

Available online at www.sciencerepository.org

Science Repository



Case Report

A Case of Two Consecutive Peri-Implant Fractures After Treatment of an Incomplete Stress Fracture of the Femoral Neck with a Sliding Hip Screw Device in a Young Adult

Utkarsh Anil MD¹, Abhishek Ganta MD² and Sanjit R Konda MD^{2*}

¹NYU Langone Health, NYU Langone Orthopedic Hospital, 301 East 17th Street, Suite 1401, New York, NY 10003

²Medisys Health Network, Jamaica Hospital Medical Center, 8900 Van Wyck Expwy, Queens, NY, 11418

ARTICLE INFO

Article history:

Received: 6 October, 2019

Accepted: 23 October, 2019

Published: 31 October, 2019

ABSTRACT

We present an atypical presentation of a non-displaced femoral neck fracture in a young adult after a fall from standing sustained 4 days prior to presentation. Patient underwent surgical fixation with a sliding hip screw, the postoperative course of which was complicated by an atraumatic peri-implant greater trochanteric fracture, requiring surgery for open reduction and internal fixation. The course was further complicated by another atraumatic peri-implant femoral neck fracture after which, the patient was definitely treated with a total hip arthroplasty.

© 2019 Sanjit R. Konda. Hosting by Science Repository.

Case Presentation

A 38-year old female with a history of gestational diabetes and obesity presented to the emergency department (ED) five days after a slip and fall from standing on the bathroom floor. She was able to ambulate after the fall but with significant pain and an inability to bear full weight on her left leg. On the day of presentation, the patient was attempting to get up from a seated position and put her full weight on her left leg. She noted an immediate grinding sensation in her left hip and a tremendous increase in pain. She presented to the hospital shortly after and was evaluated by orthopedic surgery team. On physical exam, she was noted to have ecchymosis over her left buttock. She reported moderate pain with external rotation about her hip. She was able to straight leg raise and had no pain with axial loading of the hip.

An anteroposterior (AP) radiograph of the pelvis obtained in the emergency department demonstrated a compression side stress fracture of the left femoral neck (Figure 1) with significant sclerosis around the stress fracture site on the inferomedial aspect of the femoral neck in the transcervical and basicervical regions. The patient was admitted to the orthopedic service, made non weightbearing on her left lower extremity, medically optimized for surgery, and was indicated for prophylactic stabilization of the incomplete stress fracture to allow for immediate weight bearing. She underwent an uneventful open repair with a sliding hip screw (SHS) device (Figure 2). The patient was progressing well at her 2-week post-operative follow-up visit, however, 2 weeks subsequent

to this visit (one month after her index surgery), she presented to the ED with atraumatic worsening severe lateral hip and groin pain. AP and lateral XRs of the femur obtained on this presentation demonstrated a displaced peri-implant left hip fracture with displacement of the greater trochanter and femoral neck superior to the SHS (Figure 3). This type of peri-implant fracture with the fracture located at the most proximal aspect of a plate/screw construct and involving the most proximal screw has been described as a PS2 [1]. The patient was admitted to the hospital and underwent fixation of the proximal femur peri-implant fracture with a trochanteric reattachment plate additionally secured with cables (Figure 4). The patient reported resolving pain during her postoperative follow up visits.

Five months after the index surgery and four months after her first revision surgery, the patient again presented to the ED with increasingly severe left hip pain after working with physical therapy four days prior to arrival. She was markedly tender over the left hip and reported severe pain with log roll and axial load tests. Her left hip plain radiographs demonstrated an acute peri-implant subcapital femoral neck fracture with superior cut-out of the lag screw (Figure 5). Again, the fracture was located at the most proximal aspect of the screw of a plate/screw construct which placed this fracture into the PS2 peri-implant fracture classification [1]. Infection labs were obtained at this time and erythrocyte sedimentation rate (ESR) and c-reactive protein (CRP) with both negative indicating that there was no infection. Given cut-out failure of the implant which created a bone void within the femoral head

*Correspondence to: Sanjit R. Konda MD, NYU Langone Health, NYU Langone Orthopedic Hospital, 301 East 17th Street, Suite 1401, New York, NY 10003

and refracture at the subcapital portion of the femoral neck in conjunction with a healing transcervical and basicervical femoral neck fracture, the patient underwent a second revision surgery for removal of SHS device and conversion to a left total hip arthroplasty with a diaphyseal fitting femoral stem to bypass the stress riser in the proximal femur resulting from removal of the bicortical screws used to fixate the SHS to the femoral shaft (Figure 6).



Figure 1: AP Pelvis from the day of presentation demonstrating increased sclerosis around the inferomedial aspect of the femoral neck and associated incomplete compression sided stress fracture of the femoral neck.



Figure 2: Intra-operative Fluoroscopy from operative repair of the stress fracture with sliding hip screw device.

