



FRACTURE SHAFT OF FEMUR; MANAGEMENT OUTCOME IN CHILDREN BETWEEN 10 TO 14 YEARS OF AGE TREATED BY INTRAMEDULLARY RUSH NAIL

Dr. Habibullah Memon¹, Dr. Ghulam Mustafa Kaim Khani², Dr. Naveed Ahmed Solangi³,
Dr. Muhammad Bakhsh Chachar⁴

3. Department of Orthopedic Surgery
DUHS & Civil Hospital, Karachi.

Correspondence Address:
Dr. Naveed Ahmed Solangi
Department of Orthopedic Surgery
DUHS & Civil Hospital, Karachi.
surgeonnaveed@yahoo.com

Article received on:
23/09/2014

Accepted for publication:
20/10/2014

Received after proof reading:
15/12/2014

ABSTRACT... Introduction: In school going children surgical treatment is favoured with the introduction of elastic intramedullary nails. The aim of this study was to determine the management outcome of fracture shaft of femur in children between 7-14 years of age by intra medullary rush nail. **Patients and Methods:** This study was conducted at department of orthopedic surgery, Dow University of health science and civil hospital Karachi. Duration of study was 12 months from 01-09-2011 to 31-8-2012. Children with closed fracture shaft of femur age 7-14 years of either sex meeting the inclusion criteria were included. Children were diagnosed clinically and confirmed on X ray, open reduction and internal fixation with appropriate size rush nail was done by senior orthopedic surgeon. Thereafter patients were followed every month and the final outcome was measured at the end of third month post operatively. **Results:** male were 58% while female were 42%, the average age of the patients were 11.78 ± 1.40 years. Management outcome of fracture shaft of femur in children by intra medullary rush nail showed that 100% children fracture were healed. **Conclusions:** We found a very high success rate in the management of closed fracture shaft femur with intramedullary rush nail. This surgical procedure is simple, technically less demanding, and suitable in peripheral rural hospital in developing countries.

Key words: Femoral shaft fractures, Intramedullary rush nail, closed fracture.

Article Citation: Memon H, Khani GMK, Solangi NA, Chachar MB. Fracture shaft of femur; management outcome in children between 10 to 14 years of age treated by intramedullary rush nail. Professional Med J 2014; 21(6):1153-1156

INTRODUCTION

Femoral shaft fractures are common pediatric orthopedic injuries constitutes less than 2% of all fractures in children. In majority of cases shaft is involved¹. Common mechanisms of injuries are motor vehicle accidents and fall from height. Both operative and non-operative methods are used to treat these fractures. Treatment of femoral shaft fractures varies with the age of children, associated injuries and local circumstances. Due to advancement in surgical techniques, operative treatment has become increasing popular for these fractures in school going children. Several surgical methods have been advocated. Current methods for the management of femoral shaft fractures include traction, Spica cast, Titanium elastic nail, external fixation, plate fixation, sub muscular bridge plate, and conventional intramedullary nailing².

Conservative management is preferred for the

preschool age child. Treatment options for children between 5 and 15 years of age remain controversial¹, if treated conservatively; these fractures have a high risk of shortening and mal-union. In this age group surgical treatment is preferred for early mobilization of patients, short hospital stay and to avoid psychological and social effects³.

External fixation, although producing acceptable results, is associated with complications like pin track infection. Plate fixation and rigid intramedullary nailing are also associated with many complications⁴. Rigid intramedullary nail fixation offer the advantages of low incidence of malalignment, leg length discrepancy, early ambulation and decreased hospital stay, but recent reports have described the development of osteonecrosis of femoral head, in at least 4% of cases⁵.

Flexible intramedullary nail was introduced by Nancy group in 1982, since then this method have become the treatment of choice in this age group because it allow early ambulation, little risk of osteonecrosis of femoral head and physeal damage to greater trochanter⁶.

