

# Does Prolonged Intraoperative Hypotension ( $\geq 60$ mins) Increase Risk of Periprosthetic Joint Infections in Total Joint Arthroplasty?

Alexander G Burbelo, Aidan Keaveny, Alec Phelps, Salvia Zafar, Christopher Potts, Marcus Voigt, Caleb Pawl, Brett Lowden, Matthew W Bullock

## INTRODUCTION:

Periprosthetic joint infection (PJI) is one of the most devastating complications following total joint arthroplasty. Given the substantial morbidity associated with PJI, identifying modifiable perioperative risk factors is essential to improve outcomes. Intraoperative hypotension (IOH), commonly defined as a mean arterial pressure (MAP) of less than 65mmHg, has emerged as a potentially modifiable contributor to adverse outcomes in surgical patients. IOH is believed to impair tissue perfusion and immune function, potentially increasing the risk of postoperative infections. IOH during surgery may compromise microvascular blood flow and tissue oxygenation at the surgical site, which are critical for effective wound healing and immune defense mechanisms. The purpose of this study is to investigate whether prolonged intraoperative hypotension (defined as Mean Arterial Pressure  $< 65$ mmHg) is associated with an increased incidence of PJI within 90 days following primary or revision total knee or hip arthroplasty.

## METHODS:

This retrospective, observational study analyzed 1449 Total Joint Arthroplasty (TJA) patients (1006 TKA and 443 THA) at a single academic institution over a 5-year period, stratifying them by duration of IOH (Mean Arterial Pressure (MAP)  $< 65$ mmHg), with 1369 (94.48%) experiencing  $< 60$  minutes of IOH (low IOH), and 79 (5.52%) experiencing  $\geq 60$  minutes of IOH (prolonged IOH). Demographic information, perioperative information, and postoperative outcomes were assessed using our institution's Electronic Health Record (EHR). Continuous variables were compared using unpaired t-tests (significance =  $p < 0.05$ ), and categorical variables were compared using chi-square or Fisher's exact test (significance =  $p < 0.05$ ) to evaluate the relationship between prolonged IOH and each outcome.

## RESULTS:

Sex, age, BMI, and anesthesia type (general vs regional) were not statistically different between the two hypotension groups. There were significantly less THA patients compared to TKA in the prolonged hypotension group ( $p = 0.006$ ). More patients were diagnosed with hypertension in the low IOH group, and more patients were diagnosed with diabetes in the prolonged IOH group, but neither of these differences were statistically significant ( $p = 0.099$ ,  $p = 0.431$ ). As expected, the average minutes of MAP  $< 65$ mmHg was significantly different between the two hypotension groups (5.22 vs 72.25,  $p < 0.001$ ). The incidence of PJI was higher in the prolonged IOH group, but this difference was not statistically significant (0.8% vs 1.3%,  $p = 0.659$ ). 30-day readmission rates were higher in the low IOH group (2.34% vs 1.3%,  $p = 0.535$ ), while 90-day readmission rates were higher in the prolonged IOH group (1.68% vs 2.53%,  $p = 0.572$ ).

## DISCUSSION AND CONCLUSION:

There was no significant difference in PJI risk, 30-day readmission rates, or 90-day readmission rates between patients who experienced low IOH and prolonged IOH, and confounding variables were generally similar between both groups. Interestingly, people who underwent TKA were significantly more likely to experience prolonged IOH, but the effect of this difference remains unclear. The prolonged IOH group had a relatively small sample size compared to the low IOH group, and a post-hoc power analysis concluded that our study only had a power of 6.8% to detect a true difference in PJI rates ( $h \approx 0.046$ ). PJI occurs in only  $\sim 1\%$  of TJAs, and is a rare complication that will require a much larger sample size. More patients are needed in our prolonged IOH group to reliably assess the risk of PJI and lower the probability of a Type II error.

Table 1: Effect of  $\geq 60$  min Intraoperative Hypotension

Variable	<60 min Hypotension		$\geq 60$ min Hypotension		p-value
	Mean	SD	Mean	SD	
# Patients		1369		79	
Male (%)	44.1	49.7	36.7	48.5	0.197
Age (years)	65.1	9.5	63.5	9.2	0.135
BMI	35.0	13.1	35.1	6.7	0.834
THA (%)	30.9	46.3	16.5	37.3	0.006
30-day Readmit (%)	2.3	15.1	1.3	11.3	0.535
90-day Readmit (%)	1.7	12.9	2.5	15.8	0.572
Regional Anes (%)	83.3	37.3	88.6	32.0	0.219
Hypertension (%)	78.7	40.9	70.9	45.7	0.099
Diabetes (%)	28.8	45.3	32.9	47.3	0.431
MIN65 (minutes)	5.2	12.0	72.3	16.1	<0.001
PJI (%)	0.8	8.9	1.3	11.3	0.659

**Legend:** THA = Total Hip Arthroplasty (vs. TKA); 30-day/90-day Readmit = All-cause readmission rates; Regional Anes = Regional anesthesia (vs. general); HT = Hypertension; DM = Diabetes Mellitus; MIN65 = Minutes intraoperative MAP <65 mmHg; PJI = Prosthetic Joint Infection within 90 days.

**Statistical Tests:** Continuous variables (Age, BMI, MIN65) were compared using independent samples *t*-tests. Categorical variables were compared using chi-square or Fisher's exact tests where appropriate.