**Late implant removal after posterior correction of thoracic AIS with pedicle screw instrumentation - A matched case control study with 10 year follow-up.**

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**Introduction:** Late implant removal is occasionally necessary after instrumented posterior correction of adolescent idiopathic scoliosis (AIS) due to late implant infection or implant associated pain. Progression of deformity after implant removal is possible and its clinical relevance is not yet known due to lack of studies with a comparable control group.

**Methods:** 50 patients with AIS and pedicle screw instrumentation for posterior correction that were followed for at least 10 years, of whom 7 patients needed implant removal (IR) after 3.4 (range 1.1 - 7.9) years due to late implant associated infection. These patients were matched to another 7 patients without any complications (control) by curve type (IR=control: 1 Lenke 1A, 2 Lenke 1B, 2 Lenke 2C, 1 Lenke 2B and 1 Lenke 3C), Risser stage (IR: 3.2±0.9, control: 3±1.4), age (IR =control: 15±2 years) and gender (all female). Radiological measurements were done preoperatively, at 6 weeks, 2 years and 10 years postoperatively. All patients completed the SRS-24 questionnaire at 10 year follow-up.

**Results:** Although the curve magnitude of the main thoracic curve was similar preoperatively (IR: 57±6°, control 57±10°) and corrected equally (IR: 18±4°, control 20±7°), the deformity progressed in the IR group by tendency at 2 years (25±11° vs control 17±6°) and became statistically different at 10 years (IR: 31±10°, control 19±6°, p<0.05). There was no significant difference in the total SRS Score between the groups (IR: 99±13, control: 90±17, p>0.05) at 10 years.

**Conclusion:** Late implant removal after posterior correction of thoracic AIS with pedicle screw instrumentation results in a significant loss of correction of 10-15° at 10 y follow-up, but without clinical relevance as measured by the SRS-24 questionnaire.
FM16  **Posterior correction of thoracic AIS with pedicle screw instrumentation. Clinical and radiological Results of 50 patients with a 10 year follow-up.**

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**Introduction:** Pedicle screw instrumentation has become standard of care for posterior correction of adolescent idiopathic scoliosis (AIS). There has however been very little report on long term results. We report clinical, radiological and pulmonary function results of 50 patients with minimal 10y follow-up.

**Methods:** 50 patients (44 female, 6 male, mean age at surgery 15.3 years) with 42 Lenke 1 (A=19, B=10, C=13), 6 Lenke 2 and 2 Lenke 3 curves (Risser 0-3 (n=26), >3 (n=24)) were operated for AIS from posterior with pedicle screw alone instrumentation. The data was prospectively collected preoperatively, at 6 weeks, 2 years and 10 years postoperatively. COBB angle, sagittal and coronar balance, fusion levels, adjacent disc angle and lowest fused vertebral tilt were documented at all time-points. The overall outcome as well as the outcome of different curve types were analyzed statistically.

**Results:** Overall the main thoracic curves was corrected from 57±12° to 21±09° (p<0.05). There was no significant change after 2 years (23±10°) or 10 years (26±10°). This effect was seen in all curve types. While the coronar balance restored during the follow-up period by tendency, there was a significant restoration of overall sagittal balance from preoperative 7.3mm to -3.8mm (p<0.05). The adjacent disc angle decreased from 6±3° to -2±4° postoperatively and remained stable at 10 years. The lowest fused vertebral tilt decreased from 22±7mm preoperatively to 5±5mm postoperatively and 7±5mm at 10 years. The %FVC remained unchanged at 75% at all timepoints. The SRS score did not change from 94±15 at 2y postop to 98±15 at 10 y postop.

**Conclusion:** Posterior correction of thoracic AIS with pedicle screw instrumentation achieves a stable long-term correction with a good patient satisfaction.
**FM17 vertebral body stenting versus kyphoplasty in treatment of osteoporotic vertebral compression fractures**

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**Objective:** Vertebral body stenting (VBS) was developed to impede resintering of the vertebral body encountered in balloon kyphoplasty (BKP) in the treatment of vertebral compression fractures (VCFs). Purpose of the present study was to clarify whether BKP or VBS show relevant peri- and postoperative differences.

