

Large Femoral Defects in Open Femur Fractures: A 10-Year Retrospective Review

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Purpose: Very little data exist on the management of large femoral defects in open femur fractures. The conventional method of treating these injuries has been fixation with a plate or nail and antibiotic cement followed by delayed autogenous bone grafting, but no study has yet to describe the long-term outcomes in patients with femoral defects greater than 5 cm. In a 10-year retrospective study of patients with open distal femur fractures with defects greater than 5 cm, our group sought to better understand the long-term outcomes in treating such complex injuries.

Methods: After obtaining IRB approval, through a CPT code search between 2004-2014 we identified 832 open femur fractures and reviewed each case for femoral defects greater than 5 cm. From each patient's radiograph, the size of defect and method of final fixation (plate vs intramedullary [IMN]) was recorded. The medical record was reviewed to identify individual patient factors including comorbid conditions and surgical complications related to the management of the open distal femur fraction. Multivariate analysis was utilized to identify relevant risk factors for complications.

Results: 832 open femur fractures were identified, and of these, 27 demonstrated bony defects greater than 5 cm. Demographics for these patients are demonstrated in Table 1. 61.5% (n = 16) were open distal femur fractures and 96.3% (n = 26) of the cases were treated definitively with open reduction and internal fixation (ORIF). The average defect size was 8 cm and each patient had an average of 3 surgeries for management of the injury including the initial incision and drainage. The average time to bone grafting of each defect was 139 days (17 weeks). Overall this patient group demonstrated a very high complication rate (55.6%, n = 15) driven by infection (29.6%, n = 8) and nonunion (44.4%, n = 12). The rate of amputation was 3.7% (n = 1). Multivariate analysis demonstrated that smoking, diabetes, American Society of Anesthesiologists (ASA) score, and defect size did not independently increase the risk of a complication.

Conclusion: Management of open femur fractures with large defects demonstrates a very high complication rate driven by infection and nonunion. However, these complications cannot be predicted based upon individual patient comorbid conditions or defect size. Interestingly in our series over a decade, the rates of amputation were very low. Given our data, patients with this injury should be counseled on the high risk of infection or nonunion and multiple operations but a relatively low probability of amputation.

Table 1. Demographics

<i>Injury characteristics</i>	N=27
<i>Size of defect (cm), N (%)</i>	
5 to <10 cm	20 (66.7%)
>10 cm	7 (66.7%)
Median defect size (IQR)	8.00 (6.35-10.00)
<i>Location of injury, N (%)</i>	
Distal femur	16 (61.5%)
Femoral shaft	5 (19.2%)
Supracondylar	5 (19.2%)
<i>Postoperative complications</i>	
Amputation, N (%)	1 (3.7%)
Infection, N (%)	8 (29.6%)
Malunion, N (%)	1 (3.7%)
Nonunion, N (%)	12 (44.4%)
Any complication, N (%)	15 (55.6%)