(OR=1.28, 95% CI: [1.06-1.54], P=0.010) and COPD (OR=10.36, 95% CI: [2.17-49.47], P=0.030).

CONCLUSIONS: Thirty-day mortality after 3CO is 1.2% globally. The greatest univariate risk factors are diabetes, COPD, frailty, and revision surgery. Regardless of age, sex, or BMI, it was found that COPD and duration of surgery were independently associated with 30-day mortality.

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P166. Selection of upper instrumented vertebra in adult spinal deformity: risk calculator and recommendations based on proximal junctional kyphosis

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BACKGROUND CONTEXT: The surgical correction of adult spinal deformity (ASD) presents a complex and multifaceted challenge, further intensified by the need for revision surgery. Determination of the upper instrumented vertebra can often be challenging.

PURPOSE: To develop a UIV risk index score for patients undergoing ASD corrective surgery.

STUDY DESIGN/SETTING: Retrospective cohort study of a prospectively collected single-center ASD database.

PATIENT SAMPLE: ASD.

OUTCOME MEASURES: PJK.

METHODS: We included operative ASD patients with a minimum of a 2-year follow-up undergoing fusion from at least L1 and proximal to the sacrum. Patients without PJK were isolated to determine predictive thresholds based on patient and surgical factors. Variable importance was determined utilizing random forest analysis to determine the weighting of variables with multivariable logistic regression. Conditional inference tree (CIT) determined threshold values predictive of UIV level in those who didn't develop PJK.

RESULTS: A total of 334 patients met inclusion. (Age 63±10, 77% F, BMI 27.6±5.1 kg/m^2, frailty 3.5±1.5, CCI 1.9±1.7). The model for predicting PJK was significant for osteoporosis, LL, TK, TLPA, with posterior UIV and IBD UIV (p<.05). Table 1. Baseline UIV slope of >42.4 had a higher rate of PJK postoperatively (63% vs 27%, p<.001). Evaluating factor importance for the selection of UIV determined UIV slope to have the greatest weight, with T1PA, PJK prophylaxis, PI-LL, frailty, osteoporosis, and CCI following in those who didn't have PJK. For those with UIV slope <12.7, selection of upper thoracic UIV was contingent on T1PA being <7 (p=0.018). Patients with UIV slope >27 and T1PA >30 were likely to have UIV in the upper thoracic (T4 mean) in those who didn't develop PJK. Whereas, those with a UIV slope between 12.7 to 30 with T1PA >30 were less likely to develop PJK with a lower thoracic UIV (p<.001).

CONCLUSIONS: The selection of UIV was strongly correlated to UIV slope and T1PA for avoidance of proximal junctional kyphosis. Frailty and lumbar lordosis were important contributors to the model for the selection of optimal UIV.

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P167. Sequential correction of sagittal vertical alignment and lumbar lordosis in adult flatback deformity

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BACKGROUND CONTEXT: Flatback deformity causes sagittal imbalance, which leads to back pain, fatigue, and functional limitation. Biomechanical data on the effectiveness of different surgical techniques is lacking.

PURPOSE: This study investigated the correction of sagittal vertical alignment (SVA) and lumbar lordosis achieved through sequential procedures on human spine specimens.

STUDY DESIGN/SETTING: Thirteen thoracolumbar (T10-sacrum) spine specimens were CT scanned to allow kinematic assessment of vertebral position and motion. Specimens were stratified into the iatrogenic or degenerative flatback deformity group based on initial disc collapse at L5-S1 and/or L4-5 and preoperative lumbar lordosis.

PATIENT SAMPLE: N/A

OUTCOME MEASURES: Correction of lumbar lordosis and SVA.

METHODS: The procedures for degenerative specimens included anterior lumbar interbody fusion (ALIF) at L5-S1, ALIF at L4-5, lateral lumbar interbody fusion (LLIF) at L2-3 and L3-4, and posterior column osteotomy (PCO) at L2-3 and L3-4. Iatrogenic lumbar flatback specimens underwent posterior *in situ* fusion at L4-S1 followed by hypolordotic fusion at L4-S1 created with distraction across the pedicle screws. LLIF at L2-3 and L3-4 was then performed, followed by PCO at L2-3 and L3-4. Lumbar lordosis, L1-S1 SVA, and T10-S1 SVA were recorded initially and after each stepwise procedure.

RESULTS: For the specimens with degenerative flatback, statistically significant incremental corrections were noted in SVA and lordosis after the L5-S1 ALIF, L4-5 ALIF, and PCO. A statistically significant difference was also noted in overall correction when comparing preoperative values to those after completion of the PCO. The average correction obtained with these procedures was: T10-S1 SVA -116.7±17.8 mm, L1-S1 SVA -64.9±9.2 mm, and L1-S1 lordosis -32.6±10.5 degrees. For the iatrogenic group, a statistically significant worsening was noted in all three measures with performance of the hypolordotic fusion across L4-S1. Subsequent LLIF at L2-3 and L3-4 did not show significant improvement in sagittal alignment. However, with the addition of PCO at L2-3 and L3-4, the final alignment parameters approached their preoperative values (P>0.01).

CONCLUSIONS: ALIF cages in the lower lumbar segments significantly improved sagittal alignment in adult degenerative flatback deformity. LLIF cages in the upper lumbar segments by themselves were not effective in correcting SVA or enhancing lordosis. LLIF cages in conjunction with PCO improved alignment parameters in both degenerative and iatrogenic flatback deformities.