**Methods:** In a two-armed randomized controlled trial patients with a total of 100 osteoporotic VCFs were included and allocated to either BKP or VBS treatment. Kyphotic correction was determined on pre- and postoperative radiographs. The occurrence of intraoperative complications, maximum balloon pressures and total radiation time were documented.

**Results:** Mean reduction of kyphosis (kyphotic correction angle) was 4.5±3.6° for BKP and 4.7±4.2° for VBS (p = .975). Mean pressures in VBS were 350±72 psi and 233±81 psi in BKP (p < .001). There were no significant differences in radiation time. None of the patients underwent revision surgery, postoperative neurologic sequelae were not observed. Cement leakage occurred in 25 % of the patients without significant differences between the two intervention arms (p = .220). Intraoperative material-related complications were observed in 1/50 levels in BKP and in 8/50 levels in VBS.

**Conclusions:** No beneficial effect of vertebral body stenting (VBS) over balloon kyphoplasty (BKP) was found among patients with painful osteoporotic vertebral fractures in regard of kyphotic correction, cement leakage, radiation time and the occurrence of neurologic sequelae. VBS was associated with significantly higher pressures during balloon inflation and remarkably more material-related complications.

**Keywords:** vertebroplasty; balloon kyphoplasty; vertebral body stent; osteoporotic vertebral compression fracture; spine.
Five-years results of cervical disc prostheses in the SWISSspine registry

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Introduction: The Swiss federal office of public health required a mandatory nationwide HTA-registry for cervical total disc arthroplasty (TDA), amongst other technologies, to decide about reimbursement of these interventions. The group of 10 surgeons with the highest primary case load, contributing about 50% of the registry datapool, was selected for detailed long-term followup. The goal of the SWISSspine registry is to generate evidence about the safety and efficiency of these medtech innovations.

Methods: Within the registry 166 cases treated between 3.2005 and 6.2010 who were eligible for 5 year followups were analyzed. Followup rates for 3-6-months, 1 year, 2 years and 5 years were 90%, 90%, 71% and 72% respectively. Surgeon administered outcome instruments were primary intervention, implant and follow-up forms; patient self-reported measures were EQ-5D, COSS (cervical NASS), and a comorbidity questionnaire. Outcome measures were neck and arm pain levels, medication, quality of life, work status, intraoperative and postoperative complication and revision rates. Additionally, segmental mobility (implant mobile, immobile or ossified) and osteophytes were analyzed at the 5-year followup.

Results: There was significant, clinically relevant and lasting reduction of neck (preop/postop 64/23 points) and arm pain (preop/postop 68/18) on VAS and a consequently decreased analgesics consumption at 5 years after surgery. Similarly, quality of life significantly improved from preop 0.37 to postop 0.82 points on EQ-5D scale. No intraoperative and 9 early postoperative complications as well as 9 complications at followup occurred. 8 re-interventions during the same hospital stay and 7 revisions were documented. During all followups 16 (9.6%) patients complained about 18 new events like headache (n=7), fibromyalgia (n=2), symptomatic stenosis (n=2), depression (n=1), pseudoarthrosis (n=1), slanted neck posture (n=1) and cervical distorsion (n=2).

At 5-year followup, osteophytes were diagnosed in 23.8% of all segments. 91.7% of all treated segments were mobile, 5.8% were immobile and 2.5% were ossified.

Conclusions: Cervical TDA appeared as safe and efficacious in long-term pain alleviation, consequent reduction of pain killer consumption and in improvement of quality of life. The improvement is stable over a five years postoperative period. The vast majority of the treated
segments remain mobile after 5-years, although a quarter of the patients showed osteophytes.

FM19 **MRI-changes of the multifidus muscle in lumbar radicular compression. Relation to severity and duration of compression and need for surgical decompression**

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**Introduction:** It was the aim of this study to investigate whether atrophy of the respective multifidus muscle in MRI is related to the severity of nerve root compression and/or the duration of clinical symptoms. Furthermore we assessed whether multifidus asymmetry had any correlation with the ultimate decision for surgical lumbar nerve decompression.

