Novel Process for Major Complication Risk Stratification in Total Hip Arthroplasty Using Preoperative Hemoglobin A1c: A Multicenter Database Study

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INTRODUCTION:
An elevated Hemoglobin A1c (HbA1c) has been associated with increased risk of complications following Total Hip Arthroplasty (THA). Given that nearly 1.5 million patients are newly diagnosed with diabetes each year and that over 450,000 patients undergo THA each year, it's imperative to better understand the risk-benefit continuum associated with chronic, elevated blood sugar to improve shared decision-making between patients and surgeons. The purpose of this study was to determine data-driven HbA1c thresholds to stratify the risk of short-term major complications following THA.
METHODS: A retrospective cohort analysis was conducted using a federated, national database of over 69 million records. Patients who had osteoarthritis of the hip, underwent THA, and had a recorded HbA1c level within three months of surgery were identified via ICD-10 and CPT codes. Distinct HbA1c cutoffs were determined using stratum-specific likelihood ratio (SSLR) analysis, an adaptive method that generates HbA1c thresholds above which the likelihood of major complications is significantly increased. Propensity score matching was then conducted to control for demographics and comorbidities, and adjusted risk ratios with 95% confidence intervals (95%CI) were utilized to assess the 90-day risk of common, major complications using SSLR-designated HbA1c cohorts. The control group was designated as the cohort with the lowest HbA1c range.
RESULTS:
A total of 22,722 patients met inclusion criteria after propensity matching. SSLR analysis reported 3 distinct cohorts of HbA1c ranges: <6.4 (n=18,223), 6.5-7.9 (n=4,119), and >8.0 (n=789). The HbA1c 6.4-7.9 cohort had a 30% increased risk for cardiac complications (95%CI=[1.1-1.6]) when compared to the matched control. The HbA1c >8.0 cohort had a 64% higher risk of anemia (95%CI=[1.2-2.3]) and 69% higher risk of cardiac complications (95%CI=[1.1-2.5]) when compared to the matched control. For both cohorts, there were no differences in other common, major complications when compared to the control group.
DISCUSSION AND CONCLUSION:
An elevated HbA1c is associated with increased risk of major complications following THA. Using stratum-specific likelihood ratios in a nationally representative patient sample, we have identified three distinct HbA1c thresholds above which the risk of major complications is significantly increased. These cutoffs may be incorporated into shared decision-making conversations with patients and in the development of future clinical practice guidelines.