

## Case Report

# Surgical challenges in total hip replacement after failed proximal femoral osteosynthesis: two case reports

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**Received:** 25 July 2025

**Accepted:** 18 September 2025

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## ABSTRACT

Conversion total hip arthroplasty (THA) after failed proximal femoral osteosynthesis is a technically demanding procedure due to altered anatomy, poor bone quality, retained hardware and risks of intraoperative complications like stem perforation and periprosthetic fractures. A 60 years old hypertensive female presented with pain and limited mobility two years after undergoing proximal femoral nailing for an intertrochanteric fracture. Imaging revealed malunion and avascular necrosis (Ficat and Arlet Stage 4). She underwent hybrid THA, complicated by stem perforation. Revision THA with a long uncemented stem and trochanteric osteotomy was performed. Postoperatively, she developed wound gaping and sterile serous discharge, managed successfully with VAC therapy and debridement. A 44 years old male with prior bilateral subtrochanteric fracture fixation presented with left hip pain and avascular necrosis. Following implant removal, uncemented THA was done but complicated by stem perforation through a prior lag screw hole. Revision THA with corrected trajectory using the same stem was performed. Recovery was uneventful. THA following failed internal fixation carries higher risks than primary THA due to distorted anatomy and implant-related challenges. Intraoperative adaptability, use of long-stem prostheses and meticulous wound management were essential in both cases. Fluoroscopic guidance and preoperative planning helped manage complications effectively. Conversion THA after failed fixation presents significant technical challenges. However, with individualized surgical strategies and diligent perioperative care, satisfactory outcomes can be achieved.

**Keywords:** Avascular necrosis, Failed osteosynthesis, Revision hip replacement, Total hip arthroplasty

## INTRODUCTION

Proximal femoral fractures represent a significant burden on orthopedic practice, particularly in the elderly and osteoporotic population, due to their high incidence, morbidity and complex biomechanical considerations. The National Osteoporosis Foundation reports that over 53 million individuals in the United States are affected by or at high risk for osteoporosis. By 2040, the projected annual healthcare expenditure for managing fragility fractures is expected to surpass \$95 billion.<sup>1</sup> Internal fixation using devices such as dynamic hip screws (DHS), proximal femoral nails (PFN) or other osteosynthesis techniques is

commonly employed to preserve the native hip joint and promote early mobilization.<sup>2</sup> Fixation with a proximal femoral nail may offer superior outcomes compared to DHS in unstable intertrochanteric hip fractures, as it is associated with improved functional results (higher Harris Hip Scores), a lower risk of fixation failure and reduced re-operation rates.<sup>3</sup>

However, failure of osteosynthesis due to implant breakage, cut-out, non-union, malunion or avascular necrosis of the femoral head remains a challenging and not uncommon complication, especially in osteoporotic bone or cases of technical inadequacy.<sup>4</sup> In such scenarios,

conversion to total hip arthroplasty (THA) becomes necessary to restore mobility and relieve pain. Nevertheless, performing THA in the setting of failed internal fixation presents substantial surgical challenges. These include altered anatomy, retained hardware or its removal, bone loss, deformity, soft tissue scarring and compromised abductor function all of which complicate implant positioning and increase the risk of intraoperative and postoperative issues, including periprosthetic fractures, joint instability and surgical site infections.<sup>5,6</sup>

