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Research Article

Intramedullary nails: should it be removed after fracture healing?

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ABSTRACT

Background: Intramedullary Nailing of long bone fracture is a common surgery done in orthopaedics. It offers early weight bearing and less chances of malunion than cast and other conservative treatment. Removal of intramedullary nail after the bone has united is a matter of debate, we reviewed 48 cases in terms of improve in symptoms ,functional status and complications associated with hardware removal.
Methods: Retrospective study was conducted in tertiary care centre.48 patients were enrolled in the study who were admitted for Tibia nail removal or exchange nailing. The mean age was 37.9 years ranging from 20-69 years. There were 28 males and 20 females in our study. On follow up visits x-rays were taken at 3 weeks and patients were assessed for improvement in symptoms, pain status, functional outcome and complications of nail removal.
Results: Out of 48 patients operated, 43 (89.58%) tibial intramedullary nail were removed over a period of 5 years. Out of 23 patient insisting nail removals due to anterior knee pain only 21 nails were removed and 19 patients who requested nail removal only 16 nails could be removed. Complications were seen in 13% of nail removals. Overall, 72.09% (31/43) of patients were satisfied with their IMN removal. The mean VAS score was 2 after nail removal.
Conclusions: We conclude that removal of tibia nail should be done if patient complaints of pain. Radiographs must be assessed for fracture union and patient must be warned about the complications associated with the hardware removal.

Keywords: Tibial nails, Fracture, Implant, Removal, Refracture

INTRODUCTION

With increase in Road traffic accidents Fractures of lower limb have become common diagnosis. Intramedullary nailing is the common, less invasive procedure performed for most diaphysial fractures of femur and tibia. There are many studies showing high union rates and low rates of malunion in intramedullary nailing of tibia and femur.[1,2] With tibial nailing the patient can be mobilized early as compared to cast and other conservative treatment3.Whether nail should be removed or not after fracture healing is a matter of debate, but static and dynamic knee pain is the complaint for which patients comes to orthopedic surgeon and insist on removal of nail.[4,5] If hypothetical consideration is made that to leave the metal inside the body is hazardous to health than even its removal is not without complications. Very few literature is available on intramedullary nail removal and its complications on the other hand several literature exists on removal of plates.[6-8] Some literature have shown improvement in symptoms after nail removal ,while some literature contradicts this and states that pain might

persist even after the nail removal or pain can be a new symptom.[9,10] In order to assess the indication, complications and morbidity of tibia nail removal, we retrospectively reviewed a series of tibial nail removed in our institution.

METHODS

A retrospective study was done in department of orthopedics at tertiary care centre. We went through the hospital records to find out patients for whom tibia nails were removed year 2008 to 2013. We selected 48 patients who were admitted for tibial nail removal or Exchange nailing. Indoor record files and radiographs were reviewed. The indication for nail removal was recorded from the patient's history (Table 1). Radiographs were assessed for prominence of nail. The nails were considered prominent if there was protrusion over anterior cortex of tibia. After nail removal patients were kept on below knee slab for 2 weeks and then started on partial weight bearing followed by full weight bearing. On follow up visits x-rays were taken at 3 weeks and patients were assessed for improvement in symptoms, pain status, functional outcome and complications of nail removal. The mean age was 37.9 years ranging from 20-69 years. There were 28 males and 20 females in our study. The male:female ratio was 1.4:1 The mean time from nail insertion to nail removal was 21 months (range 8 to 54 months). Patients were asked about improvement in pain after nail removal and to grade their pain as none, mild, moderate and severe or on VAS scale. At the time of nail removal, a nail extraction system of the same company was used. The universal nail extraction system was kept ready if the nail couldn't be removed by the company set. After removal of the interlocking screws, a para-patellar incision was performed through the old scar to gain access to the nail insertion site. In most of the cases the proximal end of nail had significant bone in growth that was removed with a curette. The removal instruments were inserted into the nail, and the nail was extracted with a hammer attachment. If the nail could not be removed after removal of locking bolts, nails was left in situ.