The Rush nails, the forerunner of modern elastic intramedullary fixation, are of solid stainless steel, slightly flexible and have hooked ends to prevent their migration into the bone cavity. It should be pre-bent to achieve three-point fixation on the inner aspect of the cortex⁷. In these implants, rotational stability is not good. The aim of this study was to determine the outcome of fracture femur shaft in children between 7 – 14 years of age managed with intramedullary rash nail.

PATIENT AND METHOD

This study was conducted at department of orthopedic surgery Dow University of health sciences and Civil hospital Karachi. Duration was 12 months, from 01.08.2011 to 31.09. 2012.

Children in the age range of 7-14 years of either sex with closed fracture shaft femur were included. Children with open fractures of femur, pathological fracture, osteomyelitis femur were excluded.

Children were diagnosed clinically and radiologically. Informed consent was taken from the parents of the children for inclusion in the study. The procedure was done under general anesthesia. Surgery was performed in supine position. Open reduction and internal fixation with appropriate size rush nail was done. To achieve three point fixation, we bend the Rash nail and introduced to the metaphysis of proximal femur just below the greater trochanter, avoiding epiphysis of greater trochanter and also blood supply of femoral head. POP back slab up to hip joint was applied in all cases. Mobilization in bed was started on 2nd post-operative day. Patients were discharged on 4th post-operative day. Stitches were removed on the 10th POD. POP slab were removed after three weeks of surgery. Post operatively after removal of POP, knee and hip mobilization was started and in all cases we

achieved full range of motion in knee and hip joints. Thereafter patients were followed every month in outpatient clinic and the final outcome was measured at the end of 12 weeks of surgery.

Partial weight bearing was started once callus was visible on x-rays, usually 5-6 weeks after surgery and full weight bearing after full union. Union was assessed clinically with no pain, tenderness or movement at the fracture site and on X rays showing callus formation.

Data analysis was performed through statistical packages for social science using SPSS Version-16.

RESULTS

50 children with closed fracture shaft femur were included. The average age of the patients was 11.78 ± 1.40 years. Out of 50 children, 29(58%) were male and 21(42%) were female as shown in table 1. Fifty four percent children were injured with road traffic accident and 46% were injured with fall from height (Table I).

Sex		Mode of fracture		Side of fracture	
Male	Female	RTA	FALL	Left	Right
29 (58.0%)	21 (42.0%)	27 (54.0%)	23 (46.0%)	21 (42.0%)	29 (58.0%)

Table-I. Total no of patients 50

Complications	No of patients	Percentage
Limb length discrepancy.	05	10%
Angular deformity	02	04%
infection superficial	02	04%

Table-II. Post-Operative Complications (N=50)

Management outcome of fracture shaft of femur in children by intra medullary rush nail showed that 100% children's fracture were healed. Early callus was seen 4—6 weeks after surgery in all patients and full union was achieved after 9 to 12 weeks. In two patients, angulation of 5 degree in sagittal and coronal plane was noted. Limb length discrepancy was not a significant problem, in three cases less than 2.0 cm limb shortening was noted on final follow up and in two patients shortening of 3 cm was observed. Nail migration or nail penetration was not noted in our series.

Two patients developed superficial infection and were treated by local wound debridement and antibiotics. We evaluated our results according to Flynn criteria⁸, and found excellent results in 45 and satisfactory in 05 patients.

DISCUSSION

Paediatric femur fractures are most common orthopaedic injury that require hospitalization of children in United States⁹. Motor vehicle accidents and fall from height are the main cause of injuries in this age group.

