Impact of Obesity on Outcomes in Adult Spinal Deformity: A 3-Year Category-Based Analysis

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INTRODUCTION: The impact of obesity on clinical outcomes and HRQL is poorly understood. This study investigated the effect of body mass index on Clinical Outcome and HRQL after corrective surgery for adult spinal deformity (ASD).

METHODS: Inclusion criteria were operative ASD patients (coronal Cobb angle≥20°, SVA≥50mm, PT≥25°, and/or thoracic kyphosis>60°) who underwent ASD corrective surgery, >18yrs with complete baseline (BL) and 3-year (3Y) radiographic and HRQL data. Patients were stratified by body mass index into normal BMI, overweight, and obese groups (<25, 25–30, and >30). Health-related quality of life (HRQL) scores, complication, alignment, and compensatory mechanisms were compared across cohorts using analysis of variance and temporally with paired t-tests. Means comparison tests assessed differences in baseline demographics, surgical details, and perioperative outcomes between normal BMI, overweight, and obese patients. Additionally, multivariable logistic regression and ANCOVA assessed differences in outcomes while accounting for age, CCI, frailty, baseline deformity, and invasiveness.

RESULTS: 340 ASD patients met inclusion criteria (Age: 59.0±15.0; F=78%; CCI: 1.6±1.7). 91 patient were obese. 126 were overweight. 123 has a normal BMI. In terms of demographics, O has significantly higher CCI (2.1 vs 1.7 vs 1.2; p<0.001), m-ASD-FI (11.4 vs 5.5 vs 4.2; p<0.001), age (63.2 vs. 58.5 vs. 56.3; p=0.004), less female.(69% vs 74% vs 89%; p<0.001). In term of surgical details, overweight significantly higher decompression rate (66% vs Obese: 59% vs N:61% ; p=0.013). No significant difference in osteo rate, number of level of fusion, ISSG invasiveness, EBL, Op time, SICU admission rate, and LOS. In terms of HRQL, Obesity has a signicant higher ODI (50.2 vs 40.4; p<0.001), NDI (30.2 vs 24.8; p=0.046, worse SRS total (2.6 vs 2.9; p<0.001), higher NRS-back (7.6 vs 7.0; p=0.021), NRS-leg (5.6 vs 4.2; p<0.001), lower EQ5D (0.73 vs 0.76; p<0.001). At 3Y, obese patient has the highest NRS-leg scores (3.44 vs 3.03 vs 2.38; p=0.044), has the highest ODI (31.7 vs 27.1 vs 23.1; p=0.008), has the lowest PCS (35.9 vs 39.2 vs 44.1; p<0.001), lowest SRS activity (3.31 vs 3.5 vs 3.7; p=), lowest SRS appearance (3.2 vs 3.4 vs 3.7; p=0.001). In terms of opioid usage, obese has the highest SRS-22r-q11 at 6W (31.6% vs 8.2% vs 18.2%; p=0.02). No difference at 6M, 1Y, 2Y, 3Y. In terms of complication, obese group has a significant higher rate of major medical complication before 90D (11.7% vs 6.1%; p=0.048), reoperation before discharged (6.7% vs 1.7%; p=0.007), reoperation before discharged due to surgical complication (5.0% vs 1.5%; p=0.028), after 90 day before 2Y major complication (11.% vs 6.1%; p=0.048), major surgical complication after 90 days before 2 year (11.7% vs 6.1%; p=0.048). In terms of Radiographic complication, obese patient has a higher rate of PJF at 6 weeks (6.6% vs 1.2%; p=0.006).

DISCUSSION AND CONCLUSION: Obesity significantly impacts both spinopelvic alignment and clinical outcomes in adult spinal deformity correction. Obesity was also associated with worse health-related quality of life (HRQL) scores, including higher disability (ODI), more pain (NRS-back/leg), and lower overall physical function (PCS, SRS). Additionally, obese patients experienced higher rates of major complications, reoperations, and radiographic complications, including proximal junctional failure. These findings highlight the challenges in achieving and maintaining optimal alignment in obese patients undergoing ASD corrective surgery, underscoring the need for tailored surgical strategies and intensive postoperative management in this population.