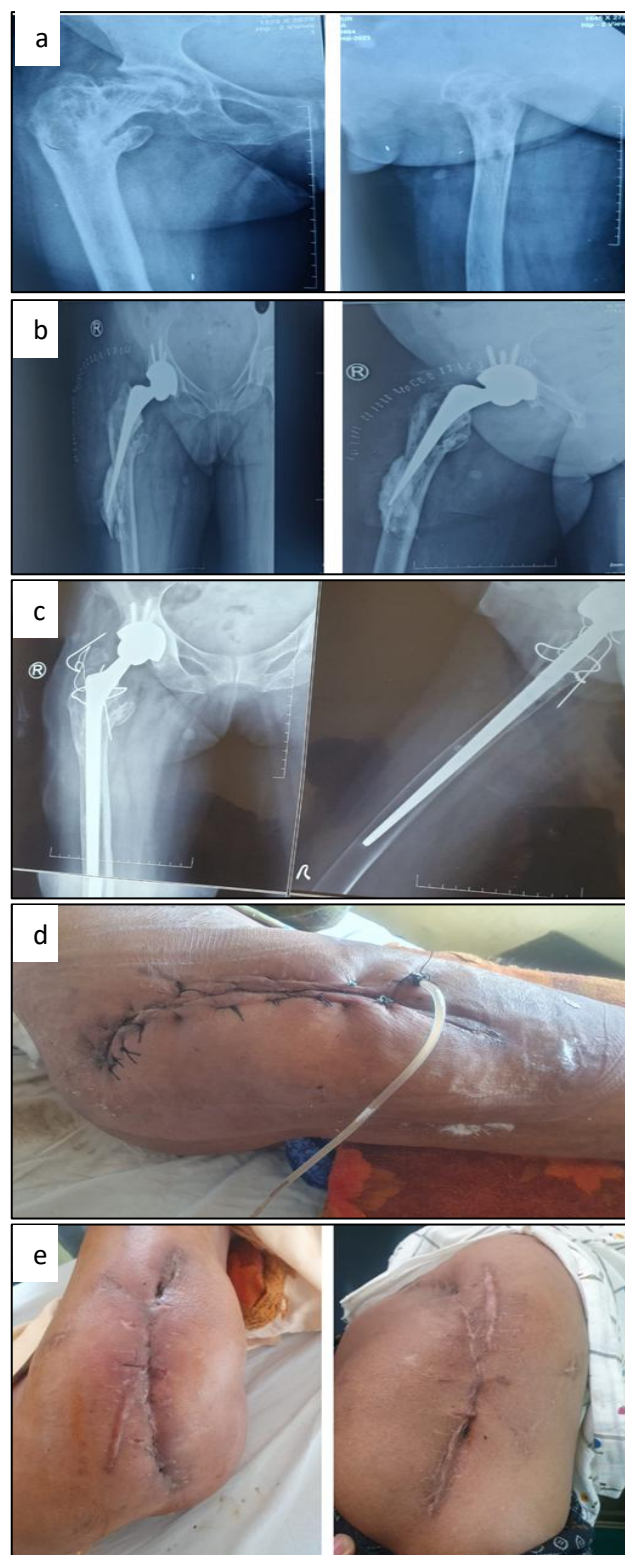
Furthermore, the outcomes of THA after failed fixation are generally inferior to those of primary THA, with longer operative times, greater blood loss and higher revision rates.<sup>7</sup> Given these complexities, each case necessitates a tailored surgical strategy that considers patient age, bone quality, type of previous fixation and the specific cause of failure. This case report highlights two such instances where patients underwent total hip replacement following failed proximal femoral osteosynthesis. The cases underscore not only the technical difficulties encountered but also the critical intraoperative decisions and postoperative care required to achieve satisfactory functional outcomes.

