CASE REPORT

Open Inter Locked Nailing Without Targeting Device or X-Ray Guide in Revision Surgery for Non-Union of the Femur: A Case Report

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ABSTRACT

We present a patient with non-union of the femur and fracture of the nail after Kuntscher nailing who went on to have union after interlocked nailing with a modified Kuntscher nail (K-nail). The interlocked intramedullary nailing was done without X-ray guide or targeting device. The essence of this report is to highlight the possibilities inherent in modification of devices and established procedures. The early result calls for a closer look at this cheap, safe and effective means of handling femoral non-union in third world societies where instrumentation and implants for interlocked nailing may not be readily available.

Key Words: Interlocked-Intramedullary nail, Femur, Cortical window.

INTRODUCTION

Interlocked intramedullary nailing is a standard technique of internal fixation of femoral fractures. It has the capacity to prevent mal-rotation, shortening and angulation of comminuted femoral fractures.1 Cost of the C-arm X-ray machine, instrumentation and implants as well as the absence of a safe and readily affordable alternative technique of using interlocked nails have made this excellent fixation method inaccessible to most patients in many third world countries.

The practice of intramedullary nailing in a number of developing countries has remained to a large extent limited to the reamed intramedullary nailing technique popularised by Kuntscher.2

In addition, the occurrence of non-union after the use of K-nails is most likely in oblique fractures and may be associated with fatigue of the nails.

Further more, after the effect of nailing the on intramedullary blood flow; subsequent plating of the fracture may carry a higher risk of necrosis of the underlying bone.

Based on the above we modified a regular k-nail by creating two distal holes and one proximal hole to enable the insertion of interlocking screw.

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CASE HISTRORY

A female, 28 years old, presented with a history of pain at the upper part of her left thigh. She had fracture of the left femur following a road traffic accident three years before presentation. She had been operated upon twice by the same surgeon who .had to replace a broken Kuntscher nail (K-nail). Radiograph (Figure 1) confirmed that the second K-nail had also suffered fatigue fracture.

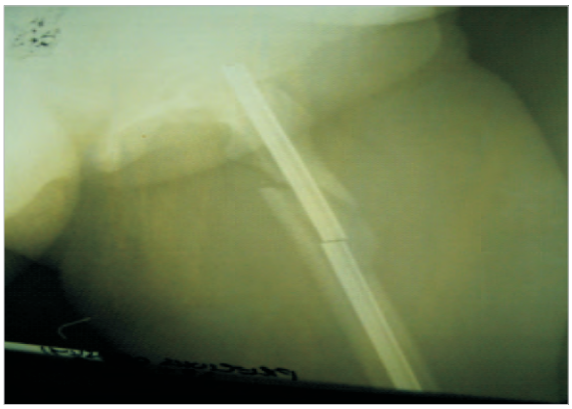

Figure 1: Pre operative X-ray (Anteroposterior view

We converted standard K-nails of sizes 12 and 13 to interlocking nails by drilling one hole at the proximal end (The hole was placed obliquely at 130° to the long axis of the nail and started at 2cm below the end of the slot for extraction) and two holes at the distal end. The

distal holes were 2cm apart and at ninety degrees to the long axis of the nail. The lower
of the distal holes was placed at 2cm from the end of the nail. All holes were placed at ninety degrees to the longitudinal slit of the nail, (Figure 2)

At surgery, which was done in the supine position under epidural anaesthesia, the limb was adducted to the extent that the ipsilateral popliteal fossa lay over the contralateral knee. The greater Trochanter was exposed through a 5cm long longitudinal skin incision. The piriform fossa was located with the gloved finger and an awl (Herzog awl) was used to perforate it to gain access to the proximal end of the intramedullary canal.

