

CASE REPORT

Two-step sequential management for hip arthroplasty after hip joint gunshot injury: A case report

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Key Clinical Message

Combined fractures of the femoral head and acetabulum due to hip gunshot injuries (GSI) are rare, and there is no preferred treatment option. We present a 35-year-old male patient who sustained a right hip GSI. Delayed THA with a two-step sequential approach is a feasible management in this situation to manage soft tissue and decrease infection rate. At a 1-year follow-up visit, the pain was relieved, and the function improved significantly, and he had no complaints.

KEYWORDS

gunshot injury, hip joint, total hip arthroplasty

1 | INTRODUCTION

Musculoskeletal injuries associated with firearm-related injuries to the hip and pelvis formed a collection of injuries such as bone and soft tissue.^{1,2} While there has been a rise in gunshot injuries that present problems to orthopedic surgeons,³ great vigilance is required. Associated contamination, nerve damage, and visceral organ damage must be in mind as well as the high cost of treatment.⁴

In literature, the frequency of hip joint injuries related to gunshot injuries is reported to be about 2%–17%.⁵ However, there are few studies elaborate on hip joint gunshot injuries.^{1,6} According to the literature, the preferred treatment option for hip joint gunshot injuries is limited to arthroplasty.⁷ The concomitant femoral head and acetabular fractures are rare and are the result of high energy trauma.⁸ In the present study, we report a young patient who sustained hip joint gunshot injury (GSI) with femoral head fracture and comminuted acetabular fracture, which treated in two stages.

2 | CASE HISTORY

2.1 | Preoperative management

The patient is a 35-year-old male with no past medical history who presented to our institution after sustaining a single GSW to the right hip during a home invasion 2 weeks ago. He has undergone laparotomy emergently, and after stabilizing, the patient referred to our center. Physical examination revealed an open ballistic wound to the posterior hip and right sciatic nerve deficit. Radiographs (Figure 1) and computerized tomography (CT) scans (Figures 2 and 3) of the pelvis and hip were obtained, which demonstrated a comminuted fracture of the femoral head, along with a comminuted fracture of both acetabular columns. Three-dimensional CT reconstruction images were acquired further to characterize the femoral head and acetabular fracture fragments. Associated injuries such as bowels and bladder managed via general surgery and urology services.

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FIGURE 1 Pre-op x-ray shows the fracture of the right acetabulum and femoral head.

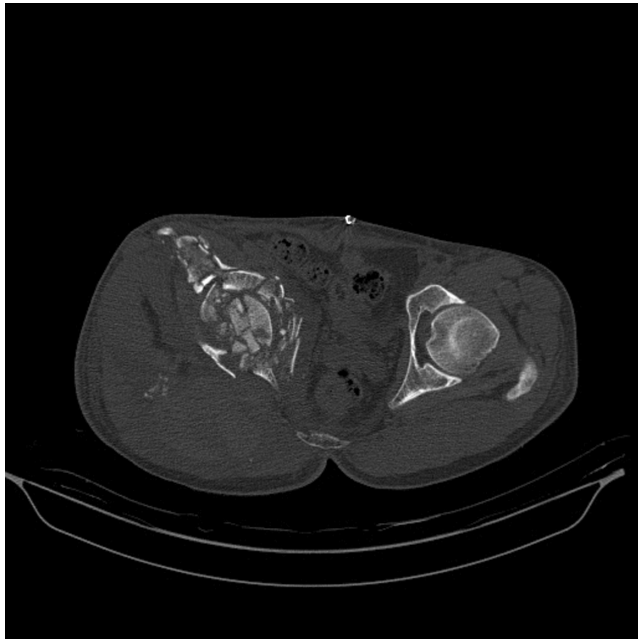


FIGURE 2 Axial CT scan demonstrates severe comminution of the right acetabulum and femoral head.



FIGURE 3 3D CT scan shows the severe comminution of the right posterior column.

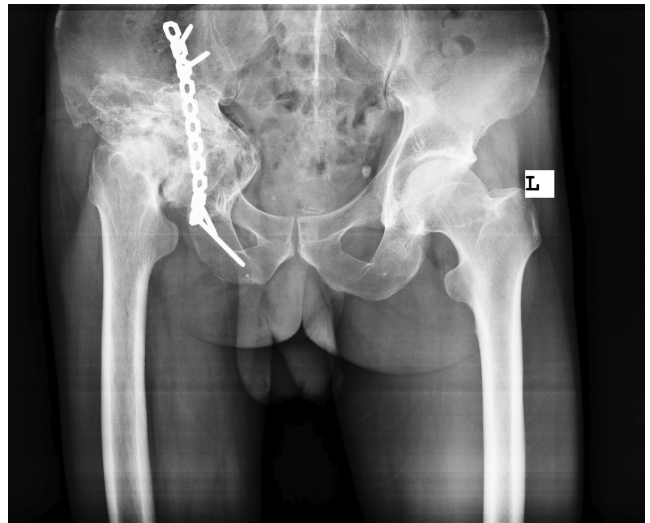


FIGURE 4 Post-operative x-ray of the first step shows posterior column reconstruction.

2.2 | Operation

After discussing the risks and complications of operative treatment, informed consent was obtained, and the patient transmitted to the operating room.

