



ORIGINAL ARTICLE

To evaluate the outcome of intramedullary nailing in femoral shaft fractures in children.

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ABSTRACT... Objective: To determine the frequency of outcome of intramedullary nailing in femoral shaft fractures in children. **Study Design:** Case series study. **Setting:** Department of Orthopedics, ATH, Abbotabad. **Period:** 27th February 2020 to 26th August 2020. **Methods:** We included 85 patients with femoral shaft fractures, and age 5 to 10 years of both genders, meeting the criteria and consent was taken. Each patient was followed fortnightly for assessment 2 of outcome (excellent/satisfactory/poor) after 3months post-operative. **Results:** In our study age ranges from 5 to 10 years with mean age of 7.14 ± 0.90 years. Majority of the patients 60 (70.59%) were between 5 to 7 years of age. We had 64 (75.29%) males and 21 (24.71%) were females. Mean weight was 24.35 ± 4.66 kg. Mean duration of symptoms was 6.48 ± 2.45 days. In this study, the excellent outcome was seen in 70 (82.35%) patients, satisfactory in 10 (11.77%) and poor outcome in 05 (5.88%) patients. **Conclusion:** This study concluded that intramedullary nail is simple, effective, minimally invasive procedure for treating femoral shaft fractures in children with excellent outcome.

Key words: Femoral Shaft Fracture (FSH), Intramedullary Nail (IN).

INTRODUCTION

Femoral shaft fracture is one of most emergency faced in triage and accounts for 4% of all long bone fractures in children. Spiral or transverse is common type followed by comminuted and then open. Due to rich blood supply result in significant bleeding and shock while infection is more common in open type of scenario needs early vascular surgeon consultation.¹ Patients usually present with significant pain and deformity. Usually x-ray is sufficient but arteriography is needed when if vascular injury is suspected.²

If neurovascular signs are present then needs multidisciplinary approach as clinical neurological function testing is usually not reliable because of pain although nerve injury is not common as nerves are surrounded by musculature. Analgesia in adequate amount is required, traction devices is used for limit mobilization.³ In open fracture wet dressing is applied, sterile irrigation for any contamination done. Morbidity and mortality

is much reduced because of modern method specially allows for early mobilization of patient.^{4,5}

There are different modes of management depending upon type and skeletal maturity like external fixation, intramedullary nailing and screw plate fixation. Open fracture may need immediate operative debridement followed by intra medullary nailing late.⁶ Transfer of patient is initial challenge and need special attention to reduce mobilization. Patient those survive initial trauma heal well and early mobilization and less complication is observed with intra medullary nailing. The rationale of the study to make local data as there is paucity of local data so we can make local guidelines on management for expert and cost effective management.^{8,7}

METHODS

This Case series study was done in department of orthopedics, ATH, Abbotabad. From 27th February 2020 to 26th August 2020. By using

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WHO calculator for 8% margin of error with 95% confidence level, and taking percentage of excellent outcome as 83.0% our sample was 85. Through non-probability, consecutive sampling, we included 85 patients with femoral shaft fractures of age 5 to 10 years of both genders and duration of symptoms >48 hours we excluded patients with open femoral shaft fractures (assessed on clinical examination), Children with diabetes mellitus (assessed on history) and Significant medical co-morbidity like CLD (s/bilirubin >2.0 mg/dl), CRF (s/creatinine >1.5 mg/dl).

After approval from institutional ethical review committee reference number (OSG/ 2018-010-2028) total number of 85 patients admitted to the department of Orthopedics, Ayub Medical Complex, Abbottabad, fulfilling the inclusion criteria were selected. Informed consent was taken from each patient's parents. All patients were undergone intramedullary nailing by one consultant orthopedic surgeon (with at least 3 years postfellowship experience). Each patient was followed fortnightly for assessment of outcome (excellent/satisfactory/poor) as per operational definition after 3 months post-operatively. All this data (age, gender, duration of symptoms, weight of child and outcome) was noted on a pre-designed proforma.

All the data was entered and analyzed by using SPSS version 25.0. Age, weight of child and duration of symptoms were presented as mean and standard deviation. Gender and outcome (excellent/satisfactory/poor) were presented as frequency and percentage. Effect modifiers were controlled through stratification and chi square test was applied. P-value ≤ 0.05 was considered as significant.

RESULTS

We have enrolled 85 patients with range from 5 to 10 years with mean age of 7.14 ± 0.90 years while majority lies between 5 to 7 years. Mean weight was 24.35 ± 4.66 kg while mean duration of symptoms was 6.48 ± 2.45 days as shown in Table-I. Out of 85 patients, 64 (75.29%) were males and 21 (24.71%) were females. The excellent outcome was seen in 70 (82.35%)

patients, satisfactory in 10 (11.77%) and poor outcome in 05 (5.88%) patients as shown in Table-II. Stratification of outcome with respect to age groups and gender with statistically no significant difference among different groups and also the stratification of outcome with respect to weight and duration of symptoms respectively as shown in Table-III.

