

The Tip of the Iceberg: Are We Underestimating Blood Loss in Percutaneously Treated Pelvic Fractures?

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INTRODUCTION: Expected blood loss often factors into operative planning of pelvis fractures. Percutaneous pelvic fracture fixation is considered a low blood loss procedure but we suspect that the quantity of blood lost through screw entry incisions cannot account for all changes in anemia status in patients with complex pelvic ring injuries. We sought to compare intraoperative blood loss between pelvic fractures treated with open reduction internal fixation and pelvic fractures treated with percutaneous fixation.

METHODS: We retrospectively reviewed 335 adult patients undergoing operative fixation of pelvis fractures at a level 1 trauma center between 2008 and 2018. Blood loss was calculated for standardization using a hemoglobin balance method that accounts for estimated total blood volume (using height, weight, and gender as described by Nadler), as well as perioperative changes in hemoglobin and intraoperative transfusions. We also assessed the recorded surgeon estimated blood loss (EBL). Means were compared using t tests for statistical analysis.

RESULTS: Pelvic fractures treated with open surgery had significantly greater perioperative blood loss than those treated with percutaneous fixation but significant discordance between surgeon EBL and calculated EBL. Average surgeon reported EBL for open surgeries was 355cc, and only 76.8cc for percutaneous surgeries ($p < 0.0001$). Mean perioperative blood loss thru the hemoglobin balance equation was 1852cc for open surgeries and 992cc for percutaneous surgeries ($p = 0.0001$). Surgeon reported EBL may significantly underestimate intraoperative blood loss for both open and percutaneous surgeries, when compared to the hemoglobin balance method ($p < 0.0001$).

DISCUSSION AND CONCLUSION: Significant discordance exists between surgeon estimated and calculated perioperative blood loss in percutaneous treatment of pelvic fractures, suggesting regular ongoing bleeding not visible to the surgeon. Open pelvic surgeries may produce at least twice the amount of blood loss when compared to percutaneous surgeries, as calculated by the hemoglobin balance equations. Perhaps most significantly, there is discordance between surgeon EBL and calculated blood loss in open surgeries by a factor of 4, and discordance in percutaneous surgeries by a factor of 9. While the optimal method of calculation is not known, these findings suggest we are likely underestimating hidden blood loss in pelvic ring injuries, particularly in percutaneous fixation, when bleeding continues underneath the skin.