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Case Report

Orthopaedics Section

Small Incision Osteotomy: An Innovative Approach for Removal of Impacted Kuntscher Nail

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ABSTRACT

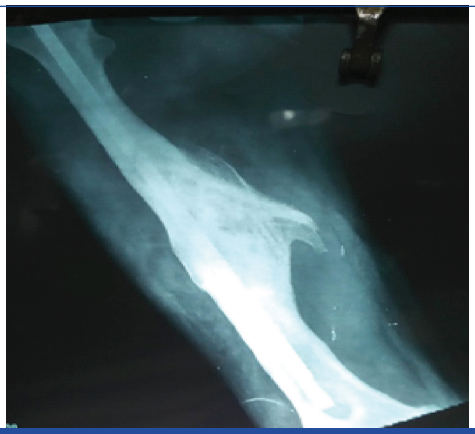
The use of Kuntscher nail has been one of the most important advancement in trauma surgery. Removal of impacted Kuntscher nail represents one of the difficult problems in orthopaedics today. A 53-year-old male presented with pain and implant back out following Kuntscher nail done 20-years back. The fracture had clinically and radiologically united. Implant extraction was done by an innovative technique described subsequently as small incision osteotomy. Gigli saw wire was passed through the slot of Kuntscher nail by a small bony window near the greater trochanter, another window was made at the tip of the nail and wire end extracted out. Subsequently, osteotomy of femur was done without exposing the whole length of the femur. Osteotomy was opened with a small osteotome and nail was extracted through the entry site.

Keywords: Fracture, Gigli saw wire, Trauma surgery

CASE REPORT

A 53-year-old male attended the outpatient department with complaints of persistent pain over the right gluteal region and swelling due to prominent implant. The patient met a car accident 20 years back and sustained a closed femoral shaft fracture treated with an open reduction internal fixation with Kuntscher nail. The patient started complaining of pain since the past one year and had developed swelling over the gluteal region with palpable proximal end of the nail. Radiographs revealed united fracture with an extensive callus formation and implant backing out [Table/Fig-1a,b].

[Table/Fig-1a]: Showing preoperative radiograph AP views.



[Table/Fig-1b]: Showing preoperative radiograph Lat views.

He was administered spinal anesthesia and placed in a lateral position with affected side upwards on the operating table. A 5 cm incision was made centred over the proximal end of nail and bone was exposed over the lateral aspect of femur. Another incision was made at lateral aspect of distal thigh at the level of nail tip under image guidance. Bone exposed, window created and a gigli saw wire was passed through the nail slot on anterolateral aspect and taken out from the distal end of the nail. Osteotomy was done with gigli saw wire and handles without exposing the whole length of femur, corresponding to the length of nail [Table/Fig-2]. Subsequently, small osteotome is introduced at osteotomy incision site and praying of cortex was done to complete the osteotomy.

[Table/Fig-2]: Intraoperative photograph showing the technique of small incision osteotomy.

The nail was hammered to remove it through the entry point. Nail was inspected to confirm that there was no breakage. The patient was discharged the next day with full mobilisation [Video-1].

DISCUSSION

The use of Kuntscher nailing system for the fractured shaft of femur has been a major technological break through in nailing design. It is closed anterograde technique but subsequently, most Kuntscher nails were done retrograde, thereby opening the fracture site [1]. Removal of a Kuntscher nail is considered a routine procedure once its purpose has been served, but could become really challenging and may turn into a nightmare. Kuntscher nail is a cloverleaf-shaped

hollow tubular nail with an anterolateral slot which allows for some plasticity *in situ*, there is an eye at the proximal end to engage the hook for extraction. Most commonly, pulling off the nail from the entry point is determined as a primary procedure for removal; however, slippage of the extraction device remains a major course of failure, in these cases impacting the nail from fracture site can be used as an alternative [2,3].

