

Case Report

Management of fracture shaft femur with ipsilateral un-united neck femur fracture with femoral neck system in situ, with review of fixation options

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ABSTRACT

Ipsilateral fractures of the femoral neck and shaft are rare but complex injuries that require meticulous planning and surgical execution. The presence of a previously fixed but ununited femoral neck fracture using a novel implant, such as the femoral neck system (FNS), further complicates management. We present the case of a 23-year-old male who sustained a mid-shaft femur fracture following a road traffic accident. Notably, the patient had undergone surgical fixation of an ipsilateral femoral neck fracture two months prior using FNS. Radiographs revealed non-union of the femoral neck with early signs of avascular necrosis, along with a fresh shaft fracture. Surgical management included removal of the FNS and closed reduction with internal fixation using a cephalomedullary (sirius) nail. Proximal femoral fixation was augmented using two locking screws through the nail and one additional screw outside the nail. The patient had an uneventful postoperative recovery. At four-month follow-up, radiographs showed progressive union of both femoral neck and shaft fractures, with no radiographic signs of implant failure or further head collapse. This case illustrates the surgical challenges in managing sequential ipsilateral femoral fractures with prior implant in situ. Timely revision of the FNS and stabilization with a cephalomedullary nail allowed for successful outcome. Such complex cases require individualized surgical planning, and the combination of appropriate fixation techniques can yield satisfactory healing and functional recovery.

Keywords: Ipsilateral femoral shaft and neck fracture, Femoral neck system, Cephalomedullary nail, Revision fixation

INTRODUCTION

Ipsilateral fractures of the femoral neck and shaft are uncommon injuries that pose significant challenges in orthopaedic trauma care.¹ These injuries are most commonly seen in young adults following high-energy trauma such as road traffic accidents.² The management of this dual fracture pattern is complex due to biomechanical instability, difficulty in achieving anatomical reduction, and high rates of complications including non-union, avascular necrosis (AVN) of the femoral head, and implant failure.³

Traditionally, treatment strategies have revolved around the use of either a single implant or dual implant

constructs.⁴ A single implant may include long cephalomedullary nails or dynamic hip screw (DHS) with a long side plate that spans the shaft fracture.⁵ On the other hand, dual implant fixation offers flexibility and targeted fixation of each fracture component—typically, cannulated cancellous (CC) screws or femoral neck system (FNS) for the neck fracture, combined with an intramedullary or extramedullary device for the shaft.⁶

The FNS is a novel implant designed for the fixation of femoral neck fractures, offering angular stability, minimal invasiveness, and improved rotational control.⁷ Despite its promising outcomes, clinical experience with FNS remains relatively limited, especially in complex or sequential injury scenarios.⁸

We report a rare and instructive case of a young adult who sustained a femoral shaft fracture following recent fixation of an ipsilateral femoral neck fracture using FNS. The femoral neck fracture showed signs of non-union with possible AVN, necessitating revision of the existing implant during fixation of the new shaft fracture. This case highlights the surgical decision-making process, technical considerations in revising FNS, and the use of a cephalomedullary nail with supplementary fixation to address both fracture components.

CASE REPORT

A 23-year-old male presented to the emergency department with pain and inability to bear weight on the right lower limb following a high-energy road traffic accident. The patient had sustained an ipsilateral femoral neck fracture two months prior and underwent surgical fixation using the FNS at another centre. His post-operative recovery at that time was uneventful until the current trauma.

On clinical examination, the right lower limb was shortened and externally rotated with localized swelling and tenderness over the mid-thigh. There were no neurovascular deficits. Systemic examination revealed no other injuries.

Radiographic evaluation of the pelvis and right femur revealed a transverse fracture of the mid-shaft femur along with a previously fixed but ununited femoral neck fracture. The femoral neck showed signs of non-union and early AVN of the femoral head. The FNS implant was in situ, but signs of implant loosening and inadequate healing at the fracture site were evident (Figure 1).

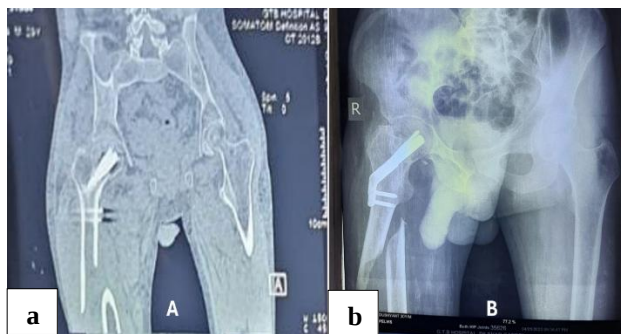


Figure 1: Preoperative radiograph showing femoral shaft fracture and ununited neck with FNS in situ, (a) CT scan, and (b) AP radiograph of pelvis.

Given the complexity of the injury and the compromised fixation in the femoral neck, surgical planning involved implant removal and definitive stabilization using a strategy that would address both fracture components effectively. After pre-operative evaluation and counselling, the patient was taken for surgery under spinal anaesthesia.

