

## Removal of Distally Migrated Cannulated Interlocking Tibial Nail Using Schanz Screw; A Case Report

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### SUMMARY

**Background:** Distal migration of nails is one of the reasons for nails removal, though they are hardly reported in relation to cannulated interlocking nails.

**Objectives:** To present a rare case of distally migrated cannulated interlocking nail of the tibia and a proposed technique for the removal of the nail using Schanz screw.

**Case:** A 55year old woman had cannulated interlocking nailing for diaphyseal left tibial fracture 5 years prior to presentation. She later had septic loosening of the distal locking screw with subsequent symptomatic distal migration of the nail despite united osteosynthesis. Attempt at free hand removal using conventional instruments failed due to increased distance of the nail from the entry point, mal-rotation and lack of visibility of the nail following obliteration by fibrous and granulation tissues within the nail cavity. Thus, an improvisation with Schanz screw, due to its threading surface was used to capture and remove the nail successfully without any cortical damage of the bone.

**Conclusion:** The use of Schanz screw is a safe, cheap and effective means of free hand removal of distally migrated cannulated interlocking nails.

**Key words:** Migrated-nail, tibial, fracture, implant, removal

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### Introduction

Intramedullary interlocking nailing is the gold standard in the management of diaphyseal tibial fractures<sup>1</sup>. Interlocking nails occasionally do fail in their function of stabilizing the fractures to ensure optimal healing or can fail after healing has taken place thereby calling for removal of implant. Although there are no clear cut indications for removal of implant currently. Reasons for removal ranges from; symptomatic implants, skeletally immature patients, broken implants, compromised skin, non-union after fixation, mal-union, infection with instability, fear of carcinogens, migrated nails and patients' request<sup>1-9</sup>. Distal migration of intramedullary nails is only reported in relation to Kuntscher nails, where reasons like; fracture comminution, distally based oblique fractures, premature weight bearing and narrow nails 2mm less in diameter compared to the isthmus of the tibia as the reasons for nail migration<sup>3</sup>. Also most migrations are seen in long standing nails following osteosynthesis<sup>3</sup>. There is

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paucity of literature on distal migration of cannulated interlocking tibial nails both locally and internationally, probably because of the nail design; blunt terminal, roundish smooth configuration, differential width (wider towards the base), the posterior angulation at the junction of proximal and middle 1/3 as well as the provision for locking using screws. The aforementioned reasons may be responsible for paucity of information on removal techniques for distally migrated cannulated tibial interlocking nails. This study therefore, highlights a rare case of distally migrated cannulated interlocking nail of the tibia and present an improvised technique of the nail removal using Schantz screw.

### Case Presentation

MB is a 55-year old woman who had cannulated interlocking nailing for non-union fracture of the left tibia about 5 years ago. She developed wound infection and dehiscence which was managed conservatively and healed by secondary intention. Two years later she presented with infection at the distal interlocking screw site and the x-ray revealed a loosened screw lying in the soft tissue with a united tibial fracture. The screw was subsequently removed under local Anesthesia. Eight months after removal of the distal screw the patient started complaining of mild occasional pains in the left ankle worsened by activity and relieved by rest, she was reassured and placed on NSAIDS, glucosamine and calcium supplements by the general practitioner in her locality. The pains gradually progressed and subsequently became constant with decreasing walking distance to barely few meters at a time, so she was asked to return to the orthopedic unit for re-evaluation. At presentation she has a limping gait, swelling with tenderness around the left ankle with decrease in both active and passive range of motions to 10 degrees' plantar flexion and 10-degree dorsiflexion with increasing tenderness on passive motion as well as crepitus. She had plain radiograph of the tibia (AP&LAT), full blood count (FBC) & differentials, urinalysis and urea/electrolyte. Her x-rays revealed a united osteosynthesis with a mal-rotated distally

migrated interlocking nail with the proximal screw still attached to the proximal tibial cortex, the distal end of the nail has traversed the ankle joint and through the talus into the subtalar joint. The full blood count and other investigations were all within normal limits. An impression of distal migration of interlocking tibial nail in a united tibia was made and patient was counselled for implant removal.



