Open Kuntscher Nailing Of Closed Femoral Shaft Fractures: Revisited

A Olasinde

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Abstract

Interlocking intramedullary nails is now the standard in the treatment of femoral shaft fractures however costs precludes its common use in developing countries, making open Kuntscher nailing a common procedure. This study was done to evaluate the outcome of Kuntscher nailing with regard to union, infection, limb length and range of motion.

This was a three years prospective study from January 2002 to December 2004.Thirty seven patients were included in the study. The average age of the patients was 35years.Nineteen fractures occurred in the upper third and 18 in middle. All the 37 fractures healed on the average of 20weeks. Two patients had superficial wound infection, 4 had limb shortening of 1-2 centimetres and range of motion at the knee from 100 to 135 degrees at minimum twelve months follow up.

It was concluded that open Kuntscher is still a relevant operation in the developing worlds with good functional and clinical results.

INTRODUCTION

Internal fixation of fractures has been proposed by the 'Association for Osteo-synthesis' as a means of preventing the development of fracture disease. Intramedullary nail fixation of femoral shaft fractures with the use of clover shaped nail was popularized by a German Orthopaedic Surgeon, Kuntscher during the Second World War. Though the principle was well known as Lambotte of Antwerp in 1913 and Hey Grooves of Bristol in 1918 who used similar methods during the First World War but lack of inert metals was major handicap. [1] It was the development of special stainless steel that made intramedullary nailing very practicable. The indication for its use is a transverse fracture occurring at the isthmus of shaft in the middle third. The advantage with this method lies in the ease of insertion of the nail, reduced cost compared to plate and screw fixation, and availability. The subsequent removal also avoid exposure of the fracture site; however one its short coming is that it cannot be used for fractures in other part of the bone and also offers poor rotational alignment. This led to the introduction of interlocking nails in the last two decades.

The closed intramedullary locked nails is now the 'gold standard' in the treatment of femoral shaft fracture as its offers good control of limb length and rotational alignments. However the cost of instrumentations and the nail has been a major factor militating against the wide spread use especially in third world country like ours. [2, 3]

The surgeon practicing in this environment has had to extend the use of the Kuntscher nails to fractures in the middle shaft of femur and those with large butterfly fragments with the use of anti-rotation bars incorporated in boot Plaster of Paris cast at the ankle. This prevents rotatory movement of the distal fragment. This prospective study was done to evaluate the use of open Kuntscher nail with regard to time to union, infection, limb length and range of motion at the knee

PATIENTS AND METHODS

This was three years prospective study from January 2002 to December 2004 carried out in the department of Orthopaedic surgery and Traumatology, Federal Medical Centre, Owo in Nigeria. All the patients who presented with closed fractures of femoral shaft involving the proximal and middle third of the bone who had open retrograde intramedullary nailing with Kuntscher nails were included in this study. This also included those with fresh and old fractures however those with open fractures and severe communition were excluded. Those with fresh fractures had initial clinical assessment, resuscitation, and investigation done in the accident and

emergency department of the hospital .These included history taking, physical examination, essential hematological and radiological investigations.

The roentogram was used to assess for fracture configuration. The degree of communition of the fracture was graded using Winquist et al grading. [4] All the patients with Type 1,11,111 were included in the study and those with type 1V excluded. All the patients had prophylactic antibiotics with use of intravenous ciprofloxacin. All the patients had open retrograde method of insertion with the use of rigid reamers. Appropriate sized nail was selected intraoperatively based on the last reamer size. The patients with segmental fracture had passage of the nail with minimal exposure of middle fragment in order to avoid stripping of the soft tissue which may further compromise the blood supply to it. The operative exposure of the fracture was via the postero-lateral approach through the lateral intramuscular septum. Those patients with butterfly fragment had the fragment reduced and held with either cerclage wire or nylon 1 suture. These were applied snugly circumferentially to prevent the development of ring necrosis. Post operatively patients with fracture pattern other than transverse line had anti-rotation bar applied to foot and ankle for a period of four weeks. A roentogram of femur is taken to ascertain the presence of soft callus at the fracture site. The patients had quadriceps exercises postoperatively. The bar was removed if soft callus was present at four weeks otherwise it was left for six weeks. The patients were then mobilized out of bed on non- weight bearing axillary crutches and subsequently discharged once stable. They are then followed up at consultant outpatient clinic. Full weight bearing was commenced once radiological union occurred. The radiological union was defined for the purpose of this study as when fracture line was completely obliterated

RESULTS

The average age of the patients was 35years± 8.9 SD with a male: female ratio of 2:1.The mean time of presentation was within 24hours in 34 (91.9%)patients, one presented within 48hours and 96hours after the injury, and the longest delay to presentation was 10months.This patients was initially managed by traditional bone setters with non union femoral shaft fracture. The average duration of hospital stay was 53.7days±47.1SD with a range of 20-240 days. The longest stay had open tibial fracture, Gustillo and Andersen type IIIB of the contra lateral side.

