Elevated Preoperative HbA1c Is Associated With Worse PROMIS Outcomes Following Arthroscopic Rotator Cuff Repair

Nicholas James Morriss, Hashim Shaikh, Phillip Tristan Yang, Michaela Lenore Malin, Gregg T Nicandri, Brian D Giordano, Ilya Voloshin, Michael Dennis Maloney, Sandeep Mannava

INTRODUCTION:
Preoperative hemoglobin A1c (HbA1c) level provides a gauge of glycemic control in patients with diabetes mellitus (DM). Prior work has demonstrated that patients with DM may experience poorer outcomes following ARCR; however, granular insight into the specific impact of HbA1c levels on postoperative status is needed. This study evaluates the effect of preoperative HbA1c on achieving the Minimal Clinically Important Difference (MCID) as captured by the Patient-Reported Outcomes Measurement Information System (PROMIS) across physical function (PF) and pain interference (PI) following ARCR. The findings from this work may offer insight into how specific preoperative HbA1c thresholds affect postoperative outcomes and provide impetus for improved glycemic control in patients undergoing ARCR.
METHODS:
We retrospectively reviewed the records of patients who underwent ARCR at our institution between 2015 and 2023. Patients were included if they had a preoperative HbA1c value, preoperative PROMIS PF and PI scores 6 months before ARCR, as well as postoperative scores at least 2 years following ARCR. Higher PF scores are associated with greater physical function, while higher PI scores are associated with greater pain interference. MCID thresholds were determined via a distribution-based method of 0.5 multiplied by the standard deviation of preoperative PROMIS scores for the cohort. Patients were stratified into quartiles based on preoperative HbA1c values as follows: Q1 (<5.3%), Q2 (5.3%–5.9%), Q3 (6.0%–7.0%), and Q4 (≥7.1%). HbA1c values were used to produce receiver operating characteristic (ROC) curves; the area under the curve (AUC) was determined to identify discriminatory capacity, and HbA1c thresholds were computed via Youden's index, which maximizes the difference between true and false positive rates. Univariate logistic regression was performed to assess the impact of quartile assignment on MCID achievement. Statistical significance was set at $p < 0.05$.
RESULTS:
Ultimately, 773 patients were included for analysis; the cohort's mean age was 67.7 ± 8.5 years, 52.5% of patients were female, and the average preoperative HbA1c was 6.4%. Quartile distributions were as follows: Q1 (<5.3%, n = 90), Q2 (5.3%–5.9%, n = 347), Q3 (6.0%–7.0%, n = 200), and Q4 (≥7.1%, n = 129).
Across the quartiles, preoperative and postoperative PF scores differed across groups ($p = 0.002$ and $p = 0.005$ respectively). Patients in Q1 had higher preoperative (42.7 ± 8.1) and postoperative (43.1 ± 8.6) PF scores compared to patients in Q4 (39.9 ± 8.6 preoperatively and 40.1 ± 8.3 postoperatively). Similarly, PI scores varied across quartiles both preoperatively ($p < 0.001$) and postoperatively ($p = 0.001$). Patients in Q1 likewise had lower preoperative (59.5 ± 6.7) and postoperative (56.3 ± 8.6) PI scores, compared to patients in Q4 (62.2 ± 6.9 preoperatively and 59.9 ± 8.7 postoperatively).
Per univariate logistic regression, patients in Q4 had lower odds of achieving MCID for both PF (OR: 0.18; 95% CI 0.10-0.32; $p < 0.001$) and PI (OR: 0.53; 95% CI: 0.30-0.93; $p = 0.025$) compared to patients in Q1. No differences in odds of MCID achievement for PF or PI were observed for patients in Q2 or Q3 compared to Q1.
DISCUSSION AND CONCLUSION:
Increased preoperative HbA1c levels were associated with reduced likelihood of clinically meaningful improvements in PF and PI as captured via PROMIS following ARCR. This finding highlights the importance of glycemic control in optimizing postoperative outcomes.