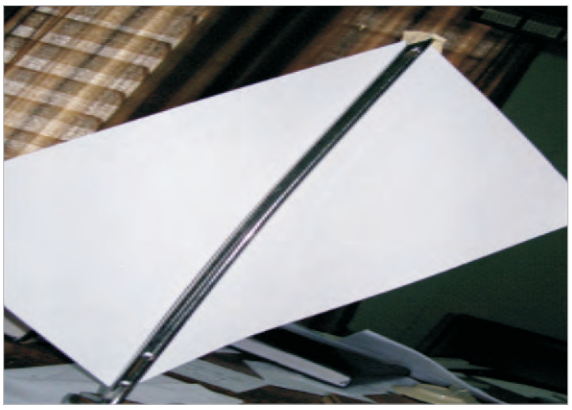

Figure 2: The modified K-nail with one proximal and two distal holes.

. An incision, approximately 10 cm (Five-finger breadth) long, was made at the lateral aspect of the thigh over the site of fracture. The incision was developed in layers to the site. The distal piece of the broken nail was removed through lateral thigh incision. The proximal piece was removed through the proximal incision. A smooth tipped 2mm guide wire was introduced into the proximal fragment through the piriform fossa. The intramedullary canal was reamed, over the guide wire with hollow reamers to size 14. The distal fragment was canalized using reamers of similar size. The appropriate length of nail was determined by inserting the guide wire into the medullary canal and measuring the depth with a sterile ruler. The guide wire was re-introduced from the piriform fossa and advanced into the distal fragment under direct vision. A size 13mm/40mm Kuntscher nail, which had been modified to enable the application of two distal 4.5mm AO cortical screws and one proximal 4.5mm malleolar screw, was threaded over the guide-wire into the distal fragment. The guide wire was removed and the nail was advanced until only a finger-breadth of the nail was palpable above the piriform fossa. The longitudinal slit in the nail was directed posteriorly. Another nail of equal length was placed parallel to the one in the intramedullary cavity and used as a rough guide to the likely site for interlockingscrews placement A 5 cm incision was made over the distal locking screws site. The intramedullary cavity of the distal end femur was exposed through a longitudinal anterolateral cortical window, measuring about 1cm by 0.5cm, which was made on the lateral condyle. With the aid of a 1 mm kirschner wire the site of each hole on the nail was identified. A 2.7mm drill bit was used to drill through the near cortex and the far cortex with the drill bit passing through the hole in the nail. A 4.5mm tap was used to tap the holes and a 4.5mm cortical Screw was placed across as an interlocking screw. The same procedure was repeated for the next hole. With the aid of the similar nail, the lateral part of the oblique proximal hole was targeted and a 2mm Kirschner wire (K-wire) was drilled through the bone and the lateral part of the hole at 130 degrees to the axis of the nail. The presence of the Kirschner wire in the lumen of the nail was confirmed by a probe placed into the lumen of the nail. The hole made by the K-wire was drilled with a 3.2mm drill bit and a self tapping malleolar screw was used as the proximal locking screw. Ipsilateral proximal tibial cancellous bonegrafts were harvested and applied at the fracture site. All wounds were irrigated with normal saline and closed in layers using nylon 2.0 for skin with suction drain tube inserted beside the fracture site.

Post-operatively, intravenous ceftriazone 1gm daily for 5days and 500mg of metronidazole 8hrly for 24 hours; Intramuscular injection of 100mg of tramadol hydrochloride 8hrly for 72 hours as well as daily intramuscular injection of 75mg of diclofenac sodium for 5 days were administered. In addition, subcutaneous enoxaparin 40mg daily for seven days from the first day after surgery and oral soluble aspirin 75mg daily for four weeks from the second day after operation were given. The operated limb was elevated on a pillow for 5 days with the knee in 15° flexion. The drain was removed on the second day post-operation. The patient commenced static quadriceps exercises on the 3rd day after the operation and was ambulated on a pair of axillary

crutches (Non-weight bearing) from the 5th day after surgery. All stitches were removed on the fourteenth day after operation.

