DO LUMBAR ORTHOSES AFFECT THE MUSCULAR REGENERATION AFTER POSTERIOR LUMBAR FUSION? A RANDOMIZED CONTROLLED TRAIL TO PROOF A DIFFERENCE IN MUSCLE REGENERATION WITH SURFACE ELECTROMYOGRAPHY

Yorck Rommelspacher, Jana Ziob, Hannah Bode, Charlotte Struwe, Rahel Bornemann, Andreas Strauss, Dieter Christian Wirtz, Robert Pflugmacher
Dept of Orthopedics and Trauma surgery, University Hospital Bonn, Germany

Background:
There is a concern that lumbosacral orthoses cause trunk muscle weakness and atrophy.

Purpose:
This randomized controlled trial wants to proof this hypothesis with surface electromyography (sEMG) in patients who underwent a one or two level posterior fusion of the lumbar spine.

Methods:
Patients with degenerative disease of the lumbar spine who underwent a one or two level posterior spinal fusion were included in this trail. All surgeries were performed with a posterior midline approach to the lumbar spine. Before surgery, at hospital discharge, 6 weeks and 12 weeks after surgery a surface EMG of the M. erector spinae was detected. While recording the sEMG the patients were performing a modified Sorensen test, a validated stress test of the M. erector spinae. The patient is lying in prone position with the upper body placed over the edge of the table and is asked to maintain the upper body at least 20 seconds in horizontal position. The relative muscle action potential (rMAP), the peaks per second (PpS) and the slope of the mean frequency (sMF) were analyzed as parameters of muscular regeneration and intramuscular coordination.

Results:
50 patients were included in this trail (male 23 / female 27). 23 patients were included in the orthosis group and 27 in the control group. As a sign of muscular damage, in both groups sMF showed higher values after surgery. 12 weeks after surgery there is a trend in favor of the orthosis group, which is not significant (0,84 with orthosis, 0,15 without orthosis; p = 0,179). Both peaks per second and rMAP show similar results during the course of the study period. After surgery PpS and rMAP increase in both groups and decrease in the 6 weeks control. 12 weeks post-surgery the PpS and rMAP are nearly the same in both groups (3,63 / 34% with orthosis vs. 3,59 / 32% without orthosis).

Conclusion:
After surgery, an impairment of muscle function is detected in all parameters. Although there is no significant difference, a trend in favor of the orthosis group can be identified. Especially the sMF shows more sufficient working muscles in the orthosis group. Therefore, this trail indicates that lumbar orthoses do not have a negative effect on muscle regeneration after posterior lumbar fusion.

Disclosures:
Author 1: grants/research support: Bauerfeind AG
Author 2: none; Author 3: none;
Author 4: none; Author 5: none;
PULMONARY CEMENT EMBOLISM FOLLOWING CEMENT AUGMENTED FENESTRATED PEDICLE SCREW FIXATION IN ADULT SPINAL DEFORMITY PATIENTS WITH SEVERE OSTEOPOROSIS (ANALYSIS OF 2978 FENESTRATED SCREWS)

Meric Enercan, Isik Karalok, Emel Kaya, Onur Levent Ulusoy, Gokce Feride Inan, Cem Sever, Tunay Sanli, Sinan Kahraman, Selhan Karadereler, Azmi Hamzaoglu
Istanbul Spine Center, Istanbul, Turkey

BACKGROUND
The incidence of pulmonary cement embolism (PCE) following cement augmented fenestrated pedicle screw fixation (CAFPS) in 281 pts with severe osteoporosis was 16.3% in this study. Among those symptomatic PCE incidence was 1.4%. The risk of symptomatic PCE increased as number of levels, screws and cement volume increased.

THE PURPOSE OF THE STUDY
There is very limited information about PCE following cement augmented fenestrated pedicle screw fixation in the literature. The aim this study to report the incidence of PCE following CAFPS fixation in adult deformity pts with severe osteoporosis and to identify risk factors such as; the number of levels, number of screws and the cement volume used.

METHODS
281 pts (204F, 77M) in whom CAFPS fixation was used during deformity surgery were included. All patients` routine postop 2.day chest x-rays and any available CT scans were reviewed by two radiologist. In patients with PCE; preop, early postop and latest echocardiography studies were compared in terms of changes in pulmonary artery pressure (PAP) and right ventricular dilatation. Estimated cement volume used was calculated as; 2cc (1cc+1cc) per thoracic and 3cc (1.5cc+1.5cc) per lumbar levels, which are our routine protocol. Statistical analysis for risk factors were assessed with point biserial correlation test.

