



Research Week 2020

Blood Loss in Acetabular Surgery; Consequence of Fracture Pattern and Surgical Approach

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Keywords

acetabulum; fracture; bloodloss

Abstract

Purpose

Intraoperative blood loss (IBL) in acetabular fracture care is rarely minor; accurate IBL prediction and measurement may improve intra and postoperative care in high blood loss operations. The purpose of this study is to determine the impact of fracture pattern and surgical approach on IBL during acetabular surgery, investigated using a novel, quantitative, formulaic approach.

Methods

All patients presenting to our Level 1 academic trauma center receiving unilateral acetabular ORIF were reviewed (2008-18, n=371) for patient, injury, pre & post operative hematocrit, surgical details, and intraoperative transfusions. Fractures were classified and approach categorized as: Kocher-Langenbech, Ilioinguinal (full or 1st & 3rd windows), Stoppa only, or percutaneous. IBL was calculated using adaptations of the Gross and Nadler formulas which utilize changes in hematocrit and, through the "blood volume" factor, account for patient differences in height, weight, and gender:

$$\text{Blood loss} = \text{Blood Volume} \times ((\text{Hct0} - \text{HctF} + \text{Units Transfused} \times 1.9) / \text{HctAVG})$$

A multivariate model was created & variables were prioritized via backwards stepwise multivariate linear regression.

Results

349 patients (94%) were included in the model; 67% of patients (233/349) sustained associated patterns. IBL was similar across fracture patterns, and all potential groupings. A difference existed between approaches (Figure 1), with highest IBL via the Kocher-Langenbech approach (df=3, F=3.59, p=0.01). In multivariate modeling, percutaneous approach (-448 mL, p<0.01), height (+13.3 mL per cm, p<0.01), and delayed surgery (-48 mL, p<0.01) were all associated with IBL.

Conclusion

IBL is influenced by surgical approach & technique, patient height, and time to surgery as calculated by formula, as opposed to intraoperative estimation.