CASE REPORT

A Rare Case of Open (Gustilo II) Periprosthetic Fracture (Vancouver B2) in a Polytraumatized Patient

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Abstract

Periprosthetic femoral fracture is the third most frequent complication after total hip replacement (THR). It is mainly caused by low-energy trauma in the elderly. Open periprosthetic fractures are significantly rarer and are caused by high-energy trauma. Here we present a case of a 73-year-old man who sustained an open (Gustilo II) left periprosthetic femoral fracture with an unstable femoral component (Vancouver B2). After an early stabilization with a temporary external fixator, a single-stage revision using a tapered long femoral stem was performed. At the last follow-up (3.2 years), the patient was satisfied and walked without pain and aids, and the Harris Hip Score was 83.5. No signs of infection or osteolysis were present in the last radiographs.

Level of evidence: V

Keywords: Open periprosthetic fracture, Periprosthetic fracture, Polytruma, Vancouver classification

Introduction

Periprosthetic femoral fracture is a relatively common complication after total hip replacement (THR). According to the Australian Orthopedic Association National Joint Replacement Registry, it is the third most frequent cause of revision, with an incidence of 1.3% ten years post-operatively.[1,2] Most periprosthetic fractures are caused by low-energy trauma in frail elderly patients with osteoporotic bone.[3] Considering the constantly growing number of people that undergo THR, an increasing incidence of periprosthetic fractures is expected, especially in the younger more active population.[2,3] In this paper, we report on a patient affected by an open (Gustilo II) periprosthetic left femoral fracture (Vancouver B2) and a non-displaced periprosthetic fracture of the posterior wall of the left acetabulum. The paper also discusses a comprehensive review of the current literature on this topic. This is the first study reporting a one-stage revision for the management of an open periprosthetic femoral fracture.

Case Report

A 73-year-old man (175 cm, 82.5 kg, BMI 24.5 Kg/m^2) with a well-functioning THR implanted six years before injury (ABG II, Stryker) was admitted to our hospital following a high-speed motor vehicle collision. He was alert on the scene and was hemodynamically stable in the emergency department. He sustained an open periprosthetic left femur fracture (Gustilo II, Vancouver B2) [Figure 1], a periprosthetic non-displaced fracture of the posterior wall of the left acetabulum, a Monteggia-like fracture of the left forearm, a mildly displaced fracture of both maxillary sinuses, a left orbit fracture, a nasal bone fracture, and multiple fractures of the left and right costal arches with a small right pneumothorax. The injury severity score (ISS) at the admission was 43 and according to the "New Berlin Definition" the combiniation of injuries are considered a polytrauma (ISS > 18).[4] He was initially treated with irrigation and debridement of the open wound and with stabilization of the femoral fracture using an external fixator (two supraacetabular titanium screws 4.5 mm x 180 mm bilaterally, and three titanium screws 4.5 x 180 mm at the distal third of the femur connected with titanium bars) [Figure 2]. During the surgical procedure, five tissues sample for bacterial examinations were collected.[4, 5] He was later transferred to the intensive care unit and empiric antibiotic therapy was administered for the next 72 hours (2gr of cefazolin and 5 mg/kg of gentamicin). Definitive treatment was delayed until the patient hemodynamic stability was re-established. Considering that the cultures taken during the irrigation and debridement were negative and no local or systemic signs of infection were present, a single-stage revision was planned 20 days after the index trauma. Both the acetabular (Delta TT Revision shell with a polyethylene

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liner by Lima Corporate) and the femoral components (Profemur R 15 mm x 260 mm tapered modular stem by Microport Orthopaedics, short standard proximal body, a long anteverted and lateralized femoral neck, and a 36 mm long metallic head) were revised [Figure 3]. In addition, the femoral fracture was stabilized with seven metallic cerclages and a trochanteric LCP Proximal Femur hook plate (by Synthes) [Figure 3].[6,7,8]