## CASE REPORTS

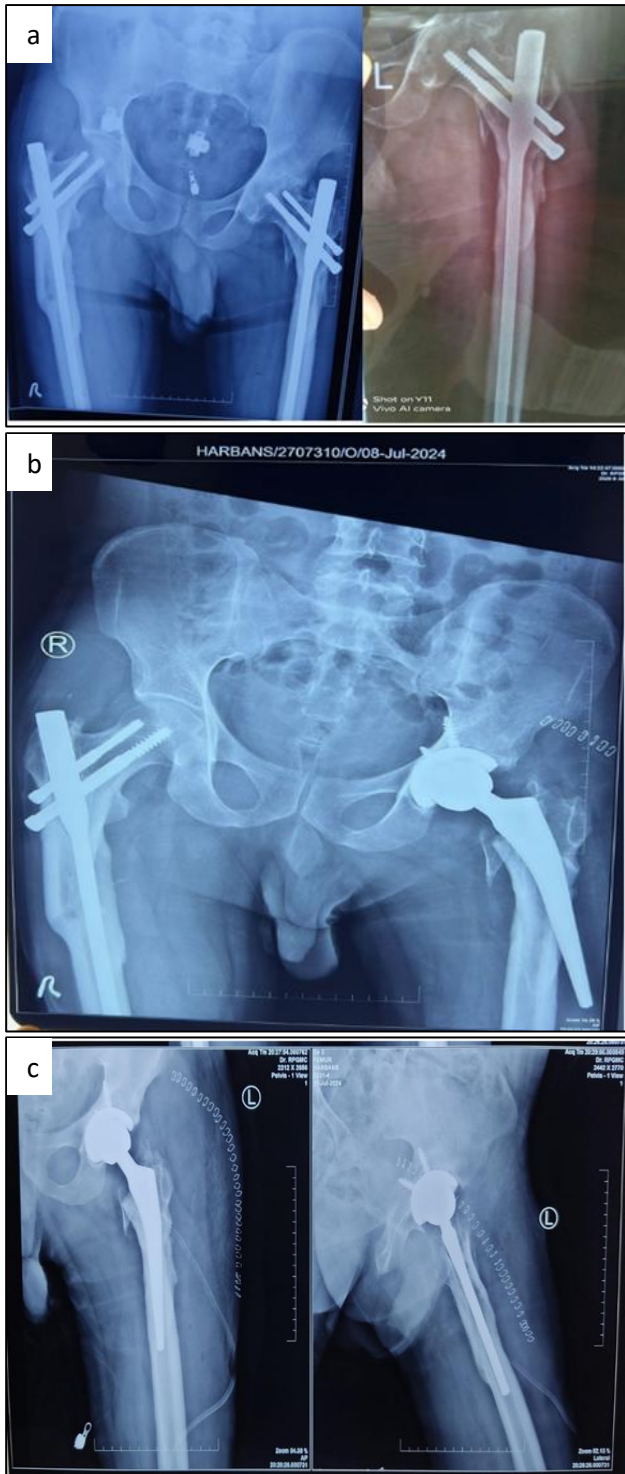
### Case 1

A 60 years old female presented to the orthopaedic outpatient department with complaints of pain and restricted range of motion in her right hip for the past 1 year, along with progressive difficulty in walking. She reported a history of fall 2 years ago, diagnosed as intertrochanteric fracture of the right femur, for which she underwent proximal femoral nailing (PFN) at another center. The implant was later removed after 1 year due to suspected implant failure. The patient after clinical assessment was advised radiographs which shows a malunited intertrochanteric fracture with secondary osteoarthritis and osteonecrosis of the femoral head (Ficat and Arlet Stage 4) (Figure 1a). The patient was explained about the disease and the treatment modality. The routine blood investigations of the patient were done along with ESR/CRP/urine culture to rule out any infection. The patient was a known case of hypertension and thus investigated and clearance from cardiology department taken. After optimization of her comorbidities, she was planned for uncemented THR.

Intraoperatively, the uncemented stem did not achieve a satisfactory press-fit, leading to the decision for a hybrid THR with an uncemented acetabular component and cemented femoral stem. The Gibson and Moore (posterolateral approach with posterior hip dislocation) was taken. Since due to previous osteosynthesis the cortical defects were anticipated the femoral preparation and reaming were done under fluoroscopic guidance except for the cementing and final femoral stem placement due to lack of time at the time of cementing.



**Figure 1: (a) Malunited intertrochanteric fracture with osteonecrosis and secondary osteoarthritis right hip. (b) Periprosthetic fracture of femoral diaphysis with spillage of cement out of the defect. (c) Removal of cement with placement of long stem with fixation of trochanteric osteotomy with cerclage wiring. (d) Post toileting and debridement wound appearance. (e) Healed surgical site at 11 months follow-up.**



**Figure 2: (a) Pre-op X-ray showing AVN of left hip and bilateral proximal femoral nail in situ; (b) stem perforation through lag screw hole and (c) revised THR with repositioned stem.**

On post op day 1, the patient was taken for X-rays which showed the stem perforation i.e., Vancouver type B2 periprosthetic fracture of femoral diaphysis with spilling of cement out of the defect (Figure 1b). The patient on postoperative day 2 was promptly taken up for revision total hip replacement i.e., with long femoral uncemented

stem. The following were the anticipated difficulties. Removal of cemented stem without additional fractures and extraction of cement restrictor and cement mantle from the canal. A trochanteric osteotomy was performed to improve access and visibility. The cement was removed using motorized burs and the stem was extracted using a slap hammer. A long uncemented femoral stem was inserted under fluoroscopic guidance and the osteotomy was stabilized using cerclage wiring (Figure 1c). Postoperative recovery was complicated by persistent serous discharge and wound gaping. Cultures remained sterile and VAC therapy was instituted, after 2 weeks the VAC was removed and toileting and debridement was done along with the closure of the wound (Figure 1d). Eventually, the wound healed well with scarring by 11 months (Figure 1e). Functionally, the patient improved in Harris Hip Score (HHS), WHO Quality of Life (WHOQOL) and WHO Disability Assessment Schedule (WHODAS) over the follow-up period, despite mild persistent discharge and occasional pain. She remains mobile with a cane.

### Case 2

A 44 years old male presented with left hip pain and limited mobility for the past one year. He had a history of bilateral subtrochanteric fractures following trauma 5 years ago, managed with bilateral proximal femoral nailing (PFN) at our center. The patient after clinical assessment was advised the radiographs which showed AVN left hip with secondary osteoarthritis with 5 years old operated case of bilateral fracture subtrochanteric femur with B/L implant in situ without distal neurovascular deficit (Figure 2a). After clinical and anaesthetic clearance, the patient underwent implant removal followed by uncemented THR of the left hip.

