Retrospective Review of Completed Displaced Femoral Neck Stress Fractures in Young Adults

Gregory Staeheli, MD; Kevin Kuhn, MD; Grant Cochran, MD
Naval Medical Center, San Diego, California, USA

Background/Purpose: Completed displaced femoral neck stress fractures (FNSFs) are a rare injury most commonly seen in military personnel and elite athletes. These AO/OTA 31-B2.1 and 31-B2.2 fractures may develop nonunion or osteonecrosis (ON) as a result of injury. The optimal reduction technique and implant is controversial. Furthermore, the long-term prognosis of this injury and need for total hip arthoplasty (THA) is unknown with urgent contemporary surgical techniques. The purpose of this study was to review the results and complications associated with the treatment of completed displaced FNSFs.

Methods: After IRB approval, the operating room surgical database was utilized to obtain all patients undergoing operative treatment for stress fracture of the proximal femur. Incomplete and nondisplaced FNSFs were excluded. Patient demographic information was recorded. A comprehensive review of the electronic medical record was then completed. All available imaging was reviewed and measurements were recorded. Metabolic/endocrine abnormalities, previous stress fractures, prodromal symptoms, and primary care diagnoses prior to completion were noted. Method of reduction and type of implant were assessed. Primary outcomes of nonunion, ON, conversion to THA, and return to active duty were recorded.

Results: 27 completed displaced FNSFs were identified from 2001 to 2015. Marine recruits were the largest population at risk. Running was the most common mechanism of completion. Average age at time of injury was 23.4 years. Prodromal symptoms were noted by primary care providers in 81.4% of patients. 25 underwent urgent reduction, two were delayed. Open reduction was performed in 11 patients (40.7%), while 16 (59.3%) underwent closed reduction. Nine patients (33.3%) developed a nonunion. Nonunion was seen most commonly after multiple cancellous screw fixation. Five nonunions were treated with an intertrochanteric osteotomy; three (40%) successfully united the nonunion. ON developed in six fractures (22.2%), which required conversion to THA in all six patients at an average age of 26.8 years. No femoral head-preserving procedures were performed. After union, 40% of active duty personnel were able to return to duty.

Conclusion: The results of this study highlight the importance of prompt diagnosis of incomplete FNSFs given the potentially disastrous outcome of completed displaced FNSFs. We found Marine recruits to be the highest at-risk population. High rates of nonunion and ON were seen in our series despite urgent contemporary surgical techniques. After union, however, patients can continue on active duty. To our knowledge, this study represents the largest series of completed displaced FNSFs undergoing urgent surgical management using contemporary techniques.