

Treatment of Middle 1/3RD Diaphyseal Shaft Femur Fractures By Kuntscher Nail-A Functional Study

Dr Pradip Kumar Ghosh¹, Dr Soudip Sinha², Dr Sourav Naskar³

¹Department of Orthopaedics,,Burdwan Medical College and Hospital, West Bengal University Of Health Sciences, India

² Department Of Orthopaedics, Coochbehar Govt. Medical College and Hospital, West Bengal University Of Health Sciences, India

³Department of Orthopaedics,,Burdwan Medical College and Hospital, West Bengal University Of Health Sciences, India

Corresponding author: Dr Soudip Sinha

Abstract:

Background: Interlocking intramedullary nail is now the standard treatment for femoral shaft fractures in adults. However open Kuntscher nail is still remains an option for the management of noncomminuted isthmus fractures of femur in a developing country like us.

Aims: This study was done to evaluate the outcome of Kuntscher nailing with regard to union, infection, limb length and range of motion.

Materials & Methods: We retrospectively reviewed 30 patients with fracture shaft of femur treated with K nail in a tertiary care centre of eastern India with institutional ethical clearance and informed consent of the subjects. All patients were treated and they were followed up after operative management in the institution for 12 months.

Result: All fractures were middle one-third diaphyseal shaft femur fractures (closed, Gustilo type 1 and type 2). In all cases union achieved (96.7%) within 20 weeks except one which was Gustilo type 2. That case developed infective non-union (3.3%) and limb length shortening. Range of motion at knee was 100 to 135 degrees at 12 months follow up. There was no rotational deformity. 3 patient developed limited knee flexion.

Conclusion: It was concluded that K nail is still a viable option for treatment of closed, gustilo type 1 femoral fractures in hospitals with limited resources and in pregnant patients.

Keywords: shaft femur fracture , k-nail, union, fixation, functional outcome.

Date of Submission: 26-12-2019

Date of Acceptance: 10-01-2020

I. Introduction:

Fractures of the shaft of the femur are among the most common fractures encountered in orthopaedic practice. Because the femur is the largest bone of the body and one of the principal load-bearing bones in the lower extremity, fractures can cause prolonged morbidity and extensive disability unless treatment is appropriate.(1)

Treatment options depends on various factors like type and location of fracture, degree of comminution, age and socio-economic status of the patient etc. Possible treatment options for shaft femur fractures are –

- Closed reduction and spica cast immobilization
- Femoral cast bracing
- Skeletal traction
- External fixation
- Internal fixation with plate and screws
- Intramedullary nailing with open or closed technique
- Antegrade interlocking intramedullary nailing (reamed or unreamed)
- Retrograde interlocking intramedullary nailing

Regardless of the treatment method chosen, the following principles are agreed on:

- (1) restoration of alignment, rotation, and length,
- (2) preservation of the blood supply to aid union and prevent infection, and
- (3) rehabilitation of the extremity and the patient .

Though kuntscher introduced closed intramedullary nailing in 1940(2,3) Internal fixation with open intramedullary nailing had revolutionised the treatment of shaft femur fracture during World War II. Nailing techniques and designs improved a lot over the time course and currently locked intramedullary nailing is

considered as treatment of choice for shaft femur fractures. Though K-nail is rarely used now a days but it is a very good economical treatment option with good comparable outcomes in mid diaphyseal shaft femur fractures without comminution for low socio-economic status patients.

II. Materials and Methods:

In this study, 30 patients with mid shaft diaphyseal fracture of femur treated with Intramedullary k-nail at Tertiary care centre in Eastern India, between March 2017 – August 2018.

Inclusion criteria –

- Middle third diaphyseal shaft femur fracture.
- Age group – 14 yrs to 50 yrs
- Closed fractures, GA type – I and II
- Winquist & Hansen(4)classification 0, I, II
- Pregnant patient

Exclusion criteria –

- Distal and very proximal shaft femur fractures
- Very osteoporotic bone
- GA III fracture
- Severe comminution (Winquist & Hansen III & IV)
- Pathological fracture

All the patients were selected on the basis of above mentioned inclusion and exclusion criteria.