RESULTS
Ave age 70.5 (51-89) and ave f/up 3.2 years (2-5). A total of 2978 CAFPS were instrumented with a mean of 10.5 levels (2-16) in 281 pts. PCE was diagnosed radiologically in 46 pts (16.3%). Among this 46 pts, PCE was clinically symptomatic in only 4 pts. Overall incidence of symptomatic PCE was 1.4% (4 of 281). Symptomatic PCE was statistically significant when; CAFPS fixation was performed >7 levels; >14 screws were used and >20-25 cc cement was used for augmentation (r=0.378). In PCE group, mean preop PAP values of 27.40 (20-37)mm/Hg increased to 32.34 (20-50) mm/Hg in early postop and decreased to 28.29 (18-49)mm/Hg at final f/up. In symptomatic PCE pts, mean preop PAP values of 30.75 (28-36)mm/Hg increased to 45.74 (40-50) mm/Hg in early postop and decreased to 38.75 (37-40)mm/Hg at final f/up.

CONCLUSION
This study showed an overall 16.3% radiological PCE and 1.4% symptomatic PCE incidence when CAFPS were used due to severe osteoporosis. The symptomatic PCE risk was significant when CAFPS were >7 levels; >14 fenestrated screws and >20-25 cc cement volume is used and this may cause PAP increase and right ventricule dilatation.

Disclosures:
Author 1: none; Author 2: none; 
Author 3: none; Author 4: none; 
Author 5: none; Author 6: none; 
Author 7: none; Author 8: none; 
Author 9: none; Author 10: consultant: MEDTRONIC
SAGITTAL ALIGNMENT REFERENCE PARAMETERS WITH A SLOT-SCANNING 3D X-RAY IMAGER: REPRODUCIBILITY

jean charles Le Huec, Kenichiro Sakai, Masashi Okamoto, Shun Hatsuikano, Fouad Jabbour, Kazu Hazegawa
Bordeaux University Hospital, Orthorachis 2 Department, CHU Pellegrin, Bordeaux, France

Introduction: The symptoms of patients with adult spinal deformity (ASD) deteriorate as spinal alignment and posture worsen. Precise measurement of the whole spine in the standing position is essential to assess this alignment. A new imaging modality - a low-dose slot-scanning 3D X-ray imager - allows this measurement. Normative Caucasian and Japanese reference values were determined by our group; however, reproducibility of these measures has not been fully investigated. Since sagittal balance parameters are often calculated on single-plane 2D radiographs, this study aimed to determine the reproducibility of sagittal balance parameters, in both 3D and in 2D.

Methods: A total of 62 asymptomatic subjects, 32 in France, 30 in Japan (ages 20 to 81 years; BMI, 18 to 39 kg/cm²; 49% female, 51% male, chosen to have a range of pelvic incidence values), were measured using the 3D postural assessment workflow of dedicated commercial software, and in 2D. There was no crossover of subject images for ethics reasons. Subjects at each location were measured twice each by two new observers following training, including: pelvic parameters (pelvic incidence, pelvic tilt, sacral slope), lordosis/kyphosis between various levels (L5-S1, L1-L5, T1-T12, T4-T12), sagittal-vertical-axis (SVA), and spinal-sacral-angle (SSA). Intra-observer and inter-observer reproducibility was examined based on the absolute difference between each operator's measures, as well as by the intra-class correlation coefficient (ICC). Paired Student t-tests compared the 2D and 3D measures (α=0.05).

Results: In all cases, the overall mean absolute difference between repeated 3D measures was less than 2°, or in the case of SVA, less than 2 mm (Figure 1). The highest mean absolute difference for an individual observer was 2.5° for L1-L5. Standard deviations of the repeated measures were between 0.4° and 1.9°. In all but one case (L1-L5), the inter-observer 3D measures were significantly more repeatable than the 2D measures (p<0.04; often p<0.001). In all but two cases (L1-S1 and SVA), the intra-observer 3D measures were significantly more repeatable than the 2D measures for at least one observer (p<0.001). The 2D measures had an overall repeatability less than 3° except for 2D kyphosis and SSA measures, which were substantially different between observers. ICC was excellent for all measures, in both 3D and 2D (>0.9 for 3D; >0.8 for 2D).

