# Regional Anesthesia is Associated with Lower Risk of Blood Transfusion in Total Hip Arthroplasty

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INTRODUCTION: Total hip arthroplasties (THA) place a significant financial burden on the healthcare system that continues to increase with an aging population. The use of regional anesthesia (RA) for orthopedic procedures is a growing area of research that has shown promise as an alternative to general anesthesia (GA). This study aimed to assess the effect of anesthesia modality on risk of blood transfusions among patients who underwent THA.

METHODS:
The National Surgical Quality Improvement Program (NSQIP) database was queried for cases of primary THA performed between 2012 to 2020. The main exposure variable was anesthesia modality. Cases were divided into two cohorts by anesthesia modality: RA or GA. The primary outcome was transfusion and defined as occurring during the intraoperative or postoperative period and within 72 hours of incision. Potential confounders included basic demographics, baseline health status, and surgical parameters. Univariate analyses utilized chi square to identify cohort differences. Multivariable regression analysis controlling for confounding was used to assess anesthesia modality on odds of transfusion.

RESULTS: Of the 138,195 patients identified during the study period, 133,260 (96.4%) patients received GA, and 4,935 (3.5%) patients received RA. In both cohorts, the highest proportion of patients had age 60-69 years, female sex, obesity, White race, non-Hispanic ethnicity, and ASA class 2 [Table 1]. 208 (4.2%) of RA patients and 10,887 (8.2%) of GA patients received blood transfusion. On multivariable regression analysis adjusting for potential confounding, patients who had RA versus GA had 0.59 times lower odds (95% CI 0.51 to 0.69; p<0.001) of receiving blood transfusion [Table 2].

DISCUSSION AND CONCLUSION:
Patients who receive RA versus GA for THA have lower risk of blood transfusions. Further studies for strategies for minimizing the need for blood transfusion among patients who require general anesthesia may help to reduce resource utilization and optimize outcomes.

Table 1: Univariate Analysis of Patients Undergoing Total Hip Arthroplasty with Regional versus General Anesthesia

| | Regional (N=4935) | General (N=133260) | P-value |
|---|---|---|---|
| **Age** | | | |
| 18-49 | 467 (9.5%) | 11861 (8.9%) | |
| 50-59 | 1029 (20.9%) | 28798 (21.6%) | |
| 60-69 | 1670 (33.8%) | 45248 (34.0%) | 0.537 |
| 70-79 | 1253 (25.4%) | 33649 (25.3%) | |
| 80-89 | 466 (9.4%) | 12541 (9.4%) | |
| 90+ | 50 (1.0%) | 1163 (0.9%) | |
| **Sex** | | | |
| Female | 2605 (52.8%) | 73280 (55.0%) | 0.002 |
| Male | 2330 (47.2%) | 59980 (45.0%) | |
| **BMI** | | | |
| Normal | 958 (19.5%) | 24702 (18.7%) | |
| Underweight | 38 (0.8%) | 1308 (1.0%) | 0.049 |
| Overweight | 1610 (32.8%) | 42197 (31.9%) | |
| Obese | 2299 (46.9%) | 64135 (48.5%) | |
| **Race** | | | |
| White | 4171 (84.5%) | 105562 (79.2%) | |
| Black or African American | 244 (4.9%) | 12708 (9.5%) | |
| Asian | 85 (1.7%) | 2013 (1.5%) | <0.001 |
| American Indian or Alaska Native | 13 (0.3%) | 663 (0.5%) | |
| Other Race | 14 (0.3%) | 352 (0.3%) | |
| Unknown/Not Reported | 408 (8.3%) | 11962 (9.0%) | |
| **Hispanic Ethnicity** | | | |
| No | 4361 (88.4%) | 114854 (86.2%) | |
| Yes | 90 (1.8%) | 5006 (3.8%) | <0.001 |
| Unknown | 484 (9.8%) | 13400 (10.1%) | |
| **ASA Classification** | | | |
| 1 - No Disturb | 246 (5.0%) | 3698 (2.8%) | |
| 2 - Mild Disturb | 2886 (58.5%) | 64373 (48.3%) | <0.001 |
| 3 - Severe Disturb | 1730 (35.1%) | 61638 (46.3%) | |
| 4+ Life Threat/Moribund | 69 (1.4%) | 3441 (2.6%) | |
| **Wound Classification** | | | |
| 1 - Clean | 4908 (99.5%) | 132329 (99.3%) | |
| 2 - Clean/Contaminated | 13 (0.3%) | 590 (0.4%) | 0.138 |
| 3 - Contaminated | 9 (0.2%) | 159 (0.1%) | |
| 4 - Dirty/Infected | 5 (0.1%) | 182 (0.1%) | |
| **Smoking Status** | 470 (9.5%) | 18985 (14.2%) | <0.001 |
| **Immunosuppressive Therapy** | 208 (4.2%) | 5484 (4.1%) | 0.757 |
| **Diabetes and Treatment** | | | |
| No | 4428 (89.7%) | 115394 (86.6%) | |
| Insulin | 117 (2.4%) | 4570 (3.4%) | <0.001 |
| Non-Insulin | 390 (7.9%) | 13296 (10.0%) | |
| **Origin Status - From Institution** | 43 (0.9%) | 2515 (1.9%) | <0.001 |
| **Case Acuity: Emergent** | 23 (0.5%) | 1816 (1.4%) | <0.001 |
| **Inpatient/Outpatient** | | | |
| Inpatient | 4480 (90.8%) | 126571 (95.0%) | <0.001 |
| Outpatient | 455 (9.2%) | 6689 (5.0%) | |
| **Functional Status Prior to Surgery** | | | |
| Independent | 4777 (97.1%) | 129185 (97.4%) | |
| Partially Dependent | 142 (2.9%) | 3226 (2.4%) | 0.01 |
| Totally Dependent | 2 (0.0%) | 236 (0.2%) | |
| **Operative Time** Mean (SD) | 93.2 (39.2) | 98.7 (43.1) | <0.001 |
| **Transfusion Occurrence** | 208 (4.2%) | 10887 (8.2%) | <0.001 |

## Table 2: Adjusted Multivariable Regression of Anesthesia Modality and Transfusions

| | OR[7] | 95% CI[7] | p-value |
|---|---|---|---|
| **General** | Ref | -- | -- |
| **Regional** | 0.59 | 0.51 - 0.69 | <0.001 |

[7] CI = Confidence Interval, OR = Odds Ratio