

## Removal of a bent femoral intramedullary nail: a case report and review of the literature

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**Abstract:** Tibial and femoral shaft fractures are now being treated by intramedullary interlocking nailing which is now considered as gold standard for the treatment of such types of fractures. Secondary trauma usually leads to bending of the nail. This complication, which itself is rare-one, is more commonly seen with femoral fractures as compared to tibial fractures. It has always been a tough question to answer, how to remove such bent nails. In this paper, we are presenting this case to discuss different techniques for removal of bent nails and to share our experience of the management of a 30-year-old man who presented with a bent intramedullary femoral nail due to secondary trauma just one month after primary fixation. We were able to straighten the nail to some extent first by applying external force on the convex side of the deformity, and then we used the standard nail removal technique to remove the nail. Reconstruction of the femur was done with an Lc-DCP. Callus formation was visible five months after revision surgery, and the patient was able to attain a normal range of motion and gait, walking with a single cane.

**Keywords:** Fracture fixation, intramedullary; femoral fractures; nail removal.

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### INTRODUCTION

Interlocking nailing has become the gold standard for the management of femoral shaft fractures [1]. Thorough review of the literature reveals that several methods have been reported for the removal of the bent intramedullary nails [2-11]. Nearly all of these cases are associated to femoral nail. The aim of presenting this paper is to report the management of a case where an intramedullary nail, used to fix a right femoral shaft fracture, was bent just one month post primary fixation, because of a secondary trauma.

### CASE PRESENTATION

A 30-year-old male, a drug addict, and a heavy smoker, presented at our institute with history of road traffic accident when he was hit by a car. Post-accident he had pain, swelling and deformity of the right thigh. Abnormal mobility was absent at the thigh. Neurovascular status was unharmed. The patient gave a history of having right femur fracture one month ago due to road traffic accident for which he was treated by intramedullary interlocking nailing. He had no complication during postoperative period and he started non weight bearing walking with the aid of walker 3 weeks later as advised by the treating surgeon. X-rays revealed an un-united fracture of the shaft of femur and

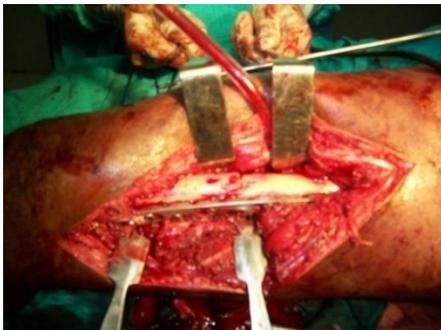
a bent intramedullary interlocking nail with both posterior and medial angulations, in situ [Figure 1].



**Fig-1: AP and lateral radiographs showing bent femoral nail with fracture of the shaft**

Though during the preoperative planning, it was well thought-out and it looked impossible to straighten out the nail, but under spinal anesthesia, we were able to straighten the nail to some extent by applying external force on the convex side of the deformity. And then the standard nail removal technique was used to remove the nail. We had also thought of and prepared for cutting of nail partially on

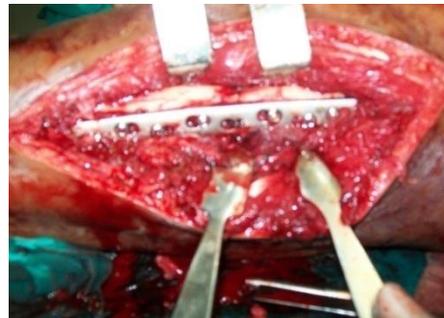
convex side wall so as to weaken it for facilitating its straightening and then removal. After removal of the nail, the fracture was treated by ORIF with Lc-DCP [Figure-2].



**Fig-2A- Per-operative photo showing Lc-DCP application**

The post-operative x-rays [Figure-3] showed a good reduction and fixation in both antero-posterior and lateral views. Subsequently, the wound healing occurred without any complication. One month after, a

non-weight-bearing walking with the aid of walker and two months after crutch walking was initiated. Radiographs revealed good evidence of callus formation [Figure-4]. Five months after revision, the patient has been instructed to start weight bearing progressively. Subsequent radiographs revealed continued evidence of callus formation [Figure-5].



**Fig-2B- Per-operative photo showing Lc-DCP fixation with screws**



**Fig- 3: Post-Operative X-ray**



**Fig-4: Two and 3.5 months post-operative X-rays showing good callus formation**



**Fig-5: Showing good bony union.jpg**

## DISCUSSION

The use of intramedullary nails for the treatment of femoral fractures is the gold standard [1]. Less comminution of fractures is seen in cases with bent intramedullary nails, due to absorption of much of the energy of the trauma by the nail. A lot more of energy is needed to cause a refracture and bending of an intramedullary nail in completely healed fractures as compared to incompletely healed ones [12]. The first step for the management of such cases is the well-thought attempt to remove the bent intramedullary nail which is at times very difficult and needs well planned strategy and its implementation. Various techniques have been described in literature such as straightening of nail in situ by applying external force on the femur [13], the sectioning of the nail and removal of each piece separately [14], and sectioning the nail to half its diameter and sectioned to half of its diameter and then straightened and removed [15]. Reviewing the available literature reveals that each case of distorted intramedullary nail removal was approached uniquely [12–16]. Technical support played a vital role in the method used to remove the nail with the least amount of damage to bone and soft tissue. In our case though we were able to straighten the nail by applying external force and could remove it easily without much difficulty, yet we were prepared for cutting of the nail partially on convex side wall if needed so as to weaken it for facilitating its straightening and then removal. Sterilized diamond-edged blades could not be arranged for the cutting of the intramedullary nail. After much thought we had planned and arranged steel cutting hexa for cutting the nail if needed, but fortunately it was not needed and nail could be straightened and extracted easily.

## CONCLUSION

In conclusion, bent intramedullary nail removal though at times may be difficult, yet bent femoral or tibial nails should always be removed. Removal process can be much easier after partial correction of the deformity by applying external force as such and if not possible by partially cutting of the nail on the convex side and thus weakening it. This technique can be used to remove severely bent nails after manual correction in situ. It's quite safe and there are fewer chances of further bony injury and also injuries to the surrounding soft tissues. Further less

surgical time is needed. Moreover, no specific instrument is needed in this method and can be used anywhere in similar cases.

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