Table 1: Indications of nail removal.

Indication for nail removal	Tibia	Percentage
Pain	23	45.89%
Patient request	19	39.5%
Non union	6	10.42%
Total	**48**	**100%**

RESULTS

Out of 48 patients operated 43 (89.58%) tibial intramedullary nail were removed over a period of 5 years, in 5 patients (10.42%) nail could not be extracted so only proximal or distal locking bolts were removed .The commonest indication for nail removal was pain at the insertion site in 23 (45.89%) cases, patient request being second common indication in 19 patients (39.5%) and in 4 patients (10.42%) nail was removed due to non-union.

Out of 23 patient insisting nail removals due to anterior knee pain only 21 nails were removed and 19 patients who requested nail removal only 16 nails could be removed.

In most of cases 18 anterior nail prominence was associated with anterior knee pain. Patients with superior nail prominence had increased pain with sitting crossed leg, running and stairs climbing. Nail prominence correlated with increased knee pain. In 8 patients nail was not prominent. Most report that the knee pain improved after the implant removal while some complained of pain after removal (4.65%).Out of six non-union cases four patients were treated with exchange nailing and two patients treated with ilizarov external fixator after intramedullary nail removal. Complications were seen in 13% of nail removals. These are shown in Table 2. Three patients had superficial infection, one patient had deep infection both were treated with regular dressing and antibiotics and two patient developed wound hematoma.

Table 2: Complications of nail removal.

Complication	Number of cases	Percentage
Deep infection	1	2.08%
Superficial infection	3	6.25%
Wound hematoma	2	4.16%
Total	**6**	**12.50%**

The commonest indication for nail removal was insertion point pain (other than routine) following tibial nailing. This was associated with nail prominence in most of the cases. All patients noted improvement in pain post nail removal and 2 patients continued to complain of pain post nail removal. This pain was categorized as mild by both the patients. Overall, 72.09% (31/43) of patients were satisfied with their IMN removal. The mean VAS score was 2 after nail removal.

DISCUSSION

Literature in sparse for indication and contraindications for tibial nail removal. The nail removal can cause refracture of the bone during removal or after weight bearing as the most dreadful complication. The rate of refracture in our series was 0%. The overall complication rate of 12.5% associated with nail removal in this study is less as compared to increased complication rate after plate removal. Wound complication and refracture rates are high after plate removal.[7,8,11] The insertion point pain after tibial nailing is recently reported in literature, but its etiology is unclear. Insertion point pain appears to be secondary to tendon or muscle impingement in our study as it improved in the majority of cases following removal of the nail. The finding matches to the study conducted by Court-Brown et al who reported knee pain resolution

in almost all cases.[9] Keating et al. showed a 45% rate of complete relief of knee pain in 110 knees after tibial nail removal. In addition, 35% of the patients experienced partial relief, while 20% had no relief. In a retrospective review of the cases of 169 patients, Court-Brown et al. noted that after nail removal 27% had complete relief of pain and marked relief was seen in 69% of patients. However, 3.2% of the patients reported worsening of pain after removal of nail. Other study involving 100 patients, 12% of previously asymptomatic patients developed knee pain after tibial nail removal.

Burying the nail deep in the substance of the tibia may make subsequent nail removal (eg, exchange nailing) more difficult because of the bony in growth but is associated with less knee pain due to prominence. Surgeons must balance these two extremes. Knee pain is multifactorial and a substantial source of morbidity. However, our data suggest surgeons can reduce knee pain after IM nailing by burying the tip of the nail, as reflected on lateral radiographs.

CONCLUSION

We conclude that insertion point pain is a significant problem in tibia nailing and is one of the commonest indications of hardware nail removal next being patient's request. Avoidance of nail prominence during primary nail insertion is recommended. We think surgeons can decrease if not eliminate, the severity of knee pain after tibial nailing by burying the tip of the nail Routine nail removal is not recommended at the cost of refracture and other complications and should not be attempted at least 24 months post insertion.

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