

Functional Outcome of Diaphyseal Femoral Fractures Treated with Titanium Elastic Nail in Paediatric Age Group (05 To 15 Years)

Dr. Naveen Kumawat¹, Dr. Mahesh Bhati², Dr. Ramniwas Vishnoi³, Dr. Sudhakar Sharma⁴, Dr. Suresh Kewalramani⁵, Dr. Dilip Raj^{6§}

¹Medical Officer, District Hospital, Kekri, Ajmer (Rajasthan) India

²Senior Professor, Dr. S.N Medical College, Jodhpur (Rajasthan) India ³Associate Professor, Dr. S.N Medical College, Jodhpur (Rajasthan) India

⁴Senior demonstrator, Department of Community Medicine, SMS Medical College, Jaipur (Rajasthan) India ⁵Associate Professor, Department of Community Medicine, SMS Medical College, Jaipur (Rajasthan) India

⁶Professor, Department of Community Medicine, SMS Medical College, Jaipur (Rajasthan) India

Abstract— Femoral shaft fractures are very demanding injuries to the patients and their families. Majority of cases occurs in children and adolescents. Titanium elastic nailing is one of the operative procedures for treatment of such fractures. So this present study was conducted on 30 diaphyseal femoral fracture patients aged 05-15 years treated with Titanium elastic nailing with the aim to assess the functional outcome of such cases in western Rajasthan scenario. It was found that. average time of union was found 6.33 weeks, average period of full weight bearing was 7.66 weeks and with average time 6.4 weeks. So it conclude that fracture of femur treated with Titanium Elastic Nailing has very good results that Titanium Elastic Nailing is an ideal device to treat pediatric femoral shaft fractures between age group 5-15 years.

Keywords: Femoral shaft fractures, diaphyseal femoral fracture, Titanium elastic nailing, Functional outcomes.

I. INTRODUCTION

Femoral shaft fractures are demanding and disabling injuries both to the patients and to the family. Peak incidence of this fracture occur at 2 & 17 years of age in a bimodal distribution and boys have a 2.6 times greater incidence than girls.¹

The treatment of paediatric femoral shaft fractures depends on several factors age, fracture, pattern, and associated bone and soft tissue injuries. A variety of therapeutic alternatives such as external fixator, compression plating, rigid intramedullary nailing and elastic stable intramedullary nailing are being used for femoral shaft fractures in children. Operative treatment results in shorter hospitalization and early mobilization, which has psychological, social, educational and economic advantages over conservative treatment.

Flynn et al (2001)² stated that the ideal device to treat paediatric femoral shaft fractures would be a simple, load sharing internal splint allowing mobilization and maintenance of alignment for a few weeks until bridging callus forms. The device would also allow rapid healing and ability to remodel without risking the physis or blood supply to the femoral head. Flexible nailing meets the requirements of this ideal device (Flynn et al 2001).⁷ Thus the aim to fix fractures of diaphysis of femur in children with intramedullary nails is to encourage formation of bridging periosteal callus.

Flexible nails is simple, safe, minimal invasive, appears to have few applications, does not interfere with growth and is associated with shorter hospital stay and rapid return to daily activities and school. It

avoids long and uncomfortable immobilization. Cosmetic damage is minimal, being limited to small scars at the sites of introduction of nails.³

So this study was conducted to find out the functional outcomes of femoral shaft fractures in children between 5-15 years of age and were treated by Titanium Elastic Nailing.

II. METHODOLOGY

This hospital based interventional study was conducted at Department of Orthopedics of SN Medical College & associated Hospital Mahatma Gandhi & Mathura Das Mathur Hospital, Jodhpur, Jodhpur (Rajasthan) India in 2018.

Before collecting the data, this study was approved by the institutional Ethics committee of SN Medical College, Jodhpur (Rajasthan) India and written informed consent was taken from every eligible subject.

For the study purpose, all patients with fracture shaft femur attended at orthopedic department of SN Medical College, Jodhpur were taken as study universe. Among them patients with 5-15 years having Diaphyseal close fractures and if compound then only corrected Gustilo's classification^{4,5} type-I & type II was included in this study. Patients with segment fracture, very distal or very proximal fractures that precludes nail and patents who were unfit for surgery were excluded.

Patients who were eligible for study were operated and post operative protocol was follows as follows:-

- Antibiotic injection (Injection Cefotaxime 500mg - 1 gm. was given at 2 pm, 10 pm and 9 am on the next day),
- One analgesic as and when required (Inj. Diclofenac 1-2 cc IMSOS),
- Dressing after 48 hours of surgery was done.
- Static quadriceps exercise was started 24 hours after the operation.
- Gentle knee bending exercise was started on 1st or 2nd postoperative day.
- Patient was discharged after 48-72 hours and called after 14 days for stitch removal.
- Patients were called for follow up after every 2 weeks upto two months and subsequently at monthly interval for six months.

