Case Report Journal of Clinical Orthopaedics 2023 July-December;8(2):88-90

Challenges Faced in the Surgical Fixation of a 4 Part Inter-Trochanteric Femur Fracture in a Patient with Ipsilateral Below Knee Amputation and Uncontrolled Diabetes Mellitus

Ameya Haritosh Velankar[1], Sanjeev Singh[1], Ashok Ghodke[1], Deepak Jain[1], Aditya More[1], Kriteya Singh[1]

Abstract

Operative treatment of hip fractures in a patient with below-knee amputation on the same extremity poses a great challenge in terms of obtaining an optimal amount of traction for fracture reduction. The absence of the foot and the distal lower limb which makes the positioning difficult and other medical co-morbidities contribute to the same. We present a case report of a 66-year-old man with ipsilateral below-knee amputation who underwent surgical fixation of a comminuted 4-part right intertrochanteric femur fracture. We discuss the pros and cons of various methods and highlight a simple and effective technique of reverse boot traction for fracture reduction.

Keywords: Inter trochanteric femur fracture, 4-part fracture, amputation, diabetes mellitus, reverse boot.

Introduction

Fractures of the intertrochanteric region pose significant surgical challenges, and their management becomes even more intricate when compounded by unique patient factors. This case report explores the complexities encountered during the surgical fixation of a rare 4-part intertrochanteric fracture in a patient with a pre-existing ipsilateral below-knee amputation. As we delve into the intricacies of this case, we aim to shed light on the nuanced decision-making processes and adaptive techniques required to address the multifaceted nature of fractures in patients with limb amputations. This report not only underscores the surgical intricacies but also emphasizes the importance of individualized approaches in managing orthopedic trauma in patients with complex anatomical considerations.

Case Report

Patient information

A 66-year-old man with an ipsilateral below-knee amputation done for a diabetic foot presented in the emergency room with a history of falls. The patient had been using a below-knee prosthesis for mobilization for the past 10 years. Radiographs were taken which revealed a comminuted intertrochanteric fracture (Fig. 1a and b). Seeing the age of the patient and the comorbidities, a Proximal Femoral Nail Antirotation (PFN A2) was planned for the patient but patient positioning and the fracture reduction posed a challenge.

Therapeutic intervention

We used a standard fracture traction table to position the patient. To get access for the C- arm the contralateral limb was attached to a leg support with hip in 90° flexion and abduction. The boot on the side of the operating limb was reversed upside down (Fig. 2). The stump was fastened with elastic bandage and adhesive tapes in a figure of 8 pattern starting from the distal end of the boot, overlapping 50% of the width extending approximately 5 cm proximal to the knee and the knee was flexed. The flexed knee was anchored to the boot piece after flipping the boot piece which permitted traction of approximately 20 kg and manipulation as in a typical intertrochanteric fracture.

Following an adequate amount of traction and internal rotation, the reduction was confirmed in a standard AP and Lateral views of the right hip. A 3 mm K-wire was used temporarily for transfixation of the fracture. Internal fixation was done with a PFN A2 (Fig. 3a and b). Fracture reduction was confirmed under C arm and the transfixation wire was removed.

Postoperatively, the stump was examined for any wounds, abrasions, or pressure sores. Post-operative radiographs of the patient showed a satisfactory reduction. The patients recovery was uneventful and

[1]Department of Orthopaedics, MGM Institute of Health Sciences, Kamothe, Navi-Mumbai- 410209, Maharashtra, India.

Address of Correspondence
Dr. Deepak Jain, MS Ortho
Assistant Professor, Department of Orthopaedics, MGM Institute of Health Sciences, Kamothe, Navi-Mumbai-410209, Maharashtra, India.
E-mail: deepaksjain1993@gmail.com

Submitted Date: 25 Oct 2023, Review Date: 12 Nov 2023, Accepted Date: 28 Nov 2023 & Published Date: 30 Dec 2023