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P168. Severe hip and knee osteoarthritis worsens patient-reported disability in adult spinal deformity patients

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BACKGROUND CONTEXT: The complex interplay between lower extremity osteoarthritis and sagittal alignment in adult spinal deformity patients is of growing clinical interest.

PURPOSE: To quantify the sequential effects of lower extremity OA on PROMs in ASD patients.

STUDY DESIGN/SETTING: Retrospective review of prospectively collected data.

PATIENT SAMPLE: ASD patients with no prior history of thoracolumbar surgery, and available baseline PROMs and standing radiographs were included.

OUTCOME MEASURES: Baseline demographics, spinopelvic alignment, and PROMs.

METHODS: Included patients with PROMs, standing xrays, no prior thoracolumbar surgery, and bilateral Kellgren-Lawrence (KL) hip/knee grade at baseline. Patients grouped into **Spine** (KL <3 BL hips & knees), **Spine-Hip** (KL>3 BL hips, KL <3 BL knees), **Spine-Knee** (KL>3 BL knees, KL>3 BL hips), **Spine-Hip-Knee** (KL>3 BL hips & knees). Baseline demographics, spinopelvic alignment, and PROMs were compared. Multivariate regression with forward stepwise selection predicted PROMs with variables (demographic, radiographic, OA severity) with significant association identified on Pearson correlation

RESULTS: Included 160 patients: 56 Spine, 32 Spine-Knee, 20 Spine-Hip, and 52 Spine-Hip-Knee. Spine-Hip-Knee patients were older (Spine=62.2, Spine-Knee=61.2, Spine-Hip=59.1, Spine-Hip-Knee=68.5; p<.001) but similar in sex, comorbidities, and frailty; p>.05. Spine-Hip-Knee patients had higher SVA (50.0,30.6,60.5,83.5), T1PA (25.2,20.4,20.3,27.8), GSA (3.7,2.3,4.3,7.5), and KA (0.0,2.1,2.9,10.5); p<.005. SRS total and VR12 PCS scores were similar but VR12-2b climbing stairs (1.73,1.91,1.55,1.40, p=.014) and SRS-8 back pain at rest (2.29,2.84,1.95,2.71, p=.012) were lower in Spine-Hip-Knee and Spine-Hip, respectively. ODI (42.75,35.88,50.30,44.59, p=.040) and ODI Pain (2.88,1.84,2.90,2.46, p=0.019) were higher in Spine-Hip patients; ODI lifting was higher in hip OA patients but not significant (2.95,2.69,3.45,3.35, p>.05). In multivariate analyses, KOA changed the prediction of ODI pain from R^2 0.052 to 0.086 and SRS-8 from R^2 0.077 to 0.147. HOA changed the prediction of VR12-2b from R^2 0.113 to 0.140 and ODI Lifting from R^2 0.175 to 0.202. Frailty impacted PROMs across all models (p<.001) and GSA changed ODI, ODI pain, and VR12-2b models (p<.05).

CONCLUSIONS: Severe hip and knee OA worsen patient-reported disability and physical function in ASD patients. These results quantify the impact of lower limb arthritis on patient reported outcomes, and highlight the need for integrated assessment and management of both spinal alignment and joint health in patients.

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P169. Should pelvic incidence influence realignment strategy? A detailed analysis in adult spinal deformity

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BACKGROUND CONTEXT: Pelvic incidence (PI) serves as the cornerstone for realignment schema to create a more individualized realignment target. Yet, it is not known if outcomes of realignment schema are dependent on the amount of pelvic incidence. The purpose of this study is to assess how varying realignment strategies affect mechanical failure and clinical outcomes in PI-stratified cohorts following ASD surgery.

PURPOSE: The purpose of this study is to assess how varying realignment strategies affect mechanical failure and clinical outcomes in PI-stratified cohorts following ASD surgery.

STUDY DESIGN/SETTING: Retrospective cohort study; Single academic center.

PATIENT SAMPLE: A total of 445 adult patients met radiographic criteria for adult spinal deformity.

OUTCOME MEASURES: Mechanical failure (either a major hardware failure requiring intervention or proximal junctional failure [PJF]); Clinical Improvement at two years: [meeting either: (1) Substantial Clinical Benefit for Oswestry Disability Index (change >18.8), or (2) Oswestry Disability Index <15 and Scoliosis Research Society Total>4.5]; Good Outcome involved meeting Clinical Improvement criteria with absence of mechanical failure by two years.

METHODS: Conditional Inference Tree (CIT) analysis was utilized to define subsets within pelvic incidence generating significantly different rates of mechanical failure. These subsets of pelvic incidence were further analyzed as sub-cohorts for the outcomes and effects of realignment within each. Multivariate logistic regression analysis controlling for baseline frailty and lumbar lordosis (L1-S1) analyzed the association of age-adjusted realignment (Sagittal Age-Adjusted Score [SAAS]; Lafage et al) and Global and Alignment Proportionment (GAP; Yilgor et al) strategies with meeting Good Outcome within PI-stratified groups.

RESULTS: Using CIT analysis, a parabolic relationship between PI and mechanical failure was seen, whereas patients with either less than 51° (n=174; 39.1% of cohort) or greater than 63° (n=114; 25.2% of cohort) of pelvic incidence generated higher rates of mechanical failure (18.0% and 20.0%, respectively) and lower rates of Good Outcome (80.3% and 77.6%, respectively) than those with moderate (51-63°) pelvic incidence (n=145, 32.6% of cohort; 8.9% mechanical failure, 92.2% Good Outcome). Patients with Lower PI (<51°) more often met Good Outcome when under-corrected in age-adjusted PI-LL and SAAS overall (12.3% vs 0.0%;