fixation. Building on a validated simulator for hip fractures, we developed an augmented reality simulator to train orthopedic residents in pinning SCH.

Aim: The aim of this study was to assess the construct validity of the SCH simulator that means its ability to distinguish surgical expertise.

Materials and Methods: 43 surgeons from the University of Iowa, University of Minnesota, and University of Aarhus, Denmark were included. 21 novices (first- or second-year residents), 11 intermediate surgeons (third- or fourth-year residents), and 11 advanced surgeons (fifth-year residents or faculty) participated. Surgical performance was graded on wire divergence, use of fluoroscopy, and overall time. Differentiating features of the simulator include: (1) camera-based tracking of a wire replaces fluoroscopic radiation exposure and (2) a plastic Sawbone replicates the feel of drilling through actual bone. After a warm-up exercise, participants were exposed to a reduced SCH and asked to place 3 diverging lateral wires based on haptic and radiological feedback by the simulator.

Results: Advanced and intermediate surgeons achieved significantly greater pin spread than the novice group (advanced 49%, intermediate 40%, novice 29%). The advanced group used significantly less fluoroscopy than the intermediate and novice groups (advanced 27+/-6 images, intermediate 41+/-17, and novice 52+/-18). The advanced participants required significantly less time to place the 3- wire construct (advanced 321+/-74 seconds, intermediate 448+/-137, novice 592+/-196). All results were statistically significant, $p<0.05$.

Interpretation / Conclusion: Treating SCH is a critical skill that orthopedic surgeons must acquire. This study shows that the novel simulator can clearly distinguish between the 3 groups: novice, intermediate, and advanced performance. Future studies will investigate how simulator training can improve the surgical skill of novice and intermediate residents.

172. Evaluating Inter-rater reliability of the Modified Gordon Score for pin site infection

Marie Fridberg, Arash Ghaffari, Hans-Christen Husum, Ole Rahbek, Søren Kold
Interdisciplinary Orthopaedics, Aalborg University Hospital, Denmark

Background: There is no consensus on how to evaluate and grade pin site infections, the most common complication in external fixation. Pin site infection is diagnosed from clinical symptoms (erythema, swelling, pain, drainage, pus). A precise, objective and reliable pin site infectious score is warranted to improve post-surgical care
Aim: The aim was to test the reliability of the Modified Gordon Infection Score (MGS). The observed agreement and inter-rater reliability were investigated between nurse and doctors
Materials and Methods: MGS: 0=clean 1=Serous drainage, no erythema 2=Erythema, no drainage 3=Erythema and serous drainage 4=Erythema and purulent drainage 5=Erythema, purulent drainage, radiographic osteolysis 6=Ring sequestrum or osteomyelitis. To differentiate between grade 4 and 5 radiographs are needed to identify osteomyelitis. MGS score was performed in the outpatient clinic at Aalborg University Hospital, Denmark on 1472 pin sites in 119 patients by one nurse and one of three orthopaedic surgeons blinded to each other's judgement. The data was stored in a Red Cap Database for further statistical analysis. The observed agreement between the nurse and the 3 orthopaedic surgeons was evaluated with a one-way random-effect model with interclass correlation with absolute agreement. Furthermore the observed agreement for each of the 3 surgeons with the nurse was calculated
Results: The distribution of MGS infection grade in the 1472 pin sites was: Grade 0; n=1372, Grade 1; n=32, Grade 2; n=39, Grade 3; n=24, Grade 4; n=5, Grade 5; n=0, Grade 6; n=0. The observed agreement between the nurse and the surgeons was calculated as 98%. The ICC estimated between nurse and the surgeons was 0,8943 (ICC >0,85 = reliable). The grading was done by three different doctors with an agreement with the nurse as follows. Rater1 (n=239) =99,5 % , Rater2 (n=649) =97,4%, Rater3 (n=384) =96,6%
Interpretation / Conclusion: A limitation to this study is that the dataset represents mostly clean pin sites MGS 0. Only 100 pin sites had signs of superficial infection MGS 1-4 and no sites with deep infection were observed. We found that the MGS infection score is highly reliable for low grade infections, but we cannot conclude on reliability in severe infections

173. Therapist-led interventions to prevent hip dislocation and uncorrectable scoliosis among children with cerebral palsy

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Department of Orthopaedic Surgery, Aarhus University Hospital, Aarhus, Denmark[1]; Department of Clinical Medicine, Aarhus University, Aarhus, Denmark[2]; CPNorth: Living Life With Cerebral Palsy in the Nordic Countries, Aarhus, Denmark[3].