Discussion: This study demonstrated that 3D sagittal alignment parameters are reproducible using biplanar radiographs, even with newly-trained users, and that 3D measures have better reproducibility than 2D. To our knowledge, this is the first time that the reproducibility of 3D vs 2D measures has been compared for sagittal balance parameters. Overall differences between repeated measures was less than 2° or 2 mm on average for all measures.

Keywords: Spine, sagittal balance, reproducibility, reference parameters, 3D, low-dose, full-body

Disclosures:
Author 1: none; Author 3: none; Author 4: none; Author 6: none;
Figure 1: Comparison of 2D and 3D intra- and inter-observer repeatability
OVERESTIMATION OF PAPERS WITH POOR LEVEL OF EVIDENCE AMONG THE TOP-100 MOST INFLUENTIAL STUDIES ON IDIOPATHIC SCOLIOSIS. A BIBLIOMETRIC ANALYSIS

Carlos Barrios, Joel Gambin, Joaquin Alfonso
Valencia Catholic University, Valencia, Spain

Introduction. To date, no study has used bibliometric analysis to review the most influential articles about IS. It is hypothesized that an overestimation of studies with poor clinical evidence (Level IV) in term of high citation rate is still lasting the literature about IS.

Purpose of the study. This report identifies and analyses the characteristics of the 100 most cited articles on IS, with special reference to the level of evidence.

Material and Methods. Bibliometric review of current literature. The Thompson Reuters Web of Science was accessed to find the 100 most cited articles on IS until 2016. The number and citation density, Authorship, institutions, country of origin, year of publication, source journals, type of study, topic, study design and level of evidence were analysed.

Results. The 100 most frequently cited articles accumulated 13,749 citations. The number of citations ranged between 616 and 80. The 10 most cited articles represent 24.6% of all citations. The treatment of IS was the most commonly studied issue, specifically surgical correction (n=36). Most studies originated in the United States (n=62). Almost half of the papers (n=49) were published between 2000 and 2008. The majority of studies have a case series design (n=35). Most of the cited articles have low levels of evidence (III=36; IV=35) (Figure 1). Notably, Level V articles were published in journals with a higher mean IF, and showed the longest time since publication (p<0.001). In the last decade analysed, there was a slight increase of articles with Level II evidence, but this was scarce.

Conclusion. This bibliometric analysis includes the 100 most cited articles on IS. An overestimation of studies with poor clinical evidence (Level III-IV) in term of high citation rate together with very low proportion of Level I-II articles is consistently observed. The surgical correction of IS is the most studied issue, mostly under a retrospective case series design. Even in the last decade, there is a very low proportion of Level I-II articles on IS.

Disclosures:
Author 1: none;
Author 2: none;
Author 3: none;
THE INCREASED ACTIVITY OF THE END PLATE OF THE VERTEBRAL BODIES AFTER SURGICAL CORRECTION OF SCHEUERMANN'S DISEASE.

Michał Latalski, Marek Fatyga, Anna Danielewicz Bromberek
Children Orthopedic Department. Lublin, Poland

Introduction.
The effectiveness of the nonoperative treatment Scheuermann disease depends on many factors, especially the bone age. In the final phase of reconstruction by. Mau (test Risser sign 3+ / 4+) in deformities above 60 ° surgical treatment is the only effective option.

Aim of the study.
The aim of the study is to analyze the degree of restoration of vertebral bodies in follow-up after surgical correction of children treated for Scheuermann disease.

Material and methods.
The analysis included 22 patients aged 15-17 y.o. surgically treated with the posterior approach only. An additional Ponte osteotomy on the apex of kyphosis had 15 patients. Risser sign in the study group was 4+. We were used to evaluating the spine radiographs made of digital technology. The angle of kyphosis before, immediately after surgery and in follow-up. Digital technique measured the degree of wedged vertebrae in two ways. One consisted of measuring the wedged angle and second consisted of determining height indicator stalk expressed by the ratio of the front wall to the height of the rear wall. Measurements were performed after surgical correction and in follow-up. The follow-up ranged from 1 year to 5 years (min 3 years). The results were statistically analyzed.