A Kocher-Langenbeck approach used for exposure. We decided to explore and neurolysis the sciatic nerve and use just a 3.5 mm reconstruction posterior column buttress plate to do the total hip arthroplasty (THA) after bone union, along with irrigation and debridement (Figure 4).

After a year, bone union completed, and laboratory data showed no evidence of infection. The pre-op Harris hip score (HHS) was 22. In this stage, THA was done through a lateral approach. After dislocating the hip joint anteriorly, the hip was taken into a position of flexion, adduction, and external rotation to deliver the femoral neck osteotomy into the anterior aspect of the exposure and resecting the femoral head residues. Then, the acetabulum was prepared, and a 52 mm Zimmer Biomet continuum cup implanted with a 36 mm linear. The femoral canal was prepared, and after trial, a 16/225-mm Zimmer Biomet Wagner SL press-fit femoral stem implanted with a metal Zimmer Biomet 36 mm head



FIGURE 5 Post-operative x-ray of the second step.



FIGURE 6 One-year post-operative x-ray.

and -3.5 mm neck length. The hip was then reduced with satisfactory stability and soft-tissue tension. The exposure was then closed in standard fashion. Standard radiographs were obtained immediately after the operation (Figure 5).

2.3 | Post-operative care

He was made touch-down weight-bearing for 6 weeks and then allowed to advance as tolerated. The physical therapy team consulted postoperatively for mobilization, and global hip precautions provided as this patient had a dual approach. No heterotopic ossification prophylaxis

utilized. At 1 year postoperatively, the patient returned for a follow-up visit, and radiographs obtained at this time for routine monitoring and to confirm the proper positioning of hardware (Figure 6). He had no complaints, and the HHS was 74.

3 | DISCUSSION

Ballistic fractures have increased in the last two decades and made a splash to establish new therapeutic algorithms and reduce the morbidity rate.⁹ Unfortunately, there is a lack of high-level evidence guiding management. According to previous studies, gunshot injuries to the hip joint account for two percent of all limb gunshot injuries, and open reduction and internal fixation is suggested as the preferred treatment in acute phase.¹⁰

Remarkable, hip arthroplasty is preserved for failed fixations.¹⁰ The ratio of this algorithm, may refer to the high complication rate after hip joint gunshot injuries since poor functional results are reported in cases of acetabulum fracture and contamination with bowel contents.² However, the severity of injury and contamination varies from case to case.¹¹ Although vascular injury is condemned as a risk factor for infection after low-velocity intra-articular gunshot injury,¹² in a recent study, there was no risk factor for infection in such injuries.^{13,14}

The primary consideration in hip joint GSI is decision-making about delayed vs. immediate hip arthroplasty concerning high contamination possibility¹⁵ since Weinstein et al.¹⁴ showed all bullet tracks are grossly contaminated with foreign materials.

Naziri et al.⁵ evaluated the outcome and complications of THA in nine patients with secondary arthritis due to prior GSI. Although THA in these patients was technically demanding, the outcome was surprising and comparable to primary THA due to degenerative joint disease. Georgidiadis et al.¹⁶ reported a 22-year-old male patient with hip GSI and femoral neck fracture treated with internal fixation and valgus osteotomy. Pazraci et al.⁴ showed that THA after debridement is a feasible treatment in young patients with a history of hip GSI, although the poor post-operative harris hip score (65.5%) after THA in hip joint gunshot injuries. They included ten patients and operated them 4–8 months after injury. The intestinal injury was associated with a high infection rate. Ozden et al.¹⁷ demonstrated that THA is an effective option to improve patients with secondary hip arthritis due to previous hip GSI. Martin et al.¹⁵ reported a 70-year-old female patient with hip GSI resulted in the femoral head and acetabulum fracture. She was treated with open reduction and internal fixation of the acetabulum, as well as bipolar hemiarthroplasty. Bell et al.¹⁸ reported a 39-year-old with hip GSI and comminuted fracture of the femoral head and

neck who had undergone staged arthroplasty after the initial placement of an antibiotic spacer.

Here, in our study, we describe a two-sequential management for THA in a young male after hip GSI. Since there was a severe comminution in the acetabulum and femoral head and the post-traumatic arthritis was amenable, we just reconstructed the posterior column and avoided more soft tissue manipulation. After achieving bone union, THA was done to improve his function.

In conclusion, hip GSI deserves a multidisciplinary approach and managing the soft tissue as well as decreasing the infection rate in secondary THA. Delayed THA with a two-step sequential approach is a feasible management in this situation.

AUTHOR CONTRIBUTIONS

Reza Zandi: Conceptualization; methodology; project administration. **Shahin Talebi:** Supervision; validation. **Akbar Ehsani:** Writing – original draft; writing – review and editing. **Saeed Nodehi:** Data curation; investigation; validation.

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CONFLICT OF INTEREST STATEMENT

The authors have no competing interests to declare that are relevant to the content of this article.

DATA AVAILABILITY STATEMENT

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

ETHICAL APPROVAL

Consent to participate was obtained from patient following ethical approval granted from Shahid Beheshti University of medical science ethics committee.

CONSENT

Written informed consent was obtained from the patient for publication of his anonymized information in this article. The authors declare that there is no information (names, initials, hospital identification numbers, or photographs) in the submitted manuscript that can be used to identify patient.

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