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Upside Down Technique for Cephalomedullary Nailing of Subtrochantic Femoral Fracture in Bilateral Below Knee Amputee

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ABSTRACT

Introduction: *Cephalomedullary femoral nailing or ORIF for femoral fracture is difficult in bilateral below knee amputees. Setting up the patient for traction is a challenge. These patients have no foot to put in the traction boot and the insertion of Steinman pin in distal femur preventing distal locking of the nail. We describe an upside-down technique of setting up of the fracture table, which is being used in our department.*

Technique: *On the traction table, since the patient has a short stump below the knees on both sides. The stump on the operation side, acts as a foot and knee on this side will act as heel. The traction boot is put upside down on the traction apparatus of the fracture table. On the non-injured side stirrup is also turned upside down as is the natural attitude of the stump. The stump of the amputee was acting as a foot against the foot plate of the stirrup and the knee was acting as heel. The stumps are then secured as normal.*

For distal locking of long cephalomedullary nail, the foot is taken out of the traction & done free hand.

Keywords: Upside down technique, Cephalomedullary nailing, Subtrochantric femoral fracture, Bilateral below knee amputee

INTRODUCTION

Cephalomedullary femoral nailing or ORIF for proximal femoral or shaft fracture poses a challenge in bilateral below knee amputees. The biggest problem is setting up the patient for traction to reduce the fracture. Since these patients have no foot to put in the traction boot and the insertion of Steinman pin in distal femur for traction is an invasive procedure with a risk of infection, preventing distal locking of the nail.

We describe an upside down technique of setting up of the fracture table for bilateral below knee amputation patients with femoral fracture. We have successfully performed long cephalomedullary nail with distal locking in these patients without any difficulties.

TECHNIQUES

The patient is put in a supine position on the fracture table for proximal femoral & shaft fractures. Since the patient has a short stump below the knee, this stump acts as a foot and knee on this side will act as heel of foot. The inverted foot is placed upside down with the heel facing up and toes downward towards the floor when the patient is in a supine position on the traction table.

On the side of the femoral fracture, the traction boot is put up side down on the traction apparatus of the fracture table.

The stump of amputee limb acts as the foot and the knee acts as the heel of the foot. This stump is then padded with wool and fixed in the traction boot. The knee rests at the base of the boot and the stump against the foot plate, acting as the foot. This is further secured with crepe bandage and reinforced with Elastoplast (Figure 1).

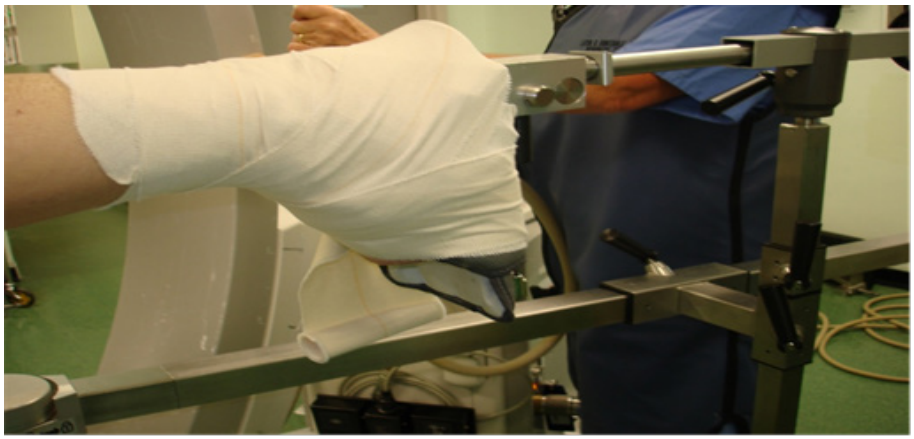

Figure 1: Upside down traction boot holding stump of injured limb

The non-injured side is held in side stirrup (lithotomy pole). Since below the knee amputees have a small stump, putting the stirrup in the normal way will cause pressure problems in the knee and at the end of the stump and is very difficult to accommodate in normal way in stirrup. The side stirrup is also turned upside down as is the natural attitude of the stump. The idea was that instead of securing it to the fracture table from the lower end, it was secured to the fracture table close to the hip and facing the lower end of fracture table upside down. The stump of the amputee was acting as a foot against the foot plate of the stirrup and the knee was acting as heel. Velcro straps of stirrup were used to hold the thigh which was further secured with crepe bandage (Figure 2).

Figure 2: Upside down stirrup holding stump of un injured limb where hip is flexed and abducted to accommodate image intensifier

The hip was flexed and abducted in the stirrup for the C arm access (Figure 3 and Figure 4). After this, traction is applied through thee traction boot and the fracture is reduced (Figure 5).

Figure 3: Intra operative picture showing both traction boot upside down holding stump of injured limb and upside down stirrup holding uninjured limb

