A Novel Technique For Reducing Sagitally Unstable Intertrochanteric Hip Fractures

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Abstract

Introduction: Intertrochanteric fractures are common fractures which needs to be reduced and fixed appropriately for optimum outcome. Poor reduction increases the chances of its failure by multiple times. Sagitally split fractures are notorious due to the associated flexion and sagging of distal fragment. Indirect reduction techniques have been used but with less reliability. **Methods:** This study tries to evaluate and put forward a technique to fix these fractures adequately translating into good clinical outcome. the fracture reduction was tried under traction. A stab incision was put anteriorly to manage the flexion of the proximal fragment.**Conclusion:** it is a simple and effective technique. Digital palpation by the operating surgeon aids in reduction and gets the idea of spatial orientation of the neck and thus it is easy to direct the guide wire along the direction of the neck which otherwise may take multiple trials and increased radiation exposure.

Keywords: Intertrochanteric fracture, IT fracture, reduction maneuver

1. Introduction

Intertrochanteric fractures are one of the most common fractures around the hip joint [1]. With the increase in life expectancy, both the incidence and the number of operative procedures for these fractures have increased [2]. Achieving anatomical reduction is essential for obtaining the best functional outcome, as poor reduction increases the likelihood to failure by 3 times [3, 4]. Closed reduction technique alone is unable to reduce these fractures in most of the cases specially the unstable intertrochanteric fractures where they remain unreduced in the sagittal plane with the proximal fragment going in flexion and the distal fragment sagging posteriorly. This necessitates the use of indirect reduction techniques or open reduction. Here we present a novel technique of reducing the sagitally unstable I/T fractures by pushing the proximal fragment posteriorly by a thumb passed through a stab incision anteriorly and simultaneously lifting the distal fragment, thereby avoiding the need of open reduction.

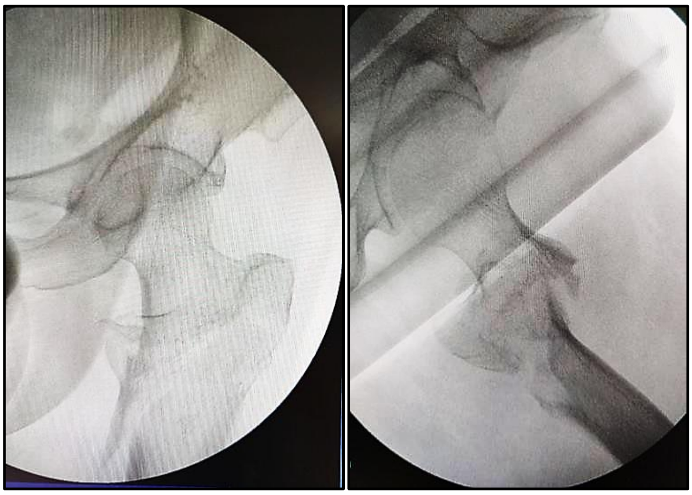
2. Operative technique

After intubation the patient is placed on a fracture table in supine position with the non-affected leg kept in well leg holder with the hip and knee in flexion, external rotation and abduction to provide passage for the C arm. A well-padded perineal post is kept to avoid undue pressure on the labia or the scrotum while giving traction. The affected leg is kept and strapped adequately in a boot present on the end of the fracture table (Fig. 1).

Fig1: The patient positioned on the fracture table as described in text and the parts painted and draped. Note that the C arm is covered with sterile technique and placed on the opposite side with the monitor

The trial of closed reduction is given i.e. linear traction and adduction with internal/external rotation of the limb. AP and Lateral views are taken using C arm. If found un-reduced in the sagittal plane (Fig. 2) the following technique is followed after painting and draping the patient.

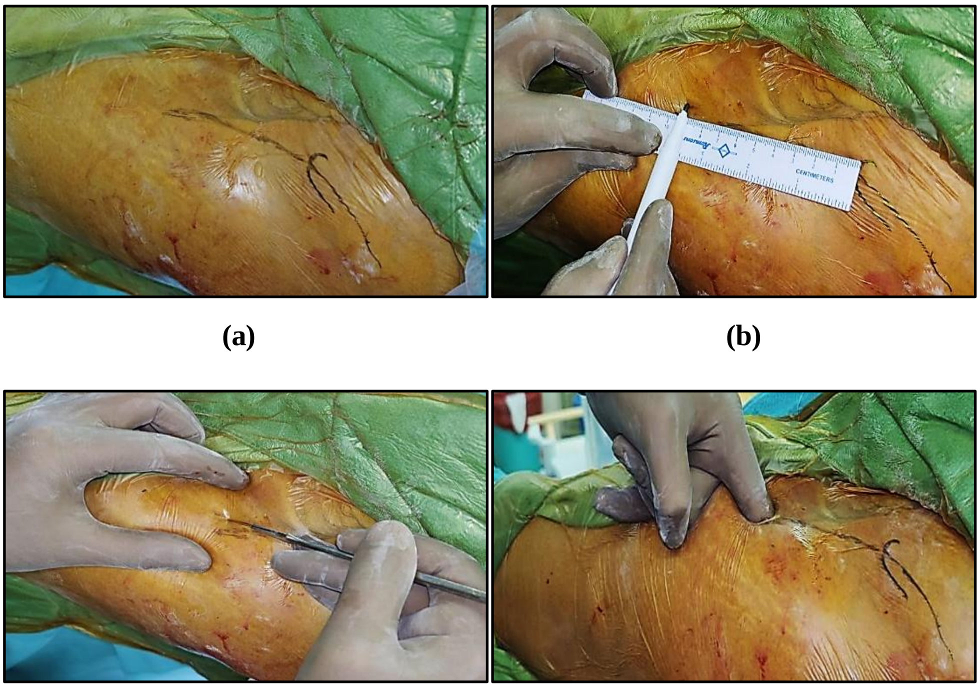
(a)



