Hemodilution and Avoidable Blood Transfusions: Are We Over-Resuscitating Patients after Hip Fracture Surgery?

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INTRODUCTION: Anemia and subsequent allogeneic blood transfusion (ABT) secondary to proximal femur fractures is a known risk factor for patient mortality and poorer functional outcomes after surgical management of hip fractures. We suspect that preoperative fracture induced anemia may be exacerbated by iatrogenic hemodilution and lead to unnecessary ABT. Identifying patients at risk for over-resuscitation may help mitigate this risk. We retrospectively reviewed a cohort of hip fracture patients at a single institution to identify trends in fluid management and risk factors associated with need for ABT after hip fracture surgery.

METHODS: There were 193 patients identified over a one-year period at our institution who were treated surgically for management of a hip fracture. We included patients with femoral neck fractures (FN), as well as pertrochanteric and intertrochanteric (PT/IT) femur fractures. Patients with FN fractures were treated with percutaneous screw fixation, a sliding hip screw, hemiarthroplasty, or total hip arthroplasty (THA). Patients with PT/IT fractures were treated with a sliding hip screw or cephalomedullary device placement. We excluded patients with polytraumatic injuries, femoral shaft or subtrochanteric femur fractures, pathologic fractures, fractures requiring prophylactic fixation, bilateral proximal femur fractures, and pediatric patients (under age 18). We also excluded patients requiring preoperative and intraoperative ABT and those who received albumin, platelets, or cryoprecipitate only. Our primary analysis compared patients who received at least one unit of packed red blood cells (pRBCs) after surgery to those who did not receive any. We compared these two groups based on demographic descriptors, intraoperative variables, and perioperative fluid administration to assess for any risk factors associated with need for ABT after hip fracture surgery.

RESULTS: Of the 193 patients with hip fractures, 32 (16.5%) required a blood transfusion of packed red blood cells within 5 days after surgery. Of these, 8 patients (25%) required subsequent transfusions. Patients in the transfusion group were older (mean age 82.8 vs. 74.7, $p<0.05$) and had lower hemoglobin (11.4 vs. 12.8, $p<0.05$) and hematocrit (35.0 vs. 39.2, $p<0.05$) on initial preoperative presentation to the hospital. There was no significant difference in mean operative time between groups (123 vs. 130 minutes, $p>0.05$). There was a 61.7% increase ($p<0.05$) in preoperative IV fluid administration for patients that went on to require ABT, but there was no difference in intraoperative fluids administered between groups (825cc vs. 898cc, $p>0.05$). Timing of initial ABT occurred on average 2.2 days postoperatively. There was a significant difference between groups based on fluid balance after surgery as calculated by net intake and output (transfused group more net positive), especially on POD0 (+81.9cc vs. -509cc, $p<0.05$) and POD1 (+424cc vs. -36cc, $p<0.05$).

DISCUSSION AND CONCLUSION:

We found that patients who receive blood transfusions after hip fracture surgery were more relatively fluid positive compared to non-transfused patients. This suggests that transfusions may occur because of iatrogenic hemodilution. While transfused patients had lower blood count lab values prior to surgery, they were more relatively fluid positive the first few days after surgery compared to those who did not require ABT. Given these findings, investigating stricter fluid management protocols in the perioperative care of hip fracture patients may serve to prevent avoidable blood transfusions.