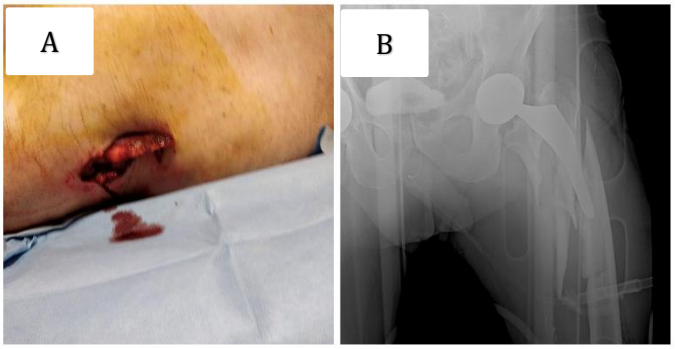

Figure 1. (A) Open femoral fracture 4 cm laceration, (Gustilo II) involving the left thigh; (B) AP view of the left femur demonstrating a Vancouver B2 periprosthetic fracture

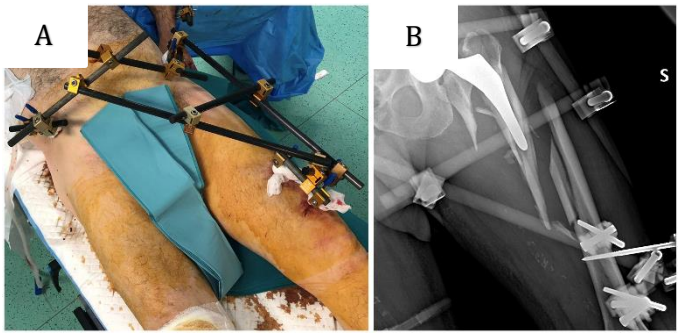

Figure 2. (A) Early stabilization of the fracture with external fixation and (B) postoperative x-ray

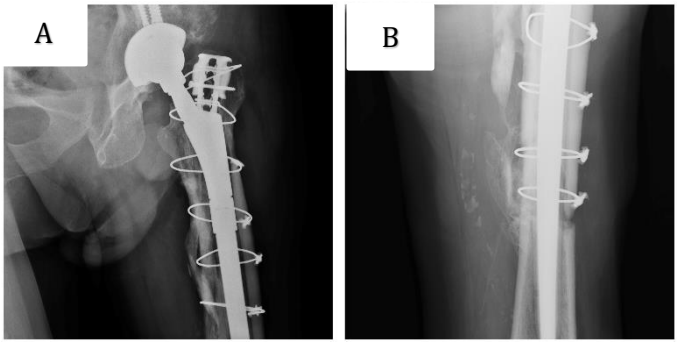

Figure 3. Radiographic anteroposterior (A) and axial view (B) at three months of follow-up showing the partial healing at the fracture site, the adequate position of the implant, and no signs of migration

Hip flexion was restricted from 0° to 40° during the first forty days, and the patient was allowed to weight-bear on the affected limb three months after surgery. Postoperatively, a tailored antibiotic therapy with vancomycin and teicoplanin was administered, since the intraoperative samples were positive for methicillin-resistant S. epidermidis. At the latest follow-up, 3.2 years, no signs of either local or systemic infection were observed and the patient was able to walk with no limitations or aids. His hip active flexion was 105°, extension 30°, abduction 30°, and adduction 15°; internal and external rotation were limited to 5° and 10° respectively. The Harris Hip Score at the last follow-up was 83.5. At the intermediate radiographic evaluation, stem subsidence of approximately 2 cm was noted [Figure 4]. The patient did not endorse thigh pain. Neither progressive radiolucency lines nor progression of stem subsidence was noted at the last radiographic examination.