(b) **(c)**

Fig2:(a) Pre-operative X ray showing Intertrochanteric fracture of the left femur. (b) After attempt of closed reduction AP view and (c) Lateral view on C arm showing the characteristic sagittalplane deformity with the proximal fragment going in flexion and the distal fragment sagging posteriorly

The anterior superior iliac spine (ASIS) is marked and a line is drawn from the ASIS along the femoral axis. A point around 9cm distal to the ASIS is marked which corresponds to the inferomedial aspect of the proximal fragment. After confirming the point on C arm with an artery forceps a 2cm stab incision is given at this point and a finger is inserted by blunt dissection till it reaches the fracture site. (Fig. 3)



(a) **(b)**

(c) **(d)**

Fig3:(a) Marking of the ASIS and the line along the femoral axis. (b) Marking the point 9cm distal to the ASIS on the line. (c) Stab incision after confirming under the C arm. (d) Finger inserted through the anterior stab incision by blunt dissection till it reaches the fracture site.

The finger pushes the flexed proximal fragment posteriorly as the assistant lifts the distal fragment thereby reducing the fracture site, which is then confirmed under C arm. After it is confirmed that the fracture gets reduced with this technique, the finger is removed and standard

procedure of cephalomedullary nailing is carried out. We use PFN A2 for all our cases. Guide wire is inserted after locating proper entry point and confirming it under C arm (Fig. 4). This step is very crucial for doing a PFN surgery and should be given adequate consideration. Proximal reaming is done and un-reamed/ reamed nail of appropriate length and diameter is inserted.

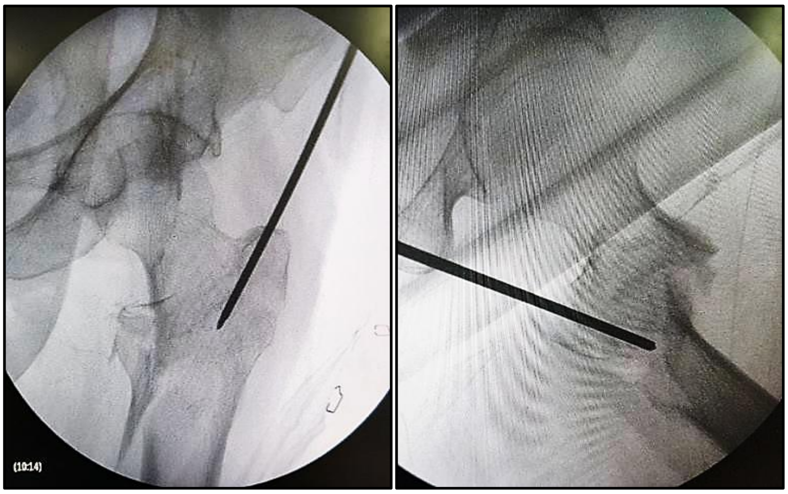


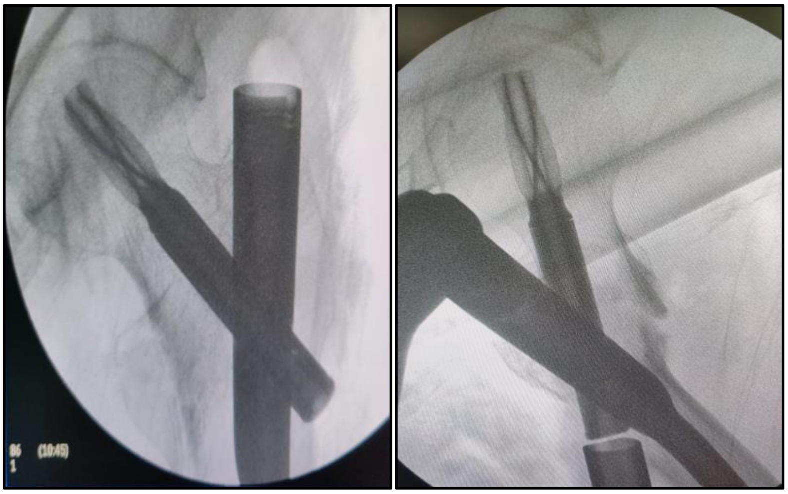
Fig4: Entry point marked by a guide wire and confirmed under C arm on both AP and Lateral view

