International Journal of Research in Orthopaedics
Puranik R et al. Int J Res Orthop. 2026 May;12(3):805-808
http://www.ijoro.org

Case Report

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20261235

Pipkin type I femoral head fracture managed by safe surgical dislocation through Gibson's interval with Ganz trochanteric osteotomy: a case report

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Received: 19 January 2026
Accepted: 25 March 2026

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ABSTRACT

Femoral head fractures concurrent with posterior hip dislocations are rare and complex injuries that challenge conventional surgical exposure and fixation. This case significantly advances our knowledge for management of femoral head fractures. A 47-year-old male driver sustained a dashboard injury resulting in a posterior right hip dislocation, which was closed reduced at a local hospital. Imaging at our tertiary center confirmed a Pipkin type I femoral head fracture involving over 20% of the head. He underwent safe surgical dislocation through Gibson's interval using the Ganz trochanteric flip osteotomy; the fragment was anatomically reduced with three 3.5-mm headless cannulated screws, and the osteotomy was fixed using 6.5-mm cannulated screws. The Ganz approach facilitates anatomic exposure and fixation while preserving femoral head vascularity, making it a robust surgical method for such uncommon but technically demanding cases.

Keywords: Pipkin type I, Femoral head fracture, Posterior hip dislocation, Safe surgical dislocation, Ganz osteotomy

INTRODUCTION

High energy posterior hip dislocations are uncommonly complicated by femoral head fractures, with Pipkin type I injuries representing a particularly rare subset.[1,2,5] These injuries present unique challenges in surgical management due to limited access and risk to femoral head perfusion. The Pipkin classification aids in identifying fracture location and guiding treatment. selecting the ideal surgical exposure for Pipkin type I femoral head fractures is debated, since standard anterior or posterior approaches can limit visualization or endanger the femoral head's blood supply.[2,4] Here, we report the use of safe surgical dislocation via Gibson's interval with a Ganz trochanteric flip osteotomy a technique that preserves femoral head perfusion while providing 360° access for anatomic fixation.[7]

CASE REPORT

A 47-year-old male professional driver sustained a dashboard injury following a road traffic accident. The patient arrived at a local hospital complaining of intense right hip pain and was unable to bear weight on the affected limb. Clinical examination revealed the right lower limb shortened, adducted, and internally rotated. A posterior hip dislocation was identified and promptly reduced by closed manipulation. The patient was then referred to our tertiary care center for definitive management. Immediate plain radiographs showed a reduced hip with a femoral head fracture (Figure 1).

Computed tomography (CT) scan confirmed a Pipkin type I femoral head fracture, with a fragment involving more than twenty percent of the head surface (Figure 2). On the same day, the patient underwent an open surgical hip dislocation utilizing a trochanteric flip osteotomy, followed by open reduction and internal fixation of the femoral head.

Figure 1: Pre-operative radiograph showing reduced hip after close reduction with fractured femoral head fragment.

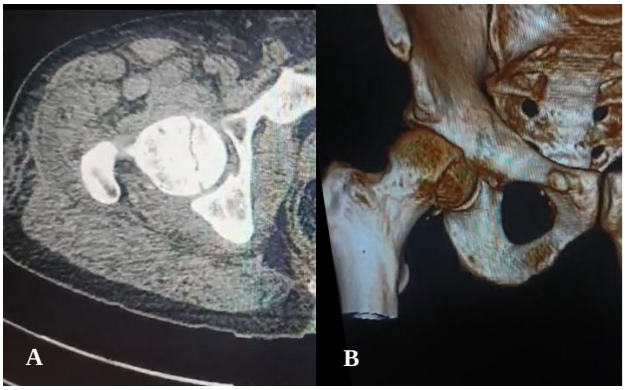

Figure 2 (A and B): CT scan demonstrating Pipkin type I fracture involving >20 percent of femoral head.

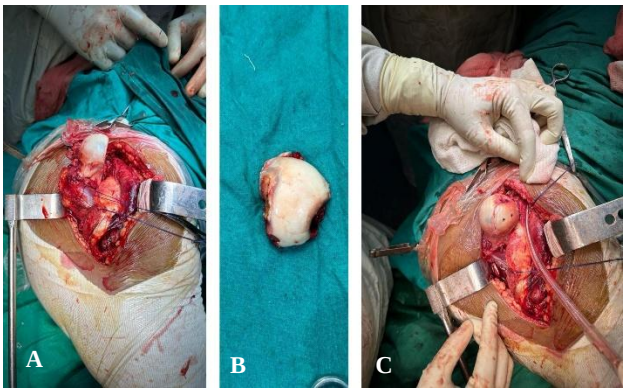

Figure 3 (A-C): Intra-operative image showing safe surgical dislocation and concentric reduction of femoral head fragment.

Surgical management

Under spinal anesthesia, safe surgical dislocation of the hip was performed using a Ganz trochanteric flip osteotomy. The patient was placed in lateral decubitus position. The trochanteric fragment was osteotomized and reflected to preserve the blood supply. Safe surgical dislocation of the hip was carried. Hip was dislocated anteriorly after Z shaped anterior capsulotomy and the femoral head fragment was identified, anatomically reduced, and fixed with three 3.5-mm headless cannulated screws after confirming adequate femoral head vascularity through intraoperative punctate bleeding evaluation (Figure 3). The trochanteric osteotomy was stabilized using 6.5-mm cannulated screws.

