The Effect of BMI on 5-Year Arthroscopic Femoroacetabular Hip Surgery Outcomes: Underweight and Obese Patients Demonstrate a Significantly Higher Risk of Not Achieving Clinically Significant Outcomes, Revision Hip Arthroscopy, or Conversion to Total Hip Arthroplasty

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INTRODUCTION: This large retrospective study sought to determine the relationship between body mass index (BMI) and likelihood of achievement of clinically significant outcomes (CSOs) as well as risk for conversion to total hip arthroplasty (THA) or revision hip arthroscopy after primary hip arthroscopy (HA) for symptomatic femoroacetabular impingement (FAI).

METHODS: A retrospective review identified patients who underwent primary HA for symptomatic FAI with minimum 5-years follow up. Patients were grouped according to BMI as follows: underweight (BMI < 18.5), normal (BMI 18.5 – 24.9), pre-obesity (BMI 25.0 – 29.9), and obesity (BMI > 30.0). CSOs were assessed by achievement of previously defined threshold scores to achieve a Minimal Clinically Important Difference (MCID), Patient Acceptable Symptom State (PASS), and Substantial Clinical Benefit (SCB) at 5-years for the HOS-ADL, HOS-SS, mHHS, and iHOT-12. This study simultaneously evaluated the risk of revision arthroscopy or conversion to THA in the same cohort. Cox proportional-hazards analysis was used to determine the relationship between BMI and risk of failure to meet MCID, PASS, and SCB for any PRO, as well as risk of revision arthroscopy or conversion to THA including continuous variable evaluation using restricted cubic splines.

RESULTS:

A total of 933 patients were included with a mean age and BMI of 34.1 years (SD;12.3) and 25.5 kg/m2 (SD;5.4) with a mean follow up of 5.2 years (range:5.0-10.0). The BMI groups contained 32 underweight, 480 normal, 254 pre-obesity, and 167 obese. All groups demonstrated significant improvement in PROs at 5-years ($p<0.01$ for all). However, obese patients demonstrated significantly lower improvements in HOS-SS ($p=0.035$) and iHOT-12 ($p<0.01$) scores at 5-years. Obese patients also demonstrated significantly lower achievement of MCID/PASS/SCB for the HOS-SS ($p=0.04/<0.01/<0.01$) and iHOT-12 ($p<0.01$ for all) and lower achievement of PASS/SCB for the mHHS ($p<0.01$ for both). Cox proportional hazards model demonstrated an increased risk of failure to achieve CSOs with increasing BMI (mHHS: 3%/1kg/m2, $p=0.01$; HOS-ADL: +3%/kg/m2, $p<0.01$; HOS-SS: 3%/kg/m2, $p=0.01$; iHOT-12: +4%/kg/m2, $p<0.01$). Advanced analysis with cubic splines demonstrated a U-shaped increase in hazards of not achieving CSOs for each PRO, with patients with very low or high BMIs demonstrating highest risk. The highest chance of CSO achievement was a BMI of 24.1 for mHHS, HOS-ADL: 23.0, HOS-SS: 23.9, iHOT-12: 22.4.

A total of 57 patients (6.1%) underwent revision hip arthroscopy and 22 (2.4%) converted to THA during follow up. The highest rate of revision HA was seen in underweight patients at 12.5% compared to 5.8% of those with a normal BMI, 5.1% in pre-obese, and 6.0% of obese patients ($p=0.400$). The highest rate of conversion to THA was seen in obese patients at 3.6% compared to 3.1% of underweight patients, 1.7% of those with a normal BMI, and 2.8% in pre-obese. Cubic splines analysis demonstrated a similar U-shaped increase in hazards of revision HA and conversion to THA with patients with very low or high BMIs demonstrating the highest risk. The lowest risk for revision HA occurred at a BMI of 21.8 for revision HA and 21.6 for conversion to THA.

DISCUSSION AND CONCLUSION: Obese patients demonstrated lower preoperative, 5-year postoperative, and delta PRO scores. However, both high and low extremes of BMI were associated with higher risk of failure to achieve clinically significant benefit and revision HA or THA compared to normal BMI peers.