The reduction maneuver is done again and sagging of the distal fragment is now corrected by lifting the insertion handle of the nail while the finger through the anterior incision reduces the flexed proximal fragment (Fig. 5). The finger in the proximal fragment also guides us about the spatial orientation of the neck of femur(i.e. anteversion) and helps us direct the guide wire in the lateral view.

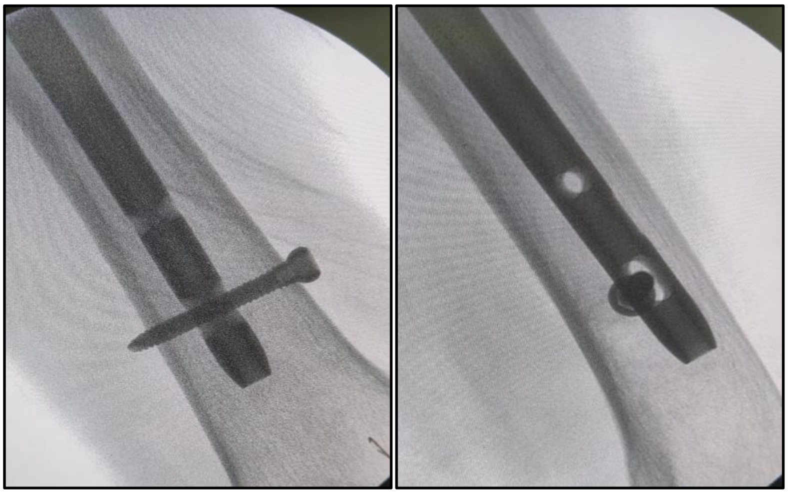
The proximal lag screw of appropriate size is inserted after passing the guide wire in centre-centre position in both AP and Lateral views. Distal locking is done and the wound is closed in layers after a thorough wash (Fig. 6).

(a) **(b)** **(c)**

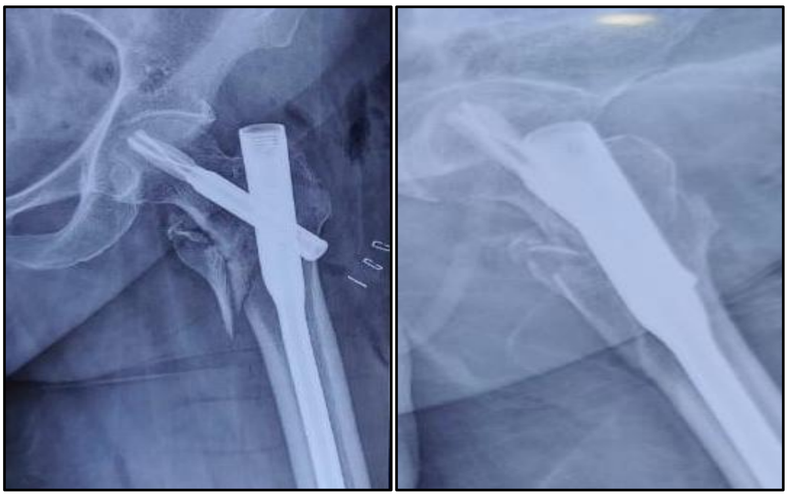
Fig5:(a) The operating surgeon reducing the flexed proximal fragment while the assistant lifts the insertion handle to correct the posterior sag thereby reducing the fracture. (b) The Lateral view and (c) The AP view on C arm showing accurate reduction by the finger marked by * and guide wire being inserted in the centre-centre position



(a)



(b)



(c)

Fig6:(a) Final AP and Lateral view of C arm after passing the proximal lag screw showing good anatomical reduction and (b) C arm picture AP and Lateral view after passing the distal locking bolt (c) Post-operative X-rays AP and Lateral view

3. Discussion

Intertrochanteric fractures are one of the most common fractures encountered in orthopaedic practice. The fracture pattern, bone quality (osteoporosis), quality of reduction and adequacy of fixation are the crucial factors that determine the successful outcome of these fractures. Out of these the last two are in control of the orthopaedic surgeon and should never be compromised.

