Morbidity and Mortality Following Total Hip and Knee Arthroplasty with Spinal vs. General Anesthesia: A Retrospective Analysis

University of Colorado Anschutz Medical Campus

Carlos Mucharraz, M.D[1]., Samantha Diulus, B.S.[2], Daniel Schmitt, M.D.[2], Nicholas Brown, M.D.[2]

[1]University of Colorado Anschutz Medical Campus, [2]Loyola University Chicago Stritch School of Medicine

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Background

Despite longstanding debate surrounding anesthesia in total joint arthroplasty, the topic remains controversial, and an optimal anesthetic mode has yet to be clearly identified. Historically, general anesthesia (GA) was recommended for total hip and knee arthroplasty (THA, TKA); however, in more recent years, spinal anesthesia (SA) has become more popular, especially in elderly patients with comorbidities [3]. Although multiple investigators have explored this topic, their conclusions are conflicting. Some studies have reported increased incidence of hypotension, motor blockade, urinary retention, and pruritis with SA [1,5,7,10]. On the other hand, some authors have reported increased blood loss, length of hospital stay, nausea, infection, and thromboembolic events with GA [4,8,9].

In comparison, hip fracture literature does not demonstrate superiority of SA or GA with multiple authors concluding that both methods are viable and comparable in morbidity and mortality [2,6,11]. This difference in reporting is interesting considering the similarities between THA and hip fracture repair. Therefore, despite previous studies examining anesthesia techniques in total joint arthroplasty, there is more room to explore this topic.

Objectives

The purpose of this study is to further investigate the relationship between total joint arthroplasty outcomes and anesthesia type in order to determine if there is a significant difference in morbidity and mortality between patients undergoing spinal anesthesia compared with those undergoing general anesthesia during primary total hip and knee arthroplasty.

Methods

Patients undergoing primary total hip or knee arthroplasty from February 2007 to February 2021 were retrospectively reviewed. From this population, two cohorts were created: GA (n = 2154) and SA (n = 3152). Readmission within 90 days, mortality within one year, and thromboembolic events in the postoperative 30 days were compared using logistic regression analysis. The multivariate model controlled for age and Charlson Comorbidity Index (CCI).

Results

There were several statistically significant difference in demographics between the two groups. This is outlined in Table 1.

Data

There was no difference in the odds of 90-day readmission or pulmonary embolism (PE) between the groups. The GA group demonstrated higher odds of experiencing a deep venous thrombosis (DVT) within 30 days postoperatively as well as higher odds of mortality within one year postoperatively in both the bivariate and multivariate logistic regression models. Table 2 details these findings.

Table 1. Demographics

	General Anesthesia n = 2154	Spinal Anesthesia n = 3152	p-value
Age (years)	63.51 ± 11.95 (20-94)	65.45 ± 10.35 (20-98)	**< .001**
BMI (kg/m2)	32.30 ± 8.71 (15.8-74.4)	32.50 ± 7.46 (15.2-64.1)	**0.02**
Sex, n (%)			0.441
Male	811 (37.7)	1221 (38.7)	
Female	1343 (62.3)	1931 (61.3)	
CCI	3.76 ± 2.82 (0-17)	3.87 ± 2.70 (0-18)	**0.018**

Values presented as mean ± SD unless otherwise indicated.
BMI: body mass index; CCI: Charlson Comorbidity Index; SD: standard deviation

Table 2. Postoperative Morbidity and Mortality According to Anesthesia Type

	General Anesthesia	Spinal Anesthesia	Bivariate logistic regression		Multivariate logistic regression	
	n = 2154	n = 3152	OR (95% CI)	p-value	OR (95% CI)	p-value
Thromboembolic Events						
DVT	69 (3.2)	58 (1.8)	1.77 (1.24-2.52)	**0.002**	1.66 (1.01 - 2.71)	**0.044**
PE	19 (.009)	18 (.006)	1.55 (0.81 - 2.98)	0.185	1.16 (0.51 - 2.59)	0.715
Readmission within 90 days	300 (13.9)	397 (12.6)	1.12 (0.96 - 1.32)	0.158	1.19 (0.98 - 1.44)	0.076
Mortality within 1 year	32 (.015)	20 (.006)	2.36 (1.36 - 4.21)	**0.003**	2.39 (1.00 - 5.79)	**0.05**

Values are presented as n (%).
OR: odds ratio; CI: confidence interval.
Odds ratio represents the odds of an event occurring in the GA group compared to the SA group.
Multivariate model was adjusted for age and CCI

Conclusion

Based upon this data, both spinal and general anesthesia are reasonable options for primary total joint arthroplasty with similar risk profiles. However, general anesthesia may be associated with a higher rate of DVT.

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