Research Paper

Volume : 5 | Issue : 6 | June 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Study of Functional Outcome of Retrograde Ender's Nailing in Diaphyseal Femur Fractures in Paediatric & Adult Patients (20 Cases)

Medical Science

KEYWORDS : Retrograde Ender's Nail, Femur shaft fractures

*** Dr. HARDIK TAILOR**	Assistant Professor, Department of Orthopaedics, Medical College, Baroda. * Corresponding Author
Dr. GAURANG PATEL	Assistant Professor, Orthopaedic Department, Medical college & SSG Hospital, Baroda.
DR. HEMANT MATHUR	Professor & Head, Depaertment of Orthopaedics, Medical College Baroda.

ABSTRACT

INTRODUCTION: Locked intramedullary nail remain the preferred surgical treatment for diaphyseal femur fractures but associated with risk of ARDS and damaging endosteal vascularity. Dynamic intramedullary fracture fixation using Ender's nail appears to closely meet the objectives of achieving osteosynthesis with minimal surgical trauma. It is a relatively simple procedure. It does not require reaming, thereby minimising chances of ARDS and damage to endosteal circulation. Ender's nailing therefore appears to be simple, safe and effective method of treating femoral diaphyseal fracture in adults as well as children.

MATERIALS AND METHODS: The study included 20 cases of fracture of the shaft femur in patients treated by closed reduction and intramedullary flexible Ender's nailing under I.I.T.V.guidence, carried out at the Department of Orthopaedics, Sir Sayajirao Gaekwad General Hospital & Medical College, Baroda, between June 2010 to November 2012. All the patients were evaluated clinically and radiologically using our modified scoring system at 1month, 6 months, and at final follow up of 1 year.

RESULTS: At the end 18(90%) patients had excellent result, 1(5%) with significant knee stiffness had good result and 1(5%) with non union had a poor result. Mean operative time was 45 mins and average blood loss was around 50 ml. 80% of adult patients treated with Ender's nailing have shown excellent results but rate of post operative knee stiffness is more.

CONCLUSION: Retrograde Ender's nailing is an effective method of treating femoral diaphyseal fractures in paediatric as well as adult patients with shorter operative time and less amount of blood loss.

INTRODUCTION

Femur is one of the common long bone to be fractured. Automobile accidents account for majority of fractures of femur bone in adults as well as paediatric age group. Being a result of high energy trauma, one must have a high index of suspicion for complication or other associated injuries.

The management of femur shaft fracture has undergone evolution from conservative to various operative modalities such as intramedullary nailing and dynamic compression plating in past two decades.

Currently, Locked reamed intramedullary nailing is the preferred surgical treatment of femur diaphyseal fractures7. However, the main limitation to conventional reamed nailing is the patient's pulmonary condition and the risk of ARDS and damage to endosteal vascularity3, 4. Moreover there are many reports recommending dynamization of statically locked nail, 8 to 10 weeks after surgical procedure, to promote union of fracture5. Use of these nails in children will produce damage to epiphyseal plate and limb length problems. Also, use of these implants necessitates a set of instruments and specific facilities which are not currently accessible in many centers.

Dynamic intramedullary fracture fixation using Ender's nail appears to closely meet the objectives of achieving osteosynthesis with minimal surgical trauma1. It is a relatively simple procedure. It does not require reaming, thereby minimising chances of ARDS and damage to endosteal circulation. As the fixation by Ender's nail is not rigid, some amount of micro motion occurs between the two fragments which in turn stimulate fracture healing. Operative time, Image intensifier exposure and blood loss in using ender's nail is much less than using interlocking nails. Ender's nailing therefore appears to be simple, safe and effective method of treating femoral diaphyseal fracture in adults as well as children.

Present study includes study of 20 cases in which Ender's nails were used to treat femoral diaphyseal fractures in adults as well as children.