Figure 4: Proximal femoral fracture

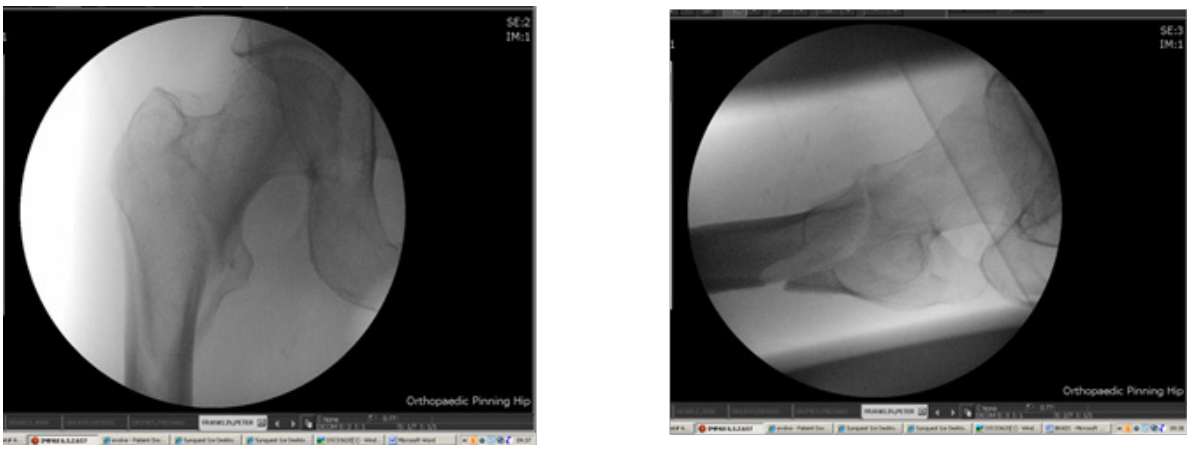

Figure 5: Intraoperative image showing fracture reduced by traction through stump with upside traction boot

Cephalomedullary nailing of femur can be performed for intertrochanteric, subtrochanteric, femoral shaft and distal femur fractures using the standard technique (Figure 6).

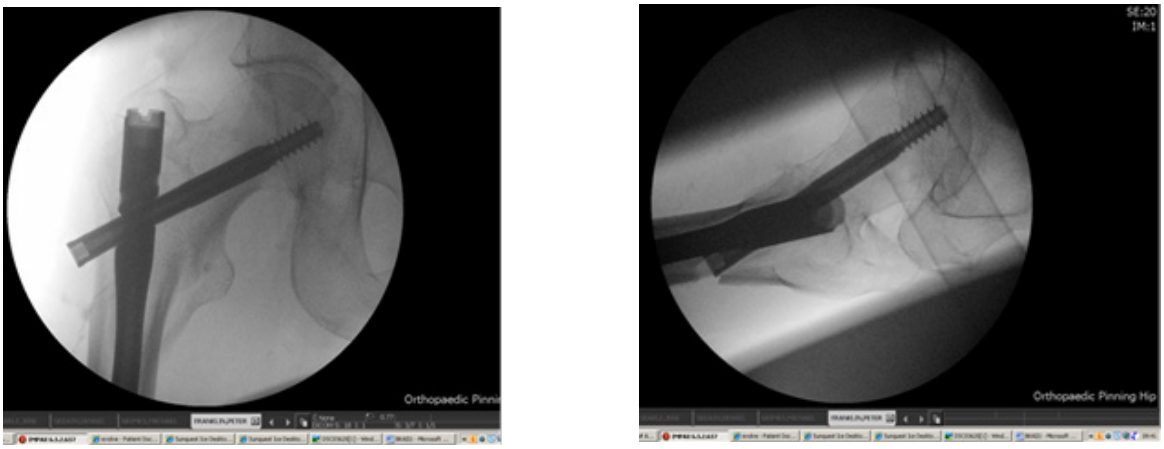

Figure 6: After intra medullary nailing with upside down technique

For distal locking of long cephalomedullary nail, the foot is taken out of the traction and free hand distal locking is done after re-prepping the distal part of the thigh (Figure 7). This is done because of the possibility of compromising the sterility of operative field close to the traction boot. However, in case of short cephalomedullary nail, distal locking is done while the stump is in traction.

Figure 7: Inta-operative image of distal locking after taking stump out of traction boot

Using the upside down technique, we have successfully performed long cephalomedullary nail for sub-trochanteric femoral fracture in two bilateral below knee amputee patients. The total operative time was less than one hour in each case.

DISCUSSION

Cephalomedullary femoral nailing or ORIF for proximal femoral or shaft fracture poses a challenge for surgeons in cases of bilateral below knee amputees since positioning them on the fracture table is difficult because of the absence of the feet and part of the legs.

Several methods of supporting the fractured limb on the traction table have been described in patients with below-knee amputations. Al-Harthy described a technique in a below knee amputee whereby they inverted the traction boot to fit

around the knee and stump with the knee in a flexed position [1]. This method was also used by Ochi who reported that the technique was carried out safely and effectively to achieve and maintain fracture reduction during fixation of the intertrochanteric fracture for their patient with a below-knee amputated limb [2]. Rethnam described positioning of the below knee amputated limb on a radiolucent leg support, allowing for adequate imaging [3]. Since the fracture in their patient was undisplaced, fixation of the fracture was performed with rotation of the hip by the assistant.

Aqil described a technique similar to that of Rethnam et al. but their patient was a bilateral above knee amputee with a minimally displaced intertrochanteric hip fracture [4]. Davarinos reported securing the stump to the distal end of the fracture table in a similar manner to the application of skin traction in a patient with bilateral above knee amputation [5]. Berg described a technique which enables traction to be applied and rotational control of the surgical limb in an above knee amputee [6].

All these diferent techniques that have been successfully used are for unilateral amputee and bilateral above knee amputees but as far as we know, there is no technique described for femoral nailing in bilateral below knee amputees.

We describe an upside down technique of setting up of fracture table for bilateral below knee amputation patients with femoral fracture. We have successfully performed long cephalomedullary nail in our bilateral below knee amputee patients without any difficulties.

We believe the same technique can be used successfully for all kind of fixation including DHS, for the proximal femur fracture. It can also be used for the ORIF of femoral shaft fracture. It can save very valuable theatre time while doing pre-operative planning. This technique is however not suitable for retrograde femoral nailing

CONCLUSION

This modified operation technique is capable of reducing operation time and morbidity in the cepalomedullary nailing or ORIF of femoral fracture in bilateral below knee amputees and can save very valuable theatre time while operative planning for such rare cases.

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