**Methods:** MRI scans of 79 patients with symptomatic single level, unilateral, lumbar radiculopathy were retrospectively reviewed for this study. The cross sectional area (CSA) of the multifidus muscle and the perpendicular distance of the multifidus to the lamina (MLD) were measured on the affected side at the respective level, on axial cuts, as well as on the contralateral side by two experienced radiologists. The ratios of CSA and MLD between the affected and contralateral sides were calculated and correlated to the severity of nerve root compression, duration of symptoms and decision for surgical decompression.

**Results:** There were 67 recessal and 12 foraminal symptomatic nerve root compressions. Neither the MLD ratio (severe 1.19±0.55 vs. less severe nerve compression: 1.12±0.30, p=0.664) nor the CSA ratio (severe 1±0.16 vs. less severe 0.98±0.13, p=0.577) nor the duration of symptoms significantly correlated with the degree of nerve compression. A MLD>1.5 was highly predictive for need of surgical decompression (OR 27, Specificity 92%, PPV 73%).

**Conclusions:** The extent of atrophy of the multifidus muscle on the affected side in comparison with the contralateral side does neither correlate with the severity nor the duration of nerve root compression in the lumbar spine, but severe asymmetry with substantial multifidus atrophy is highly predictive for the decision to surgical decompression.
Neurophysiological changes during interspinous distraction in lumbar spinal stenosis

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Background: Interspinous devices have been introduced as a means of treating lumbar spinal stenosis (LSS) in selected patients on the assumption that some degree of distraction will indirectly decompress the spinal canal explaining thus the improvement of symptoms. We aimed to measure the neurophysiological effects of interspinous distraction during spine surgery for LSS and compare them to those obtained following surgical decompression.

Methods: Twenty two patients with lumbar spinal stenosis undergoing decompressive surgery by a single surgeon were enrolled in this study. From those 8 underwent single level decompression the remaining undergoing multilevel decompression. A total of 133 stenotic levels were analysed. Intra-operative motor evoked potentials (MEPs) were acquired prior any distraction of a particular level (baseline), during calibrated distraction at 6, 8, 10, 12, 14 and 16mm, and finally after bilateral decompression. Hand MEPs served as reference. Relative changes of the area under curve of MEP’s (adjusted to reference) compared to baseline were used as the primary outcome measure for each individual distraction increment as well as for the final decompression. Results were analysed with respect to disc height, number of affected levels and LSS radiological severity score based on the morphological grading.

Results: Both decompression and distraction results were related to radiological severity score, the former being most effective in high scores and the latter in low scores. Single level stenosis showed improvement of MEPs of similar magnitude to full decompression during the 8mm distraction process (p=0.13). In contrast 10,12,14 and 16mm distraction were less effective in this setting (p<0.05). Multiple level decompression was more effective in a statistically significant manner than any amount of distraction. Results did not depend on disc height.

Discussion: We found that interspinous distraction in particular of 8mm was sufficient to replicate electrophysiological improvements obtained during full decompression in spinal stenosis even of severe grade in single level stenosis patients. This did not appear to be the case in patients with multilevel disease. There appears therefore to be some neuro-physiological basis behind the reported clinical improvement of interspinous distraction which contrary to the accepted criteria was also present in severe stenosis.
cases providing this was limited to one level pathology. This is to our knowledge the first study that analyses the pathophysiological basis of interspinous devices aimed at treating LSS.

**FM21**  
**TCMEPS MONITORING DURING SPINAL OSTEOTOMIES FOR SAGITTAL IMBALANCE**

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**Background:** Kyphotic deformities with sagittal imbalance of the spine can be treated with spinal osteotomies. Those procedures are known to have a high incidence of neurological complications in particular at the thoracic level. Evoked motor potentials have been widely used in helping avoiding major neurological deficits post operatively. Previous reports have shown that a significant proportion of such cases present with important Tc MEP decreases during surgery with some of them being predictive of post operative deficits. The aim of our study was to look at the TcMEP changes in our series of patients and correlate them with clinical findings.

**Patients and methods:** Seventeen patients were operated in a 2 year period, presenting with kyphosis of congenital, degenerative or post traumatic origin. Shortening subtraction osteotomies were performed in 9 patients at lumbar level (L1 to L4) and 8 at thoracic level (T1 to T12).

