Impact of Different Body Mass Index Cutoff Points on Complication Rates following Primary Total Shoulder Arthroplasty

Marissa L Boettcher, Lauren Elizabeth Schell, Alexander Stefano Guareschi, Josef Karl Eichinger[1], Richard J Friedman[1]
[1]Medical University of South Carolina

INTRODUCTION: Increasing body mass index (BMI) is correlated with a less optimal surgical course and postoperative outcomes following total shoulder arthroplasty (TSA). However, the use of BMI cutoffs to stratify complication reduction in TSA has not been studied. The purpose of this study is to determine how different BMI cutoff points impact complication rates and the number of patients denied surgery.

METHODS: The Nationwide Readmissions Database (NRD) was used to identify obese patients (BMI ≥ 30 kg/m^2) undergoing primary TSA between 2015 and 2019. Patient demographics and complication rates for patients in the four highest BMI categories (35-39.99, 40-44.99, 45-49.99, and ≥ 50 kg/m^2) were then compared to individuals in the 30-34.99 kg/m^2range using Chi-square, one way ANOVA, and binary logistic regression, to determine if the degree of obesity impacts these variables.

RESULTS: This study identified 35,701 obese patients who underwent primary TSA and observed a significant decrease in patient age at time of surgery as BMI increased, from 70 years at BMI 30-34.9 kg/m^2 to 64 years at BMI ≥50.0 ($p<0.001$). BMI was also found to be predictive of a longer hospital stay and more comorbidities. There were significant differences between complication and readmission rates for the different BMI groupings (all $p<.001$); however, there was no difference in revision rates in any of the BMI groups. On further analysis of 180-day complications by binary logistic regression, there is a linear increase in risk by increasing BMI. Having a BMI of 40-44.99 or ≥50 kg/m^2 was significantly predictive of hospital readmission ($p<0.001$), while having a BMI of 35-39.99 or 45-49.99 kg/m^2 was significantly predictive of increased mortality ($p=0.004$, OR: 2.917; $p=0.032$, OR: 2.802, respectively). Additionally, there was a significantly increased risk of perioperative complications with ascending BMI, including dislocation, acute renal failure, acute respiratory distress, and thrombosis. Using a BMI cutoff of 40 kg/m^2 allows 65% of obese patients to proceed with a TSA while avoiding nearly 44% of complications. However, using this cutoff results in 10,731 patients (35% of all obese patients) being denied a pain-relieving, and potentially complication-free, procedure.

DISCUSSION AND CONCLUSION:

As the BMI cutoff increases, the number of complications increases in exchange for allowing more obese patients to proceed to surgery. Our results suggest that using a strict BMI cutoff might be inappropriate despite the good intention of risk reduction. Instead, orthopaedic surgeons should consider the additional comorbidities present in their obese patients (e.g., diabetes, hypertension, etc.) to determine which patients are at the highest risk of complications and who to proceed with a TSA. A more holistic approach to determining surgical candidacy will allow more patients to proceed to surgery while minimizing as many complications as possible.