Results
The initial angle of kyphosis ranged from 57 ° to 90 ° (min 76 °) after surgery, 56 ° to 29 ° (min 42 °). There was no loss of correction in follow-up. The angle of wedging measured immediately after surgery ranged between 15.63 ° and 8.40 ° (standard 5 °) during follow-up underwent markedly reduced. Height indicator physiologically close to unity (0.96) initially ranged from 0.64 to 0.80 and in follow up its value is clearly growing. Statistical analysis confirmed significant differences in the direction of reducing wedging of the vertebral bodies.

Conclusions
1. Surgical treatment of Scheuermann disease before reaching full maturity backbone augurs a good and lasting clinical and radiological outcome.
2. The processes of growth despite a significant slowdown lead to a reduction in the degree of wedging, giving good support front for durability correction.
3. Correction hyperkifosis activates cartilage growth and a further growth of the vertebral body.
4. Early anterior release in adolescents is required in exceptional cases.

Disclosures:
Author 1: consultant: DePuy Synthes
Author 2: none;
GROWTH VELOCITY OF FUSED SPINAL SEGMENT IN CHILDREN AFTER VERTEBRAL BODY RESECTION IN THE THORACOLUMBAR AND LUMBAR SPINE

Nikita Khusainov, Sergey Vissarionov, Dmitry Kokushin
Department of Spine pathology and Neurosurgery, Turners scientific research institute for pediatric orthopedics, Russia

Objective. To assess the growth velocity and development of the fused spinal segment in children operated on for congenital spinal deformity in thoracolumbar and lumbar region associated with disorders in vertebral formation using transpedicular fixation.

Material and Methods. The outcomes of surgery in 31 patients at the age of 1 year and 9 months to 6 years and 11 months with a single hemivertebra were assessed. The surgery involved hemivertebra resection using combined approach, deformity correction with posterior instrumentation, anterior fusion and posterior local fusion of fixed spinal motion segments with autobone. After the solid fusion was achieved implants were removed and the patient was observed for each year. The rate of bone block formation and the dimensions of fused spinal segment in the region of hemivertebra resection and of the adjacent vertebra were assessed on the basis of postoperative x-rays. New functional unit of the spine was compared to the adjacent intact vertebral bodies in dynamics.

Results. The mean follow-up period was 60 months. Solid bone fusion was achieved in all patients. The mean height of the upper intact vertebral body after surgical treatment was 11.4 mm; after five years of follow-up observations it was 15.1 mm; the anteroposterior dimension was 15.2 mm, reaching 21.2 mm by the end of the follow-up period. The relative growth of the mean height and the anteroposterior dimension of the body of the adjacent upper vertebra was 24.8 and 28.1 %, respectively. The mean height of the bodies of a fused spinal motion segment after surgery was 25.9 mm, reaching 34.2 mm after 5 years. The mean anteroposterior dimension of the bodies of the fused spinal segment during the follow-up period increased from 15.8 to 21.5 mm. The relative growth of the mean height and anteroposterior dimension of the bodies of the fused spinal segment was 22.4 and 26.7 %, respectively. The mean height and anteroposterior dimension of the body of the lower intact vertebra has increased from 13.2 and 17.2 mm to 17.8 and 23.0 mm, respectively, during the follow-up period (26.9 and 25.2 %). Thus, the relative growth of the mean values of the bodies of the upper and lower adjacent vertebrae and the fused spinal segment has undergone the same changes. Over the entire follow-up period, the average growth of these values was 25.4 % (Hmean) and 25.7 % (Lmean) of the initial values.

Conclusion. After hemivertebra resection, the fused spinal segment is developing as a single unit without delay in growth of height and anterior-posterior dimension of vertebral bodies involved in the block. New functional unit of the spine consistently develops and enables normal growth and development of the whole spine.

Key Words: congenital scoliosis, spine growth, fused spinal segment, transpedicular fixation.

Disclosures:
Author 1: none; Author 2: none; Author 3: none;
Measuring the parameters of a fused spine motion segment (FSMS) and the adjacent vertebrae using the X-ray
SEVERE HYPERKYPHOSIS HARRMS AEROBIC CAPACITY AND MAXIMAL EXERCISE TOLERANCE IN PATIENTS WITH SCHEUERMANN DISEASE

Alejandro Lorente, Jesús Burgos, Carlos Barrios, Roció Tamariz, Eduardo Hevia, Luis Miguel Antón, Rafael Lorente
Dept of Orthopaedic Surgery, Madrid, Spain

Summary of Background Data.
Adolescents with mild or moderate thoracic hyperkyphosis due to Scheuermann disease do not exhibit significant restrictions in ventilatory parameters measured by conventional static spirometry and maximal exercise tolerance test as compared to healthy individuals matched in age. However, patients with severe hyperkyphosis (>70°) show a reduced aerobic and ventilatory capacity.