Background: Prevention of hip displacement and scoliosis is a key concern among children with cerebral palsy. Therapist-led interventions may prevent aggravation of the diseases and reduce or postpone the need for surgery.
Aim: The aim of this study was to determine the prevalence of hip displacement and correctable scoliosis and the incidence of hip dislocation and uncorrectable scoliosis among children with cerebral palsy. Moreover, to describe the variation in type and frequency of therapist-led interventions in the time period from identification of hip displacement or correctable scoliosis until the following physiotherapeutic assessment.
Materials and Methods: This population-based descriptive cohort study was based on data from the Danish Cerebral Palsy Follow-up Program. We included all children registered with radiographic and physiotherapeutic assessment. We estimated the prevalence of children with hip displacement and correctable scoliosis and the incidence of hip dislocation and uncorrectable scoliosis in the time period 2010-2020. Type, frequency, intensity and aim of therapist-led interventions were descriptively compared across the cohorts.
Results: The prevalence of hip displacement was 22% (95% CI: 0.19-0.23) and the prevalence of correctable scoliosis was 26% (95% CI: 0.24-0.28). The incidence of hip dislocation was 1% (95% CI: 0.00-0.02) and the incidence of uncorrectable scoliosis was 5% (95% CI: 0.03-0.06). The proportion of children who received intensive treatment was higher among children with hip displacement than children with correctable scoliosis. In both cohorts the primary aim of the therapist-led interventions was to increase joint range of motion. The use of a standing aid among children with hip displacement was frequent, whereas the use of a spinal brace among children with correctable scoliosis was rare.
Interpretation / Conclusion: Hip displacement and correctable scoliosis are highly prevalent in children with CP, whereas the incidence of hip dislocations and uncorrectable scoliosis is low. For both cohorts a smaller proportion than to be expected received intensive treatment. The proportion of children with correctable scoliosis who used of a spinal brace was surprisingly low.

174. Congenital pseudarthrosis of the tibia. Early experiences with the Paley protocol

Søren Kold, Ole Rahbek
Department of Orthopaedics, Aalborg University Hospital

Background: Limb preserving surgery for congenital pseudarthrosis of the tibia has historically carried very high rates of non-union and refracture. A new treatment algorithm by Paley has in a case-series of 17 patients with an average follow-up of 3.7 years resulted in a calculated probability of 100% to achieve union without refracture using external fixators. The method has recently been improved to allow for treatment without external fixator. However, results from this surgery performed outside the Paley Institute are currently not available.
Aim: This study reports preliminary results with the Paley algorithm for CPT.
Materials and Methods: 2 patients with Crawford type IV congenital pseudarthrosis of the tibia. The age at time of surgery was 21 and 30 months. Both patients received preoperative injections of zoledronic acid to protect the autogenous bone graft from resorption after implantation. The surgery included: 1) resection of hamartoma and resection of tibial and fibular bone to vital bone; 2) angular correction of the deformities; 3) recanalization of tibial medullary canal and stabilization with Fascier-Duval telescopic nail combined with locking plate stabilization of the tibia; 4) autogeneous cancellous bone graft and periosteal grafting from the pelvis in combination with recombinant bone morphogenetic protein; 5) intramedullary fixation of the fibula. The patients were kept in a long leg cast for 2 weeks after surgery and hereafter in a low leg cast until union. After union an orthosis is applied for out-door activities.
Results: Patients became fully weightbearing and ambulatory shortly after conversion to a low leg cast 2 weeks postoperatively. Both patients have succesful cross-sectional union between the tibia and fibula. The telescopic nails function in both patients. No refracture has occurred with a follow-up of 5 and 26 months after primary surgery.
Interpretation / Conclusion: Preliminary results of the Paley protocol for CPT in a Danish setting achieved 100% union without use of external fixators. The low age at surgery allows for surgical treatment prior to proximal migration of the distal fibula. Long-term follow up is warranted.