All the 37 fractures united on the average of 18 weeks with a range of 16-30weeeks.Three patients had cancellous bone grafts. Two of which had medial cortical defect and one atrophic non union. All these fractures united at an average of 20weeks.

Four (14.8%) of the patients had shortening ranging from 1-2 centimeters. Two patients had 2cm shortening and the remaining two had 1cm shortening. The 2patients with 2cm shortening had type II and III fracture communition whereas those with 1cm shortening had type 1.

The duration of follow up was 12-18 months with average of 14 months. The range of motion at the knee was 100 to 135degrees at follow up.

The fracture configuration was transverse in 15 (37%), and committed in 22 (63%).The degree of communition using Winquist et al classification are; 6 patients had typeI,12 had type II and 4 had type III.

18 (48.7%) of the fractures was on the right and 19(51.3%) involved the left limb.

There was involvement of the upper third in 19(51.3 %) patients and middle third in 18(48.7%) patients. The antirotation bar was applied in 15 (55.6%) of the patients with unstable fractures.

Two patients had superficial wound infections which resolved completely with dressing and appropriate antibiotics. The culture results yielded the growth of Staphylococcus aureus was sensitive to ciprofloxacin the peri-operative antibiotic used for the all the patients.

Ten (37%) of the patients had associated injuries. These are shown in table 1

Full weight bearing was commenced on the average of 18.3 weeks±8.3 SD. The other post operative complications occurred in 6 (22.2%) patients. There are extension knee lag in 2 patients that resolved with quadriceps strengthening exercises, gluteal pain that resolved following the removal of the nail at 18 months, and proximal extrusion of the Nail in 3 patients which was reseated properly through the gluteal wound.

Figure 1

Table 1: Associated Injuries In 10 Patients

Associated injuries	Frequency of occurrences
Tibia Fractures	10
Soft tissue injuries	5
Pelvic fractures	2
Radius fractures	2
Head injury	2
Humeral fracture	1
Total	22

* Some of the patients

DISCUSSION

While closed interlocking nails remains the gold standard in the treatment of femoral shaft fractures, open Kuntscher nailing still has it relevance in the developing countries where this facilities may not be available. In this study all the patients treated with open Kuntscher nailing had their fractures united on the average of 20 weeks with a range of 16to 30 weeks. This was comparable to the findings by Davlin et al [5] at 20 weeks but longer than those reported by Devnani [6] that had union in their group of patients at 14weeks.We established from this study the extended use of Kuntscher nails to fractures of Winquist type 1 and II also achieved union at average of 20weeks.

The advantages of interlocking nails was the prevention of shortening and mal-alignments but despite the locking this has not been completely prevented with reports of 1-2 cm and 10-15degree of mal-rotation regarded as excellent to good results.[7,8] In this study only 4(14.8%)patients had 1-2cm shortening. This did not affect their gait significantly as none of them had any need for raising of the shoe. Though rotation mal-alignment was not looked for in this study, prevention of this complication of Kuntscher nailing was effected firstly through good cortical apposition of the fracture ends in type 1 and II communition. The type III communition in addition to cortical apposition had three point purchase of straight nail on the endosteal surface of the medullary canal. Secondly, all the patients with comminuted fractures had application of anti-rotation bar. This was essentially a boot Plaster of Paris cast applied with the incorporation of a long wooden bar at the heel for 4-6weeks till soft callus was seen at the fracture site.

The fear of infection has always been the bane of open surgery hence recent trend towards closed surgery. In this study 2(7%) patients developed superficial wound infection that resolved with dressing and appropriate antibiotics. This was higher than those reported by Blumback et al [8] who reported 3-5 %in 89 fractures and Williams reported 2.4% in 42 fractures.[9] However, their reports included only deep infections. In our centre, the orthopaedic surgeon do not have a theatre suite separate from the general surgeons and gynaecologist, this might have contributed to this infection rate.

The range of motion at knee ranged from 100 to 135 degrees at minimum six month of follow up.

It was concluded that open Kuntscher nailing is safe, effective and still relevant in the centre where facilities for closed interlocking nails may not be available. It gives good functional and clinical results in transverse, short oblique fractures and those with lesser degrees of communition

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CORRESPONDENCE TO

Dr A.A.Olasinde FWACS Federal Medical Centre, Department of Orthopaedic Surgery and Traumatology P.M.B.1053, Owo, Ondo State Email: olasindetony@yahoo.com

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had multiple associated injuries

Author Information

A. A. Olasinde, FWACS
Department of Orthopaedic Surgery and Traumatology, Federal Medical Centre