There were 23 males and 7 females ,1 of them was pregnant. Average age was 23.1yrs (ranging 14 yrs to 56 yrs) . Majority of them suffered high velocity trauma. Comminution was graded according to Winquist & Hansen classification and 17 were grade 0, 12 were grade I and 1 case of grade II . Open fracture was classified according to Gustilo -Anderson classification. 24 cases were closed fracture, 5 cases were of GA I and 1 case was of GA II. All the cases were given skeletal traction after admission and preoperative investigations were done.open wound cases were treated with adequate cleaning of wound and iv antibiotics and time given for healing before posting for operation. Avg delay from admission to operation 4-5 days for closed fractures and from 7-10 days for open fractures. Patients were positioned in a lateral decubitus position on a standard operating table. Fracture site exposed through lateral approach and minimal periosteal stripping done. Fracture surface cleaned and reaming done. First retrograde reaming done in the proximal fragment and passed through the pyriform fossa. Skin cut over the pointing tip of reamer. After reaming both the fragments, nail length taken with the help of reamers. Then appropriate sized kuntscher nail was introduced in a retrograde fashion through the proximal fragment and nail end flushed with the end of proximal fragment. Then fracture was held in proper reduction and the nail hammered into the distal fragment keeping the eye postero-medially. The proximal end of the nail kept 2 cm above the tip of the greater trochanter. The wound was closed over suction drain. The drain kept for 48 hrs and removed. Patients were discharged after 4-5 days if 3rd days post operative wound shows no discharge and healthy. Stich off done after 2 weeks and patients was encouraged for hamstring, quadriceps and range of motion exercises after that. Partial weight bearing given after 6wks. Full weight bearing allowed after radiological sign of good union.

III. Results:

In our study 76.6 % were male and 23.4% were female. 54%(18 of 30) patients were between 14 to 20 yrs age group. 80% had closed fractures, 16.6% had GA type I wound and 3.3% had GA type II wound. Fracture comminution graded according to Winquist and Hansen clasification. 56.6% case had no comminution (grade 0), 40% had grade 1 and 3.3% had grade II comminution. Avg Delay of 4.1 days from admission to operation for closed fracture and 9.3 days for open fractures. Avg operation time were 47.6 mins (ranging from 40-60 mins).

In all the cases wound healed without any complication and stitch off done at 2 wks except 1 case developed deep infection and continue discharge which was of GA type II wound during presentation. 10 cases achieved radiological union within 12 wks, 17 cases within 16wks,2 cases within 20 wks and 1 case developed infected non-union. 2 episodes of antibiotic beads given for the infected case but later chronic osteomyelitis developed for which exchange antibiotic impregnated k-nail done.

There was no fat embolism. Only the infected case developed 3 cm shortening. Range of motion at knee was 100 to 135 degrees at 12 months follow up. There was no rotational deformity. 3 patient developed limited knee flexion. No incident of bent nail or nail break in our series. Proximal migration of nail was found in 2 case. Full weight bearing allowed in 33.3% cases at 12 wks and 56.6% cases at 16 wks and 6.6% cases at 20 wks. The infected case doing well after exchange antibiotic impregnated K-nail and currently under follow up.

IV. Discussion:

Today in the age of advanced interlocking nails 1st generation nails like kuntscher nail is nearly obsolete. Interlocking nail provide better stability, rotational control, less chance of infection, less chance of shortening, early weight bearing but it comes with costly implant and instruments, modern OT setups, necessity of image intensifier and technical expertise(5). Where as 1st generation nail like Kuntscher nail is done in normal operating table without modern OT setups and image intensifier and cost of implant and operation is very low, OT time is less and learning curve is less compared to interlocking nails.

In our study we achieved 33.3% union rate within 12 wks, 56.6% within 16 wks and 6.6% within 20wks. Infection and non union developed in 3.3% cases which collaborate with the literature.

According to literature infection and non-union was reported between 1.5 to 10% in cases of open kuntscher nailing.