MATERIAL & METHOD

This was a prospective study of 20 cases of fracture of the shaft femur in patients treated by closed reduction and intramedullary flexible Ender's nailing under I.I.T.V.guidence, carried out at the Department of Orthopaedics, Sir Sayajirao Gaekwad General Hospital & Medical College, Baroda, between June 2010 to November 2012.

Inclusion criteria

Simple fracture
Wedge fracture
Complex fracture
Poly trauma patients
Open grade 1 and 2 fractures of femur
Pathological fractures
Conversion from external fixator

Exclusion criteria

Infection or skin lesion at entry site (dermatitis) Open grade 3 fractures of femur.

First we had classified fractures according to AO classification and then on x-ray we determined the diameter of nail by measuring the diameter at isthmus and nail size clinically. The width of the canal was measured at the narrowest point in the diaphysis on both the AP and lateral view and the maximum diameter number was divided by two. If the fracture involves isthmus we calculated nail diameter on X ray of opposite extremity.

After general Anesthesia, spinal Anesthesia, or Epidural anesthesia, the patients were shifted on the fracture table. All the patients were operated on traction table in supine position. Reduction was achieved by close means and retro-

grade Ender's nails were introduced from Medial and Lateral epicondyle. All the nails were pre bent before insertion to facilitate placement of nail, to achieve reduction of fracture, and for jamming and fanning of the nail.

Post operatively limb was supported in a cylindrical slab. Static and dynamic quadriceps exercises were encouraged. Then patients were encouraged for high sitting exercises once pain subsided. From the third day onwards non weight bearing crutch walking was allowed. The patients with concomitant other injuries (e.g. lower end radius fracture); after suture removal, they were discharged with immobilization depending on their associated injuries with bedside knee and hip physiotherapy. The suture removal was on the tenth post-operative day. Patients were discharged with non weight bearing and called for clinical and radiological follow-up at 1month, 6 months and at final followup of 1 year. Once early callus formation was present on x-ray, patients were advised progressive weight bearing as tolerated. On each follow up for the assessment of the patients, we used **Lysholm** knee scoring system.

RESULTS AND ANALYSIS

In our series, age varied from 5 to 47 years; with a mean age of 26 years. There were 6 paediatric patients, 4 adolescents and 10 adult patients. There was male preponderance. Male: Female ratio was 4:1. Commonest mode of injury was vehicular accident (70%) and fall from height (30%). Mean interval between injury and surgery was

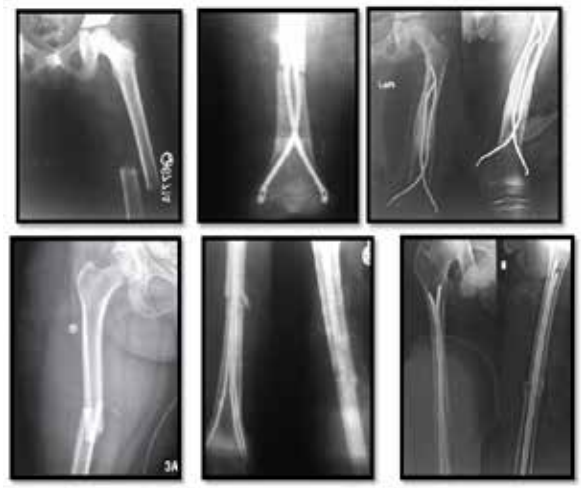
5 days. Majority (70%) of our patients were having close shaft femur fracture. 4 patients had Open grade 1, and 1 patient had Open grade 2 fracture.

