

Iron Depletion Persists at 3 Months from Fracture Surgery

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INTRODUCTION: Recent studies show that 95% of patients meet criteria for injury-associated anemia immediately after fracture surgery, with hypothesized temporary impacts on patient iron stores and, subsequently, potential negative consequences for patient’s fatigue, mental health, and fracture healing. The duration of this anemia, impact on iron reserves and length of time recommended for ongoing follow up and intervention is not known at this time.

METHODS: This study was approved by the Ethics Committee. We conducted a prospective observational study including all patients requiring orthopedic surgery for lower extremity fracture management between September 2023 and December 2024 at a level 1 academic trauma center. Baseline blood counts and iron studies were collected on postoperative day 1. Patients were offered anemia testing at routine 3 month follow up. A statistical comparison using paired students t-test was completed for each laboratory value.

RESULTS: 56 patients elected for follow up anemia assessments. At 3 months anemia was persistent in 19 (34%) patients. Ferritin decreased in 48 (86%) patients. The mean 3-month postoperative ferritin was 57.2 (reference range 51-200 ng/mL) with an average decrease of -114 ng/mL from screening labs (p=0.0006, CI 62) at the time of fracture surgery. 16 patients had received perioperative iron infusions as part of their routine care; only 4 (25%) demonstrated persistently low ferritin at 3 months compared to 25 (45%) patients who had not received iron infusions initially (mean ferritin 104 vs 45 ng/mL, p<0.05). Twenty-nine total patients (52%) qualified for an iron infusion at 3 months on the basis of their low ferritin. The prevalence of perioperative anemia was 100%. During their initial inpatient care, fifteen patients (27%) had reached transfusion requirements in the hospital; sixteen (29%) patients received iron infusions in the period between discharge and 3 months.

DISCUSSION Functional iron deficiency and anemia are common and under-recognized following fracture surgery. Over 50% of patients qualified for iron infusion at 3 months following orthopedic trauma surgery. Further investigation is needed to identify whether iron monitoring and repletion may be beneficial for fracture patients, both at the time of trauma and during follow up.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): Functional iron deficiency and anemia are common and under-recognized following fracture surgery. Over 50% of patients qualified for iron infusion at 3 months following orthopedic trauma surgery. Further investigation is needed to identify whether iron monitoring and repletion may be beneficial for fracture patients, both at the time of trauma and during follow up.

REFERENCES: Peterson DF, McKibben NS, Duke VR, Hutchison CE, Yang CJ, Curtis C, Lancaster K, Trapalis T, Choi D, Shatzel JJ, Dekeyser GJ, Friess DM, Schreiber MA, Aslan JE, Nakayama K, Willett NJ, Working ZM. Injury-associated anemia and iron homeostasis following orthopaedic trauma: a prospective observational study of 844 patients. J Orthop Trauma. 2025 Jun 9. doi: 10.1097/BOT.0000000000003027. Epub ahead of print. PMID: 40488532.

IMAGES AND TABLES:

<i>Laboratory Value</i>	Hemoglobin	Hematocrit	Platelet Count	Ferritin
<i>Reference Range (Unit)</i>	M13.5-17.5 F 12.0-16.0(g/dL)	M 41.0-53.0 F 36.0 - 46.0 (%)	150-400 (K/mm ³)	51-200 (ng/mL)
Mean Perioperative Value	9.6	28.9	189.1	139.3
Mean Postoperative Value	13.3	40.7	261.7	57.2
#Abnormal POD1 (%)	56 (100%)	56 (100%)	15 (27%)	5 (9%)
#Abnormal at 3 months (%)	19 (34%)	16 (29%)	1 (2%)	29 (52%)
Mean Change (Stdev)	3.8±1.9	11.7±5.5	58±94	-114±234
p-value	P<0.0005	P<0.0005	P<0.0005	P=0.0006
Confidence Interval	0.5	1.5	25	63

All comparisons and p –values above refer to comparison between posotoperative day one and 3 month visit values. POD1 = postoperative day one; m = male; f = female.

