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Blunt Hohman-Lever Technique for Reduction of Intertrochanteric Fracture – A Surgical Technique

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Authors' contributions

This work was carried out in collaboration among all authors. Authors RA, AS, VM and AA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors VKNS, VM, RA and AS managed the analyses of the study. Authors AS, VKNS and AA managed the literature searches. All authors read and approved the final manuscript.

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Short Communication

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ABSTRACT

We present a 60 years old patient who presented to us with history of domestic fall and sustained injury to the right hip and was diagnosed with trochanteric fracture right side. As closed reduction was not acceptable and bone spike was not available in the set, we designed our own technique of using a bone lever introduced from the same incision from where reaming/nail insertion was done. To the best of our knowledge this technique *has never been described before in english literature.* Since our first case we have tried it in 6 other patients and without any issues.

Keywords: Blunt bone-lever technique; trochanteric fracture; surgical technique; injury.

1. INTRODUCTION

Intertrochanteric fractures and subtrochanteric fractures are commonly seen in elderly and result from fall from standing height [1]. In young adults the same fracture needs considerable energy. Numerous studies have shown that intramedullary nails are the gold standard for

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fixing these fractures [1-8]. The usual protocol is closed reduction of the fracture followed by nailing and if closed reduction is unsuccessful then surgeon can use varied tricks to achieve reduction followed by ailing [9]. Kokalis [9] et al. have documented a comprehensive review of tips and tricks which can bail the surgeon out. However, in situations where certain instrumentation is missing from the tray, the tips and tricks will be futile. We present our unique technique which to the best of our knowledge has not been described before.

2. TECHNIQUE

After medical optimization patient was placed supine on a fracture table and manual reduction was performed using traction. The position was confirmed in both Antero-posterior (AP) and lateral projections under image intensifiers. When an appropriate reduction could be achieved, the nailing process is performed.

The technique we are describing in this paper is useful when a manual traction on a fracture table fails to achieve an acceptable reduction.

We had a 60 years old patient presented to us with history of domestic fall and sustained injury to the right hip and was diagnosed to have *intertrochanteric* fracture right side (Fig. 1).

A closed manual reduction was performed but the fracture reduction in anteroposterior (AP) & Lateral projections (Fig. 2), could not be achieved.

No further attempts were made to manipulate the fragments as the displacement was significant.

Sterile draping was done and incision 5-6cms proximal to the tip of greater trochanter was performed. The entry point was made on the tip of greater trochanter.

The proximal neck fragment was found slightly flexed, with the spike pointing anteriorly. The shaft fragment was found sagging posteriorly in the lateral projection (Fig. 2).

The distal fragment was lifted using a heavy *mallet* to align it on to the proximal fragment. Though the amount of displacement in lateral projection had improved, a perfect reduction could not be achieved.

A blunt bone lever was inserted through the proximal incision (Fig. 3), the lever was passed close to the bone, with the mildly curved blunt tip facing the neck fragment. The bone lever was advanced gently along the bony fragment to reach the calcar area (Fig. 4) and the proximal fragment was levered to reduce the flexion (in Lat view) and medial displacement (in AP view).

The medial cortical continuity was achieved by performing this leverage. While the leverage was held in position, the remaining proximal femoral nailing steps were performed.

The reduction was held while inserting the nail and spiral blade into the head and neck fragment (Fig. 5).

A satisfactory final reduction was achieved (Fig. 6).

3. DISCUSSION

Intertrochanteric fractures are an ever-increasing burden on the society and has huge economic impact(reference) both for the patient and society. It is important to have patients medically optimized and proceed with surgery. Once patient is deemed medically stable, in the operating room he/she is positioned on the fracture table and closed reduction is attempted with traction and rotation and verified under C-arm. The anesthetist should ensure adequate relaxation of muscles to facilitate reduction. It is important to restore continuity of anterior and medial cortex. Apart from traction and rotation maneuvers one can also use a crutch/mallet underneath the distal fragment [10] or raise the level of leg [11-14] and hence the distal fragment to obtain a good reduction. If one is using a mallet or crutch it must be used for the entire length of procedure and can be cumbersome [9].

If closed methods are unsuccessful then one switch gears and use minimally invasive methods like schanz [15,16] pins, spiked washers or use of bone hooks and levers. This can be done through stab incisions, however if fracture anatomy is complex then one needs a bigger incision to achieve reduction.

In certain situations, and heavy patients, one might have to resort to open reduction and use of cerclage wires (if subtrochanteric) to achieve reduction [17-20]. *Care must be taken to preserve* biology to facilitate healing. The other disadvantage of open reduction is increased surgical time and blood loss, both of which can have a bearing on outcome. Readers are directed to specialized text for the above mentioned closed and open techniques.