**Results:** Intraoperatively all patients showed significant TcMEP changes. In particular a loss superior to 80% in at least one muscle group was observed in 4/8 patients in the thoracic group and 4/9 patients in the lumbar group. No surgical maneuver was undertaken as a result of this loss in an effort to improve motor responses other than verifying the stability of the construct and the extent of the decompression. Only 3 patients developed post operative deficits, all of them being of radicular origin (two T1 level and one L3 level) recovering fully at 3 months post surgery. No relation was found between intraoperative blood pressure and TcMEP changes. In our series, severity of TcMEP did not correlate with post operative deficits.

**Discussion:** TcMEP loss during major spinal surgery is of particular concern for physicians involved in this type of procedures. Although nearly all patients experienced loss of TcMEPs of some degree, only 3 patients developed symptoms but those were relatively minor and transient. Even though every effort should be taken to improve motor responses by verifying the extent of the decompression and stability of the spine as well as maintaining blood pressure, it may be that such dramatic TcMEP changes need not to alert physicians since they do not appear to have a lasting clinical effect. Total loss of TcMEP (not witnessed in our series) might require more drastic approach with possible reversal of the correction and wake up test.
FM22  **Gait analysis under real-life conditions in patients presenting with lumbar spinal stenosis**

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**Introduction:** The diagnosis of lumbar spinal stenosis (LSS) is based on patient history, clinical picture, and radiological findings. Although walking limitation is the cardinal sign of LSS, reports on its relation to symptom severity are contradictory. In addition, most studies looked at just a few walking cycles in a laboratory setting. Our primary aim was to quantify the gait parameters of LSS patients monitored under long time real life condition using ambulatory devices, in patients with LSS undergoing either conservative or surgical treatment. Our secondary aim was to identify differences between surgical and non surgical candidates on the basis of their gait parameters.

**Patients and Methods:** Twenty eight patients (average age 71.4y, SD 10.4y), referred to a spinal surgeon with symptoms attributed to radiological stenosis of varying degrees and with neurogenic claudication were included. Symptom and radiological stenosis (morphological grade) severity was greater in 15 patients who subsequently underwent decompressive surgery (surgical group). Walking parameters were monitored during 8 hours daily over a period of five consecutive days, prior to any treatment (non-surgical, or surgical), using 2 miniature gyroscopes on thigh and shank. Periods >10s were analyzed with regards to walking speed, cadence, stride length and walking distance as well as gait variability. Walking distance was calculated and compared for the three longest periods recorded in each subject. Gait variability was expressed as coefficient of variability (CV) of the three longest recorded walking periods of each baseline measurement. Statistical differences were analysed using t-test.

**Results:** A total of 3757 walking episodes >10sec were analysed. Average values for cadence speed, and stride length were 99 ±6.5 steps/min, 3.1±0.8 km/h, and 1±0.2 m respectively in non-surgical group and 97±10.6 steps/min, 2.9±0.6 km/h, and 1±0.2 m in surgical group. The average values of CV for speed, cadence and stride length were 0.12, 0.07 and 0.09 respectively in the non-surgical group and 0.14, 0.06 and 0.12 in the surgical group, representing a smaller gait variability in the non surgical. There was a trend towards longer walking distances, for the three longest monitored walking periods, in the non surgical group (239±304m vs 110m±111, p=0.01)

**Conclusion:** We found better walking capacities and less gait variability in the non surgical group. Although gait parameters might depend on a variety of factors, severity of symptoms and stenosis appear to have a measurable impact as observed in our two groups of patients. To our knowledge no previous study looked at physical activity over such a prolonged period in several subjects in the context of LSS. Future research into the reversibility of the aforementioned differences following treatment is underway.
Age-dependent normal values for bony, cartilaginous and labral coverage in the pediatric hip measured on MRI

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Introduction: Residual dysplasia of the pediatric hip after treatment of developmental dysplasia of the hip is a common problem in clinical practice. Age-dependent normal values of the acetabular index as an important value of acetabular coverage are well known. Some hips that are clearly dysplastic according to these normal values do show a surprising maturation with normal coverage in the course. It was hypothesized that hips that present a normal cartilaginous coverage on MRI might develop favorable. However, normal values for cartilaginous and labral coverage on MRI are not known. The aim of our study was to establish age-related normal values of bony, cartilaginous and labral coverage of the pediatric hip on MRI.