Unstable Intertrochanteric fractures are often difficult to reduce by closed reduction techniques because of the deforming forces acting at the fracture ends. The proximal fragment tends to go in flexion, more so in the cases where the lesser trochanter remains attached to the proximal fragment, due to the pull of iliopsoas muscle. Also depending upon the fracture pattern it can be externally rotated due to the action of short external rotators. The distal fragment is pulledproximally and medially due to the adductors and hip flexors/extensors leading to varus deformity and shortening [5]. Thus there is a need for indirect reduction techniques or open reduction. Open reduction leads to disruption of local blood supply, leads to more blood loss, increases chances of infection, delay union and increases the operative time and thus it is often kept as the last resort necessitating the use of indirect reduction techniques.

Various indirect reduction techniques have been illustrated in the literature each having its benefits and drawbacks and it remains the operating surgeon's choice depending upon his familiarity of the technique and his ease. Aktselis*et al*. [6]and Carr *et al*.[7]used the standard proximal incising to slide either a Hohmann retractor, Wagner raspatory or a Jocher elevator anteriorly along the proximal fragment and exert downward pressure on it. In addition to this Koval*et al*.[8]used another elevator posteriorly in the distal fragment and lifts it to correct the deformity. Ruecher*et al*.[9]and Ban *et al*.[10]used pointed reduction clamps, bone hooks and bucking bar to correct the reduction by splitting the lateral musculature bluntly and passing these devices. These techniques however pose difficulty in maintaining reduction throughout the procedure, increase the chance of injury to soft tissue and vasculature and needs multiple exposures of C arm to confirm the reduction.

Langford *et al*. [11]used a posterior reduction device (PORD) to correct the posterior sag. This device remains attached to the fracture table and does not hinder the movement of C arm. Though it corrects the posterior sag of the distal fragment but it cannot correct the flexion deformity of the proximal fragment.

De Palma *et al*. [12]introduced a novel device; the pneumatic patient positioner (PPP), which they placed beneath the hip at the time of closed reduction and inflated it so as to correct the external rotation and posterior sag of the distal fragment. Still this technique alone cannot correct the posterior sag of distal fragment and flexion of the proximal fragment.

Some authors used cerclage wiring to hold the reduction achieved by clamps or other methods throughout the nailing and removed it or left it depending upon the fracture stability. They advocated the use of wire secures decreases assistant dependence of holding the reduction, secures the posterior fragments and protects the lateral wall. But this technique increases the operating time, disrupts the blood supply leading to delay in fracture healing and increases blood loss[13].

Some surgeons have used a sterile draped crutch below the thigh to correct the posterior sagging, but in many cases they encountered slippage of the crutch requiring an additional assistant to hold the distal fragment[5, 7, 8, 14].

In the study by Young *et al*., they used a mallet, which was held by an assistant to lift the distal fragment while the surgeon pushes down the proximal flexed fragment using a Steinman pin inserted anteriorly. Similarly Kalia *et al*.,[15]used a stab incision anteriorly similar to our technique and reduced the proximal fragment by an artery forceps or a ramrod type device. Additionally they used acrutch to correct the posterior sag of the distal fragment. Though they reported successful results with this technique we feel that passing sharp instruments anteriorly can be a risk and there may be slippage of the crutch leading to loss of reduction.

In our technique the chief surgeon used a finger/thumb to correct the deformity of the proximal fragment. This serves the advantage of preventing any injury to soft tissues and vessels that can be caused by using sharp instruments.

Additionally by digital palpation the operating surgeon gets the idea of spatial orientation of the neck and thus it is easy to direct the guide wire along the direction of the neck which otherwise may take multiple trials and increased radiation exposure. We feel that it is not necessary to maintain the reduction throughout the nailing. Once the guide wire is passed in the distal fragment we can remove the reduction maneuver. Only after the nail is inserted we re achieve the reduction, and this time, lifting up the insertion handle of the nail by the assistant helps us in correcting the posterior sag of the distal fragment. Also if the reduction is lost in between it can be felt easily as we have a finger placed at the fracture site and this leads to decrease in the C arm exposure as well.

Though there are multiple reduction maneuvers described in the literature we feel our technique is safe, easy for the operating surgeon as well as the assistant, less time consuming, decreases C arm exposure, does not disrupt local blood supply and leads to acceptable reduction in all the cases. We did not find the need for open reduction or adding any other technique in dealing with such fractures. Thus we recommend the use of this technique rather than trying for multiple trials of closed reduction or going for open reduction.

4. Conclusion

Intertrochanteric fractures are frequently encountered fractures in orthopaedic practice and achieving anatomical reduction during operation is one of the most important factors for successful outcome. Multiple reduction maneuvers have been documented and each have shown its benefits and difficulties and it remains the choice and ease of surgeon to choose. The novel technique described above for the sagitally unstable fractures is an easy, surgeon friendly, time efficient and biological reduction technique that has showed excellent results and can be adopted by the orthopaedic surgeons all over.

5. References

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