Functional outcome of the patients in the form of weight bearing and rage of knee movement, were assessed after 6 month of follow-up.

Data thus collected were entered and compiled in MS Excel 2010 worksheet. These data were classified and analyzed as per objectives.

Statistical analysis: Qualitative data were expressed in percentage (%) and quantitative data were summarized as mean and standard deviation (S.D.).

III. RESULTS

In this present study, out of 30 study subjects, majority (22 i.e. 73.33%) were males and 8 (26.67%) were females with M:F ratio 2.75. The youngest patient was 5 years old and the eldest was 15 years old with an average age of 9.13 years. (Table 1)

TABLE 1
AGE AND SEX WISE DISTRIBUTION OF THE STUDY POPULATION (N=30)

S. No.	Variables	Number of subjects	Percentage	
1	Age group	6-7 Years	6	20
		8-9 Years	7	23.3
		9-10 Years	11	36.7
		11-12 Years	2	6.7
		13-15 Years	4	13.3
2	Sex	Females	8	73.33
		Males	22	26.67

In present case series the most common site of fracture of shaft of femur was middle third 66.67% followed by distal third (13.3%) and upper third (20%). And the most common pattern of fracture was oblique fracture (50%) followed by transverse fractures (40%). (Table 2)

TABLE 2
FRACTURE CHARACTERISTICS WISE DISTRIBUTION OF THE STUDY POPULATION (N=30)

S. No.	Variables	Number of subjects	Percentage	
1	Site of Fracture	Upper end	6	20
		Middle shaft	20	66.7
		Distal end	4	13.3
2	Pattern of Fracture	Transverse	12	40
		Oblique	15	50
		Other	3	10

Absence of pain on walking was taken as clinical indicator of union of fracture as per standard radiological and clinical criteria.⁶ The average time of union was found 6.33 weeks. (Ranged between 6 8 wks). There was no case of delayed union and non union in present study. (Table 3)

Most of the patients started full weight bearing up to 8 weeks. The average period of full weight bearing was 7.66 weeks. (Table 3)

Majority of patients (86.67%) achieved full range of knee movement up to 6 weeks with average time 6.4 weeks. (Table 3)

TABLE 3
FUNCTIONAL OUTCOME OF THE STUDY POPULATION (N=30)

S. No.	Variables	Number of subjects	Percentage	
1	Time of Union	6	25	83.33
		8	5	16.67
2	Full weight bearing (weeks)	6	6	20.0
		8	23	76.7
		10	1	3.3
		After 10	6	20.0
3	Full range of knee movement (Weeks)	6	26	86.7
		8	1	3.3
		9	2	6.7
		10	1	3.3

IV. DISCUSSION

In present study the most common site of fracture shaft femur was middle third 66.67% followed by distal third (13.3%) and upper third (20%). This proportion was almost equal to the proportion of site of fracture reported in study conducted by Flynn et al⁷ and Cramer et al⁸. Flynn et al⁷ also observed that the most common fracture of shaft of femur was middle third shaft femur fractures which was 72%. And likewise Cramer et al⁸ also observed fracture of middle third shaft femur fractures in 70% among all fracture of shaft of femur.

In this present study the most common pattern of fracture was observed oblique fracture (50%) followed by transverse fractures (40%). This was contrast to the study conducted by Cramer et al⁸ who found higher proportion of transverse pattern (60%) of fracture than other one. Even Mann et al⁹ also reported higher proportion of transverse pattern (56%).

Average time of union was found 6.33 weeks in present study. Whereas it was reported more by other authors. Galpin et al¹⁰ the average time of union was reported 9.1 weeks and Cramer et al⁸ (2000) observed that all fractures were healed within 12 weeks. Literature¹¹ also reported that long bone takes 2-6 months to heal. This reason of lesser union time in present study may be because of better antibiotics and more facilities available nowadays.

In present study none of the cases was of delayed union and nonunion. Similar observations were of Flynn et al⁷, Mann et al⁹, Cramer et al⁸ and other studies¹⁰⁻¹¹.

In present study, average time of full weight bearing was 7.66 weeks. Whereas other authors^{7,9} reported more average time of full weight bearing than the present study. The average time of full weight bearing in study conducted by Flynn et al⁷ was 8.5 weeks, while that in study conducted by Mann et al⁹ it was 8.6 weeks. This reason of lesser average time of full weight bearing in present study may be because of better antibiotics and more facilities available nowadays.

V. CONCLUSION

This study conclude that fracture of femur treated with Titanium Elastic Nailing has very good results i.e. average time of union was found 6.33 weeks, average period of full weight bearing was 7.66 weeks and with average time 6.4 weeks. This concludes that Titanium Elastic Nailing is an ideal device to treat pediatric femoral shaft fractures between age group 5-15 years.

CONFLICT OF INTEREST

None declared till now.

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