3.3. TREATMENT: RISK FACTORS

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QUESTION 1: What are predictors of the need for allogeneic blood transfusion (ABT) in periprosthetic fractures?

RECOMMENDATION: Predicting factors for allogeneic blood transfusion are: revision arthroplasty, preoperative anemia, increasing age, higher comorbidity index, lower Body Mass Index (BMI), female gender, longer surgical time and hip surgery.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 95%, Disagree: 5%, Abstain: 0% (Unanimous, Strongest Consensus)

RATIONALE

There is little data regarding predictors of the need for ABT in periprosthetic fractures. Periprosthetic fracture studies typically include a low number of patients, and conclusions about covariates are often not available. These fractures may be treated by either revision surgery or open reduction and internal fixation (ORIF). General indications for ABT in total joint arthroplasty (TJA) can be identical in the first group.

Slover et al. demonstrated that hip arthroplasty had a significantly higher likelihood of blood transfusion (odds ratio (OR) 1.76, 95% confidence interval (CI), 1.68 to 1.83) than knee arthroplasty. Increasing age (age ≥ 80 years; OR, 2.99, 95% CI, 2.82 to 3.17), Medicaid insurance (OR, 1.36, 95% CI, 1.27 to 1.45), higher comorbidity index (score of ≥ 3, OR, 2.33, 95% CI, 2.22 to 2.45), and females (OR, 1.75, 95% CI, 1.70 to 1.80) all had significantly higher odds of blood transfusion after TJA [1].

Parvizi et al., reported that advanced age, low BMI, simultaneous bilateral arthroplasty and low preoperative hemoglobin were independently associated with increased rates of ABT [2].

In a study by Rasouli et al., one-stage bilateral TJA (OR, 3.30;, 95% CI, 3.24 to 3.37; $p < 0.001$), anemia due to chronic blood loss (OR, 2.69, 95% CI, 2.59 to 2.74, $p < 0.001$), deficiency anemia (OR, 2.59; 95% CI, 2.56-2.62; $p < 0.001$) and increased Charlson comorbidity index (OR, 1.24, 95% CI, 1.23 to 1.24; $p < 0.001$) were independent predictors of allogeneic blood transfusion [3].

In the study by Solon et al., 12 patients with Vancouver B2 periprosthetic fractures around cemented collarless polished tapered (CCPT) stems treated by ORIF alone (median follow-up 67 months) were compared with those of nine patients with a similar fracture treated by revision surgery. All 12 patients with Vancouver B2 femoral fractures around CCPT stems treated by ORIF alone healed and all stems restabilized and remained stable within their original cement mantle. These patients had significantly shorter surgical times ($p = 0.002$) and required fewer units of blood transfusion ($p = 0.008$) than patients in the revision cohort [4].

Saidi et al. evaluated 3 different surgical methods for treating comminuted distal femoral periprosthetic fractures in 23 patients over the age of 70 (average age 80, range 70-90). Reconstruction techniques included seven allograft prosthesis composites (APC), nine revision systems (RSA), and seven distal femur replacements (DFR). Operative time and blood loss were found to be significantly less in RSA and DFR patients compared to the APC patients [5], suggesting that more ABTs are required in complex revisions for periprosthetic fractures [5].

Min et al. retrospectively evaluated the clinical and radiographic outcomes of a series of 21 Vancouver type B1 periprosthetic femur fractures (PPF) treated with minimally invasive plate osteosynthesis (MIPO) and locking compression plate (LCP) between February 2011 and February 2017. The mean duration of follow-up was 33.8 months. They also compared outcomes of these patients to similar patients with 19 Vancouver type B1 fractures treated with ORIF between April 2006 and December 2011. The authors found that operative time was significantly shorter and intraoperative blood loss was significantly less in the MIPO group compared to the ORIF group [6].

Fulkerson et al., showed that percutaneous fixation of PPFs with the Less Invasive Skeletal Stabilization (LISS) plate is an effective although technically demanding method of treatment with minimal blood loss [7]. Thomas et al. also had similar results with the LISS plate [8].

Blood loss was minimal and only two of ten patients needed a blood transfusion with Vancouver type B1 fractures treated with percutaneous cerclage wiring for fracture reduction and maintenance of reduction with MIPO utilizing an LCP [9].

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