**Figure 1:** Showing migration of the interlocking nail into the ankle joint.

### Procedure of Removal

Informed consent was obtained for removal of migrated implant under spinal anesthesia. Patient was cleaned and draped in supine position under spinal anesthesia. With the knee and ankle at 90 degrees, through previous scar on the anterior surface of the knee, the proximal entry point of the nail anterior to the tibia spine was identified and exposed. An interlocking nail extracting jig was passed through to locate and engage the proximal end of the nail but proved abortive as the conventional jig failed to locate and engage the nail. A nail extraction hook was also tried and still failed to engage same. After a while, the nail was pushed retrogradely from below by locating the tip using instruments that are unlikely to cause further damage, so the idea of using a stout Steinmann's pin on a Jacob chuck came to mind. Through a 2 cm incision on the sole of



the foot in the midline of the heel, the Steinmann's pin mounted on Jacob chuck was passed and same used to locate and engage the distal end of the nail using metal sounding technique as there was lack of luxury of a functional C-arm. See figure 2a. The nail was banged in a retrograde direction for about a distance of 10 cm; gauged by length of the Steinmann's pin that has disappeared within tissues. While maintaining pressure on the nail from below using the Steinmann's pin, a second attempt was made to engage the nail with conventional removal device but was hampered by dense fibrous and granulation tissue within the nail. Also, attempt to use the extraction hook failed again.

A Schanz screw of the linear rail system was hypothesized to be used for the removal of the implant because of its threading and its increasing width towards the base, making it similar to the conventional device. The Schanz screw was mounted on a Jacob chuck, and was used to locate the proximal cannulated end of the nail and screwed into it with a tight fit. The distal pin and Jacob chuck were removed and the nail measuring 10 by 360mm was extracted successfully from the tibia through the entry point at the knee without damage to the bone cortex.



Figure 2a: Showing Steinmann's pin mounted on Jacob chuck to locate and engage the distal end of the nail



Figure 2b: Showing Schanz screw mounted on a Jacob chuck used to remove the implant

### Discussion

Distal migration of nails is one of the reasons for nails removal, though such migrations are hardly reported in relation to cannulated interlocking nails of the tibia which has been reported for Kuntscher's nails<sup>4, 10</sup>. The cannulated interlocking nail design may be an important factor for decrease in rate of distal migrations. However, factors like premature loosening of locking screws and a differential diameter of 2mm less than the isthmus of the tibia<sup>4</sup>, as well as loose fitting of the proximal end of nail against proximal end of the tibia are likely contributors to distal migration<sup>6, 8</sup>. In this patient, there was premature loosening of distal locking screw, mal-rotation of the nail and ultimate loosening of the proximal screw with distal migration of the nail. Also a differential 2mm disparity between the nail and the isthmus of the tibia may be another contributor in addition to prolonged presence of the nail long after osteosynthesis.

Once symptomatic migration occurs, it becomes mandatory for the nail to be removed<sup>4, 10</sup>. The challenge in low resource setting is not in deciding whether to remove or not but rather on how to remove it. The first major challenge is that of non-availability of a functional image intensifier to allow for localization of the implant intra-operatively and lack of standard set specifically designed for free hand removal of such implant. Also, unlike distally migrated femoral nails that can be removed distally through the knee, the tibial nails must be removed retrogradely because their configuration prevents further descent and

also may cause more damage to the articular surfaces if removed from below.

In an attempt to overcome above challenges, we improvised the use of Schanz screw due to its threaded surface and successfully extracted the nail with an astonishing outcome.

Following removal of the nail, the patient's symptomatology improved remarkably as evident by disappearance of pain with increase in range of motion around the ankle and disappearance of tenderness on passive ankle movement with an improvement in gait and walking distances.

The advantage of this technique is that; it is simple and cheap, the materials are readily available, it does not weaken any cortex nor worsen articular damage. It can be easily reproducible and it leads to remarkable improvement in symptoms.

#### Conclusion:

The use of Schanz screw is a safe, cheap and effective means of free hand removal of distally migrated cannulated interlocking nails.

#### Recommendation:

Future studies in terms of case series will help strengthen evidence on the effectiveness of Schanz screws in the removal of distally migrated cannulated interlocking tibial nails.

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