The FNS implant was carefully removed. Closed reduction and internal fixation of the shaft fracture were performed using a cephalomedullary nail (sirius nail). For the femoral neck, two proximal locking screws were inserted through the nail, and one additional screw was placed outside the nail to ensure stability across the neck fracture site (Figure 2).

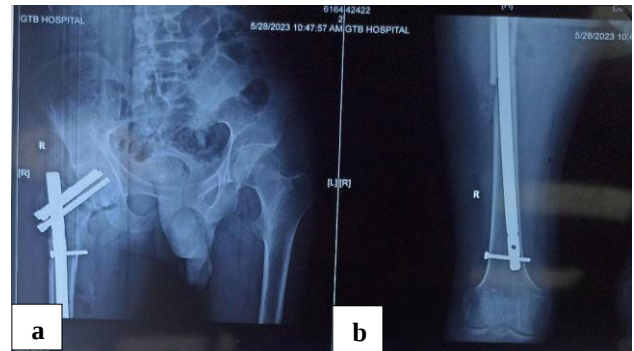


Figure 2 (a and b): Post op radiograph with internal fixation using a sirius nail.

The postoperative period was uneventful. The patient was mobilized with non-weight bearing on the affected limb, and serial radiographs during follow-up showed progressive union at both the femoral shaft and neck fracture sites. At the six-month follow-up, radiographs demonstrated satisfactory callus formation with maintained alignment (Figure 3).

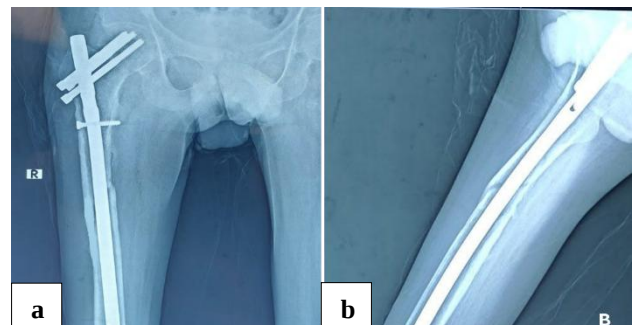


Figure 3 (a and b): Six month follow up X ray depicting union at fracture sites.

DISCUSSION

Ipsilateral fractures of the femoral neck and shaft are complex injuries typically resulting from high-energy trauma, predominantly affecting young adults. The management of these concurrent fractures is challenging due to the risk of complications such as non-union and AVN of the femoral head. Various treatment modalities have been explored, including single-implant and dual-implant strategies.

In the present case, a 23-year-old male sustained a femoral shaft fracture with an existing ununited femoral neck fracture previously stabilized using the FNS. This scenario

necessitated the removal of the FNS and subsequent stabilization using a cephalomedullary nail with supplementary proximal screws.

The use of cephalomedullary nails in managing ipsilateral femoral neck and shaft fractures has been supported in the literature. Bedi et al reported that cephalomedullary devices provide stable fixation for both fractures, facilitating early mobilization. However, they emphasized the importance of achieving anatomic reduction of the femoral neck to prevent non-union and AVN.^{10,11}

Similarly, Jain et al demonstrated that cephalomedullary interlocked nailing is effective for ipsilateral hip and femoral shaft fractures, offering the advantage of a single implant with minimal soft tissue dissection. They reported satisfactory union rates with this technique.¹²

Conversely, the FNS, designed for femoral neck fractures, has shown promising results in isolated cases. A systematic review by Wu et al indicated that the FNS could reduce the incidence of femoral neck shortening and promote fracture healing compared to cannulated cancellous screws.¹³

However, limitations of the FNS have been noted. Kale et al reported cases where the FNS failed, leading to complications such as varus collapse and implant impingement, necessitating revision surgeries.¹⁴

In our case, the initial fixation with FNS did not achieve union, and the patient developed a subsequent shaft fracture. The decision to remove the FNS and utilize a cephalomedullary nail with additional proximal screws was influenced by the need to address both fractures effectively. This approach allowed for stable fixation and facilitated early mobilization, aligning with findings from previous studies.

This case underscores the importance of individualized treatment planning in ipsilateral femoral neck and shaft fractures. While the FNS offers advantages in isolated femoral neck fractures, its limitations in complex fracture patterns necessitate careful consideration. Cephalomedullary nailing, with or without supplementary fixation, remains a viable option, provided that meticulous attention is given to achieving anatomic reduction and stable fixation to minimize complications.

CONCLUSION

This case highlights the complexities involved in managing ipsilateral femoral neck and shaft fractures, especially in scenarios where previous fixation has failed. The successful revision of the FNS and stabilization using a cephalomedullary nail with additional proximal fixation demonstrates that individualized surgical planning and implant selection are crucial in such cases. Timely intervention, meticulous surgical technique, and close postoperative follow-up can lead to favourable outcomes,

even in challenging revision scenarios involving ununited fractures and early signs of avascular necrosis.

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