Though the advantages of interlocking nail is prevention of shortening and mal-alignment, shortening of 1-2 cm and 10-15 degree of mal-rotation regarded as excellent to good result in the literature. (6)

In our series, no mal-alignment and shortening (except in 1 infected case) developed due to proper alignment done intra operatively by seeing linea aspera, most of the cases were transverse and no or minimal comminution were there.

V. Conclusion:

In our study we achieved union between 12 to 20 wks which was comparable to the study of Davlin(7) et al and Devnani(8) et al 20 wks and 14 wks respectively.

Infection and non-union rate in our study 3.3% was comparable to report by Blumback(9) et al 3-5% in 89 fractures and more than the report of Williams(10) 2.4% in 42 fractures.

Full weight bearing period were much longer than interlocking nails as in cases of K-nails, weight bearing only given after good radiological evidence of union.

Though interlocking nail is the treatment of choice for shaft femur fractures, middle 1/3 rd closed or open(GA type I) shaft femur fractures with no or very less comminution (Winkvist and Hansen grade 0, I, II) can be effectively treated with Kuntscher nail.

Advantages of kuntscher nail are –

- 1) donot need modern OT setup
- 2) Don't need image intensifier
- 3) Very cheap
- 4) Less operating time(helpful for polytrauma patients for early stabilization)
- 5) Less technical expertise
- 6) Easy learning curves
- 7) Safely done in pregnant patients without risk of exposure.

Disadvantages of k-nail

- 1) chance of infection
- 2) Less rotational stability
- 3) Shortening if done in comminuted fractures
- 4) Late weight bearing
- 5) Bending /breakage of nail
- 6) Proximal migration of nail
- 7) Not good for pathological and osteoporotic fractures

So, we have to choose cases very carefully for Kuntscher nailing.

In cases of mid 1/3 rd diaphyseal closed or GA I shaft femur fractures with no or very less comminution (Gr 0, I and II) in 14 to 40 yrs of age group, kuntscher nailing is a good economic treatment option in a developing country like us.

References

- [1]. Frederick M. Azar. James H. Beaty. S. Terry Canale. CAMPBELL'S OPERATIVE ORTHOPAEDICS. 13th edition, Philadelphia, ELSEVIER, 2017 : 2796
- [2]. Sage FP. The second decade of experience with Kuntscher medullary nail in the femur. Clin Orthop Relat Res 1968;60:77-85.
- [3]. Kuntscher GB. The Kuntscher method of intramedullary fixation. J Bone Joint Surg Am 1958;40- A(1):17-26.
- [4]. Winkvist RA, Hansen ST. Segmental fracture of the femur treated by closed intramedullary nailing. J Bone Joint Surg Am 1978;60(7):934-9.
- [5]. Roy RK, Prasad M. Comparative study of Kuntscher nail vs. interlocking nailing for femoral isthmus fractures. J Evid Based Med Healthc 2017;5(41):2450- 2.
- [6]. Shashi Kant Suman. Rajkumar. L.B. Manjhi. Open Kuntscher nailing for fracture shaft of femur. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 15, Issue 9 Ver. III (September. 2016), PP 19-21

- [7]. Davlin L, Johnson E, Thomas T, Lian G. Open versus closed nailing of femoral fractures in the poly trauma patients. *Contemp. Orthop* 1991; 22(5):557-63
- [8]. Devnani AS. (2003) Open reamed femoral intramedullary nailing -Revisited. *Eastern J.Med.* 2003;8(1):7-10
- [9]. Blumback RJ, Ellision PS Jr, Lakatos R, BathonGH, Burgess AR. Intramedullary nailing of open fractures of the femoral shaft. *JBJS* 1989; 17:1324-1330
- [10]. William MM, Askins V, Hinkes EW, Zych GA. Primaryreamed intramedullary nailing of open femoral shaftfractures. *Clin. Or thop.* 1995; 318:182-190

Dr Pradip Kumar Ghosh.et.al. "Treatment of Middle 1/3RD Diaphyseal Shaft Femur Fractures By Kuntscher Nail-A Functional Study." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(1), 2020, pp. 23-26.