

Propensity-matched analysis of general versus spinal anaesthesia for patients undergoing ankle fracture surgery

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Introduction/Purpose: The choice of anaesthesia is a modifiable risk factor in optimizing post-operative outcomes in hip and knee surgery, with decreased rates of transfusion, thromboembolic events, and infection with the use of spinal anaesthesia versus general anaesthesia. Regional anaesthesia has been evaluated with respect to its effect on early pain in patients undergoing ORIF of the ankle, but there is no data regarding complication rates. The purpose of this study was to compare operating time, length of stay, and rates of post-operative adverse events within 30-days in patients undergoing open reduction and internal fixation (ORIF) of the ankle using spinal vs. general anaesthesia.

Methods: Adult patients who underwent ORIF of a closed ankle fracture from 2012 to 2016 were identified from the American College of Surgeons National Surgical Quality Improvement Program database. Patients who were operated on after admission from the ED are not included in the database. Operative time (skin to skin), length of stay, thirty-day adverse events, and unplanned readmissions were compared between patients who received general anaesthesia and those who received spinal anaesthesia. Propensity-adjustment with respect to known risk factors for complications and adjunctive regional block was used to match patients using a 1:4 ratio of spinal to general anaesthesia. Adverse events tracked included wound dehiscence, surgical site infection (superficial and deep), sepsis, venous thrombotic events, cardiac events, prolonged intubation, need for unplanned intubation, return to operating room, pneumonia, urinary tract infection, renal insufficiency, and re-admission within 30 days. Comparisons were performed using a propensity based multivariate analysis.

Results: Of the 10,795 patients meeting inclusion criteria, 9,862 (91.4%) were treated with only general anaesthesia and 933 (8.6%) were treated with only spinal anaesthesia. Using propensity-scored matching, 822 patients in the spinal cohort were matched to 3,288 patients in the general cohort with similar baseline demographics (61.5% female, mean age 56.4). Procedure performed was similar in both cohorts (47% lateral malleolus ORIF, 34% bimalleolar ORIF, 10% trimalleolar ORIF, 8% medial malleolus ORIF, 1% posterior malleolus ORIF). Spinal anaesthesia was associated with increased length of stay (+0.5 days, 95% confidence interval (CI) 0.20-0.75, $p<0.001$) and increased mortality (0.6% vs 0.2%, OR: 4.02, 95% CI 1.15-14.1, $p=0.03$). Rates of overall complications (4.0% vs 4.2%) and readmissions (0.8% vs 0.7%) were similar and available in Table 1.

Conclusion: General anaesthesia is predominantly used for fixation of ankle fractures. While spinal anaesthesia is associated with lower complication rates in hip and knee surgery, we found no advantage in patients undergoing ORIF of the ankle.

Table 1. Univariate Analysis of 30-Day Complication After ORIF Ankle Fracture

	Spinal Anesthesia	General Anesthesia	<i>P</i>
Total	822	3288	
Any Complication	33 (4)	136 (4.1)	<i>0.953</i>
Major Complications	17 (2.1)	76 (2.3)	<i>0.773</i>
Deep Infection	0 (0)	19 (0.6)	<i>0.058</i>
Sepsis	0 (0)	9 (0.3)	<i>0.278</i>
Septic Shock	1 (0.1)	1 (0)	<i>0.86</i>
Wound Dehiscence	2 (0.2)	10 (0.3)	<i>1</i>
Pulmonary embolism	2 (0.2)	10 (0.3)	<i>1</i>
Ventilator >48 h	0 (0)	5 (0.2)	<i>0.576</i>
Unplanned intubation	1 (0.1)	6 (0.2)	<i>1</i>
Acute renal failure	0 (0)	1 (0)	<i>1</i>
Myocardial infarction	3 (0.1)	0 (0)	<i>0.885</i>
Return to operating room	9 (1.1)	45 (1.4)	<i>0.656</i>
Mortality	5 (0.6)	6 (0.2)	<i>0.083</i>
Minor Complications	18 (2.2)	82 (2.5)	<i>0.704</i>
Superficial SSI	9 (1.1)	17 (0.5)	<i>0.105</i>
Pneumonia	3 (0.4)	14 (0.4)	<i>1</i>
Urinary Tract Infection	4 (0.5)	30 (0.9)	<i>0.322</i>
DVT or thrombophlebitis	1 (0.1)	20 (0.6)	<i>0.14</i>
Renal insufficiency	2 (0.2)	1 (0)	<i>0.194</i>
Transfusion	5 (0.6)	24 (0.7)	<i>0.889</i>
Unplanned Readmission	19 (2.3)	81 (2.5)	<i>0.656</i>
Operating Time: mean (SD)	75.9 (53.6)	78.2 (46.5)	<i>0.215</i>
Length of Stay: mean (SD)	2.4 (3.8)	1.9 (3.8)	<i>< 0.001</i>

*Percentage of patients with presence of complication shown in parentheses