Hypothesis
Scheuermann hyperkyphosis do not imply cardiorespiratory response to maximal exercise

Design
Prospective evaluation of non consecutive patients

Introduction
The evaluation of ventilatory functional restrictions during a maximal exercise tolerance test in patients with Scheuermann disease has never described. This study evaluates the respiratory functional capacity of patients with Scheuermann as compared to healthy adolescents matched in age.

Methods. 24 adolescents with hyperkyphosis (mean, 71.2°±9.3°) due to Scheuermann were assessed by basal spirometry and dynamic ventilatory parameters during a maximal exercise tolerance test. Similar studies were performed in a control group of 15 healthy adolescents.

Exercise test consisted of a ramp protocol on treadmill, and was completed to exhaustion to determine maximal oxygen uptake (VO2max) and ventilatory efficiency parameters.

Results. There were no differences between patients with Scheuermann and healthy individuals in any of basal (FVC, FEV1) and maximal exercise ventilatory parameters (RER, VO2max/kg, VE, VE/CO2) (Table). However, basal FVC, time of exercise, VO2max and ventilatory efficiency (VE) at maximal exercise was close related with hyperkyphosis severity in Scheuermann patients. Individuals with more than 70° thoracic kyphosis showed a severe deterioration of VE and VO2max.

Conclusion. Patients with mild and moderate hyperkyphosis (<70°) do not exhibit cardiopulmonary restrictions in basal static conditions and during maximal exercise tolerance tests. Patients with more severe hyperkyphosis show a significant respiratory inefficiency together with lower ventilation capacity and lower VO2max.

Disclosures:
Author 1: none; Author 2: none;
Author 3: none; Author 4: none;
Author 5: none; Author 6: none;
Author 7: none;
<table>
<thead>
<tr>
<th>Respiratory Parameters</th>
<th>Thoracic Kyphosis</th>
<th>2-tailed significations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson correlation</td>
<td></td>
</tr>
<tr>
<td>FVC</td>
<td>-0.512</td>
<td>0.011</td>
</tr>
<tr>
<td>O2 Saturation max</td>
<td>-0.464</td>
<td>0.022</td>
</tr>
<tr>
<td>Time of exercise</td>
<td>-0.640</td>
<td>0.001</td>
</tr>
<tr>
<td>VO2max</td>
<td>-0.502</td>
<td>0.011</td>
</tr>
<tr>
<td>VE</td>
<td>-0.459</td>
<td>0.024</td>
</tr>
<tr>
<td>METS</td>
<td>-0.810</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
CONGENITAL CERVICOTHORACIC SCOLIOSIS WITH HEMIVERTEbra: INDICATED FOR POSTERIOR RESECTION

Yong Qiu, Zhonghui Chen, Xu Sun
Spine Surgery, Drum Tower Hospital of Nanjing University Medical School, Nanjing, China

Background: Cervicothoracic hemivertebra (HV) is a rare congenital deformity. It locates between the mobile cervical spine and the fixed thoracic spine, leading to rapid curve progression, shoulder imbalance, fixed torticollis and facial asymmetry.

Purpose of the study: To evaluate radiographic and cosmetic outcomes following posterior-only hemivertebra resection and instrumentation at the cervicothoracic junction.

Materials and Methods: Eighteen patients (8 boys and 10 girls) with cervicothoracic HV treated by posterior-only HV resection and instrumentation were reviewed, with at least a 2-year follow-up period (24-62 months). The mean age was 9.2 years at surgery (range 4-15 years). There were 12 cases of single hemivertebra, and 6 cases of double hemivertebra, with or without contralateral bar. There were totally 24 hemivertebrae [C7 (2), T1 (4), T2 (12), T3 (3), and T4 (3)], and 16 of them were fully segmented (66.7%) and 8 semisegmented (33.3%), respectively. All patients were neurologically intact. Radiographic measurements included the segmental Cobb angle, distal compensatory Cobb angle, segmental kyphosis and global thoracic kyphosis. The shoulder balance was evaluated by T1 tilt and clavicle angle. The neck tilt was measured by the angle between the longitudinal axis of cervical spine and the vertical line. The head shift was defined as the distance between a vertical line drawn from the middle of mandibular body to the middle of sacrum.