Methods: MR-images of hips were identified from the electronical archive. They had to meet the following inclusion criteria: no former treatment for developmental dysplasia of the hip, no hip pathology that might influence acetabular coverage or its measurement (no bone disorders such as epiphyseal dysplasia, Perthes disease, slipped capital femoral epiphysis or septic arthritis) and a contemporary Xray of the pelvis with an acetabular index below the 90. percentile of the age-related normal values according to Tönnis. MR images of 115 hips in 73 children were analysed and the bony, cartilaginous and labral acetabular index (AI bone/cartilage/labrum) was measured by two different observers in order to determine interobserver variability. The measurements were made on the coronal plane just posterior to where the triradiate cartilage between pubic and ischial bone was still visible. Percentile graphs were established from the Student’s t-distribution of the measurements grouped by 2 years of age.

Results: Interobserver variability for the measurement of the AI bone was excellent (Intraclass correlation coefficient ICC 0.90). For the AI cartilage and labrum the ICC was somewhat lower (0.78) but interobserver variability was still rated as good. Percentile graphs of the AI bone, cartilage and labrum are presented. Although AI decreased during childhood, AI cartilage stayed relatively constant with the 50. percentile around 5° and a 90. Percentile around 10°.

Conclusion: We present percentile graphs of age-related normal values. Although bony coverage increases during childhood cartilaginous coverage seems to stay constant. We think that this knowledge is a valuable adjunct in decision making when to indicate secondary surgery for residual dysplasia.
Periacetabular triple innominate osteotomy for improved containment of hips with poor prognosis after Legg-Calvé-Perthes-Waldenstroem (LCPW).

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Introduction: Patients with LCPW who develop hip contracture and decentration of the femoral head usually have a poor prognosis. In 1992 GUE has begun to use periacetabular triple osteotomies in selected patients with lateralization of the femoral head and secondary dysplastic development of the acetabulum to reconstitute containment of the femoral head within the acetabulum. Functional arthrograms were performed before surgery to exclude severe hinge abduction, which is considered a contraindication.

Patients and Methods: 14 patients (16 hips) with CLPW and lateral extrusion of the femoral head and secondary dysplastic development of the acetabulum have been treated by triple innominate osteotomy (TIO) for lateralization and dysplastic acetabular development with a subinguinal adductor approach. Age at triple osteotomy ranged from 4 to 11 years (avg. 6.8y). Besides standard radiographs the indication was based on dynamic standard radiographic or MRI arthrograms. The more recent cases were pre- and postoperatively studied by quantitative CT. The TIO was performed at 9 to 30 months (avg. 18 months) after the first symptoms.

Results: All hips at follow-up (5 to 17 years, avg. 9 years after surgery) have developed concentrically and in most cases sphericity was regained or improved. All patients at present are painfree and follow the same activities as their peers.

Conclusions: Triple innominate osteotomy is a procedure with high potential to improve the prognosis for hips with a spontaneous poor development after LCPW, if appropriately indicated.
San Diego Pelvic Osteotomy through a minimal lateral incision, results in two different centers.

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**Background:** Most clinicians agree that surgical treatment is indicated for progressive hip subluxation in patients with cerebral palsy (CP).

**Introduction:** The purpose of this study is to evaluate the outcome of severe CP patients (Gross Motor Function Classification System [GMFCS] levels IV and V) with hip subluxation or dislocation treated by simultaneous percutaneous pelvic osteotomy (PPO) and intertrochanteric varus shortening osteotomy (VDRSO). We review a larger cohort of patients than the one presented in 2005 at the SSO and the results at two different centers.

**Methods:** Eligible patients included those with a diagnosis of spastic quadriplegia or CP GMFCS levels IV or V with unilateral or bilateral hip subluxation or dislocation and surgical treatment of the deformity by simultaneous soft tissue release, VDRSO, and PPO. From 2002 onwards, all severe CP patients at our institution were treated using this technique.