The availability of interlocking nails, improved surgical instruments and closed nailing techniques has favoured the exodus of Kuntscher nails [4]. Most of the nail removals done today are being done for nails inserted a decade ago and as the experience with nail removal and implantation decreases, the complications are bound to rise. This article presents a case of an incarcerated Kuntscher nail and describes a salvage procedure for the nail extraction after all previously described methods have failed.

The incidence of broken impacted Kuntscher nails has been reported from 1% to 3.3% [4,5]. The major reasons cited for incarceration have been bony ingrowth, excessive callus formation and/or bent or broken nails. Impacted Kuntscher nails are difficult to remove, therefore a number of techniques and instruments have been described for its removal [Table/Fig-3,4]. Universal nail extraction sets are available but they frequently fail and alternate techniques should be known. Georgiadis GM et al., described one technique using a carbide drill to create a hole in proximal fragment to attach the hook, but requires large soft tissue dissection to expose the proximal part of the nail [6]. Various other techniques have been described to extract the Kuntscher nails using hooks or stacked wires inserted through a window in the lateral femoral cortex, or Ender nails, which must be placed beyond the distal tip of a broken nail and then hooked through the locking holes of the nail [3,7,8].

Authors	Technique	No. of Patients	Complications	Recommendations
Mari R et al., [2]	Longitudinal femoral osteotomy	1	Non-union and redisplacement	Remove early
Liodakis E et al., [3]	Retrograde mobilisation through arthrotomy	1	Arthrotomy	Useful
Georgiadis GM et al., [6]	Creating new hole with carbide drill	3	Avoid embedding metal shavings	Recommended carbide drill bit/ conical extraction device.
Marwan M et al., [7]	Cerclage wire	3	Slippage	NA
Weinrauch PC et al., [8]	Proximal stacked wire	1	NA	Not useful for solid nails
Steinberg EL et al., (9)	Steinman pin and 10 mm k nail	1	NA	Adequate reaming
Park SY et al., [10]	Bent and hooked guide wires	1	Frequent slippage	NA
Maini L et al., [11]	Ender nail	1	Check the size of ender nail carefully	Not for larger nails
Rohilla et al	Bending the nail 90	1	Breakage	NA

[Table/Fig-3]: Showing nail removal techniques used by various authors [2,3,6-12].

Retrieval of broken Kuntscher's nail is difficult from other nails, such as interlocking nails, because of the presence of a slot in the nail. Thus, the methods listed above may become technically difficult or unsuccessful. Various techniques have been described such as use of Cerclage wire [7] multiple wire jamming [8] and Steinman pin technique [9], however these cannot be used with Kuntscher nail because of nail architecture.

Hollow Nails
High-speed drill to cut a hole in the nail [6]
Cerclage wire [7]
Custom-made hook [13]
Beaded guide [14]
Modified Kuntscher reaming guide [15]
Vise grip locking pliers [16]
Multiple guidewires [17]
Corkscrew extractor [18]
Solid Nails
Percutaneous osteotomies and grasping device [13]
K-wire mounted on a concave instrument [19]
Push-out technique [20]
Synthes extraction kit
Laparoscopic forceps [21]

[Table/Fig-4]: The various techniques of intramedullary nail removal [6,7,13-21].

The described technique of small incision osteotomy has a number of advantages like minimal soft tissue stripping, less morbidity and early recovery, in addition being a simple innovative technique which can be done using minimal equipment available in all orthopaedic operating rooms and no specialised or custom-made devices are required. To the best of authors' knowledge and extensive literature search, the technique of small incision osteotomy has not been described prior to this.

CONCLUSION

Small incision osteotomy for Kuntscher nail removal is an innovative technique with many advantages such as shorter operative time, lesser blood loss, lesser morbidity, better cosmesis and early postoperative recovery. However, longer series is recommended to know the results and difficulties faced during removal. There are very few cases published in the literature using this technique for nail removal in a difficult stuck situation.

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