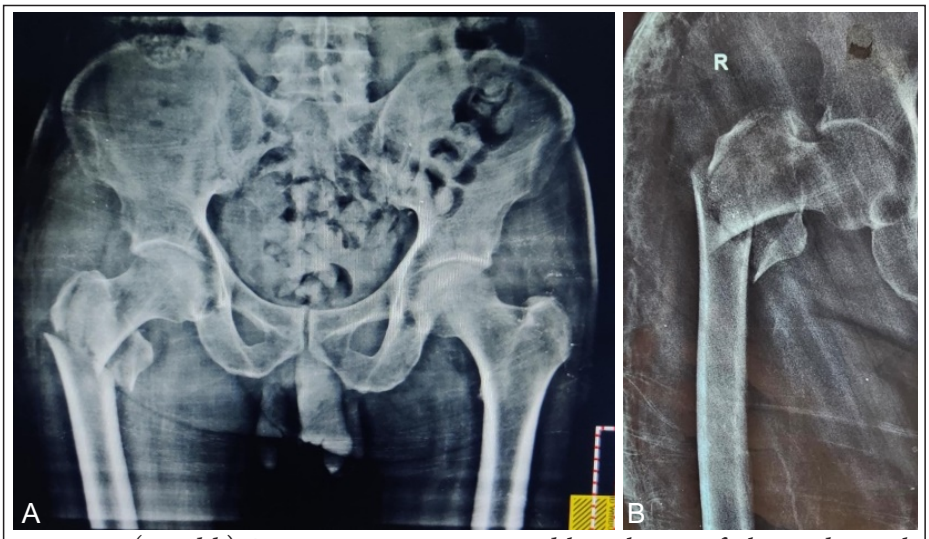

Figure 1: (a and b) Anterior-posterior view and lateral view of plain radiograph showing a four part comminuted right inter trochanteric femur fracture.

was discharged after rehabilitation.

Discussion

Advancement in the field of prosthetics, help patients with lower limb amputations lead functionally active life. Hence, when hip fractures occur in such patients, operative intervention helps to restore mobility and reduce morbidity arising because of the fracture. Intertrochanteric femur fractures are one of the most common fractures witnessed in the emergency room. A variety of surgical procedures such as the intramedullary nailing, dynamic hip screws, and dynamic condylar screws have been used for a long time. However, in such cases, challenges such as positioning of the patient and the limb, use of the traction table, and reduction of the fracture are encountered. Details regarding the best method of fracture reduction are lacking.

Several techniques have been described in the past to overcome the issue.

The first is the use of skeletal traction for the reduction of the fracture. This involves the insertion of a Steinmann pin into the proximal tibia of the stump and an assistant's help to position the affected limb for acceptable reduction [1]. An alternative is attaching the Steinman pin to the traction device. The disadvantages of this technique include the risks of infection, cutting out of the pin in osteoporotic bones, and soft-tissue injury to the distal stump [1]. However, achieving rotational stability with this technique was difficult [2].

Another is the use of skin traction to secure the stump to the traction boot. This technique can still be used in the presence of a severe contracture in the knee joint, unlike the inverted boot technique. An important consideration when utilizing this method is the skin condition. Surgeons should carefully assess the skin around the knee joint and stump before application of the elastic adhesive tape as any fragile areas may be prone to breaking down during the procedure. Given the ease of application and ability to provide adequate amounts of traction and rotation, surgeons should consider this method of skin traction when faced with obtaining traction for hip fractures in below-knee amputees[3]. Some studies suggested that such a technique can be used only in undisplaced and minimally displaced fractures and also provides minimal rotational control.

Another method that has been described is the use of manual traction by an assistant to manipulate and maintain the fracture reduction or to fit the patient's prosthesis to the boot of the traction table. This technique is challenging as it is unlikely to provide satisfactory fracture reduction and control of the distal limb, especially in cases of displaced fractures, which often require a considerable amount of traction. In addition, manual traction by the assistant is difficult to maintain throughout the surgery [4].

Bipolar hemiarthroplasty is an option for Intertrochanteric fractures however it is associated with greater morbidity, increased risk of infection due to larger incisions and more soft-tissue handling.

The technique described in this case report involves the use of the inverted boot method on a traction table to accommodate the flexed knee. It gives a good amount of traction and rotational control. The advantages of this method are that sustained traction can be achieved which improves the fracture reduction and ease of fixation, no need of an assistant to hold the reduction, manipulation is easy, risk of skin injury and infection of pin tracts is avoided. Nagesh et al. described that these patients rehabilitated better than the pin traction group. They started using their

Figure 2: Positioning patient on a traction table. The boot is inverted so that the stump rests in the boot and the knee joint acts as a counter traction. The adhesive tape is applied in a figure of 8 fashion circumferentially, around the boot just proximal to the knee.

