

Analysis of Blood Loss Prior to Admission, Due to the Wait for Theater and Due to Surgery in Hip Fracture Patients

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Purpose: Perioperative hypotension is a risk factor for mortality in hip fracture patients. We have accepted the role in major trauma patients for aggressive resuscitation, major transfusion protocols, and early administration of tranexamic acid (TXA), but not in hip fracture patients. Do we underestimate the blood loss caused by fracture prior to arrival in the Emergency Department (ED) and the ongoing blood losses prior to surgery? The aim of this study was to determine and investigate the effect on outcome, of blood loss in the interval between (1) injury and admission, (2) ED and theater, and (3) operative losses in the first 24 hours.

Methods: All patients admitted with a hip fracture over 12 months to a Level I trauma center having a full blood count (Hb/Hct) within 90 days prior to admission, on admission, immediate preoperative, and day 1 postoperative were included. Blood loss was determined using the Nadler and Mercuriali methods, accounting for transfusions between blood samples. Three intervals were compared: injury losses pre-ED (T1), interval ED to surgery (T2), and operative losses for first 24 hours (T3). Interval blood loss, fracture type, anticoagulants, and surgery type were analyzed, along with the effect on transfusion rates and mortality.

Results: Of 936 patients, 366 were eligible for inclusion and had full data sets including preinjury Hb/Hct within 90 days prior to fracture. Median age was 82.5 years with a female predominance (67.5%). Intracapsular (IC) fractures were more common (59.6%). Modal American Society of Anesthesiologists (ASA) grade was 3. Oral anticoagulants were present in 52.5% of patients. Blood loss was significantly higher for extracapsular (EC) fracture at each time point versus IC fractures (all $P < 0.01$). Overall, median blood loss from injury to day 1 postoperative were significantly higher for EC fractures versus IC fractures (490.4 vs 244.1 mL; $P < 0.001$), AO A3>A2>A1 vs IC fracture types (843.6 vs 556.6 vs 290.0 vs IC 244.1; $P < 0.001$) and higher for those receiving an intramedullary nail versus a dynamic hip screw, hemiarthroplasty, or total hip replacement (674.8 vs 314.5 vs 224.9 vs 255.2, respectively; $P < 0.001$). Largest median blood loss was seen at T3>T1>T2 (172.4 vs 49.8 vs 49.5; $P < 0.001$). Preoperative transfusion (T2) rate was 63/366 (98 units) versus 68/366 (82 units) postoperatively (T3), which was not significantly different ($\chi^2(1) = 0.232$; $P = 0.6297$). Mortality was 5.7% at 30 days, and 27.9% at 1 year. At 1 year, mortality was higher for males versus females (44.5% vs 19.9%; $P < 0.001$), a procedure that was not a total hip replacement ($P = 0.017$), and those on anticoagulant medication (32.8% vs 29.7%; $P = 0.035$).

Conclusion: Blood loss in hip fracture patients is significant, even prior to surgery. EC fractures subsequently treated with intramedullary nailing (A3) have the largest blood loss at all time points. There is significant blood loss and transfusion demand as a result of the injury, and the wait for surgery. TXA administration at time of diagnosis may mitigate against this.