Sarcopenic Obesity: An Underrated Phenomenon Impacting Adult Spinal Deformity Intervention Outcomes

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INTRODUCTION: The amount and quality of tissue do not always positively correlate as is the case with sarcopenic obesity. As the population of elderly people with adult spinal deformity (ASD) continues to increase, sarcopenia (decreased muscle mass) and obesity continue to soar in prevalence, although sarcopenia is underacknowledged. Sarcopenic obesity may impact adult spinal deformity surgery outcomes and better characterize the health of important surrounding structural tissue that is key to alignment.

METHODS: In this retrospective cohort review of a prospectively enrolled database, operative ASD patients with complete baseline (BL) and two-year (2Y) baseline, radiographic, and health related quality of life (HRQL) data were included. Sarcopenia was defined based on the validated European Working Group of Sarcopenia in Older People (EWGOSOP2). Obesity was classified via traditional BMI categories. The cohort with sarcopenic obesity (SO) was compared to a cohort of patients without.

RESULTS: 529 patients met inclusion criteria (mean age: 60.2±14.3, mean BMI: 27.1±5.8, mean CCI 1.6±1.7, mean weighted mASD-FI: 6.5±4.9). In terms of surgical characteristics, mean operative time 414.1±175.3 minutes, mean EBL 1565.9±1387.2, mean levels fused 10.9 ±4.6). 311 patients (58.8%) registered a confirmed diagnosis of sarcopenia, while 100 patients (60.4%) were considered obese. Altogether, 206 (38.9%) of patients demonstrated aspects of SO. The SO cohort was significantly older (61.9 v. 59.1, p=0.032) with a significantly greater number of comorbidities and higher frailty score (p<.001, both). At baseline, patients with SO demonstrated significantly lower baseline lower extremity motor scores (p=.004). Radiographically, SO patients had greater pelvic tilt (25.2 v. 22.9, p=0.018), greater PI-LL (19.6 v. 12.6, p<.001), less lumbar lordosis (41.7 v. 36.3, p=0.004), greater vertebral pelvic angles (p<.01) at T1, T4, T9, L1 and L4, and greater GAP scores indicating higher disproportionality (p=0.032). In terms of complications, SO patients demonstrated considerably higher rates of cardiac complications (83.3% v. 16.7%, p=0.025) and surgical infection (66.7% v. 33.3%, p=0.025).The SO cohort also sustained a significantly greater rates of pseudoarthrosis (64.3% v. 35.7%, p=0.049) and failure with reoperation (60.0% v 40.0%, p=0.027), with a significantly higher rates instrumentation failure (50.7% v. 49.3%, p=0.045). From a prevention perspective, the use of PJK prophylaxis amongst those with SO showed lower rates of screw breakage (p=0.039) and mechanical complications (p=0.004) as opposed to SO patients who did not receive prophylaxis. SO was a positive predictor of instrumentation failure (OR 1.7, p=0.047) while obesity or sarcopenia were not significant predictors alone. SO patients also achieved age-adjusted match goals at a lower rate than non-SO patients (p<.001). Clinically, this manifested as greater back and leg NSR pain scores at every time point up to two years.

DISCUSSION AND CONCLUSION: Sarcopenic obesity appears to significantly hamper outcomes after ASD, and awareness of the patient's muscle quality could guide operative decision-making as well as serve as a valuable target for preoperative optimization through measures such as nutritional counseling and prehabilitation.