Poster Walk 7: Trauma

16. november

17:00 - 18:00

Chair: Joakim Jensen / Frederik Borup Danielsson

182. Higher Rate Of Nonunion In Bicondylar Tibial Plateau Fractures With A Tibial Tubercle Fragment

Derek Stenquist, Tyler Caton, Eric Chen , Selzer Faith, Marilyn Heng, Michael Weaver, Arvind von Keudell

a Harvard Medical School Orthopedic Trauma Initiative, Boston, MA b Harvard Combined Orthopaedic Residency Program, Boston, MA c Brigham and Women's Hospital, Department of Orthopaedic Surgery, Boston, MA dDepartment of Orthopaedic Surgery, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark

Background: A separate tibial tubercle fragment (TF) is found in up to half of all bicondylar tibial plateau (BTP) fractures. Techniques to address the TF include lag screws, plate fixation, or cerclage wiring. Adequate healing of the TF is required to reconstitute the extensor mechanism of the knee.
Aim: The purpose of this study was to compare functional outcomes and complications after ORIF (Open reduction and internal fixation) of BTP fractures with and without a TF.
Materials and Methods: This is a retrospective cohort study of adult patients undergoing ORIF of an AO/OTA 41- C or Schatzker V/VI BTP fracture at two Level 1 trauma centers. Radiographs and computerized tomography (CT) scans were reviewed to determine the presence of a separate tubercle fragment (TF) and mode of fixation if addressed. Primary outcomes were the Patient-Reported Outcomes Measurement Information System Physical Function (PROMIS PF) score and EUROQUOL-(EQ)-5D-3L. Secondary outcomes included rates of infection, reoperation, and nonunion.
Results: This analysis was comprised of 189 patients (mean follow-up 8.1 years, range 1.1-16.5) and TF was identified in 55 patients (29%). Compared to NTF patients, those in the TF group had more open fractures (16% vs 5%, p=0.02) and more 41C3 fractures (65% vs 44%, p=0.01) but there was no significant difference in the rates of deep infection (15% vs 8%, p=0.19) or reoperation (23% vs 13%, p=0.09) between the two groups. There was no difference in PROMIS PF (48.1 vs 47.5, p=0.45) or EQ-5D scores (0.82 vs 0.83, p=0.32) between the TF and NTF groups. Furthermore, there was no difference in functional outcome according to management of the TF. There was a higher rate of nonunion in the TF cohort compared to the NTF cohort (11% vs 2%, p=0.02) but no difference in nonunion rate according to mode of TF management (no repair 0% vs screws 6% vs cerclage 15%, p=0.85).
Interpretation / Conclusion: In this retrospective cohort study of patients with bicondylar tibial plateau fractures, patients with a TF experienced more severe injuries but no difference in functional outcomes were detected compared patients without a TF.

186. Risk Assessment of Accidents Involving Stand-up Electric Scooter Riders in Odense, Southern Denmark, in the Period of July 2019 to December 2021

Eva Lindhardt Hansen, Jens Lauritsen, Martin Lindberg-Larsen, Niels Dieter Röck
The Research Unit of Orthopaedic Surgery, Department of Orthopaedic Surgery, Odense University Hospital; Accident Analysis Group, Department of Orthopaedic Surgery, Odense University Hospital; Department of Clinical Research, University of Southern Denmark.

Background: Electric scooters (e-scooters), a new form of personal transport device, was introduced in rental programmes in Odense, Denmark, in 2019. E-scooter riders are vulnerable road users, who can legally travel at 20 km/h with little noise and, prior to 2022, no required safety gear. The risk of sustaining a trauma riding an e-scooter has been shown to be 8-10 times the risk of riding a bicycle. The safety of e- scooters in an urban setting must be examined to assess risk of accidents and the severity of injuries. Both to inform the e- scooter riders, the legislators and the health personnel that care for the injured.
Aim: We aim to assess the number, characteristics and severity of accidents involving riders of e-scooters in Odense from their introduction July 2019 to December 2021.
Materials and Methods: All contacts to the emergency department of Odense University Hospital are routinely registered. We used this registry to identify all injuries involving e-scooters from July 1st 2019 to December 31st 2021. Resulting in 350 total contacts, 320 involving riders of e-scooters. The time of accident, sex, age and acquired injuries were anonymously extracted and processed with EpiData.
Results: Men comprised 2/3 of injured riders. The average age of patients was 25 years old. 55 % of accidents happened from Friday to Sunday. Saturday night accounted for 11 % of total accidents. The most common injuries were to the upper extremities (47 %), seconded by head and neck (33 %). 13 % wore a helmet at the time of the accident. The injuries were of major severity in 15 % of the cases and out-patient treatment was most common (96 %). There were no fatalities in the period.
Interpretation / Conclusion: From July 2019 to December 2021 there were total 320 accidents involving riders of e- scooters. The number increased every year. Most accidents involved men, occurred in the summer, during the weekend and at night. Upper extremities, head and neck were the most common injuries sites. Less than 1 in 7 riders wore a helmet with no significant increase from 2019 to 2021. Most injuries were of minor severity and there were no fatalities. Helmet-requirement was introduced by January 2022, follow-up is needed to see the effects of this new legislation.