We have followed AO classification in our study. According to which there were 13(65%) patients of type A, 7 patients (35%) of type B.No perioperative complications were encounterd in all patients. Majority of our patients were discharged on the 3rd day and were called on follow-up for suture removal on 10th day. None of our patents had infection either at entry site or fracture site. Minimum follow up was of 6 months and maximum follow up was of 2.5 years, with a mean follow-up of 1 year. In majority of the patients fractures were united within 5 months. But there was one incidence of non-union. Mean union time was 20 weeks. Significant knee stiffness (knee range of motion <90 degree) was present only in 2(10%) patients one of which was due to lack of post operative rehabilitation in case of psychiatric illness of the patient. None of our patient had hip stiffness. One adult patient had shortening of 1 centimetre because fracture was malunited in 15 degree of varus. In 5(25%) cases nails were removed due to back out amongst which 3 patients were of paediatric age. At the end 18(90%) patients had excellent result, 1 with significant knee stiffness had good result and 1 with non union had a poor result.

(Table -1)

Lysholm Knee Score	No. Of Patients
Excellent(>90)	18(90%)
Good (84 – 90)	1(5%)
Fair (65 – 83)	0(0%)
Poor	1(5%)

We got excellent result in 90% of the patient. Only one patient developed non union had a poor result. (Table 1) We have got excellent results in 14 out of 15 close fractures. All the patients having open grade 1 fracture had excellent result and 1 patient with open grade 2 fracture had good result and 1 patient with close fracture had poor result.



DISCUSSION

Among the various modes of treatment of femoral shaft fracture, internal fixation has been the main stay of treatment, with emphasis on intramedullary fixations. Though intramedullary interlocking nail is the ideal treatment of shaft femur fracture in adults, reports in literature indicating adverse effects of reaming like pulmonary embolization16, disruption of vascular supply of inner 2/3 rd of cortex. So use of unreamed intramedullary nailing has gained popularity now a day.

Flexible unreamed intramedullary nails have long been used to manage diaphyseal fracture of femur. These nails provide three point fixation in the medullary canal and provide favourable mechanical conditions, as the forces are evenly distributed along the entire length of the nails. Operative reduction and stabilization with this technique is safe and without risk of pulmonary embolization, damage to vascular supply or damage to growth plate in case of children. Ender's nail is safe and satisfactory mode of fixation which is relatively easy to perform.11-14

Average blood loss, average radiation exposure, average operative time, average hospital stay are significantly less in Ender's nailing than intramedullary locking nails. Present and even previous study on treatment of femoral diaphyseal fracture of femur with Ender's nail has shown excellent results except in highly comminuted fractures of shaft of femur though there are reports of having postoperative knee stiffness especially in adult patients.

Ender's nailing allows early mobilization, more rapid return to normal function and has educational, social, psychological advantages over other modes of treatment of femoral diaphyseal fractures in paediatric as well as in adult patients.

We have compared the results of our study with previous Indian as well as western studies such as R. Gupta et al; 7, P Singh et al 8, Sohail Sheikh et al9, Bhattacharya et al10. The average operative time, average blood loss, rates of infection, delayed union and non union are quite similar. However the average union time was slight higher in our study may be due to inclusion of adult patients but the average hospital stay was much less in our study.

CONCLUSION

Most of shaft of femur fractures are result of high velocity trauma. Ender's nailing is an effective method of treating femoral diaphyseal fractures in paediatric as well as adult

Volume : 5 | Issue : 6 | June 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

patients. Ender's nailing can be done with significantly less amount of time and blood loss. In paediatric patients Ender's nailing should be preferred over conservative method. 80% of adult patients treated with Ender's nailing have shown excellent results but rate of post operative knee stiffness is more. Ender's nailing is able to produce excellent results in term of union and functional activities in all age group. Rehabilitation is faster with Ender's nailing and loss of wages in terms of occupational disability is significantly reduced. It provides early return to pre trauma occupation or lifestyle.