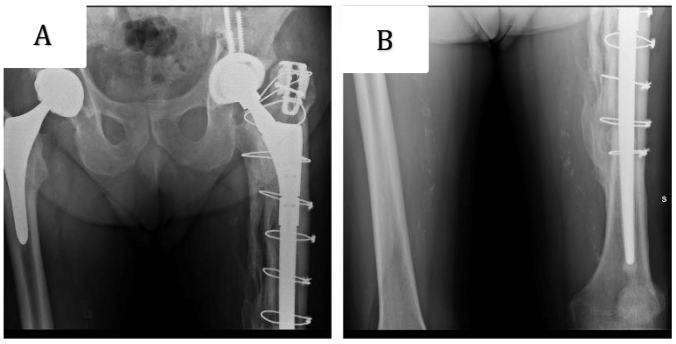

Figure 4. Radiographic anteroposterior (A) and axial view (B) at 3.2 years of follow-up showing the complete fracture healing, the good position of the acetabular component, and subsidence of the femoral stem without progressive radiolucent lines

Discussion

This study reports a unique case of an open (Gustilo II) periprosthetic femoral fracture (Vancouver B2) with an unstable femoral component and a non-displaced periprosthetic acetabular fracture. The patient was treated with a single-stage total hip revision 20 days after early temporary stabilization with an external fixator. High-energy trauma with an open fracture of the femur is considered a serious and potentially fatal injury, with reported perioperative mortality rate ranging between 8% and 20% in two case series.[9,10] Recent data suggest that definitive fixation of an open diaphyseal femoral fracture should be delayed until the patient is medically stable.[11] "Damage control orthopedics" should be considered in the case of an open periprosthetic femoral fracture associated with other injuries.[7] In our case, in addition to the acetabular and femoral fracture, the patient presented with a Monteggia-like fracture of the left elbow, multiple rib fractures and left pneumothorax. Considering the patient ISS of 43, we decided not to perform components revision and fracture fixation immediately. Aleen et al., [11] reported a similar case where a 73-year-old woman was run over by a bus reporting an open (Gustilo III) Vancouver C fracture of the right femur, an open (Gustilo III) diaphyseal transverse fracture of the left femur, bilateral lung contusions, multiple ribs fractures, mild left hemothorax, splenic laceration, stable pubic rami fractures, and degloving injuries of both lower limbs. She was hemodynamically unstable both on the scene and in the

emergency department. She was urgently brought to the operating room and underwent irrigation and debridement of the open wounds and definitive fixation of the femoral fractures. She was hemodynamically unstable before, during, and after the surgical procedure, and she deceased a couple of days after surgery.

Additionally, when treating an open periprosthetic fracture, the risk of a postoperative periprosthetic joint infection (PJI) is also of critical concern.[12, 13] since no local or systemic signs of infection 20 days after orthopedic damage control were detected and the intraoperative cultures were negative, we decided to proceed with a single-stage revision. We do not know whether this period between early stabilization and revision surgery is long enough to assume that the fracture site is not infected. However, even in a different scenario, 20 days after the stabilization of an open fracture with no signs of infection, definitive surgical fixation is usually successful.[14-16] On the other hand, in cases of possible infection, a two-stage revision with an additional debridement and an antibiotic-loaded cement spacer position until periprosthetic soft tissue healing occurs should be considered.[10,11] At the last follow-up, our patient was satisfied with the surgery, as documented by his Harris Hip Score of 83.5. However, he complained about limited hip rotation, likely due to the impingement between the proximal femur and the pelvis from stem subsidence. The patient was allowed to weight bear three months after surgery and we believe that a longer period without weight bearing would not be helpful. Instead, a larger femoral stem might have prevented its subsidence. However, the poor bone quality and the multifragmentation of the fracture intraoperatively lead us to choose a smaller implant. To promote fracture healing and potentially prevent stem subsidence, a cortical strut graft could have been considered.[17] However, we preferred not to use allograft struts due to the risk of periprosthetic infection.

Conclusion

In conclusion, open periprosthetic hip fractures are very rare. This case report supports performing a one-stage revision surgery after an initial orthopedic damage control for a Gustilo II/Vancouver B2 fracture without signs of acute infection, when the patient is affected by polytrauma.

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