In our case multiple attempts at closed reduction were unsuccessful as revealed by x-rays (Fig. 1) -which shows the malreduction. Our preference would have been to use a Spiked washer but for unexplained reasons it was not available.

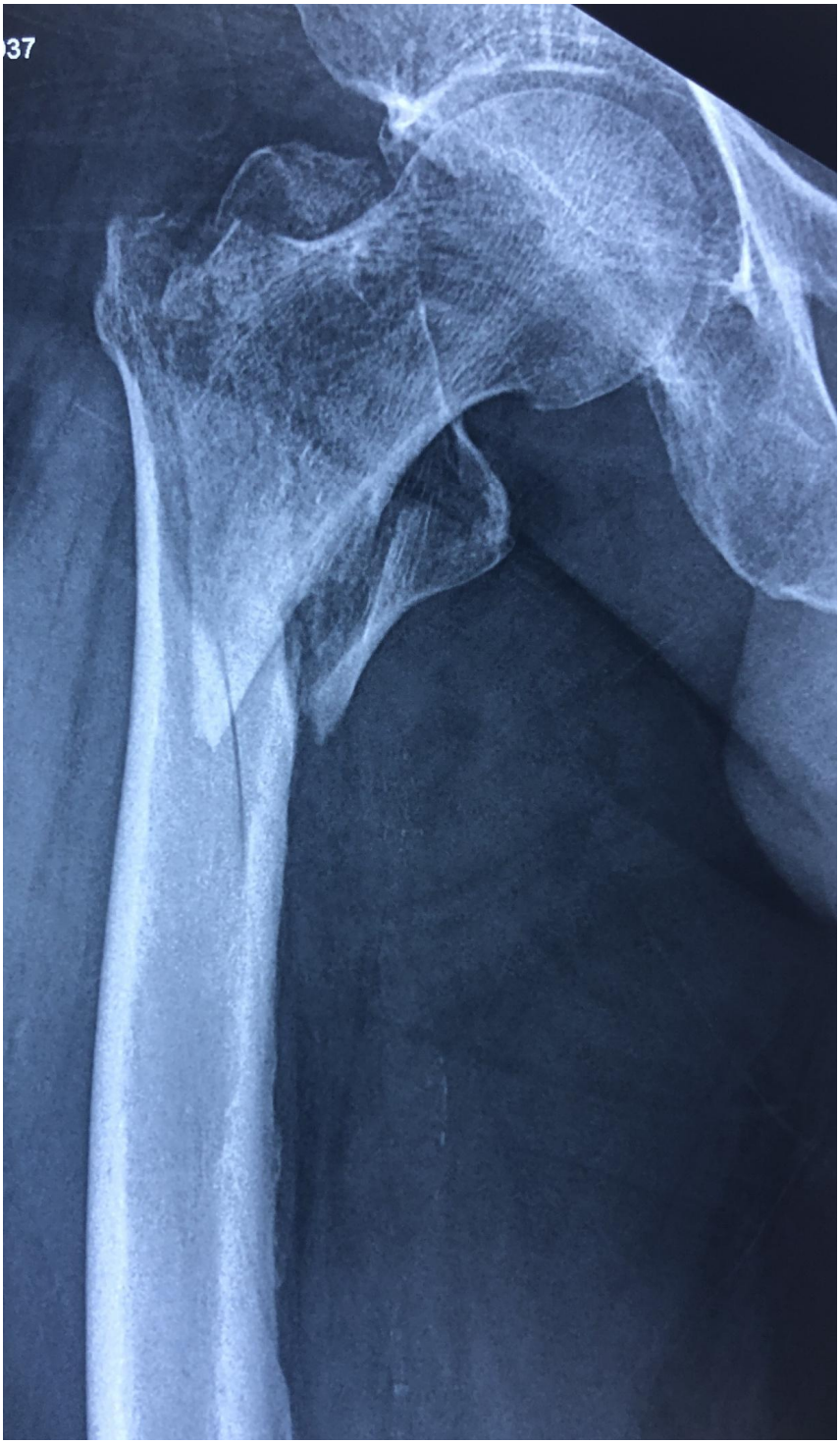

Fig. 1. The radiograph showing (Anteroposterior view) of right hip, in a 60 yrs. old man showing fracture of the right intertrochanteric area