Post-operative course

Postoperative radiographs confirmed anatomical reduction and stable fixation (Figure 4). The patient was kept non-weight-bearing for six weeks, followed by gradual partial weight-bearing. At the three month follow up, the patient was able to bear full weight without pain (Figure 6) and exhibited a satisfactory range of motion. No complications such as avascular necrosis or hardware failure were observed at 9 months follow-up (Figure 5).

Figure 4: Immediate post-operative radiograph showing anatomical reduction and fixation.

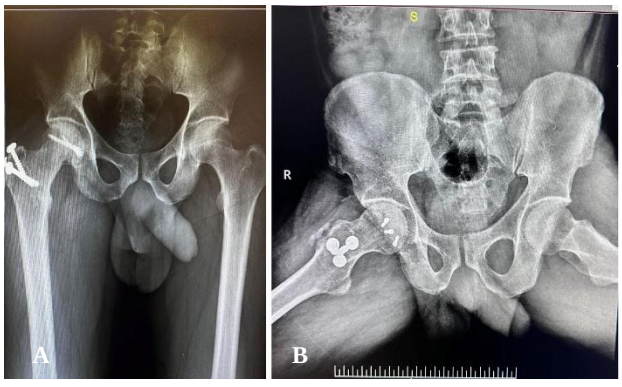

Figure 5 (A and B): Follow-up radiograph at nine months demonstrating union with maintained joint congruity.

Figure 6: Patient full weight bearing at 9 months follow up.

DISCUSSION

Birkett first described femoral head fractures in 1869, and Pipkin's classification (1957) remains the most widely used.[1,2,4,5] Pipkin type I fractures are uncommon and pose a surgical conundrum due to fragment location and vascular preservation concerns. Despite being considered less severe than type II–IV fractures, their management is complex due to the risk of complications such as avascular necrosis (AVN), heterotopic ossification, and post-traumatic arthritis.[3,12] In a large review, Giannoudis et al reported that anatomical reduction of femoral head fractures is the most critical factor influencing long-term outcomes, regardless of classification.[5,6] Early reduction of hip dislocation is critical in preventing cartilage damage and compromising femoral head perfusion.[3,12] Scolaro et al studied 147 Pipkin fractures and noted that type I injuries generally had better functional outcomes when treated surgically compared with non-operative management, particularly when the fragment size exceeded twenty percent.[7] Conventional anterior approaches offer limited visualization of posterior fragments and risk damaging ascending branches of the lateral femoral circumflex artery.[13] Posterior approaches allow dislocation but jeopardize the medial femoral circumflex artery, the dominant blood supply to the femoral head. While ORIF of Pipkin type I fractures is associated with a higher AVN rate (11%) compared to fragment excision (2%) and conservative treatment (7%), the Ganz approach preserves both the deep branch of the medial femoral circumflex artery and the external rotators, while providing complete 360° visualizations of the femoral head and acetabulum.[14] This allows precise reduction, stable fixation, and the opportunity to address concomitant chondral or labral pathology.[8,9] The Ganz trochanteric flip osteotomy offers circumferential access, allowing precise reduction and fixation.[7,8] Headless screws are preferred to minimize articular surface disruption.[6] This case demonstrates that this method is both safe and effective, offering excellent early recovery in middle aged patients.

In our case, the patient was 47 years old, active, and without comorbidities. Preserving the native femoral head was therefore essential. THR, although a definitive solution for pain relief, is associated with implant longevity concerns, risk of early loosening in high-demand patients, and potential need for revision surgery in the future.[12,13] By opting for safe surgical dislocation and anatomical fixation, we achieved stable union, preserved the natural joint, and avoided the morbidity of arthroplasty in a relatively young adult.

This case adds to the growing body of evidence supporting the Ganz approach for femoral head fractures. Compared with anterior or posterior approaches, it ensures vascular preservation and accurate reduction. Compared with THR, it allows joint preservation in younger adults, delaying or avoiding the need for prosthetic replacement.

CONCLUSION

Femoral head fractures with hip dislocation demand meticulous pre-operative planning for timely reduction and selection of a vascular-preserving approach to ensure anatomic fixation and minimize complications such as AVN and post traumatic arthritis. This case highlights how safe surgical dislocation via Gibson's interval with a Ganz trochanteric flip osteotomy provides 360° exposure and femoral head perfusion, significantly advancing surgeons' understanding of this technique. Long-term, multicenter studies are needed to validate outcomes and refine treatment guidelines for Pipkin type I fractures.

ACKNOWLEDGEMENTS

Authors would like to acknowledge the support of the operating room staff and radiology department in the management of this case.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Puranik R, Zad S, Deshpande S, Kengar S, Sapkal V, Sawant A. Pipkin type I femoral head fracture managed by safe surgical dislocation through Gibson's interval with Ganz trochanteric osteotomy: a case report. Int J Res Orthop 2026;12:805-8.