Risk Factors For Infection in 1,107 Distal Femur Fractures

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INTRODUCTION: Distal femur fractures occur at an annual rate of 8/100,000 in the US (about 25,000 annually), with similar incidence rates in other countries. Though treatment techniques have improved, recent retrospective studies have reported the complication of deep surgical site infection arising in up to 5% of distal femur fractures. Deep infection is associated with debilitating pain and disability for patients as well as excess cost for the health system. The purpose of this study was to examine the incidence and predictors of infection in a large multicenter cohort of consecutive distal femur fractures. Patient and injury characteristics, as well as intraoperative factors, were examined to identify potentially modifiable predictors of infection.

METHODS:

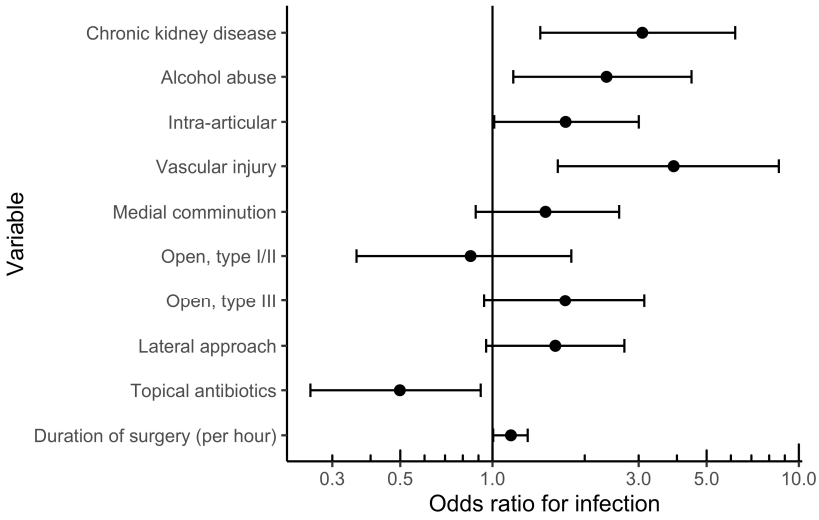
A multicenter retrospective review involving 10 centers was performed. Distal femur fractures in patients at least 18 years of age who underwent operative fixation between January 2012 and December 2019 were included. Pathologic fractures and patients with less than 3 months of follow-up and no outcome event were excluded. The study cohort was comprised of 1,107 distal femur fractures. The outcome of interest was any infection requiring surgical treatment meeting the criteria of the Fracture-Related Infection Consensus Group. Associations between potential predictors and infection were evaluated using logistic regression analysis.

RESULTS:

There was a 7% (79/1107) rate of deep surgical site infection. In the multivariate analysis (figure), predictive factors included alcohol abuse (odds ratio [OR] = 2.36; 95% confidence interval [CI]: 1.17 - 4.46; $p = 0.01$), intra-articular injury (OR = 1.73; 95% CI: 1.01 - 3.00; $p = 0.05$), vascular injury (OR = 3.90; 95% CI: 1.63 - 8.61; $p < 0.01$), the use of topical antibiotics (OR = 0.50; 95% CI: 0.25 - 0.92; $p = 0.03$), and the duration of the surgery (OR = 1.15 per hour; 95% CI: 1.01 - 1.30; $p = 0.04$). There was nonsignificant trend toward an association between infection and type III open fracture (OR = 1.73; 95% CI: 0.94 - 3.13; $p = 0.07$), and lateral approach (OR = 1.60; 95% CI: 0.95 - 2.69; $p = 0.07$). The most frequently cultured organisms were methicillin-resistant Staphylococcus aureus (22%), methicillin-sensitive Staphylococcus aureas (20%), and Enterobacter cloacae (11%).

DISCUSSION AND CONCLUSION:

7% of distal femur fractures in this large multicenter cohort developed infections requiring surgical treatment. The infection rate identified in the present cohort is higher than previously reported in smaller studies with shorter follow-up and should motivate increasing efforts to understand and minimize infections after distal femur fractures. While several non-modifiable factors were revealed—chronic kidney disease, alcohol abuse, intra-articular injury, and vascular injury—other predictive factors were surgeon-modifiable, including operative time, topical antibiotic use, and, potentially, the surgical approach. Surgeons may be able to use this information to prevent some deep infections after the treatment of distal femur fractures.


Chronic kidney disease
Alcohol abuse
Intra-articular
Vascular injury
Medial comminution
Open, type I/II
Open, type III
Lateral approach
Topical antibiotics
Duration of surgery (per hour)
Variable
0.3
0.5
1.0
3.0
5.0
10.0
Odds ratio for infection