Lower Extremity Amputation in Fracture-Related Infection

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Purpose: Amputation is an undesirable yet sometimes necessary outcome following fracture-related infection (FRI), particularly in the lower extremities. The purpose of this study was to determine patient, bacterial, and treatment factors that may be associated with higher rates of amputation following fracture related infection.

Methods: After IRB approval, a retrospective study was performed at a single institution that included lower extremity (femur, tibia, and calcaneus) FRIs over a 7-year period. Information on demographics, comorbidities, fracture characteristics, infection presentation, treatment, and resolution were collected. The decision for amputation after FRI was made jointly by the treating surgeon and patient based on multiple factors (local soft-tissue conditions, bone healing, patient physiologic condition, and patient lifestyle demands). Those who ultimately required amputation were grouped and compared to those patients who did not undergo amputation. Minimum follow-up was 90 days following the patient's final infectious operation.

Results: A total of 222 patients were included in this study. The overall rate of amputation was 9.5%. There were no differences in age, sex, or body mass index between amputation and non-amputation cohorts. Staphyloccus aureus (non-MRSA [methicillin-resistant S. aureus), Pseudomonas aeruginosa, and culture-negative infections never resulted in amputation. There was a significantly higher rate of gross purulence found intraoperatively in the amputation cohort (85.7% vs 61.5%; P = 0.028). Binary logistic regression demonstrated that diabetes (odds ratio [OR], 4.01; P = 0.032), chronic kidney disease (OR, 6.89; P = 0.038), and a higher total number of operations for infection (OR, 1.38; P = 0.001) were associated with a greater incidence of amputation. Conversely, African American race (OR, 0.15; P = 0.036) and implant removal/exchange (OR, 0.22; P = 0.031) were associated with lower rates of amputation.

Conclusion: Care following fracture-related infection is a complex and multifactorial process, which can result in amputation. This study demonstrates that diabetes and chronic kidney disease is a risk factor for all lower extremity amputation in patients with FRI while removal of implants in these patients results in lower rates of amputation. Knowing which patients are at higher risk for amputation may help surgeons to avoid excess burden on these patients as they are likely to have twice as many operations.

Logistic Regression for Amputation	Odds Ratio	p-Value
CCI		0.067
Number Pathogens		0.080
DVT/PE		0.197
A/A	0.15	0.036
Diabetes	4.01	0.032
CKD	6.89	0.038
Total # Operations	1.38	0.001
Implant Removal	0.22	0.031

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