

## Leg length discrepancy and limb lengthening in children in relation to circumferential periosteal release assessed using EOS. 47.

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**Background:** Leg length discrepancy (LLD) in children may be treated using circumferential periosteal release (CPR); however, it is controversial how minor LLD in children are best managed. Currently, limb lengthening with intramedullary lengthening nails or ring fixators are used widespread for major LLD. When the child is approaching skeletal maturity total epiphysiodesis of the longer leg may be used, however previous reports has shown CPR to stimulate longitudinal bone growth in the shorter leg.

**Purpose / Aim of Study:** The primary purpose was to evaluate whether CPR can improve leg length discrepancy in children. The secondary purpose was to evaluate reproducibility of 2D EOS imaging of leg length parameters.

**Materials and Methods:** Sixteen children (12 boys and 4 girls) aged 7-12 years were retrospectively evaluated after treatment of LLD with CPR between 2016 and 2018 in the department of children's orthopedics at Aalborg University Hospital. The causes of LLD were Legg-Calve-Perthes disease (n=9), Cerebral Palsy (n=4) and idiopathic (n=3). Limb length can be assessed using biplanar X-ray (EOSTM). In present study all preoperative and postoperative EOS scans were assessed by manual assessment. The primary outcome of the study is the change of LLD before and after CPR. The secondary outcome is the inter-rater reliability of the manual leg length assessments on EOS scans presented by Intra-Class Correlations (ICC).

**Findings / Results:** For the manual assessments a ratio between the non-operated and the operated femur and functional lengths were calculated. The preoperative femoral ratio were 0.026 (SD=0.019) and the postoperative femur length ratio were 0.014 (SD=0.022), with a difference of 0.012 (p=0.001). The preoperative functional length ratio were 0.02 (SD=0.008) and the postoperative functional length ratio were 0.012 (SD=0.013), with a difference of 0.007 (p=0.004). A test-retest showed excellent inter-rater reliability with Intra Class Correlations of 0.99-1.00.

**Conclusions:** Circumferential periosteal release may improve minor LLD. The improvement amounts to 1.2% on the femur and 0.7% of the functional lower limb length. However statistically significant, it can be discussed whether present improvement are clinically relevant.