187. Management of Aseptic Failure after ORIF of Complete Articular Tibial Plateau Fractures

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Background: Bicondylar tibial plateau (BTP) fractures are complex injuries associated with high complication rates following fixation. While infection has received the greatest focus in existing literature, aseptic failures after ORIF such as loss of reduction, nonunion, and symptomatic malunion have also been reported and necessitate reoperation with potential morbidity.
Aim: The primary aim of this study was to review the clinical course associated with aseptic failure following open reduction internal fixation (ORIF) for BTP fracture.
Materials and Methods: This is a retrospective case series of adult patients who underwent fixation of AO/OTA 41-C (Schatzker 6) BTP fractures at two Level 1 trauma centers between 2001-2018 and developed aseptic failure (nonunion, symptomatic malunion, loss of reduction, or hardware failure) requiring reoperation. Patients with deep surgical site infection were excluded. Demographic, injury, fracture, and initial fixation characteristics were collected. Clinical course following diagnosis of the index complication was reviewed. Revision operation surgical details, timing, and outcomes were recorded.
Results: 508 AO/OTA 41C fractures were identified, with 26 experiencing aseptic failure of fixation (5%): 15 nonunion, 6 symptomatic malunion, 3 loss of reduction, 1 hardware failure, and 1 fracture fragment osteonecrosis. Mean age 52.7 years (standard error [SE] 2.4), 50% female, mean follow-up 4.0 years (SE 0.8). Regarding initial injury, 3 (11.5%) were open fractures, 6 (23.1%) were staged with external fixation, and 4 (15.4%) required flap coverage. After diagnosis of the index complication, 15 (57.7%) underwent revision ORIF.
Interpretation / Conclusion: BTP fractures are complex injuries that require prolonged monitoring of bony healing. Aseptic failure encompasses a range of complications and is relatively rare but can lead to a protracted treatment course requiring multiple operations. Revision ORIF for septic nonunion presents particular challenges and was successful in only half of cases in this series. A high percentage of non-united fractures required eventual TKA.

189. Gait recovery is not associated to soft tissue injury in patients with lateral tibial plateau fractures

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Background: Although soft tissue injuries following lateral tibial plateau fractures are common, little is known regarding functional recovery and postoperative development in specific gait patterns.
Aim: The aim of the present study was to report 12-month gait recovery in patients with lateral tibial plateau fractures divided into groups with and without conservatively managed MRI-verified soft tissue injuries.
Materials and Methods: The study design was a prospective cohort study. Included were patients treated following a lateral tibial plateau fracture (AO-41B) between December 2013 and November 2016. The primary outcome score was gait patterns.
Results: Fifty-six patients were included. The mean age of the patients at the time of fracture was 56 years (range 22-86). Thirty-three patients (59 %) were female. Twenty-eight patients (50 %) presented with preoperative soft tissue injuries. Basic characteristics of the gait show a mean gait speed of 125.7 (SD31.3) cm/sec. for patients with soft tissue injuries and 125.2 (SD31.1) cm/sec. for patients without soft tissue injuries (P=0.96). Patients with and without soft tissue injuries show no significant difference in % asymmetry of gait function, although gait asymmetry was common in both groups.
Interpretation / Conclusion: Twelve months of gait recovery following lateral tibial plateau fractures were not associated with MRI-verified soft tissue injuries. More research is needed to investigate the effects of treatment strategies and rehabilitation.

195. BLOOD-FLOW RESTRICTED EXERCISE FOLLOWING ANKLE FRACTURES - a feasibility study

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Background: Blood flow restricted exercise (BFRE) is characterized by muscle strength training with low external weight loads (20-30% of one-repetition maximum (1RM)) combined with a pneumatic cuff inflation that partly reduces arterial blood flow and limits venous return, thus, elevating metabolic stimulus in the working muscles. Due to the low external weight needed, BFRE seems useful in the rehabilitation of patients with ankle fractures, and may reduce the negative effects of immobilization.

