## Defining a High Risk Adult Spinal Deformity Patient

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INTRODUCTION: High risk committees recently have been instituted at many hospitals, in an effort to minimize operative risk and recruit a multi-disciplinary discussion. Both surgical and medical risk factors can lead to the occurrence of adverse events and prolonged recovery course. Little consensus has been reached as to which components of patient profiles and surgical factors predispose preoperative discussion. We sought to investigate baseline and surgical factors that will identify which adult spinal deformity (ASD) patient presents as a high risk patient.

METHODS:

Operative ASD patients (scoliosis >20º, SVA>5cm, PT>25º, or TK>60º) with available baseline (BL) and 2-year (2Y) radiographic and HRQL data were included. Determination of risk of surgery was assessed by medical and surgical complications. High medical risk was defined as experiencing a major medical complication before 90 days with a negative clinical impact (failing to meet minimal clinically important difference (MCID) for Oswestry Disability Index (ODI)). High surgical risk was defined as experiencing a major surgical complication or revision surgery within two years also with a negative clinical impact. Conditional inference tree machine learning developed threshold cutoffs for continuous variables. Multivariable logistic regression developed medical risk and surgical risk scores.

RESULTS:

A total of 381 ASD patients met inclusion criteria (61.1yrs±14.0, 78%F, BMI: 28.0 kg/m2 ±6.0, CCI: 1.9 ±1.7). Surgically, patients had 11±4.3 levels fused, length of stay was 7.9±4.6, EBL 1476±1434ml, and Op-time 376±133 min, with 63% undergoing an osteotomy, 54% a decompression. In terms of surgical approach, 71% posterior-only and 28% had a combined approach. For High Medical Risk, age >70, BL ODI >56, BL Frailty Index >5, CCI >3, prior revision, history of heart disease, liver disease, lung disease, BL SVA >15cm, BL C7PL >7cm, and BL PI-LL >25 predicted a poor outcome with an AUC of 94% and accuracy of 90%. Patients with a medical risk score greater than -3.7 had a greater likelihood of major medical complication (7.2, p=.04). Patients with at least 1 of these factors had a greater degree of major (21% vs. 5%), mechanical (19% vs. 10%), and overall complications by 2 years (64% vs. 46%, all p<.05). For High Surgical Risk, age >70, BL ODI >56, BMI >34, Frailty >5, BL SVA >15cm, BL C7PL >7cm, BL PI-LL >25, previous surgical fusion, >16 levels fused, 3CO, and >3 interbody fusions predicted poor outcome with an AUC of 91% and accuracy of 90%. Patients with at least 2 of these factors had higher rates of major (20% vs. 9%), mechanical (20% vs. 10%), and overall complications (65% vs. 48%, all p<.05).

DISCUSSION AND CONCLUSION:

Recognition of patient-specific and surgical factors that contribute to a high risk of major medical and surgical complications with poor clinical outcomes will allow surgeons to better profile which patients may require multi-disciplinary collaboration for appropriate perioperative optimization.