Staheli defined the ideal treatment of femoral shaft fractures in children as one that controls alignment and length, is comfortable for the child and convenient for the family, and causes the least negative psychological impact. Different methods of treatment depend upon age of child, pattern of fracture and associated injuries¹⁰. The recent trend has been toward surgical stabilization¹¹. Flexible intramedullary nails are now routinely used for stabilization of paediatric femur fractures between 5-15 years of age. Closed rigid intramedullary nailing through the piriformis fossa in children has been associated with avascular necrosis of femoral head; (it is from damage to the medial femoral circumflex artery by placing the nail through the piriformis fossa)¹², secondary coxa valga, epiphysiodesis of greater trochanter and femoral neck narrowing¹³. External fixator has its own problems like pin tract infection, is cumbersome for child and removal of external fixator has been associated with refracture¹⁴. Compression plating has risk of infection, large soft tissues exposure, and re-operation for removal of implant. Other potential surgical complications include shortening, angular and rotational deformity, limb length discrepancy, and skin problems¹⁵. In our series of 50 cases, male were 29(58%) while female were 21(42%), and average age of the patients was 11.78 ± 1.40 years, these findings are similar to other published literatures^{16,17,18}. As mentioned in other series^{19,20}, motor vehicle accident was the main cause of fracture shaft femur reported in 54%, Right side was involved in 58% while left side in 42% patients.

As reported in literature^{20,17,20}, union was not a problem in our series, all fractures healed clinically and radiologically within 10 weeks in average (9-12 weeks), Patrick¹⁸ in a series of 37 cases of open fracture femur reported delayed union in nine cases and average time to union was 5.1 months. We noted limb length discrepancy 2cm in two patients and less than 2 cm in 3 patients, whereas Kanellopous et al²¹ and Momberg et al¹⁶ reported limb length difference 1mm to 1.4mm and HO et al²² reported 1-2cm limb length discrepancy in 17 cases in a series of 98 cases.

In our series superficial infection was seen in 2 patients which resolved by multiple debridement and oral antibiotics. Keeler et al¹³ reported postoperative infection in 2.5% cases, and Patrick et al¹⁸ reported infection in ten patients.

In our series, post-operative immobilization with POP was done in all cases for 3 weeks, Flynn et al¹⁴, Soumaya et al²⁰, Ho et al²² also used post-operative immobilization. Hip and knee movements were restored in all cases. Timing of nail removal remained controversial, most of the authors recommended nail removal after fracture healing 6 months to 1 year after surgery^{9,23}. We also advised removal of nail 6-8 months after surgery. Although reported in literature^{6,13}, in our series we did not notice proximal femoral valgus deformity or avascular necrosis of femoral head. Zhon et al²⁴ also reported not a single case of avascular necrosis of femoral head in series of 18 cases of fracture femur treated with Rush pin.

CONCLUSIONS

Rush nail technique is simple, technically less demanding and minimum instrumentation is needed. We found a very high success rate in the management of closed fracture shaft femur with intramedullary rush nail. This success rate of union is in line with the other national or international studies. In developing countries where C-arm and other advance facilities are not available in rural areas, fracture shaft femur in school going children can be treated by this simple procedure in rural area hospitals.

Copyright© 20 Oct, 2014.