Aim: The objective was to investigate the feasibility of blood flow restricted exercise (BFRE) as a rehabilitation modality in patients with a unilateral ankle fracture.

Materials and Methods: Feasibility study with a prospective cohort design. Inclusion criteria were above 18 years of age and unilateral ankle fractures. Exclusion criteria: history of cardiac or embolic diseases, cancer, diabetes, hypertension and family history of cardio or vascular diseases. The predefined feasibility outcome was based on three criteria regarding patients experience with participating in the BFRE protocol and the absence of any serious adverse events.

Results: Eight patients were included. Median age was 33 years (range: 23-60). All eight patients reported maximum satisfaction on the two questions regarding patient's perception of the overall experience with BFRE training and the feasibility to introduce BFRE as an intervention.

Interpretation / Conclusion: Early use of BFRE in patients with unilateral ankle fractures seems feasible in patients without comorbidity.

193. Complications and Soft Tissue Coverage After Complete Articular, Open Tibial Plateau Fractures

Phillip Grisdela, Jeffrey Olson, Theodore Guild, Mihir Dekhne, Andrew Hresko, Upender Singh, Michael Weaver, Arvind Von Keudell, Derek Stenquist
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Background: Bicondylar tibial plateau (BTP) fractures are associated with high-energy mechanisms and open fractures are reported in 11-16%. The optimal timing of definitive fixation and soft tissue coverage is still debated.
Aim: The primary aim was to evaluate the incidence of complications following these injuries. The secondary aim was to study the effect of timing of fixation and timing of flap coverage on deep infection rates following open reduction internal fixation (ORIF).
Materials and Methods: This is a retrospective case series of adult patients who had ORIF of Schatzker 6 open, BTP fractures at two Level 1 trauma centers between 2001-2018. Demographic, injury, and fracture data were collected. Surgical details including number of debridements, timing of definitive ORIF and soft tissue coverage relative to injury were recorded. Primary outcomes included rates of deep infection and unplanned reoperation.
Results: 508 BTP fractures were identified, with 51 open fractures: mean (SD) age 45.7 (12.3) years, 72% male, mean (SD) follow up of 4.3 (39.8) years. Forty-two (82%) were Gustilo-Anderson type III open injuries. A median (IQR) of 2 (1-3) debridements were required prior to closure. Twenty-four (47%) patients underwent acute ORIF (<24 hours). Twelve patients (24%) received a primary flap at mean (SD) 6.4 (3.9) days following injury. Five (35%) were simultaneous “fix and flap” procedures. Another 14 (27%) required a secondary flap for wound complications. The overall deep infection rate was 39% and unplanned reoperation 86%. Among patients with type IIIB and C injuries, rates of deep infection (83% vs 17%, p = 0.02) and reoperation (83% vs 33%, p = 0.08) were higher in patients treated with delayed (>7 days) versus early flap coverage. There was no difference in infection (29 vs. 48%, p=0.16) and unplanned reoperation (33 vs. 52%, p=0.18) rates between acute (<24hrs) and delayed fixation.
Interpretation / Conclusion: Time to flap coverage greater than 7 days was associated with higher rates of deep infection and unplanned reoperation in this cohort. Patients with these injuries should be counseled about the high rate of complications. Definitive soft tissue coverage should be accomplished as soon as feasible.

198. Outcomes after ORIF of Bicondylar Schatzker VI (AO Type C) Tibial Plateau Fractures in an Elderly Population

Mihir Dekhne, Derek Stenquist, Nishant Suneja, Michael Weaver, Michael Moerk Petersen, Anders Odgaard, Arvind von Keudell

Mihir S. Dekhne(a,b), Derek Stenquist(b,c), Nishant Suneja(b,c), Michael Weaver(b,c), Michael Moerk Petersen(d,e), Anders Odgaard(d,e), Arvind von Keudell (b,c,d) aHarvard Medical School, Boston, Massachusetts, USA bHarvard Orthopaedic Trauma Initiative, Harvard Medical School, Boston, Massachusetts, USA cDepartment of Orthopaedic Surgery, Brigham and Women's Hospital, Boston, Massachusetts, USA dDepartment of Orthopaedic Surgery, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark eDepartment of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark

Background: The surgical management of bicondylar tibial plateau (BTP) fractures in elderly patients aims to restore knee stability while minimizing soft tissue complications.
Aim: The purpose of this study was to compare injury characteristics and surgical outcomes after ORIF of BTP fractures (AO/OTA 41-C (Schatzker VI)) in young (< 50 years) versus elderly (> 65 years) patients.
Materials and Methods: A retrospective cohort study was conducted using data from two American College of Surgeons (ACS) level I trauma centers. Inclusion criteria were: (1) age 18 years or older, (2) bicondylar tibial plateau fracture (AO/OTA 41-C or Schatzker VI), (3) treatment with ORIF, and (4) minimum of 6 months follow-up. Patients between 50 and 65 years of age were excluded. Data collection was performed by reviewing electronic medical records, operative reports, and radiology reports.
Results: We identified 323 patients (61% male) with 327 BTP fractures and a median follow-up of 685 days. There were 230 young patients (71%) < 50 years and 93 elderly patients (29%) >6 5 years at time of presentation. Elderly patients were significantly more likely to have a low energy mechanism of injury (44.6 vs. 16.2%, $p < 0.001$), and present with diabetes (19.4 vs. 4.4%, $p < 0.001$) or coronary artery disease (12.9 vs. 1.3%, $p < 0.001$). Elderly patients were also significantly less likely to undergo staged management with initial knee-spanning external fixation followed by delayed ORIF (19.2 vs. 33.9%, $p = 0.008$). Elderly patients had a lower arc of motion at final follow-up (105 vs. 113, $p < 0.001$) and reduced PROMIS-10 function scores (43.8 vs. 49.8, $p=0.013$). No differences were observed in rates of superficial infection, deep infection, reoperation, or EQ-5D scores.
Interpretation / Conclusion: This is the largest study to compare injury characteristics and outcomes after ORIF of BTP fractures according to age. Elderly patients (age > 65 years) sustained BTP fractures by lower energy mechanisms than their younger counterparts with similar fracture patterns and were often managed with ORIF. The results of this study suggest that ORIF of BTP fractures in elderly patients is associated with similar complication rates and outcomes as in younger patients.

202. ANALYSIS OF THE FIXATION STABILITY OF PERI-ARTICULAR BONE FRACTURES

Simon Comtesse 1, Arvind von Keudell 2,3, Stephen Ferguson, Thomas Zumbrunn
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Background: For complex peri-articular fractures, it is often unclear how the screws and plates should be positioned to achieve maximum stability. Postoperative immobilization is often depended on this. Hence, outcomes may heavily depend on the surgeon's experience.
Aim: Our goal is to introduce a method for quantitative evaluation of fracture-fixation stability, by means of finite element analysis and musculoskeletal modelling.
Materials and Methods: Based on a pre-operative computed tomography (CT) scan, ten bone fragments of a right proximal bicondylar tibia fracture (Schatzker 6) were segmented and aligned to achieve adequate fracture reduction. Bone material properties were assigned from Hounsfield Units based on internal density calibration. According to the post- operative CT scan, 3D models of the implanted stainless-steel screws were designed and aligned to the bone fragments thereby reverse-engineering the clinical reconstruction. Knee joint reaction forces and muscle forces were imported from a subject-specific musculoskeletal gait model during mid- stance phase (AnyBody Technology, Denmark) and implemented in the Finite Element Model
Results: A maximum displacement of 1.62mm was found at the proximal aspect of the lateral fragment. The maximum von Mises stress (423MPa) was located on the most distal lateral screw,
Interpretation / Conclusion: After validation of the model, fragment movement could be related to fracture healing and serve as a predictive tool for clinical outcome. Possible hardware failure could be predicted by means of von Mises stresses in the screws. Furthermore, this process may enable development of more effective patient-specific implants in the future.

Poster Walk 8: Tumor – Spine

16. november

17:00 - 18:00

Chair: Michael Bendtsen / Dennis Hallager

209. Effect of negative pressure wound therapy after surgical removal of deep-seated high-malignant soft tissue sarcomas of the extremities and trunk wall – study protocol for a randomized controlled trial

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Background: Sarcomas are a heterogeneous group of rare malignant tumors in the musculoskeletal system. The reported incidence is 300 cases per year in Denmark (250 Soft tissue sarcomas (STS) including 100 retroperitoneal/abdominal STS and 50 bone sarcomas). The main treatment principles is surgery supplemented with adjuvant radiotherapy depending on subtype and stage. STS surgery is often combined with pre- or postoperative radiation therapy and is a high-risk procedure concerning wound complications and postoperative infections. A previous retrospective study showed that Negative Pressure Wound Therapy (NPWT) reduced the risk of wound complications in patients with lower extremity STS..

