

Extraction of broken interlocking tibial nail without opening the fracture - Nail in Nail technique: A simpler and cost effective solution

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Abstract: The removal of the distal fragment of broken intramedullary nail often poses an important technical challenge. Many methods have been published on the removal of the distal piece of a broken distal closed section intramedullary nail that involve the use of hooks, olive wires or special instruments that are often not available to the general orthopedist working in a smaller setup. Additionally, because it is difficult to remove the fragments using this approach, orthopedists performing the procedure may need to open the nonunion site in cases where opening the fracture site was not required. The authors have reported two cases of extraction of broken tibial interlocking nails using a novel technique without opening the fracture site using a long drill bit and a Talwalkar's square radius nail. The technique has been explicitly described in the article and shall be of great use to the orthopaedicians working in smaller setups. It's a simple procedure with minimal blood loss and has decreased the time of surgery. The authors have found this method quite easy, simple, and biological, hence does not add to the cost of treatment and should find a place in standard management of such cases.

Keywords: Interlocking nail, tibia, square nail, extraction.

INTRODUCTION

Intramedullary nail placement is currently the treatment of choice for long bone diaphyseal fractures especially in lower limbs, and has several biomechanical advantages compared to internal fixation with plates [1 and 2] and consolidation occurs in 97-100% of cases [3]. The use of closed focus insertion allows surgeons to avoid damage to the surrounding soft tissue (biological approach). Additionally, the surgical technique is simple and has good reproducibility [4]. Despite numerous advantages, this method is not exempt from complications. Most commonly, intramedullary nails fail by metal fatigue secondary to non union, without significant deformity of the metalwork. Plastic deformation of the nail can result following new acute trauma, particularly before definite bone union has occurred. The removal of the distal fragment of the intramedullary nail often poses an important technical challenge. Many methods have been published on the removal of the distal piece of a broken distal closed section intramedullary nail [5-11]. Most authors have described techniques for the retrograde removal of nail fragments that involve the use of hooks, olive wires or special instruments [6, 9 and 12]. These methods require the use of specific equipment that is often not available to the general orthopedist working in a smaller setup. Additionally, because it is difficult to remove the fragments using this approach, orthopedists performing the procedure may need to open the nonunion site or damage the surrounding tissue in cases where opening the fracture site was not required. [4]

We report an original novel technique of removing the distal part of broken tibial nail without opening the fracture site using a Talwalkar's square forearm [radius] nail in two cases.

CASE REPORT

42 years old female sustained a closed fracture of both bones of leg after road traffic accident, for which closed intramedullary interlocking nailing of tibia was performed. She again fell from stairs after 6 months of nailing and was unable to bear weight on the affected lower limb. Radiographs of the part confirmed broken tibia nail through a hole distal

to hole for dynamic bolt with valgus deformity at the fracture site. The decision to re-operate the patient was taken. As it was not an atrophic nonunion and some callus could be seen in radiographs; it was decided to remove the nail without opening the fracture site with a revision closed nail after adequately reaming the medullary canal. [Fig.1]



Fig. 1: Anteroposterior and lateral radiograph of leg showing broken interlocking tibial nail with a valgus deformity of leg.

Second case is of 30 years old male, who was operated for grade II open fracture tibia with interlocking nail and antibiotic beads were placed near the wound. After 5 months of operation he fell from bicycle and complained of pain. X rays of the part showed broken nail at non -union site. [Fig.2]

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Fig. 2: Anteroposterior and lateral radiograph of leg showing broken interlocking tibial nail

TECHNIQUE

The patient was placed supine on the operating table. Firstly, Interlocking bolts were removed. Proximal part of the broken nail was removed with the universal nail removal set from the entry portal. A long drill bit of appropriate size was inserted in lumen of distal end of retrieved proximal part of nail to check for best interference fit. With help of image intensifier drill bit was inserted into proximal end of distal fragment of nail. With T-handle attached to drill bit from outside some distance of nail was removed with back hammering on T handle. In both cases we managed to move nail upwards so that the distal

tip of nail was 3-4 cm above distal interlocking hole but were unable to remove it completely with drill bit alone. [Figure-3] The hole of the bolt in bone was made a bit larger by drilling with a larger drill bit.

Thereafter as Talwalkar's square nail for radius was taken and appropriately bent and inserted through distal hole in the bone so that its threaded end could fit into distal tip of nail with the help of image intensifier. [Figure-4] After it was ensured that it was fixed properly, the broken distal part of nail was gently hammered out by gentle blows on outer tip of radius nail till the proximal part of this broken nail was seen from the proximal entry point and the nail was subsequently delivered out from entry portal. [Figure-5-7].

The fracture site hence was not opened during this procedure and exchange interlocking nail was done after progressive sequential reaming in both the cases.



Fig. 3 : C arm image showing the drill bit mounted on the proximal end of the distal part of broken tibial nail which has been advanced proximally.



Figure- 4: Intraoperative picture shows radius square nail mounted on the distal end of broken tibial nail advanced in the marrow through a hole in the bone meant for the interlocking screw.



Figure- 5: Extracted broken nail with mounted radius square nail at its distal end.



Figure- 6: Extracted interlocking tibial nail: proximal and distal parts.



Figure- 7: Picture showing extracted nail, square nail and the long drill bit used during extraction.

DISCUSSION

The incidence of hollow nail breakage varies from 0.5% to 3.3% [6]. Although cases of atrophic non union require opening the fracture site but this technique is helpful in cases which do not require opening of the fracture site and especially when the nail has broken at proximal but distal to the proximal interlocking holes. The need for bone grafting is taken care of by adequately reaming the medullary canal which provides fertile bone grafts at the fracture site. The simple technique described here for removing hollow cross section nail needs no special devices and may be applicable to all cannulated nails. It indeed is advantageous to avoid opening the fracture site in many cases as it avoids the risks of infection, periosteal stripping, and soft-tissue dissection that may adversely affect the fracture union. It's a simple procedure with minimal blood loss and has decreased the time of surgery. It shall be of definite use especially in an average orthopaedic setup where implant removal instrumentation is not readily available. The flutes of drill bit give an interference fit and it has an advantage over Steinmann pin in retrieving nail from the entry portal. Square radius nail is stiff, has threaded end which is smaller in diameter than its shaft, therefore threaded portion can be inserted into distal tip to prevent toggling and collar of shaft sits on tip of nail which can take the hammer blows. The authors have found this method quite easy, simple, and biological, hence does not add to the cost of treatment and should find a place in standard management of such cases.

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