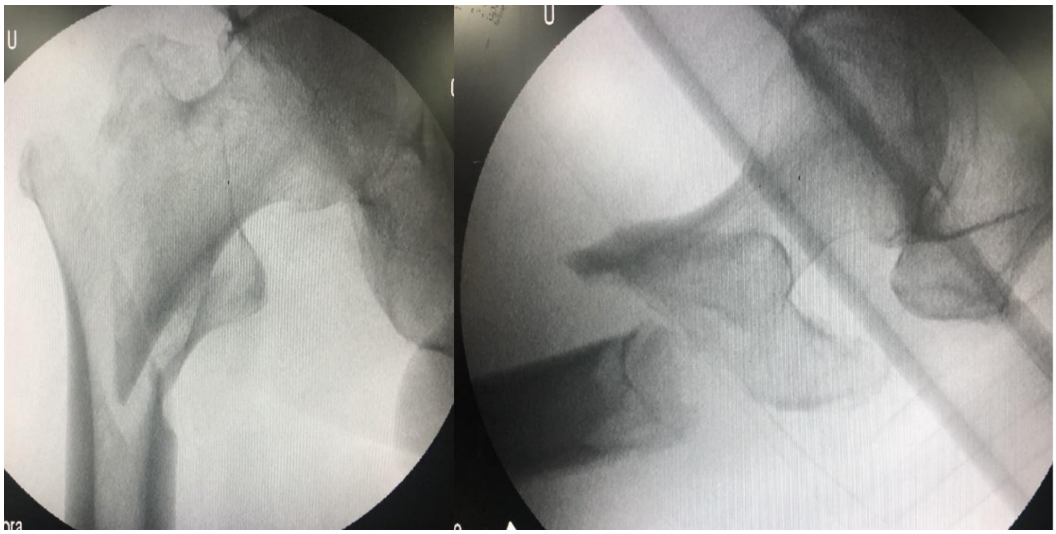

Fig. 2. The intraoperative image intensifier television (IITV) Anteroposterior and Lateral view showing the gross displacement of fracture fragments in the lateral view

Fig. 3. The intra operative image showing the blunt bone lever being inserted through the proximal entry area of the nail. The lever is used to reduce and hold the reduction of the proximal fragment

To achieve reduction and avoid another incision we used a blunt bone *lever and introduced* from the same proximal incision. The downward pressure applied by the lever helped achieved a closed reduction and thereby avoided another incision. This was supplemented by an external mallet to lift the distal fragment. Patients post op was un-eventful and he was doing well at his 6 months follow up with a healed fracture.

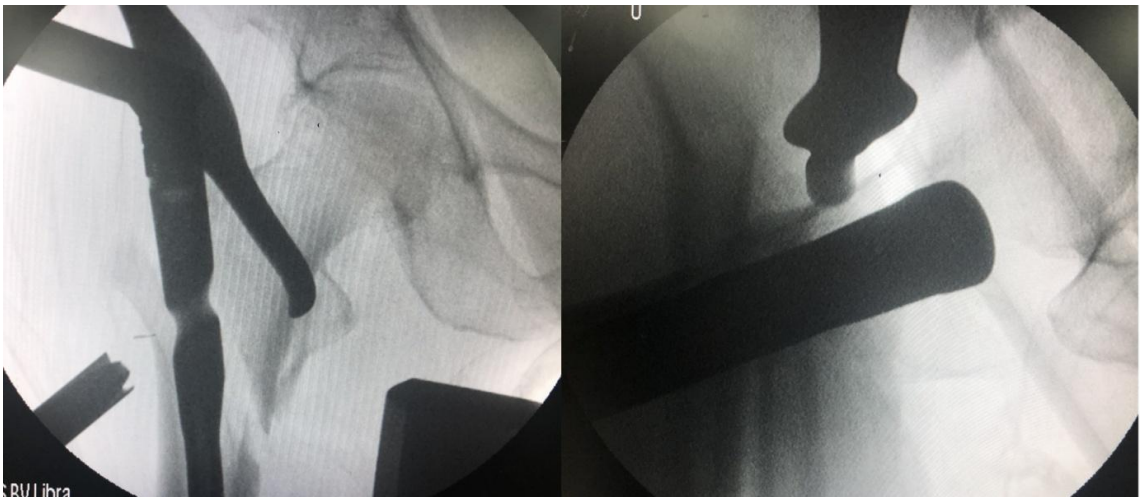

Fig. 4. The IITV images Anteroposterior and Lateral view showing hohman bone lever being used to both reduce and hold the reduction of the proximal fragment on to the distal shaft fragment