**Results:** Twenty-four patients and 30 hips (15 male, 9 female) met the inclusion criteria. At the time of chart and radiograph review, the average age of patients was 9.4 years (range: 5 to 16.5) and the mean follow-up was 35.9 months (range: 6 to 96). Six patients (25\%) underwent bilateral PPO, VDRSO, and soft tissue release; 13 patients (54\%) had unilateral PPO and bilateral soft tissue release and VDRSO; 5 patients (21\%) had unilateral PPO, VDRSO, and soft tissue release. PPO was always performed through a skin incision of 2 to 3 cm. The mean preoperative migration percentage of Reimer was 67.1\% (range: 42 to 100) and 7.7\% (range: 0 to 70) at last follow-up. The mean preoperative acetabular angle was 31.8° (range: 22 to 48) and 15.7° (range: 5 to 27) at last follow-up. Five cases presented complications: 1 redislocation, 1 bone graft dislodgement, and 3 with avascular necrosis of the femoral head.

**Conclusions:** A combined approach of soft tissue release, VDRSO, and PPO is an effective, reliable, and minimally invasive method for the treatment of spastic dislocated hips in severe CP patients (GMFCS levels IV and V). Even hips with relative incongruity, closed triradiate cartilage, and some deformity of the femoral head can be successfully treated with this combined approach. This less invasive surgical approach appears to be a valid alternative and implies less muscle scraping and blood loss, and a shorter operating time with an outcome similar to standard techniques reported in the literature.
Outcome of the Stanisavljevic procedure for patello-femoral instability

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Introduction: Congenital dislocation of the patella and recurrent symptomatic subluxation/dislocation in adolescents are very difficult pathologies to treat successfully. Stanko Stanisavljevic described an extensive release procedure in 1976 essentially involving medialising of the entire lateral quadriceps and medial soft tissue stabilisation. There are no significant series reporting the success of this method. This procedure has been performed regularly in our institution over several years and we report our findings.

Method: 40 knees in 32 children and adolescents with symptomatic recurrent or congenital dislocation of patella underwent this procedure after failing conservative treatment. Mean age 14 years (4-22). Mean follow up 8.3 years (4-20). Additional stabilisation procedures at same operation: 10 knees with Elmslie-Trillat, one with supracondylar osteotomy of femur; All were immobilised in a long leg cast for 6 weeks postoperatively. All patients were followed up in our clinic.

Results: 18 knees in 16 patients (45%) reported their knees as improved or much improved without further dislocations, subluxations or other symptoms. 16 knees in 12 patients (40%) underwent revision due to redislocation of the patella, usually Trochleaplasty and / or additional soft tissue procedure such as Insall. 3 knees in 3 patients (7.5%) still had dislocations or subluxations, but didn’t want a revision. 3 knees in 3 patients in the failed group also complained of pain and discomfort during daily activity. Symptoms first developed after a mean of 19 months (2-60) postoperatively. Only 2 patients returned to sport at the 12 month follow up.

Discussion: The Stanisavljevic procedure produces a mediocre success rate in patello-femoral instability with our long term follow up series showing a failure rate up to 55%. We recommend more specific procedures dealing with the specific anatomical deformity such as trochleaplasty in order to produce superior success rates.
Flexible intramedullary nailing: relationship between nail and medullary canal diameter.

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Introduction: Postoperative axial deviations and delayed unions are possible complications after flexible intramedullary nailing (FIN). The goals of this study were to determine if a correlation exists between occurrence of the above complications and the ratio of the diameter between nail and medullary canal (ND/MCD - ratio), and to define a threshold to be respected in order to obtain good results.

Methods: 81 consecutive diaphyseal fractures treated by means of FIN were evaluated. The ND/MCD -ratio were determined by two independent observers. Axial deviations were defined as more than 5° angulation during any time of the post operative period. Absence of bone union at three months was considered as delayed union. Statistical analysis was made for interobserver variability of MCD, dependency between occurrence of complications and ND/MCD-ratio and eventual confounding variables (age, weight, gender, fracture location).