REFERENCES

1. Sela Y, Hershkovich O, Sher-Lurie N, Schindler A, Givon U. **Pediatric femoral shaft fractures: treatment strategies according to age--13 years of experience in one medical center.** J Orthop Surg Res - 2013; 8(); 23.
2. Hunter JB. **Femoral fractures in children.** Injury,2005;36 suppl 1:A86.
3. Beaty J H. **Operative treatment of femoral shaft fractures in children and adolescents.** Clin Orthop Relat Res. 2005 May;(434):114-22.
4. Ramprakash Lohiya, Vikas Bachhal, Usman Khan, Deepak Kumar, Vishwapriya Vijayvargiya, Sohan S Sankhala, Rakesh Bhargava and Nipun Jindal. **Flexible intramedullary nailing in paediatric femoral fractures. A report of 73 cases.** Journal of orthopaedic surgery and Research 2011;6:64.
5. Park H, Kim HW. **Treatment of Femoral Shaft Fracture with an Interlocking Humeral Nail in Older Children and Adolescents.** Yonsei Med J 53(2):408-415.2012.
6. Linger JN, Metaizeau JP, Prevot J, Lascombes P. **Elastic stable intramedullary nailing of femoral shaft fractures in children.**J.bone joint Surg Br 1988, 70(1):74-7.
7. M. Barry, M. H. Paterson. **Flexible intramedullary nails for fractures in children.** J Bone Joint Surg [Br]2004;86-B:947-53.
8. Flynn JM, Hresko T, Reynold RA, Blasier RD, Davidson R, Kasser J. **Titanium elastic nails for paediatric femur fractures; a multicenter study of early results with analysis of complications.** J Paediatric Orthop 2001;21(1):4-8.
9. Enes Kanlic MD, Miguel Cruz MD. **Current concepts in paediatric Femur Fracture treatment.** Orthopedics Dec.2007. Vol.30. 12.
10. Staheli L, Sheridan G: **Early spica cast management of femoral shaft fractures in young children.** Clin Orthop 1977, 126:162.
11. Mininder S. Kocher, MD, MPH, Ernest L. Sink, MD, R. Dale Blasier MD, Scott J. Luhmann, MD, Charle. **Treatment of Pediatric Diaphyseal Femur Fractures 2009 by the American Academy of Orthopaedic Surgeons.**
12. Townsed DR. Hoffinger S. **Intramedullary nailing of femoral shaft fractures in children via the trochanteric tip.** Clin.Orthop Relat Res. Jul 2000;(376):113-8.
13. Keelar KA. Dart B, Luhmann SJ, Schoe necker PL, Ortman MR , Dobbs MB, Gordon JE. **Antegrade intramedullary nailing of pediatric femoral fractures using an interlocking pediatric femoral nail and lateral trochanteric entry point.** J. Pediatr Orthop. Jun;29(4): 345-51.
14. Arson J, Torsky EA. **External fixation of femur fractures in children.** J. Pediatr Orthp 1992, 12: 157-63.
15. Flynn JM. Schwend RM. **Management of pediatric femoral shaft fractures.** J. Am Acad Orthop Surg 2004 Sep-Oct ;12(5):345-59.
16. Momberger N, Stevens P,Smith J, Sanotra S, ScottS, Anderson J. **Intramedullary nailing of femoral fractures in Adolescents.** J. Pediat Orthop.2000 Jul-Aug;(4):482-4.
17. Iqbal M, Manzoor S, Cheema GM, Ahmed E. **Comparatively Study of Fracture Shaft of Femur in Children treated with Titanium elastic nail and early external fixator.** Annals Vol 16. No.2 APR-JUN 2010.
18. Patrick Allison, Noemi Dahan-Oliel, Victor T Jando, Stephen Su Yang, Reggie C. Hamdy. **Open fractures of the femur in children: analysis of various treatment method.** J Child Orthop.Apr 2011;5(2):101-108.
19. Shahank D Chitogpkar. **Intramedullary Kirschener wires(a prospective study): its significance for developing countries.**BMC Surgery March 2005,5:6.
20. Soumya Ghosh,Souvik Bag, Soma Datta ,Arunima Chaudhuri, Debasis Singha Roy, Abihijit Biswas. **A study of management of fracture shaft femur in children in rural population.** J. scientific society vol40.(3). Set.-Oct 2013.
21. Kanellopous AD, Yiannakopoulos CK. Soucacos PN. **Closed locked intramedullary nailing of pediatric femoral shaft fractures through the tip of greater trochanter.** J.Trauma 2006 Jan;60(1):217-22.
22. Ho.CA,Skaggs DL,Tang CW, Kay RM. **Use of flexible intramedullary nails in pediatric femur fractures.** J. pediatr Orthop.2006 Jul-Aug;26(4):497-504.
23. Morshed S. Humphrey M, Corrales LA, Millett M, Hoffinger SA. **Retention of flexible intramedullary nails following treatment of pediatric femur fractures.** Arch Orthop Trauma Surg 2007;127(7):509-14.
24. Zhon-Liau Lee, MD; Chia-Hsieh Chang, MD; Wen-E Yang,MD; Shou-Suei Hung, MD. **Rush pin Fixation Versus Traction and casting for femoral fracture in children older than seven years.** Chzng Gung Med J 2005;28:9-15.