Aim: The aim of this research project is to improve the surgical treatment of STS treatment. We want to evaluate the effect of the use of NPWT versus a conventional wound dressing on postoperative wound complications after surgical removal of deep- seated high-malignant STS of the extremities or trunk wall.

Materials and Methods: RCT (no blinding) where patients will be randomized to wound closure with staples and either NPWT for 7 days or a conventional wound dressing. Randomization sequence will be computer generated and based upon sample size calculation, using previously published data, we have decided to include 154 STS patients, 77 in each group, and to make allowance for dropouts we plan to include 160 patients. Patient's wounds will be followed with photo documentation on day 0, day 7, at definitive wound healing (removal of staples), 4 months postoperatively and in case of major wound complication. Our Primary study endpoint is a major wound complication defined as in O'Sullivan et al. within 4 months after surgery and includes following: Secondary operation under general or regional anesthesia for wound repair, wound management without secondary operation or readmission for wound care.

Results: The study is on-going, and result are not finalized.

Interpretation / Conclusion: Many new medical devises and technical solutions are currently introduced and even though some documentation regarding the use of NPWT e.g. in joint replacement surgery exist it is also important to seek documentation for this treatment principle in STS surgery

210. Sclerotherapy of aneurysmal bone cysts with polidocanol

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Background: Aneurysmal bone cysts (ABC) are benign cystic bone lesions, which make up approx. 2% of all primary bone tumors. As an alternative to the primary treatment of choice, which consists of curettage with bone grafting, alternative treatment methods with promising results have been described. At our department we have in recent years used percutaneous sclerotherapy with polidocanol. Here we present our experience with this method.
Aim: To identify the efficacy and safety of sclerotherapy with polidocanol.
Materials and Methods: Sixteen consecutive patients (mean age 12 years; range 4-25) with 17 ABCs treated with sclerotherapy with polidocanol from 2015-2020 were included retrospectively. Under general anesthesia and fluoroscopic guidance, repeated percutaneous injections of 4mg polidocanol/kg body weight were performed. Through review of the electronic medical records, the following were identified: healing and recurrence rate, number of treatments, gender, age, comorbidity, location of the tumor, side effects / complications as well as any previous surgery for ABC. The mean length of radiographic follow up was 20 months.
Results: All ABCs except one healed after a mean of 4 (range 1-8) injections. Complete clinical and radiographic healing was observed in 10 cysts, while partial radiographic healing without clinical symptoms were seen in 6 cases and were considered to be healed. The cyst that failed to heal had previously undergone curettage twice with recurrence. One patient with a pelvic ABC experienced right after two injections, possibly due to an allergic reaction, a sudden drop in blood pressure which could quickly be reversed. Further than that, no complications were observed.
Interpretation / Conclusion: Percutaneous sclerotherapy with polidocanol is an efficient and safe alternative to conventional surgery for the treatment of aneurysmal bone cysts. Our findings corroborate data presented in previous publications.

