

Stratification of Total Hip Arthroplasty Survival according to BMI as a Continuous Variable

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Introduction: Body Mass Index (BMI) has been associated with increased rates of complications in total hip arthroplasty (THA). There has been no study translating risk of revision with respect to BMI as a continuous variable. Our purpose was to characterize the survival after THA across a continuous range of BMIs.

Methods: 21,406 consecutive THA patients from 1985-2012 were analyzed from a single-institution prospective total joint registry. The average BMI was 28.7 (range, 15-68). 7661 patients (35%) had a BMI >30, and 997 (4%) >40. The average age was 65 years (range, 11-98); 53% of patients were female. Average follow-up after surgery was 7.5 years +/-5.5. The risk of revision surgery associated with BMI was analyzed using the Kaplan-Meier survival method. Comparisons were made using the log-rank test and multivariate regression analysis model. Statistical significance was set at a p-value <0.05.

Results: 1781 revision surgeries were performed. Five-year survivorship rate was 96%; 10-year rate was 90%; and 15-year rate was 79%. The risk of revision surgery was the lowest for BMI 27-32. However, the risks significantly increased (in sigmoidal fashion) for BMIs <27 (p<0.001; hazard ratio 1.04) and >32 (<0.002; hazard ratio 1.03). When referencing the normal BMI range (20-25), BMIs from 25-30 had a significantly decreased revision rate (p<0.04), while BMIs >45 had a significantly increased failure rate (p<0.05). Furthermore, when compared to non-obese patients (BMI <30), although obese (BMI 30-40) patients did not have a difference in implant (p=0.32), morbidly obese patients had a significant increase in risk of revision surgery (p<0.003). Other variables that worsened overall implant survival included younger age (p<0.001), inflammatory arthritis (p<0.05), post-traumatic arthritis (p<0.001), and osteonecrosis (p<0.001).

Conclusion: The rate of revision surgery after THA is associated with BMI. However, the effect of BMI on failure rate increases in a sigmoidal fashion for BMIs <27 and >32. Further study may examine etiologies for this relationship. This study informs the continued debate of impact of BMI on the outcomes after primary THA.