

Elevated Preoperative Blood Glucose Levels are Associated with Increased Risk of Periprosthetic Joint Infection following Total Hip Arthroplasty

Julian Wier, Kevin Liu, Mary Richardson¹, Brandon Stephen Gettleman, Natalie M Kistler², Nathanael D Heckmann³, Jay R Lieberman²

¹Keck School of Medicine - Department of Orthopaedi, ²Keck School of Medicine of USC, ³Orthopaedic Surgery, Keck School of Medicine of USC

INTRODUCTION:

Hyperglycemia has been identified as a risk factor for periprosthetic joint infection (PJI) following total hip arthroplasty (THA). However, there is no consensus regarding the impact of preoperative blood glucose level (BGL) on the day of surgery and rates of PJI. We sought to determine preoperative BGL thresholds associated with increased risk of PJI.

METHODS:

A healthcare database was retrospectively queried for adult patients who underwent primary, elective THA with a preoperative BGL on day of surgery (preBGL) from January 1, 2016 to December 31, 2021. The association between preBGL and 90-day risk of PJI was modeled using multivariable logistic regression with restricted cubic splines (RSCs). Bootstrap analysis using the Metropolis-Hastings algorithm was used to identify a changepoint. Diabetic (DM) and non-diabetic (non-DM) patients with a preBGL associated with $\geq 50\%$ increase in odds of PJI (high preBGL) were then compared to patients with normal preBGL.

RESULTS:

In total, 90,830 THAs with a recorded preBGL were identified. A preBGL associated with $\geq 50\%$ increase in odds of PJI was found at 277 mg/dL in DM patients (2.1% of cohort) and 193 mg/dL in non-DM patients (2.7% of cohort). Compared to the normal preBGL cohort, those with high preBGL had increased odds of PJI (DM: adjusted odds ratio [aOR]=2.65, 95%-confidence interval [95%-CI]=1.49-4.69, $p=0.001$; non-DM: aOR=1.95, 95%-CI= 1.32-2.89, $p<0.001$) and 90-day readmissions (DM: aOR=1.44, 95%-CI=1.08-1.92, $p=0.013$; non-DM: aOR=1.86, 95%-CI=1.55-2.22, $p<0.001$).

DISCUSSION AND CONCLUSION:

Increased preoperative BGL is associated with increased risk of PJI following primary THA in both DM and non-DM patients. Surgeons should be concerned about non-DM patients with a preBGL >193 mg/dL and DM patients with a preBGL >277 mg/dL.

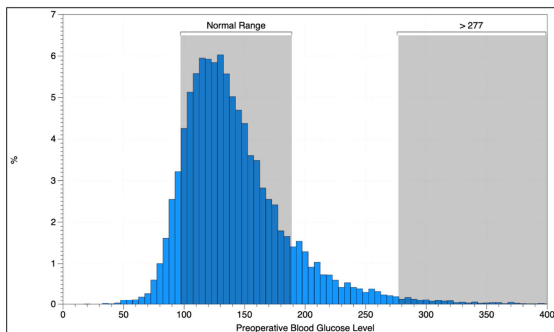


Figure 1. Histogram depicting preoperative blood glucose levels (BGL) of the diabetic cohort. Diabetic patients with “normal BGL” (range 97-189 mg/dL) were compared to those with “high preoperative BGL” (>277 mg/dL).

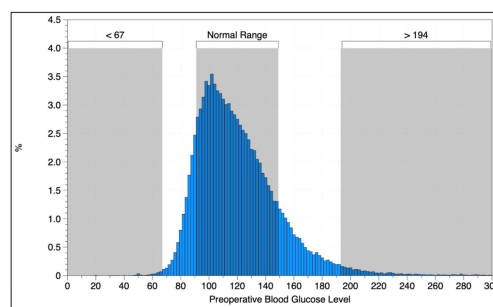


Figure 2. Histogram depicting preoperative blood glucose levels (BGL) of the non-diabetic cohort. Non-diabetic patients with “normal BGL” (range 91-149 mg/dL) were compared to those with “high preoperative BGL” (>194 mg/dL) and “low preoperative BGL” (<67 mg/dL).