Results: Of 81 fractures, 14 presented with an axial deviation and 3 with a delayed union. Interobserver variability of MCD diameter was excellent (Intra-class-correlation:0.96). Occurrence of complications was significantly associated with ND/MCD-ratio (p=0.0002) but not with any of the examined confounding variables. ROC analysis showed absence of complications with a ND/MCD-ratio above 35 % with a sensitivity of 100% and specificity of 89%. Above 35% ND/MCD-ratio no complication occurred.

Conclusion: In FIN a nail diameter superior than 35% of the medullary canal diameter should be chosen to avoid complications, besides respecting the technical principles. Measuring the medullary canal diameter in order to chose correct nail size is reproducible between different observers. In adolescents with a medullary canal diameter of more than 10mm in femur or tibia fractures, other methods of osteosynthesis the FIN should be considered.
Obese children sustain significantly more both bones forearm fractures when compared to non-obese children

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Introduction: Obesity in children is associated with an increased risk for fracture. The causes remain unclear and may be related to increased bone weakness during periods of intense growth or different kinetics (increased forces when falling). Comparing obese and non-obese children with extremity fractures has not been extensively studied. Aims: Identify the characteristics of upper extremity long bone fractures in obese and non-obese children, measure their physical activity, grade the kinetics of trauma, evaluate the treatment modalities. The hypothesis was that when compared to non-obese, obese children sustain significantly more severe fractures, such as displaced, complex, multiple, or open and that they were treated more often under general anesthesia. Methods: 6 months prospective collection of data on obese (BMI > 95 percentile) and non-obese children presenting to the emergency room with an upper extremity long bone fracture. Children's activity prior to trauma was assessed with a questionnaire. Mechanism of injury was classified between direct, slow or high motion trauma. Fractures characteristics were defined using the validated pediatric classification (AO). Treatment modalities were compared. Results: The estimated prevalence of obesity in children with upper extremity long bone fracture was 28%. 46 obese children aged 2 to 13 years (mean 9.28 y.) and 119 non-obese children aged 2 to 16 years (Mean 9.32 y.) were included in the study. There was no significant difference in the level of activity of the children in both groups (2.64 and 2.55 respectively). The mechanism of injury included a higher percentage of high motion trauma in obese children (57% versus 45%, p=0.19). The risk for sustaining both bones forearm fracture was twice as high in obese children (RR=1.97, CI 95% 1.16 to 3.34, p=0.012). Obese children required a higher number of manipulations under general anesthesia (24% versus 13%, RR 1.27, CI 95% 0.94-1.76, p=0.092). Conclusions: The prevalence of obesity in children with upper extremity long bone fracture was higher than in the general pediatric population. There was no statistical difference between both groups in the reported level of activity prior to injury, in the kinetics and in the treatment modalities. Obese children had a significantly higher risk for a combined radius and ulna fracture.
Evaluation of the Ponseti Method in Idiopathic Clubfeet

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Introduction: Treatment for clubfeet is time demanding and requires a sophisticated collaboration in order to achieve a good outcome. Numerous substantiated studies underlined a satisfying outcome of the Ponseti method¹ as the primary therapy of idiopathic clubfeet provided, that an early onset is warranted in the absence of a high-grade rigidity²-⁹. The aim was to review our treatment with the Ponseti method regarding the present literature.

Methods: Fourteen patients with 19 idiopathic clubfeet have been analysed retrospectively, concerning the start and duration of plastering, the frequency of plaster changes, the need for percutaneous tenotomy of the Achilles tendon or further surgery, the start of physiotherapy and the definite change to a brace (“Kopenhagener Schiene”) for night and naps.

Results: Looking at the median concerning patients/feet the results were the following: Start of plastering 6/6 (1-88) days after birth. Number of plasters 17/17 (3-26) in all patients. Treatment time in plaster 168/168 (47-301) days. Start of physiotherapy 7/7 (-6-21) days after start of plastering. Change to brace 196/196 (47-575) days after start of plastering. 58% of patients/64% of feet needed tenotomy once but no further interventions. Time to surgery 111/113 (76-132) days after start of plastering. Pretenotomy plasters 12/11 (3-24). Posttenotomy plasters 4/4 (2-11).