Results: The mean follow-up was 32.4 months (24-62 months). The mean fusion level was 5.2 segments. Mean operation time was 204.6 min with the average blood loss of 384.7 ml. The mean segmental Cobb angle was 45.2±12.3° preoperatively, 19.6±8.0° postoperatively (56.6% correction rate), and 20.1±7.8° at the last follow-up. The distal compensatory curve of 18.2±8.2° was spontaneously corrected to 9.6±6.7°, but increased to 16.1±7.8° at the last follow-up. The T1 tilt was corrected from 19.6±6.4° preoperatively to 9.2±5.9° postoperatively (p<0.001), and 6.4±4.7° at the last follow-up (p<0.001). The mean clavicle angle was 19.6±6.9° preoperatively, 9.7±5.3° postoperatively (p<0.001), and 5.6±3.2° at the last follow-up (p<0.001). The neck tilt was 20.1±7.1° preoperatively, 11.2±6.5° postoperatively (p<0.001), and 8.8±5.7° at the last follow-up (p<0.001). The head shift was corrected from 2.2±0.9 cm preoperatively to 1.3±0.8 cm postoperatively (p<0.001), and 0.6±0.5 cm at the last follow-up (p<0.001). A remarkable pedicle screw malposition rate (20.7%) was observed, but no neurovascular injuries. One case developed Horner syndrome, and another one had transient radicular pain after surgery.

Conclusion: In the patients with congenital cervicothoracic scoliosis due to hemivertebrae, hemivertebra resection with instrumentation allows for excellent correction in both the coronal and sagittal planes, especially the cosmetic improvement. Great care should be taken to reduce the rate of pedicle screw malposition.

Disclosures:
Author 1: none; Author 2: none; Author 3: none;
HORIZONTALIZATION OF LIV: CRUCIAL TO PREVENT CORONAL DECOMPENSATION AFTER HEMIVERTEBRA RESECTION AND SHORT FUSION IN PATIENTS YOUNGER THAN 5 YEARS OLD?

Xu Sun, Song Li, Yong Qiu
Department of Spine Surgery, the Affiliated Drum Tower Hospital of Nanjing University Medical School, Nanjing, China

Background—In our center, for patients with thoracolumbar hemivertebra, a kind of coronal decompensation may occur unexpectedly after surgery, which had increase of Cobb angle more than 20° from its postoperative value. To the best of our knowledge, there is a paucity of data regarding the effect of horizontalization of LIV on coronal balance restoration as well as the risk factor of coronal decompensation after hemivertebra resection surgery.

Objective—To investigate the role of horizontalization of LIV in preventing coronal decompensation after thoracolumbar single-level hemivertebra resection and short fusion in patients younger than 5 years old.

Methods—This study reviewed a consecutive series of pediatric patients (<5 years old) with fully segmented single-level thoracolumbar hemivertebra who had undergone posterior-only hemivertebrectomy and short instrumentation with pedicle screws from January 2002 to December 2014. During the surgery, LIV was corrected to be horizontalized (less than 5 degrees to the intercrestal line) after hemivertebrectomy. They had a minimum follow-up of 24 months. According to the coronal compensation behavior, they were divided into two groups: Group P (progressed, curve decompensated beyond twenty degrees) and Group NP (non-progressed, curve well compensated). Incidence of coronal decompensation was assessed.

Results—There were 179 patients included in this study. Mean age at surgery was 30±9 months. Mean follow-up was 40±11 months. Postoperative coronal decompensation was identified in 18 patients (8 boys and 10 girls) who constituted Group P. Decompensation patterns were characterized with a thoracolumbar/lumbar curve with fusion levels involved, the same curve direction as the main curve before surgery and an apex below LIV. The remaining 161 patients had a well compensated pattern. All of patients in Group P received brace treatment instead of a revision surgery. Comparison analyses showed similar values in variables before surgery both groups. Immediately after surgery, both groups had similar correction rate, UIV tilt and LIV tilt. But Group P had significantly higher LIV disc angle (7.4±3.3° versus 0.8±3.2°, P<0.05) than Group NP. During the follow-up, LIV tended to maintain horizontal, while LIV disc experienced continuous aggravation of wedging until initiation of bracing. Regression analysis identified that postoperative LIV disc angle > 5° was an independent risk factor of coronal decompensation after hemivertebra resection.

