Solid Organ Transplant Patients Suffer From Multiple Complications After Sustaining an Emergent Fracture of the Lower Extremities

Alexander T. Reid, BA1; Aaron Perdue, MD1; James Goulet, MD1; Chris Robbins MPA, PhD1; Aidin Eslam Pour, MD1

Introduction

Solid organ transplant (SOT) procedures are used to treat patients with end-stage diseases of the kidney, liver, heart, or lungs. After an SOT procedure, patients must take immunosuppressant drugs to prevent organ rejection. Medications frequently used include calcineurin inhibitors like Tacrolimus, glucocorticoids like prednisone, and antiproliferative agents such as mycophenolic acid. These medications can lead to increased bone loss and osteoporosis in the SOT population that ultimately correspond with a higher risk of sustaining a fragility fracture.1,2

Current literature is devoid of papers addressing the outcomes of emergent/urgent lower-extremity fracture surgery in the SOT population. Research into elective orthopedic procedures suggested that adult SOT patients had more complications and infections postoperatively than did non-SOT patients.3,4 A study of non-SOT patients 65 years and older found the 90-day mortality of intertrochanteric hip fracture patients to be 15%.5 To better guide treatment in SOT fracture patients, we aim to assess the 90-day medical and surgical complication rates and 1-year mortality rates of SOT patients who undergo emergent lower-extremity fracture repair surgery.

Methods

Following approval from the Institutional Review Board, we retrospectively reviewed the charts of 36 patients to generate 37 fracture events that occurred
from 2000 to 2014. Patients were identified from a billing query using CPT (Current Procedural Terminology) codes that communicate uniform information about services provided. This retrospective study examined lower-extremity fractures in patients who had kidney, cardiac, liver, or lung transplantation. These fractures were all treated at the University of Michigan. Patients must have had their organ transplant procedure prior to sustaining an emergent fracture of the lower extremities. Fractures had to have been surgically operated on within 72 hours of presentation to the emergency department. Patients transferred from an outside facility were included in the study.

The patients' medical records must have contained at least 90 days of follow up information postoperatively. Patients' medical and surgical complications were followed for 90 days. Mortality was recorded up to 1 year postoperatively. Patients were excluded from the study if they suffered a fracture prior to the SOT procedure, were operated on after 72 hours from emergency department admission, or did not sustain a lower-extremity fracture. The initial CPT query returned 94 patients, of which we excluded 58. There were 36 patients (at least 18 years old) that met our criteria and sustained an emergent fracture in the time after having an SOT procedure. One patient suffered a lower-extremity fracture and then suffered another lower-extremity fracture more than 90 days later. We recorded this as 2 independent fracture events for 90-day complication and 90-day mortality data. However, only the first fracture event was included in 1-year mortality data, as both fractures occurred within 1 year of each other. Medical and surgical complications were determined by physicians’ notes, operative reports, or emergency department discharge summaries. Acute kidney injury, pneumonia, anemia, transfusion needs, edema, urinary tract infections, and all other potential complications were recorded if noted in the medical records.

**Results**

Out of the 36 patients, 20 were male and 16 were female. Thirty-three individuals were white, 2 were black, and 1 was Asian. There were 31 femur fractures (83%), 3 tibia fractures (8%), 1 lateral malleolus fracture (3%), 1 trimalleolar fracture (3%), and 1 event with multiple fractures (3%). Out of the 37 fracture events, the most common comorbidities were hypertension at 65% (24/37), diabetes mellitus at 43% (16/37), and hyperlipidemia at 43% (16/37). The median age at transplant was 53 with a range of 12 to 71, and the median age at fracture was 61 with a range of 20 to 78. The 90-day mortality rate following emergent repair of a lower-extremity fracture was 8.1% (3 deaths per 37 fracture events), while the 1-year mortality rate was 13.9% (5 deaths per 36 patients). The 90-day postsurgical deaths were due to septic shock (postsurgical day 1), cerebral hemorrhage (postsurgical day 48), and pulseless electrical activity arrest (postsurgical day 71). The most common 90-day postsurgical complications were acute renal failure at 40.5% (15/37), blood transfusion at 37.8% (14/37), edema at 35.1% (13/37), and anemia at 32.4% (12/37) (Table 1).

**Conclusion**

The results show that SOT patients have complicated courses following emergent fracture surgery. Mortality within the first 90 days postoperatively is 8.1% and increases to 13.9% for the 1 year after the index procedure. The rate of 40.5% for acute renal failure suggests that SOT patients need aggressive fluid and electrolyte management perioperatively. The rates of anemia (32.4%) and blood transfusions (37.8%) postoperatively suggest that hemoglobin levels should be monitored closely. To further complicate the management of adult SOT patients, many of these patients have comorbidities in addition to the transplanted organ. Some of these patients cannot be over-loaded with fluids and blood products either.

Even with a limited number of SOT patients, we believe our results provide valuable information in the absence of data in the current literature.
regarding the outcomes of emergent fracture surgery in the SOT population.

This study was limited by its retrospective design and by patients being drawn from a single institution, as well as its small sample size. Another limitation of this study was the inability to draw comparisons between our cohort and non-SOT patients. This limitation meant that we could only provide descriptive statistics about our SOT cohort. The future publication from this work will include a comprehensive report of our findings, including an examination of the relationships between predictor variables and outcomes in the SOT cohort. In conclusion, SOT patients frequently have medical complications within the 90 days following emergent fracture surgery, possibly due to immunosuppression or comorbidities. We recommend close follow-up for at least 90 days with a high index of suspicion for acute kidney injury and transfusion requirements in this cohort.

References