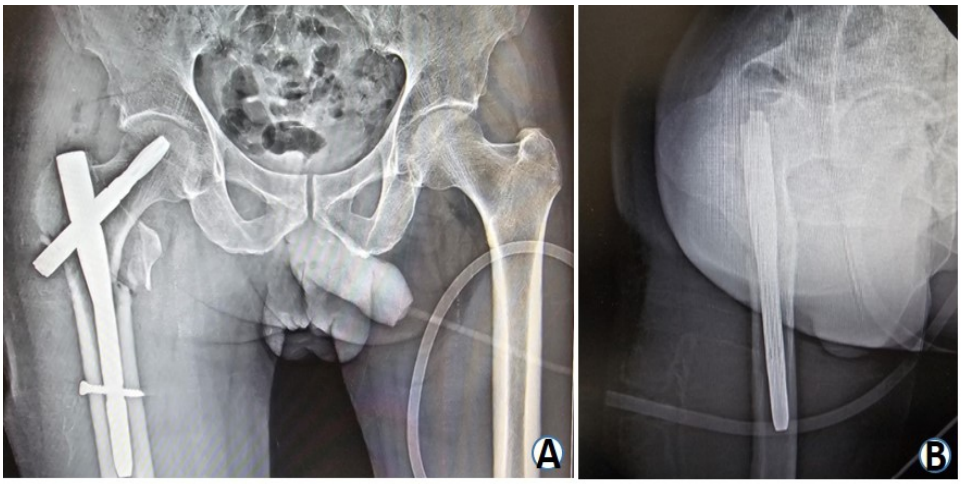

Figure 3: (a and b) Anterior-posterior and lateral view of post-operative radiographs showing a satisfactory reduction.

prosthesis in 3 days as compared to 7 days in pin traction group. Patients in whom the Reverse boot technique was used were discharged home earlier (in 14 days as compared to 21 days) than patients who had pin traction applied during surgery [5]. However, there are certain drawbacks of this method such as if the distal stump is short or if the adhesive tape is applied too proximal to the knee, it precludes the use of a long intramedullary nail by obstructing the insertion site of the distal locking screws. There may be difficulty in applying the boot in stumps <12 cm3. Where a long intramedullary nail is mandated, surgeons may have to resort to the insertion of a Steinmann pin to provide adequate traction as well as surgical exposure. The difficulty with applying the boot may be amplified in small-sized patients with short femurs. In such cases, surgeons can consider utilizing a pediatric foot traction boot which is compatible with the surgical table. Finally, the presence of a knee contracture may also pose difficulties in applying the boot as the stump should ideally be flexed to a 90° angle for attachment [3].

Our study preferred the use of a proximal femoral nail over hemiarthroplasty or cannulated cancellous screw fixation or skeletal traction. As the patient is an uncontrolled diabetic smaller incisions and limited soft-tissue handling was required which made a PFN the best option. Post-operative care in terms of antibiotics, glycemic control, hip and knee strengthening exercises, early mobilization, respiratory exercises, and mental rehabilitation play a major role in the recovery.

Conclusion

Fracture fixation in a below-knee amputee with uncontrolled diabetes is a challenge for orthopedicians. The aim is to reduce the fracture by traction and a good rotational control. Also reduce the chance of infection by using smaller incisions and reducing the surgical time by using closed nailing.

References

1. Gamulin A, Farshad M. Amputated lower limb fixation to the fracture table. Orthopedics 2015;38:679-82.
2. Gamulin A, Farshad M. Intertrochanteric femur fracture fixation in a patient with below knee amputation presents a surgical dilemma: A case report. Orthopedics 2015;38:679-82.
3. Lee BH, Ho SW, Kau CY. Surgical fixation of a comminuted inter-trochanteric fracture in a patient with bilateral below knee amputation. Malays Orthop J 2018;12:54-6.
4. Rethnam U, Yesupalan RS, Shoaib A, Ratnam TK. Hip fracture fixation in a patient with below-knee amputation presents a surgical dilemma: A case report. J Med Case Rep 2008;2:296.
5. Nagesh H, Bhargava A, Brooks C. Reverse boot traction-a simple technique for operative management of trochanteric fractures in patients with ipsilateral below knee amputation. Orthop Proc 2004;86:82.

Conflict of Interest: NIL
Source of Support: NIL

How to Cite this Article

Velankar AH, Singh S, Jain D, Ghodke A, More A, Singh K. Challenges Faced in the Surgical Fixation of a 4 Part Inter-Trochanteric Femur Fracture in a Patient with Ipsilateral Below Knee Amputation and Uncontrolled Diabetes Mellitus. Journal of Clinical Orthopaedics Jul-Dec 2023;8(2):88-90.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of Interest: NIL; **Source of Support:** NIL