Conclusions—Due to the low rate (10%) of coronal decompensation of our cohort, LIV horizontalization is crucial to maintain coronal balance after thoracolumbar hemivertebra resection in very young children. As an independent risk factor of postoperative coronal decompensation, LIV disc wedging after surgery should on all accounts be a major cause for concern.

Disclosures:
Author 1: none; Author 2: none;
ASSESSING HEALTH RELATED QUALITY OF LIFE (HRQOL) IN CEREBRAL PALSY (CP) FOLLOWING SCOLIOSIS SURGERY: IS THE CPCHILD MEASURING WHAT WE WANT?
Luigi Aurelio Nasto, Firoz Miyanji, Paul Sponseller, Tracey Bastrom, Suken Shah, Amer Samdani, Harry Shufflebarger
BC Children’s Hospital, Department of Orthopaedic Surgery, Vancouver, Canada

Background / Introduction
Reliably measuring benefits of scoliosis surgery in cerebral palsy (CP) cannot be overemphasized. Despite CPCHILD being increasingly used to assess health related quality of life (HRQoL) outcomes of spinal fusion in CP, how well it can predict surgical outcomes and its sensitivity to change in this setting has not been reported.

Purpose of the Study
The aim of this study was to assess how well the CPCHILD questionnaire predicts functional outcomes (predictive validity) and assess its sensitivity to clinical change (longitudinal responsiveness) following spinal deformity surgery in patients with GMFCS IV and V CP.

Materials and Methods
All consecutive CP patients with ≥2 yrs f/u included in a prospective multicenter database were analyzed. CPCHILD scores were collected at baseline, 1 and 2-yr post-op. Caregivers rated on a 5 level Likert-scale (anchor questions) effect of surgery with regard to improvement in quality of life (QOL), comfort (COM), ease of care (EOC), and general health (GH) at 1 and 2-yr f/u. Effect size (ES) and Standardized Response Mean (SRM) were calculated for each group. Spearman correlation coefficients were calculated between CPCHILD score changes post-op and caregivers’ answers to the anchors.

Results
173 patients were included. Mean age was 14 yrs ± 2.6, majority were GMFCS 5 (81%). Most patients rated effect of surgery as significantly “improved” in all anchors compared to “no change” or “deteriorated” (p<0.001). At 2-yr f/u CPCHILD scores also significantly improved for all domains (personal care (p=0.002), position (p=0.001), comfort (p=0.005), general health (p=0.004), quality of life (p<0.001), total score (p<0.001)), except communication (p=0.145). Moderate (0.50≤ES<0.80) responsiveness was observed at 2-yr f/u across anchor responses. Strongest correlation at 2-yr f/u was between total score and QOL, COM, EOC (r=0.33, 0.39, 0.31 respectively); quality of life and COM (r=0.33); personal care, comfort domains and EOC (r=0.3, 0.34, respectively). Weakest correlation was between CPCHILD scores in all domains and GH anchor (r<0.2). (Attached Table)

Conclusion
A high level of satisfaction was noted among caregivers following scoliosis surgery at 2-yr f/u in CP patients as demonstrated with significantly improved scores in CPCHILD and meaningful external anchors. CPCHILD demonstrated responsiveness while its predictive validity was at best modest in the domains of quality of life, personal care, comfort, and total scores.

Disclosures:
Author 1: none;
Author 2: grants/research support: Depuy Synthes Spine, consultant: Depuy Synthes Spine
Author 3: grants/research support: Research grants from DePuy Synthes Spine and from K2M to Setting Scoliosis Straight Foundation for Harms Study Group research efforts
### 1 YEAR F/U

