

Preoperative Optimization of Modifiable Health Conditions Provides Incremental Benefit in Postoperative Outcomes for Adult Spinal Deformity

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INTRODUCTION:

Recent literature has emphasized the importance of frailty in surgical outcomes for adult surgical deformity (ASD) patients. Modifiable health conditions are a known contributor to frailty and overall comorbidity status. Preoperative optimization in ASD patients has been found to lower costs and postoperative complications however, the effect on PROMs and correction is not yet studied. This study aims to determine the effects of preoperatively optimizing modifiable health conditions on postoperative patient outcomes in operative ASD patients.

METHODS: Adult spinal deformity patients (scoliosis \geq 20°, SVA \geq 5cm, PT \geq 25°, or TK \geq 60°) who underwent surgical correction and had up to 2-year postoperative outcomes data were included. Optimization was analyzed using BMI, diabetes, and osteoporosis/osteopenia with optimized defined as BMI of second or third quartiles, HgbA1c \leq 6%, and treated with an FDA-approved medication for osteoporosis, respectively. Means comparisons and descriptive analyses assessed differences in baseline characteristics. Logistic and linear regression controlling for baseline factors analyzed rates of improvement in postoperative outcomes.

RESULTS: A total of 269 ASD patients (average 56.9 \pm 13.7 years, 59% female, BMI of 29.5 \pm 7.0 kg/m², CCI of 2.4 \pm 2.3) were isolated with an average of 9.5 \pm 5.3 levels fused, operative time of 534.2 \pm 157.4 mins, EBL of 1714.7 \pm 2466.9 mL, and LOS of 6.7 \pm 4.2 days. Overall, 16% were diagnosed with osteoporosis, 2.6% with osteopenia, and 29.1% with diabetes. Of these, 85.7% of osteoporotic patients were optimized, 50.2% had optimal BMI, and 54.1% of diabetics were optimized. By BMI quartile, baseline NRS-Back and ODI both incrementally worsened with increasing BMI quartile (NRS-Back p=.001, ODI p<.001). Patients in the lowest BMI quartile showed less ODI improvement at year 1 compared to the rest of the cohort (8.0 \pm 2.8 vs. 22.7 \pm 25.8, p=.002). Logistic regression controlled for gender and modified frailty index was significant in increasing BMI predicting ODI improvement at 1 year (OR: 1.031 [1.010-7.052], p=.003). Patients with optimized HgbA1c had similar baseline HRQLs (all p>.05) but greater improvement at 1 year in NRS-Back (5.0 \pm 2.8 vs. 2.0 \pm 3.8, p=.037) and NRS-Leg (5.2 \pm 3.4 vs. 1.8 \pm 3.9, p=.033), and 2 year improvement in NRS-Back (5.6 \pm 3.3 vs. 1.7 \pm 3.4, p=.027). Linear regression controlled for age and levels fused was significant in optimized A1c predicting improvement of NRS-Back at 1 year (OR: 0.427 [2.192-5.808], p=.037) and 2 years (OR: 0.506 [1.494-7.315], p=.027).

DISCUSSION AND CONCLUSION: This study sought to quantify how optimizing medical comorbidities such as diabetes, osteoporosis, and nutrition affects postoperative patient outcomes. Patients had improved outcomes with greater medical optimization, indicating its importance in the preoperative surgical planning process. Overall, greater emphasis should be placed on enhancing surgical patients' medical preoperative counseling for improved comorbidity profiles.