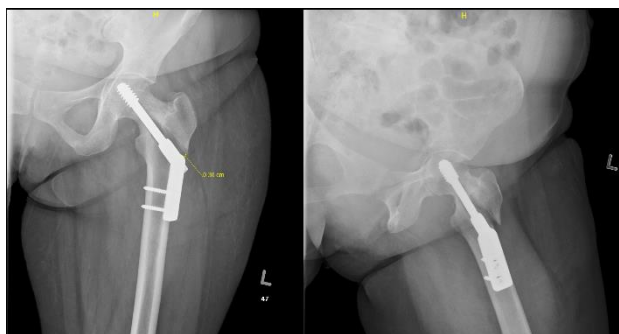


Figure 3: AP and lateral plain radiographs of the left hip 1-month status post index surgery demonstrating a peri-implant fracture around the

sliding hip screw construct. The fracture involved the greater trochanter and femoral neck (PS2).



Figure 4: AP plain radiograph of the right hip after fixation of the peri-implant fracture around the sliding hip screw construct involving the greater trochanter and femoral neck.

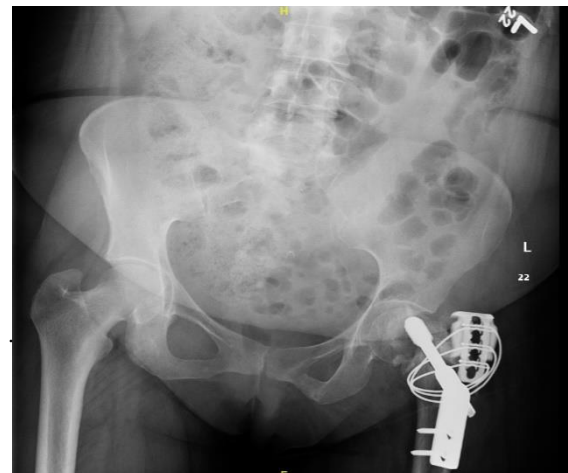


Figure 5: AP of the pelvis demonstrating a peri-implant (PS2) femoral neck fracture involving the subcapital portion of the femoral neck. There is extensive femoral head bone loss and comminution.



Figure 6: Left THA status post peri-implant femoral neck fracture. The SHS device has been removed. Note, a diaphyseal fitting femoral stem

is used to bypass the stress risers from the biocritical screws used to fixation the SHS device to the femoral shaft.

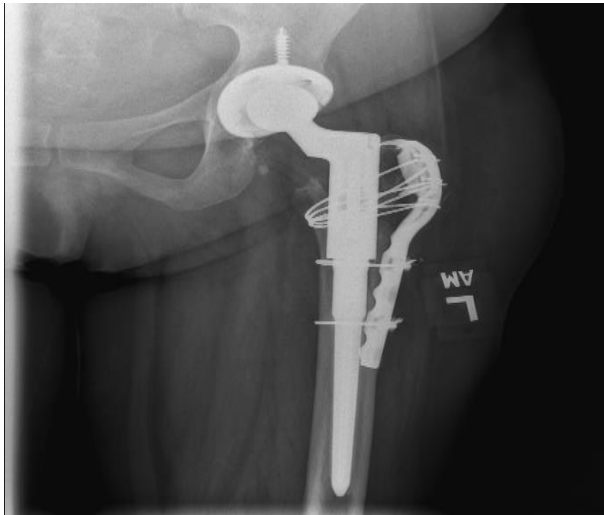


Figure 7: AP plain radiograph of the left hip at 3 year follow up demonstrating a well-fixed femoral prosthesis. There is osteopenia around the greater trochanter from disuse. The femoral head remains concentrically reduced with the acetabulum.

Patient had an otherwise routine post-operative course complicated by pain consistent with trochanteric bursitis about 6 months after left THA which resolved with physical therapy and bursal injections. The patient continued to do well at 3 year follow up from her injury and 2.5 year follow up from THA, with radiographs demonstrating no hardware complications (Figure 7)

Discussion

Femoral neck fractures in young adults are very uncommon, and when they do occur, are associated with high energy injury mechanisms [2, 3]. Alternatively, young patients can also rarely sustain stress fractures of the femoral neck commonly seen in runners and present with indolent hip or groin pain [4]. Although rare, risk factors for young patients with femoral neck fractures have been identified to include osteoporosis, steroid treatment, alcohol use and smoking [5, 6]. Our young patient had what appeared to be an acute stress fracture involving the compression side (infero-medial) of the femoral neck in an area that had been undergoing a likely chronic stress reaction given the amount of sclerotic bone noted in this region, making this case an atypical presentation of an uncommon injury.

Given the high functional demands in young patients as well as the chronic appearing stress reaction in this area, the likelihood of healing without operative intervention appeared low. Therefore, surgical intervention with a sliding hip screw device was performed as a means to both stimulate healing of the sclerotic bone around the fracture site with reaming of the femoral neck and to fixate this fracture with a stable fixed angle construct. Femoral neck fractures in younger patients are commonly associated with osteonecrosis of the femoral head due to vascular compromise and high incidence of non-union [7, 8]. Although not exclusive to younger patients, the FAITH trial has identified risk factors for revision surgery after internal fixation of hip fractures to include female sex, increased BMI, younger age, presence of a displaced fracture, improper implant placement and history of smoking [9].