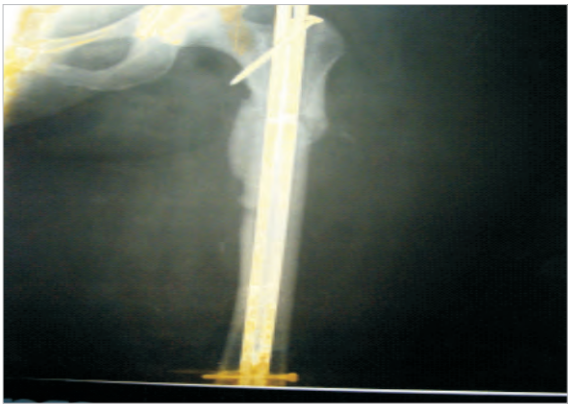

Figure 3: Post-operative X-ray, anteroposterior view

The patient was discharged home on the fourteenth day after the operation. Partial weight bearing with bilateral axillary crutches was commenced at six weeks post- operation and continued till the twenty-fourth week after surgery. Ambulation with the aid of a walking stick commenced at twenty-four weeks post-operation. At 52 weeks after surgery an anteroposterior radiograph (Figure 3) shows satisfactory union without breakage of interlocking screws. Eighteen months after surgery, the patient is ambulating without support and has no discomfort.

DISCUSSION

This case represents the best reminder that regardless of the value of the intramedullary nail, if it is not locked, the risk of non-union is real and that fatigue fracture of the nail usually ensues. It also shows the earliest results of efforts to offer stable Kuntscher intramedullary nail fixation using interlocking screws without the aid of the C-arm, targeting device and fracture table in our centre.

The presence of atrophic non-union is associated with sclerosis and narrowing of the ends of the fragments. The sclerotic ends of the fracture may need to be freshened under direct vision for the application of cancellous bone grafts at the site of atrophic non-union. Closed reduction and interlocked intramedullary nailing under image intensifier-guide is superior to the open technique we have described.

However, in a case with atrophic non-union, fractured K-nail and adjacent tissue fibrosis from previous surgery, open nailing is considerably safer in the absence of image intensifier. The technique we have described is devoid of the risk of radiation injury to the surgeon and patient.3 The quality of fixation that is derived from it is expected to be superior to the unlocked open Kuntscher nailing that is still frequently done in a number of developing countries2 because of high cost of interlocking nails and required facilities. This treatment option enhances shortened hospital stay and early ambulation without compromising the quality of fixation and will be of great value in operative treatment of fractures in such low income societies where patients' preference for traditional bone setters' treatment is rife and as a result nonunion is quite common. The anterior cortical window access for distal locking is not new and had been described by Kanellopoulos et al4 who used it as a salvage technique for distal locking When their image intensifier developed a fault. This case report ostensibly adds a window of opportunity for patients in underprivileged societies to benefit from the superiority of interlocked intramedullary nails over the unlocked Kuntscher nailing which is still in common use in such settings.

The surgical implants generation network (SIGN) interlocked nailing without image intensifier is a notable and valuable alternative that will make the distal cortical window rarely necessary but it is at this moment not widely available and accessible in Nigeria [5,6] and many other developing nations.

REFERENCES

1. Winquist RA. Locked Femoral Nailing. J Am Acad Ortho Surg 1993; 1: 95-10

2. Olasinde AA. Open Kuntscher Nailing Of Closed Femoral Shaft Fractures: Revisited. The Internet Journal of Third World Medicine 2006; 3 (2).

3. Levin P E, Schoen RW-Jr, Browner BD. Radiation exposure to the surgeon during closed interlocking intramedullary nailing. J Bone Joint Surg (American) 1987; 69: 761-766

4 Kanellopoulos AD, Yiannakopoulos CK, VossinakisL, Badras LS. Distal locking of femoral

nails under direct vision through nailing of open fractures of the tibia. Int Ortho 2004; 28: 163-166

5 Shah RK, Moehring HD, Singh RP, Dhakal A. Surgical Implant Generation Network (SIGN) intramedullary cortical window. J Ortho Trauma 2003; 17: 574-577

6 Ikem I, Ogunlusi J, Ine H. Achieving interlocking nails without using an image intensifier. Int Ortho 2007; 31: 487-490