REFERENCES

1. Harris WR (1990) Fracture healing. Wittick WG, Canine Orthopaedics. 2nd ed. Section 3 : preparation, principles and procedures for surgery. Philadelphia : Lea & Febiger, 158-165.
2. Anderson RL : Conservative treatment of factures of the femur, J Bone joint surg 49A: 1371, 1967.
3. Pape H Ragel, Dvenger A. Influence of different methods of femoral nailing on lung function in patients with multiple trauma. J trauma1993; 35: 709
4. Kempf I, Groose A, Beck G. Closed locked intramedullary nailing. J bone joint surg(AM) 1985;67-A: 709-720.
5. Thoreson BO, Alho A, Ekland A, Stromosoe K,Kolleras G, Haukebo A. Interlocking Intramedullary nailing in femoral shaft fractures. J bone and Joint Surg (AM) 1985; 67- A: 1313-1320
6. liztok A. Pilih, Andrej Cretnik.Historical overview and biomechanical principles of intramedullary nailing: post Graduate School of Surgical Techniques. 13-18
7. Gupta R, Singh M, Gupta N. Ender's nailing in diaphyseal fractures of feur. Indian J Orthop (serial online) 2003;37:6
8. P Singh, V Sharma, H Singh, I Wani, R Gupta, N Gupta. Treatment of Fractures Of the shaft of the femur in children by Ender`s nails: A prospective study. The internet journal of orthopaedic surgery.2009; 11,1
9. Sohail Iqbal Sheikh, Muhammad Ullah, Arab Khan,Javed Iqbal, Ender's Nail For Diaphyseal Long Bone Lower Limb Fractures in Children. Journal of Rawalpindi Medical College (JRMC); 2012;16(1):25-27
10. KC Saikia, SK Bhuyan, TD Bhattacharya, and SP Saikia. Titanium elastic nailing in femoral diaphyseal fractures of children in 6-16 years of age. Indian J Orthop. 2007 Oct-Dec; 41(4): 381–385.
11. Flynn JM, Skaggs DL, Sponseller PD, Ganley TJ, Kay RM, Kellie Leitch KK. The operative management of pediatric fractures of the lower extremity. J Bone Joint Surg Am. 2002;84:2288–300.
12. Narayanan UG, Hyman JE, Wainwright AM, Rang M, Alman BA. Complications of elastic stable intramedullary nail fixation of pediatric femoral fractures and How to avoid them. J Pediatr Orthop.2004;24:363–9. [PubMed]
13. Bhaskar A. Treatment of long bone fractures in children by flexible titanium nails. Indian J Orthop.2005;39:166–8.
14. Hunter JB. The principles of elastic stable intramedullary nailing in children. Injury. 2005;36:A20–4.[PubMed]
15. Johan Waltes, William Shepherd Wilson, Timothy Lyons, Roger Close. Femoral shaft fractures treated by Ender's nail using a trochenteric approach: J bone & joint surg [Br] 1990; 72-B: 14-8.
16. Bone LB, Babikian G, Stegemann PM: Femoral Canal reaming in the polytrauma patient with chest injury: a clinical perspective, clin orthop Relat Res.1995; 318:91.
17. Boyer MI, Ribeiro E, Hu R, et al: Small v/s large diameter cross section femoral nails for the treatment of femoral shaft fractures: J Trauma 41:279, 1996.
18. Brumback RJ, Ellision TS, Molligan H, et al: Intramedullary nailing of open shaft femoral fracture, J Bone Joint Surg 71A:1324, 1989.
19. Brumback et al: Intramedullary nailing of the femur: reamed v/s non reamed, J Bone and Joint Surg 72A:1067, 1992.
20. Dencker H: Shaft fractures of femur: a comparative study of the result of various methods of treatment in 1003 cases 130:173, 1965; Technical problems of medullary nailng : a study of 435 nailed shaft fractures of femur, 130:185, 1965.
21. Winquist Hansen: Closed intramedullary nailing of femoral shaft,technical consideration,27:90,1978.
22. Pankovich AM: Closed Ender Nailing of femoral shaft fractures, J Bone Joint Surg 61A:222, 1979.
23. Titanium Elastic Nail Sysem: Technique guide, Paoli, Penn, 1998, Synthes.
24. Zickel R E: Fractures of the adult femur excluding the femoral head and neck: a review and evaluation of current therapy, Clin Orthop Relat Res 147:93, 1980.