The patient's femoral neck fracture was treated with internal fixation with a sliding hip screw device. The commonly reported complications

with sliding hip screw device are related to the position of the tip of the screw to the apex of the femoral head (measured with tip apex distance) and have been associated with screw cut out and medialization of the distal fragment in trochanteric hip fractures [10, 11]. Additionally, the longer-term complication associated with surgery is avascular necrosis due to the compromised blood supply after sustaining fracture of the femoral neck or intraoperatively during fracture reduction or timing of implant placement [12, 13]. In this patient, risk of screw cutout was minimized by achieving a tip-apex distance measured to be 18mm which is below the 25mm cutoff expected for the increased likelihood of lag screw cutout. The risk of avascular necrosis in this patient was minimal given that this was an incomplete stress fracture, therefore, the retinacular blood supply to the femoral head should not have been disrupted.

It is possible that the first PS2 peri-implant fracture occurred due to an iatrogenic mechanism. This type of axial plane fracture around the proximal end of SHS device could occur if an unrecognized axial plate fracture occurs at the insertion site of the sliding hip screw barrel into bone. However, in this particular case no fracture was visualized after insertion of the plate and the patient was walking with the device in place for 4 weeks full weight bearing with improving surgical pain indicating that there was no new fracture present. The second incidence of peri-implant fracture involving a new subcapital femoral neck fracture around an existing lag screw from a SHS device does not have a clear explanation. Likely, the axial plane fracture around the SHS device that extended into the transcervical region was not healing and propagated the subcapital region with repetitive stress from walking. This has not been described before based on our knowledge and review of the literature.

Peri-implant fractures are thankfully uncommon after open or closed reduction with internal fixation of femoral neck fractures with a sliding hip screw device. We present a rare case of two consecutive peri-plant fractures around a sliding hip screw device after treatment of a relatively innocuous appearing incomplete stress fracture of the femoral neck in a young adult. The first was a greater trochanteric fracture which was fixed with plate and cable construct, and the second was a femoral neck fracture around the implant which was treated definitively with a total hip arthroplasty.

Conclusion

Peri-implant fractures, although rare, can occur after hip fracture fixation sliding hip screw and can be managed either with additional fixation or with arthroplasty if bone stock is compromised.

REFERENCES

1. Egol KA, Carlock KD, Kelly EA, Seetharam A, Mullis BH et al. (2019) Previous Implant Fractures: A New Descriptive Classification System. *J Orthop Trauma* 33: 423-427. [[Crossref](#)]
2. Askin SR, Bryan RS (1976) Femoral neck fractures in young adults. *Clin Orthop Relat Res* 1976: 259-264.
3. Robinson CM, Court-Brown CM, McQueen MM, Christie J (1995) Hip fractures in adults younger than 50 years of age. Epidemiology and results. *Clin Orthop Relat Res* 1995: 238-246. [[Crossref](#)]
4. Fullerton LR, Snowdy HA (1988) Femoral neck stress fractures. *Am J Sports Med* 16: 365-377.
5. Karantana A, Boulton C, Bouliotis G, Shu KS, Scammell BE et al. (2011) Epidemiology and outcome of fracture of the hip in women aged 65 years and under: a cohort study. *J Bone Joint Surg Br* 93: 658-664. [[Crossref](#)]

6. Zetterberg CH, Irstam L, Andersson GB (1982) Femoral neck fractures in young adults. *Acta Orthop Scand* 53: 427-435.
7. Pauyo T, Drager J, Albers A, Harvey EJ (2014) Management of femoral neck fractures in the young patient: A critical analysis review. *World J Orthop* 5: 204-217. [[Crossref](#)]
8. Tooke SM, Favero KJ (1985) Femoral neck fractures in skeletally mature patients, fifty years old or less. *J Bone Joint Surg Am* 67: 1255-1260. [[Crossref](#)]
9. Sprague S, Schemitsch EH, Swiontkowski M, Della Rocca GJ, Jeray KJ et al. (2018) Factors Associated with Revision Surgery After Internal Fixation of Hip Fractures. *J Orthop Trauma* 32: 223-230. [[Crossref](#)]
10. Im GI, Shin YW, Song YJ (2005) Potentially unstable intertrochanteric fractures. *J Orthop Trauma* 19: 5-9. [[Crossref](#)]
11. Parker MJ (1996) Trochanteric hip fractures. Fixation failure commoner with femoral medialization, a comparison of 101 cases. *Acta Orthop Scand* 67: 329-332. [[Crossref](#)]
12. Damany DS, Parker MJ, Chojnowski A (2005) Complications after intracapsular hip fractures in young adults. A meta-analysis of 18 published studies involving 564 fractures. *Injury* 36: 131-141. [[Crossref](#)]
13. Jain R, Koo M, Kreder HJ, Schemitsch EH, Davey JR et al. (2002) Comparison of early and delayed fixation of subcapital hip fractures in patients sixty years of age or less. *J Bone Joint Surg Am* 84: 1605-1612. [[Crossref](#)]