Spinal vs. General Anesthesia Use in Total Knee Arthroplasty: Are there Differences in Complication and Readmission Rates?
Nathanael D Heckmann, Kimberly Porter, Ayushmita De, Jeffrey Benjamin Stambough

1University of Arkansas For Medical Sciences

INTRODUCTION:
Spinal anesthesia has been used with increased frequency during total knee arthroplasty (TKA) due to purported benefits such as less blood loss, lower rates of allogeneic blood transfusion, and lower rates of venothromboembolic complications. However, little is known regarding differences in complication rates between spinal and general anesthesia when used during TKA. Therefore, the purpose of this study is to report on complication and readmission rates among patients who received spinal and general anesthesia during TKA utilizing the American Joint Replacement Registry (AJRR).

METHODS:
AJRR data was used from 2017-2020 to identify primary TKA procedures. The dataset was merged with the Centers for Medicare and Medicaid Services (CMS) claims database to supplement cases not captured in the AJRR. Cases with incomplete, missing, or combined spinal and general anesthesia were excluded. Patients were divided into two cohorts, general (GN) and spinal (SP), based on the mode of anesthesia administered during the index surgery. Outcome variables included 30-day readmission, 90-day revision, length of stay (LOS), and operative time. Early revision was defined as a revision surgery within 90 days of the index procedure. Hospital size and teaching status were defined using the American Hospital Association (AHA) Data Survey Fiscal Year 2015. Statistical differences between groups were determined using the chi-square test for categorical variables. Multivariable logistic regression analysis was used to evaluate the association between the four outcome measures and anesthesia type adjusting for potential confounders including age, body mass index (BMI), gender, Charlson Comorbidity Index (CCI), region, hospital size, and hospital teaching status.

RESULTS:
In total, 270,251 TKAs were identified, of which 126,970 (47.0%) received general anesthesia and 143,281 (53.0%) received spinal anesthesia. The average age (GN 66.6±10.6 years vs. SP 67.7±9.2 years, p<0.0001) and proportion of males (GN 38.8% male vs. SP 39.0% male, p<0.0001) were clinically similar but statistically different between the two cohorts. Patients who received general anesthesia had a slightly higher CCI (GN 0.5±1.1 vs. SP 0.4±0.9, p<0.0001) and BMI (GN 33.1±7.2 vs. SP 32.3±6.5, p<0.0001) compared to patients who received spinal anesthesia. The average LOS was greater in the general anesthesia group (GN 2.2±3.0 days vs. SP 1.7±1.2 days, p<0.0001). After accounting for confounding factors, spinal anesthesia was associated with lower rates of 90-day readmission (OR 0.845, 95% confidence interval [CI] 0.790-0.904, p<0.0001), lower risk of 90-day all-cause revision (OR 0.506, 95% CI 0.462-0.555, p<0.0001), lower risk of having a length of stay >3 days (OR 0.470, 95% CI 0.454-0.487, p<0.0001), but a slightly higher likelihood of having an operative time greater than the median operative time (OR 1.075, 95% CI 1.056-1.094, p<0.0001).

DISCUSSION AND CONCLUSION: In the AJRR database, spinal anesthesia was associated with a lower 30-day readmission rates and a lower risk undergoing revision TKA within 90-days. These results may be limited by short-term follow up and unidentified confounding factors.