

Is it Safe to Operate on Therapeutically Anticoagulated Hip Fractures?

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Purpose: Delays in surgical intervention for hip fractures have been shown to increase morbidity. Therapeutic international normalized ratios (INRs) are often a reason for surgical delay. Limited data exist demonstrating that optimizing INR levels to subtherapeutic values decreases the morbidity and mortality of surgery. The purpose of this study was to compare the safety of surgical intervention in hip fracture patients with subtherapeutic and therapeutic INR values.

Methods: A multicenter, retrospective analysis was performed on prospectively collected data for a consecutive series of surgically managed hip fracture patients over a 7-year period. Exclusion criteria included patients on any anticoagulant other than warfarin or aspirin or if they had an elevated INR from an underlying medical condition. Fresh-frozen plasma and vitamin K were administered per surgeon discretion. Patients with operative INR values of 1.5 to 2.0 and 2.0 to 3.0 were compared to patients with operative INR values under 1.5 (control). The primary outcome measure was the rate of major complications (inpatient death, increased level of care, acute infection, cardiovascular event, or return to operating room [OR]). Secondary outcome measurements include all complications, the rate of blood transfusions, 30-day mortality, length of stay, and time to operative intervention from admission. A Fisher exact test was employed to test the categorical variables and t tests were used for continuous variables with statistical significance set at 0.05.

Results: 730 patients who sustained hip fractures were identified with 222 on chronic warfarin therapy. 107 patients had INR values between 1.5 and 2.0 at the time of surgery, and 84 patients had INR values between 2.0 and 3.0 at the time of surgery. 539 patients had operative INR values less than 1.5 (control). Control group demographics including age, injury, American Society of Anesthesiologists (ASA) score, and implant type were not statistically different than the therapeutic INR patients. Only length of stay was statistically different in the 1.5-2.0 group compared to the control cohort (6.65 vs 5.71 days, $P = 0.039$). All other measurements did not reach statistical significance (Table 1). No statistical difference was found in the 2.0-3.0 INR group compared to the control on any outcome measure (Table 2).

Conclusion: Delaying surgical intervention for an INR less than 3.0 in hip fracture patients may have limited clinical benefit. It is unclear if reversing the INR of patients on chronic anticoagulation is necessary. Expedient surgical treatment of therapeutically anticoagulated patients demonstrates no increased rate of transfusions, 30-day mortality, or complications.

	Factors ¹	Overall	Cluster 1	Cluster 2	Cluster 3
Risk ²	Pain	4.6 (2.7)	3.3 (2.2)	5.1 (2.4)	7.1 (2.1)
	Depression	7.7 (5.9)	3.8 (3.5)	8.4 (4.0)	16.3 (4.6)
	PTSD	16.7 (14.6)	7.6 (7.3)	16.8 (9.0)	41.3 (10.7)
	Alcohol Abuse, n (%)	80 (12)	25 (8)	42 (17)	13 (12)
	Tobacco Use, n (%)	198 (29)	41 (13)	97 (38)	60 (52)
Protective ³	Resilience	6.5 (1.6)	7.1 (1.3)	6.2 (1.6)	5.5 (1.7)
	Social Support	2.1 (1.0)	3.6 (0.7)	2.9 (1.0)	2.5 (1.3)
	Return to Work	7.2 (2.9)	9.1 (1.3)	5.9 (2.8)	5.0 (2.9)
	Manage Finance	5.9 (3.3)	8.2 (2.1)	4.0 (2.7)	3.6 (3.0)

¹ Results expressed as mean (SD), except where otherwise indicated.

² Ranges (clinical cut-point): Pain: 0-10 (≥ 5); Depression: 0-30 (≥ 10); PTSD: 0-68 (≥ 30).

³ Ranges: Resilience: 0-8; Social support: 0-4; Return to work: 1-10; Manage finance: 1-10.