However, postoperative radiographs revealed stem perforation through the previous lag screw hole (Figure 2b). The patient was returned to the operating room and revision THR was done, where the perforated stem was removed and femoral canal re-reamed under fluoroscopic guidance. The same stem was reinserted after correcting the trajectory, although placement remained technically challenging (Figure 2c). Postoperative recovery was uneventful and the patient is currently ambulating with improved range of motion and reduced pain.

### DISCUSSION

THA following failed proximal femoral osteosynthesis remains a formidable surgical challenge due to the complex interplay of biomechanical, anatomical and technical considerations. The patients in these cases represent two common clinical scenarios where osteosynthesis failure necessitated conversion to THA one due to malunion and osteonecrosis and the other due to post-traumatic avascular necrosis and implant-related complications. Internal fixation with implants such as PFN or DHS is the mainstay in managing intertrochanteric and

subtrochanteric fractures. However, failure rates in osteoporotic bone and unstable fracture patterns can be substantial, ranging from 3% to 12%, often due to non-union, implant cut-out, malalignment or avascular necrosis of the femoral head.<sup>8</sup> The risk is magnified in elderly patients or when improper reduction or suboptimal implant positioning occurs. In case 1, delayed complications included malunion and avascular necrosis (Ficat and Arlet Stage 4), consistent with literature suggesting that failed fixation can lead to secondary osteoarthritis and necrosis over time.<sup>4</sup> Case 2 highlights the long-term effects of high-energy trauma and hardware retention, resulting in AVN and joint degeneration even years after osteosynthesis. THA after failed osteosynthesis is associated with higher complication rates compared to primary THA, including periprosthetic fractures, malalignment and component loosening.<sup>7</sup> Altered femoral anatomy, previous cortical breaches and retained hardware make intraoperative planning critical. In both cases, the primary arthroplasty attempt was complicated by stem perforation, a recognized complication in revision or conversion THA settings, especially when cortical integrity is compromised or the femoral canal is distorted.<sup>9</sup>

Fluoroscopic guidance, while helpful, does not always prevent iatrogenic perforation, as evidenced in both cases. The literature supports the need for a careful preoperative templating and intraoperative navigation where available to minimize these errors.<sup>10</sup> In case 1, the intraoperative conversion from uncemented to hybrid THA and subsequent revision with a long uncemented stem reflects a growing consensus on using longer revision stems to bypass areas of weakness or cortical defects. Similarly, trochanteric osteotomy, though avoided, when possible, may be essential for adequate exposure and cement removal in revision surgeries.

Infections, even in the absence of positive cultures, are a feared complication. The serous discharge and wound gaping in case 1, although sterile, underline the importance of wound care strategies such as VAC therapy in managing persistent drainage or borderline infections. While cultures were negative, such presentations can represent low-grade infections or inflammatory responses to previous implants. Both patients showed improvement in function and pain, reflected in better Harris Hip Scores (HHS) and quality of life metrics. This aligns with recent studies that have demonstrated favorable outcomes with meticulous surgical planning and proper implant selection, even in complex revision scenarios.<sup>11</sup> However, it is critical to note that revision or conversion THA carries higher complication rates, longer operative time and increased blood loss compared to primary THA. Hence, primary prevention of fixation failure through optimal technique and patient selection remains paramount.

## CONCLUSION

THR following failed proximal femoral osteosynthesis presents significant surgical challenges, stemming from

altered anatomy, compromised bone quality and the presence or sequelae of previous implants. The two cases presented in this report underscore the multifactorial difficulties encountered during conversion THA, including intraoperative complications such as stem perforation, the need for unplanned revisions and postoperative wound management. Despite these hurdles, satisfactory functional outcomes were achieved in both patients through meticulous preoperative planning, intraoperative adaptability and diligent postoperative care. These cases reinforce the importance of individualized surgical strategies tailored to the patient's anatomy, prior fixation method and specific failure pattern. The use of long-stem prostheses, fluoroscopic guidance and adjunct techniques such as trochanteric osteotomy and VAC therapy proved instrumental in achieving stable fixation and wound healing. Moreover, these experiences highlight the necessity of thorough risk assessment and informed consent when planning conversion THA.

Ultimately, while THA after failed osteosynthesis remains a complex endeavor with higher risks than primary THA, favorable clinical outcomes are attainable with careful surgical judgment, advanced implant selection and comprehensive perioperative management.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: Not required*

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**Cite this article as:** Kumar V, Thakur L, Bhardwaj R, Sharma S. Surgical challenges in total hip replacement after failed proximal femoral osteosynthesis: two case reports. *Int J Res Orthop* 2025;11:1572-6.