	Range	Mean
Age (years)	5-10	7.14 ± 0.90
Weight (kg)	22-28	24.35 ± 4.66
Duration of symptoms (days)	3-10	6.48 ± 2.45 days

Table-I. Distribution of demographic and clinical characteristics of the study sample

	No. of Patients	Percentage
Gender		
Male	64	75.29
Female	21	24.71
Clinical Outcome		
Excellent	70	82.35
Satisfactory	10	11.77
Poor	05	5

Table-II

Variable	OUTCOME		P-Value
	Excellent	Satisfactory Poor	
Age (years)			0.678
5-7	50	06 04	
8-10	20	04 0	
Gender			0.485
Male	51	09 04	
Female	19	01 01	
Weight (kg)			0.085
≤ 25	48	06 01	
> 25	22	04 04	
Duration of symptoms(days)			0.559
3-7	46	08 04	
8-10	24	02 0	

Table-III. Stratification of outcome with variables

DISCUSSION

Fracture especially long bone are not uncommon in growing age especially between 5 to 15 years of age. Femoral fracture especially due to its rich blood supply needs urgent evaluation and management. Maintenance of body fluid is a challenge and is done with fluids comprising of colloids and crystalloids. Reduction of fracture

to near anatomic position is initial step and done by applying traction devices or using splints and done with traction this in turns helps in pain reduction and hematoma formation.^{9,10}

Pain management strategy is specially required as little movement cause severe pain due to large neurovascular bundle. Oral are usually not sufficient and requires parental analgesics like opiates, care must be taken while using these agents for respiratory depression.^{11,12} Another challenge is infection control, administration of tetanus toxoid and selection of antibiotic needs attention. Antibiotic must have excellent staphylococcus coverage and good tissue penetration.¹³ In this study we have operated by using intramedullary nailing and we followed the patients for outcome and found the excellent outcome was seen in 70 (82.35%) patients, satisfactory in 10 (11.77%) and poor outcome in 05 (5.88%) patients similar results were also observed by El-Sayed AS et al, shows the results were excellent in 26 (87%) patients, successful in three (10%) patients, and poor in one (3%) patient with nailing, these results are in agreement with our observation although the sample size was small. Similar findings were also seen in other study by Jadaan M et al.^{14,15} Standard management is usually depends upon skeletal age and growth in younger children less than 3 years may be managed without operation but older children needs operative approach routinely. Intramedullary nailing or compression screw plate fixation are standard approaches. Outcomes of either approach is comparable while intramedullary nailing in number of studies shows more promising strategy.¹⁵

Frei B et al, also used nailing as standard procedure for femoral shaft fractures and found very positive results, their study also suggest about the nailing diameter. They found it to be less than 40% of the minimal medullary canal diameter. They observed complication like retro-torsion of the femoral neck, while other complication like breakage of fixator or malunion.¹⁶ Many other studies also shows the consistent findings with variable outcome. Study by R J Brumback et al, observed eighty seven patients with femoral fractures with eighty five patients shows excellent outcome by three

months follow up.¹⁷ In another study 41 patients were studied and 39 were managed with nailing 2 needs surgery. Some of patients developed complication like reflex sympathetic dystrophy, deep vein thrombosis, and malrotation noted after initial nailing, these were also seen in some of prior studies.¹⁸

Bahinipati J et al, enrolled 25 patients managed and followed up to 4 months 19 with satisfactory results while 2 patients were with poor outcome. Other study comparing with plate/screw osteosynthesis observed similar results up to 97%.¹⁹ Elastic intramedullary nailing proves more promising in recent comparative study with external fixation specially at pediatric age 5-15 years fractures of femoral shaft.²⁰

CONCLUSION

This study concluded that intramedullary nail is simple, effective, minimally invasive procedure for treating femoral shaft fractures in children with excellent outcome. So this procedure may be adopted as standard practice technique in our setup for early recovery. More studies may be conducted for getting more accurate results and improved technique.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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


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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
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2	Babar Shahzad Sadiq	Data collection, Study design.	
3	Usman Habib	Data collection, Study design.	
4	Muhammad Ali Usman	Literature & Discussion work.	
5	Saba Ayoub	Statistics, Discussion writing.	
6	Qazi Waseem	Discussion writing & Statistics.	
7	Kamran Fazal	Discussion writing & Conclusion.	