<table>
<thead>
<tr>
<th>Effect of Surgery</th>
<th>QOL N (%)</th>
<th>COM N (%)</th>
<th>EOC N (%)</th>
<th>GH N (%)</th>
<th>QOL N (%)</th>
<th>COM N (%)</th>
<th>EOC N (%)</th>
<th>GH N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved a lot</td>
<td>125 (72)</td>
<td>121 (70)</td>
<td>86 (50)</td>
<td>94 (55)</td>
<td>125 (72)</td>
<td>116 (67)</td>
<td>88 (51)</td>
<td>100 (58)</td>
</tr>
<tr>
<td>Improved a little</td>
<td>34 (20)</td>
<td>32 (18)</td>
<td>41 (24)</td>
<td>42 (24)</td>
<td>27 (16)</td>
<td>29 (17)</td>
<td>44 (25)</td>
<td>35 (20)</td>
</tr>
<tr>
<td>No change</td>
<td>2 (1)</td>
<td>6 (3)</td>
<td>25 (14)</td>
<td>22 (13)</td>
<td>4 (2)</td>
<td>10 (6)</td>
<td>17 (10)</td>
<td>25 (14)</td>
</tr>
<tr>
<td>Deteriorated a little</td>
<td>8 (5)</td>
<td>9 (5)</td>
<td>17 (10)</td>
<td>10 (6)</td>
<td>11 (6)</td>
<td>11 (6)</td>
<td>15 (9)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Deteriorated a lot</td>
<td>4 (2)</td>
<td>5 (3)</td>
<td>4 (2)</td>
<td>4 (2)</td>
<td>3 (2)</td>
<td>2 (1)</td>
<td>4 (2)</td>
<td>5 (3)</td>
</tr>
</tbody>
</table>

### 2 YEAR F/U

<table>
<thead>
<tr>
<th>Effect of Surgery</th>
<th>QOL N (%)</th>
<th>COM N (%)</th>
<th>EOC N (%)</th>
<th>GH N (%)</th>
<th>QOL N (%)</th>
<th>COM N (%)</th>
<th>EOC N (%)</th>
<th>GH N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved a lot</td>
<td>125 (72)</td>
<td>121 (70)</td>
<td>86 (50)</td>
<td>94 (55)</td>
<td>125 (72)</td>
<td>116 (67)</td>
<td>88 (51)</td>
<td>100 (58)</td>
</tr>
<tr>
<td>Improved a little</td>
<td>34 (20)</td>
<td>32 (18)</td>
<td>41 (24)</td>
<td>42 (24)</td>
<td>27 (16)</td>
<td>29 (17)</td>
<td>44 (25)</td>
<td>35 (20)</td>
</tr>
<tr>
<td>No change</td>
<td>2 (1)</td>
<td>6 (3)</td>
<td>25 (14)</td>
<td>22 (13)</td>
<td>4 (2)</td>
<td>10 (6)</td>
<td>17 (10)</td>
<td>25 (14)</td>
</tr>
<tr>
<td>Deteriorated a little</td>
<td>8 (5)</td>
<td>9 (5)</td>
<td>17 (10)</td>
<td>10 (6)</td>
<td>11 (6)</td>
<td>11 (6)</td>
<td>15 (9)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Deteriorated a lot</td>
<td>4 (2)</td>
<td>5 (3)</td>
<td>4 (2)</td>
<td>4 (2)</td>
<td>3 (2)</td>
<td>2 (1)</td>
<td>4 (2)</td>
<td>5 (3)</td>
</tr>
</tbody>
</table>

### CPCHILD domain:

<table>
<thead>
<tr>
<th></th>
<th>1 YEAR F/U</th>
<th>2 YEAR F/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal care</td>
<td>.161</td>
<td>.259*</td>
</tr>
<tr>
<td>Positioning</td>
<td>.144</td>
<td>.222*</td>
</tr>
<tr>
<td>Comfort</td>
<td>.204*</td>
<td>.378*</td>
</tr>
<tr>
<td>Communication</td>
<td>.131</td>
<td>.212*</td>
</tr>
<tr>
<td>General health</td>
<td>.095</td>
<td>.160*</td>
</tr>
<tr>
<td>Quality of life</td>
<td>.275*</td>
<td>.257*</td>
</tr>
<tr>
<td>Total score</td>
<td>.166</td>
<td>.304*</td>
</tr>
</tbody>
</table>

### p-values

- *p < 0.05

### Statistics

- **Quality of life**: QOL, COM, EOC, GH
- **CPCHILD domain**: Personal care, Positioning, Comfort, Communication, General health, Quality of life, Total score
- **Statistics**: t-test, ANOVA