177. The outcomes after Anterior Lumbar Interbody Fusion(ALIF): Our experience

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Background: ALIF is a well-established treatment for degenerative disc disease. Poly-ether-ether-ketone(PEEK) ALIF cages have many advantages: Relative radiolucency, elasticity closer to bone and showing less subsidence.
Aim: The goal of this study was to determine the radiological outcomes and complications after ALIF surgery.
Materials and Methods: Retrospective review of patients with ALIF(PEEK cage) surgery from 2014 to 2020 in our center. Complications were noted. Bone union determined with Bridwell classification. Pre and post-operative X-rays, X-rays at the last follow-up reviewed. Anterior (A)-posterior (P) disc space height (DSH), segmental lordosis (SL) at the ALIF levels, global lumbar lordosis (GL) measured.
Results: 56 patients (M:25, F:31) and 80 ALIF cages were reviewed. The diagnoses were: 33 discus degeneration, 16 spondylolisthesis, 7 non-union. The respective median age of surgery and follow-up duration(months) for these groups were: 47(37-54) /14(12-24), 45(40-52) /22(14- 27), 57(51-62) /17(16-25). Complications were: 3 venous lesions, 2 misplaced screws, 1 renal dysfunction, 1 rupture of the rectus abdominis and transverse fascia, 1 loose pedical screw, 1 anterior superficial wound infection, 4 relaxations of the left rectus abdominis musculature, 1 posterior deep infection, 2 adjacent level degenerations. Bridwell fusion were: 1 in 72 cages, 2 in 6 cages and 4 in 2 cages. The A- DSH and P-DSH L3/L4, L4/L5, L5/S1 significantly increased from preoperatively to immediately postoperatively and compared to the distance at last follow up. The A-DSH and P- DSH L4/L5, L5/S1 decreased significantly from immediately postoperatively to last follow-up. In L4/L5, the decrease in P-DSH from immediately postoperatively to last follow up was insignificant. Only for the L5/S1 level did the SL increase significantly from preoperatively to immediately postoperatively and compared to the angle at last follow-up. No significant changes noted in the GL.
Interpretation / Conclusion: The use of ALIF(PEEK cage) with posterior fixation resulted in very low non-union rate (2,5%). It generally increased DSH and conserved or increased lordosis. The approach related complications are comparable to the complication rates in the literature.

178. Demineralized cortical fibers are associated with low pseudarthrosis rate in patients undergoing surgery for adult spinal deformity without three-column osteotomy

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Background: Demineralized cortical fibers (DCF) were introduced in 2017 at our institution aiming to reduce pseudarthrosis rate after surgery for adult spinal deformity (ASD). We have previously demonstrated that the use of DCF in ASD patients undergoing procedures including 3COs reduces the risk of pseudarthrosis compared to patients receiving autologous and allogenic bone graft.
Aim: The purpose of the present study was to investigate the effect of DCF on postoperative pseudarthrosis after surgery for ASD without a three-column osteotomy (3CO).
Materials and Methods: All patients undergoing surgery for ASD were retrospectively screened at our institution from 2017- 2019, excluding patients having 3CO surgery. Patients were included if DCF was applied from at least L3-sacrum. All patients had a minimum of 2- year follow-up. The main outcome was CT-verified postoperative pseudarthrosis with implant failure (rod breakage or screw loosening) requiring revision surgery.
Results: Fifty-three patients were included for final analysis. Revision surgery due to CT-verified postoperative pseudarthrosis occurred in 13% (n=7). Nine percent (n=5) of the patients had major postoperative complications.
Interpretation / Conclusion: Our study is the first to investigate the use of DCF in patients undergoing ASD surgery without 3CO. Our results suggest that the use of DCF is associated with a low incidence of postoperative pseudarthrosis requiring revision surgery compared to previously published studies.

179. Definitions of Segmental Instability in the Degenerative Lumbar Spine – a Systematic Review

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Background: What defines segmental instability of the lumbar spine has been a clinical and scientific question for almost a century. In patients with lumbar degenerative spondylolisthesis (LDS) and spinal stenosis (LSS) the definition of segmental instability has an impact on surgical decision-making, as its presence may require a fusion procedure in addition to decompression. Despite this, the operational definition of segmental instability varies.
Aim: - To collect and group definitions of segmental instability, reported in surgical studies of patients with LSS and/or LDS - To report the frequencies of these definitions - To report on imaging measurement thresholds for instability in patients and compare these to those reported in biomechanical studies and studies of spine healthy individuals - To report on studies that include a reliability study.
Materials and Methods: We conducted a systematic review according to Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Studies eligible for inclusion were clinical and biomechanical studies on adult LDS and/or LSS patients who underwent surgical treatment and with data on diagnostic imaging. A systematic literature search was conducted in relevant databases. Full text screening inclusion criteria was definition of segmental instability or any synonym. Two reviewers independently screened articles in a two-step process. Data synthesis presented by tabulate form and narrative synthesis.
Results: We included 118 studies for data extraction, 69 % were surgical studies with decompression or fusion as interventions, 31 % non-interventional studies. Grouping the definitions of segmental instability according similarities showed that 24% defined instability by dynamic sagittal translation, 26 % dynamic translation and dynamic angulation, 8% used a narrative definition. Comparison showed that non-interventional studies with a healthy population more often had a narrative definition.
Interpretation / Conclusion: To our knowledge this is the largest review of literature on segmental instability. Despite a reputation of non-consensus, segmental instability in the degenerative lumbar spine can radiologically be defined as > 3mm dynamic sagittal translation.

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