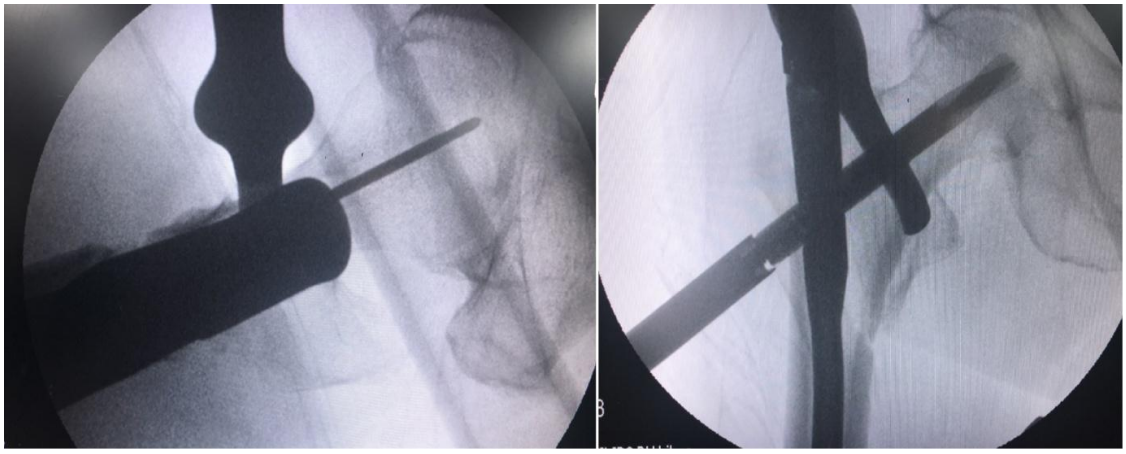

Fig. 5. The IITV images lateral view showing the guide wire being passed in the head fragment while the blunt bone lever assists the reduction. The Anteroposterior showing the screw being inserted to head fragment as the lever holds the reduction in place

Most of the above-mentioned techniques either use an open reduction technique, separate incision, or a sharp/ pointed reduction tool [15-20]. The open reduction technique and circlage needs larger soft tissue dissection, longer surgical time and blood loss, thus increases the rates of complications [17-20]. The hook leverage technique described by Kim et al. [21] uses a sharp hook as a reduction tool, which can potentially damage the adjacent neurovascular structures. Moreover, pointed hook may not be strong enough to manually reduce fragments. Rueger et al. [22] have published a comprehensive technique *guide from start to* finish for getting reduction and fixation right in intertrochanteric fractures but our technique is the first to be described via this paper.

We describe a safe and effective way of reduction of such displaced fractures using a blunt bone lever. Our technique is a closed technique without using any additional incisions. This doesn't require any open reduction of the fracture – thus reducing both surgical time and blood loss. The blunt nature of the bone lever precludes any possible injury to the neurovascular structures during closed manipulation of the neck fragment. This can be done without any further soft tissue dissection. Since our first case we have tried it in 6 other patients and without any issues.

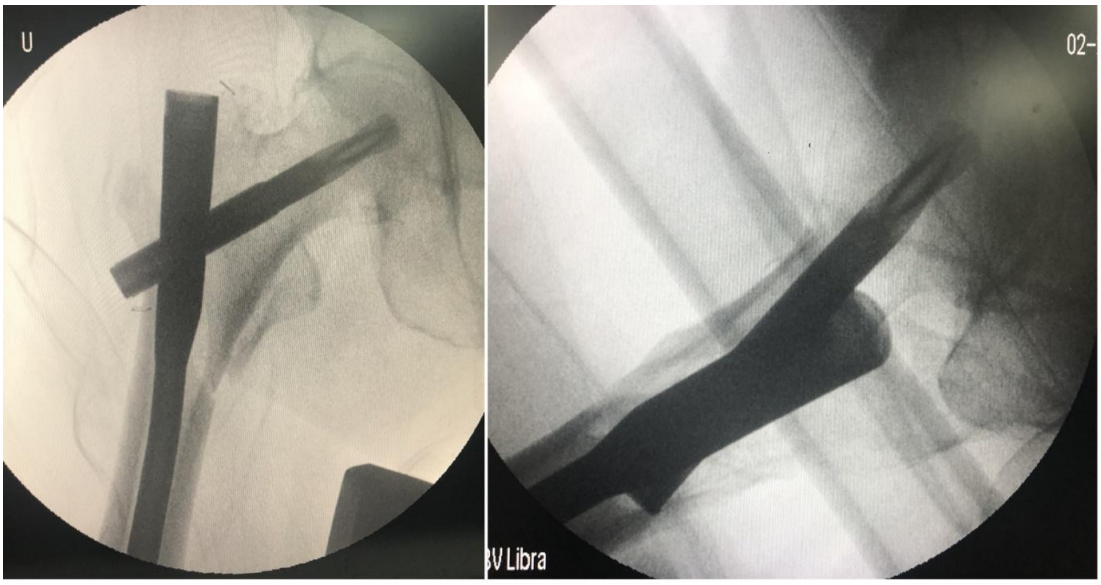

Fig. 6. The final Anteroposterior and lateral view showing adequate reduction and fixation of the fracture

4. CONCLUSION

To conclude we present a new technique to closed reduce intertrochanteric fracture which may bail out a surgeon at the time of need. It helps when the instruments which you normally use are not available.

CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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