

Functional Outcomes After Vancouver B Periprosthetic Femur Fractures

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Background/Purpose: Selecting optimal treatment for periprosthetic fractures, either fracture fixation or revision arthroplasty, can be challenging. In clinical practice, distinguishing between a stable well-fixed stem and a loose stem based on radiographs can be quite difficult. Furthermore, these patients are often frail with multiple medical comorbidities. Given this issue a growing number of orthopaedic surgeons recommend repairing the bone without revising the prosthesis in some select cases, suggesting that a potentially loose prosthesis will not be a problem given patients' limited functional needs, and that lesser surgery will allow a quicker, less risky, recovery. The purpose of this study was to (1) evaluate functional and global health outcomes after treatment for periprosthetic fracture, and (2) determine whether patients with loose femoral components have better functional outcomes when treated with surgical fixation alone or revision arthroplasty.

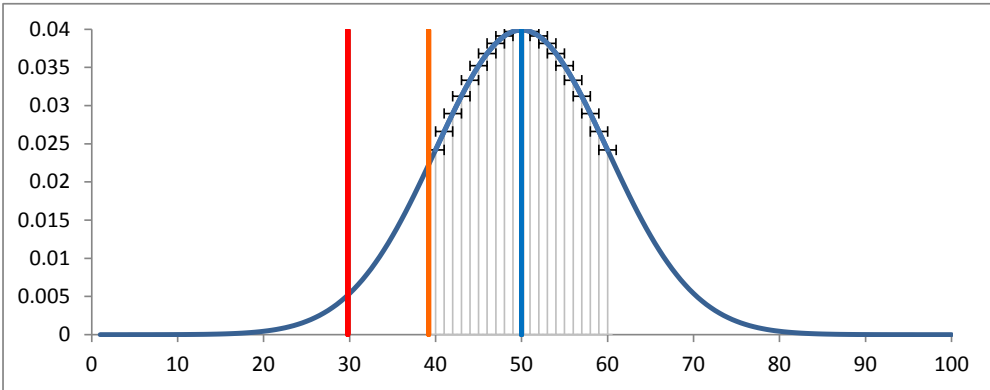
Methods: Patients treated for Vancouver B periprosthetic fractures at 3 Level I trauma centers between 2003 and 2014 were identified. Exclusion criteria were severe dementia, intraoperative fracture, known active prosthetic infection, significant polytrauma, bony metastatic disease, nonunion at presentation, and nonoperative management. Minimum follow-up was 6 months. 184 patients met inclusion criteria. 110 patients (60%) were alive at the time of the study and of these 68 patients (62%) were enrolled in the study. All associated hospital records were collected. At time of follow-up patients were administered two self-reported assessments using the Patient Reported Outcome Measurement Information System (PROMIS), physical function and general health. PROMIS instruments are reported on a scale quantified with standard methods: higher scores indicate higher physical function. The US population has an average score of 50 with standard deviation 10. Preoperative radiographs were used to classify fractures according to the Vancouver system. Linear regression was utilized to analyze the predictive association of demographic and treatment variables on PROMIS Physical Function domain score. Subgroup analysis was performed on patients classified as having loose femoral stems comparing fixation alone to revision arthroplasty.

Results: The average PROMIS Physical Function score at mean follow-up of 5.2 years (range, 1-12 years) following treatment of periprosthetic femur fracture was almost 1.5 SDs worse than age-adjusted US population norms, which is equivalent to having worse physical function than approximately 90% of the US population adjusted for age (score of 36.1, SD 10.3). The mean global health score following treatment was below the mean for age-adjusted US norms, but was within 1 SD and was therefore worse than approximately 76% of age-adjusted US norms (score 43.6, SD 7.8). Using logistic regression analysis age ($P < 0.001$), Charlson Comorbidity Index ($P < 0.001$), and open reduction and internal fixation (ORIF, as opposed to revision arthroplasty) ($P = 0.05$) were independent risk factors for poor functional outcome. Stability of the femoral stem (loose vs well fixed) ($P = 0.56$) and

postoperative weight-bearing status ($P = 0.39$ for PWB [partial weight bearing] and $P = 0.95$ for WBAT [weight bearing as tolerated]) were not risk factors for poor functional outcome. Within the subgroup of patients with loose femoral stems (Vancouver B2/3 fractures) patients who were treated with revision arthroplasty reported significantly better physical function (39.2) than those treated with surgical fixation (29.8, $P = 0.003$). Six patients (9%) sustained mechanical failure requiring revision surgery after having undergone surgical treatment for periprosthetic femur fracture.

Figure 1: PROMIS Physical Function T-score for Vancouver B2/3 Fractures

Red line represents mean PROMIS physical function outcome score for patients who underwent ORIF; orange line represents mean PROMIS physical function outcome score for patients who underwent revision arthroplasty. Blue line represents population norm, gray lines represent 1 standard deviation.



Conclusion: Patients treated for periprosthetic femur fractures fare very poorly with regard to physical function compared to US general population age-adjusted norms. There is controversy with regard to the most appropriate treatment for periprosthetic femur fractures associated with loose femoral stems. In our study, among patients with loose femoral components, patient-reported physical function outcome measures were significantly better in patients who underwent revision arthroplasty as opposed to those who had fracture fixation alone. This study highlights the significant impact that periprosthetic femur fractures have on patients' lives and suggests that those patients treated with revision arthroplasty have superior functional outcomes.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.