Conclusion: Compared to recent studies with a similar frequency of plaster changes and a similar collective of patients our treatment time in plaster was much longer (e.g. 42 days⁵). The tenotomy-rate varies in a wide range between 3. Present studies tend to report higher tenotomy-rates then we had (70-75%², 87.5%⁶, 100%³). Furthermore the higher tenotomy-rates tend to correlate with a dramatically decreased number of plasters (e.g. pretenotomy plasters 5³, total number of plasters 6³, 5⁵). An earlier³ tenotomy with a wider indication might reduce length of treatment and the number of plasters. Studies including an accelerated Ponseti regime showed similar numbers of plasters even if the plasters are changed 2-3 times a week⁶. Further prospective studies will be required to confirm these findings.

Prevalence of vitamin D insufficiency in Swiss teenagers with appendicular fractures: a prospective study about 100 cases

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Background: In elderly subjects, low vitamin D status elevates parathyroid hormone (PTH) concentrations, which, in turn, increases bone turnover and bone loss, contributes to mineralization defects, and increases risk of hip and other fractures. The significance of subclinical vitamin D deficiency in the pathogenesis of fractures in children and adolescents remains currently unclear. We aimed to determine the prevalence of vitamin D insufficiency and its effect on bone mineral values in a collective of Swiss Caucasian children with first episode of appendicular fracture.

Methods: Hundred teenagers with first episode of appendicular fracture (50 upper limb fractures & 50 lower limb fractures) and 50 healthy controls were recruited into a cross-sectional study. BMC and BMD values were measured by dual-energy x-ray absorptiometry, and serum 25 hydroxyvitamin D was assessed by using high-performance liquid chromatography coupled with tandem mass spectrometry. BMD and BMC values were adjusted for age and gender and were exprimed as Z-scores.

Results: Of the 100 injured teenagers in the study, 12% had deficient vitamin D levels (< 20 ng/mL; No significant groups’ effect was found for any of serum 25(OH) D, L2-L4 BMD Z score and L2-L4 BMC Z score variables (p=0.216). No significant difference was found between healthy controls and lower limb fractures groups for the calcaneal BMD Z score variables (p=0.278). DXA scan results were consistent for both, injured teenagers and healthy controls, with normal bone density for chronologic age. At finally, the last result that emerged from this study was the lack of influences of serum 25 (OH) D levels on bone mineral values (BMD/BMC indices).

Conclusions: A significant proportion of Swiss Caucasian teenagers with or without fractures in our study are vitamin D insufficient. However, this study failed to show an influence of low vitamin D status on bone mineral density and/or content at lumbar spine, and heel. The present results reinforce nevertheless the concept that there are probably many confounders (sexual maturity, race, genetics, diet, season) to determining the real role of vitamin D status in bone accretion during growth. Further research is therefore needed to determine the real relationship of vitamin D status on bone accretion.
Pediatric Orthopedic Work in 'resource deprived countries'. Transfer of knowledge by active Tuition in Tanzania. Example: Blount’s disease

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During the last 10 years a paediatric orthopaedic service was developed in Tanzania. The interest of the presenter has been to expand his expertise in orthopaedic problems rarely encountered in his University Environment in Europe besides transfer of knowledge to improve orthopaedic service for children in 'resource deprived (formerly called 'developmental') countries.

**Example Blount’s disease:** Langenskiöld has taught us most about diagnosis and management of Blount’s disease. Therefore we choose this problem as an example of our activities to introduce adaptation of treatment to means locally available while pursuing the goal of full correction. Blount’s disease is extremely frequent in central Africa and usually only treated when severe deformity has developed. The causes are unknown, but the presenter is convinced that nutritional deficiencies including pre-clinical rickets are likely to play a major role.

**Standard Surgical Treatment** is ‘high tibial acute osteotomy’ (HTO) and retentin in plaster of paris. This does not correct the tibial plateau deformity, which should be addressed especially in young children with potential for remodelling of the joint surfaces.

**'New' Treatment:** In the presenters european setup elevation of the medial tibial plateau is performed by an osteotomy guided into the tibial eminence and plate fixation with or without bone graft with simultaneous epiphysiodes of the lateral tibial hemiphsis and the proximal fibular physis. In Tanzania we also use this osteotomy, but fixation is performed with Schanz screws and correction to achieve a neutral Mikulicz line is gradually achieved by external fixation.