SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Orthopaedics

Outcome of Pediatric Bones Fracture Using Intra Medullary Elastic Nail in Jahurul Islam Medical College Hospital

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DOI: https://doi.org/10.36347/sasjs.2025.v11i02.024 | **Received:** 03.12.2024 | **Accepted:** 10.01.2025 | **Published:** 22.02.2025

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Abstract **Original Research Article**

Background: The most frequent fracture in children is a pediatric femoral shaft fracture. The use of intramedullary nails, dynamic compression plates, and external fixators in the surgical treatment of pediatric femur fractures has expanded; each has advantages and disadvantages of its own. One of the greatest surgical techniques is flexible intramedullary nailing using titanium elastic nails. ***Objective:*** To see the outcome of pediatric long bone fracture utilizing intramedullary elastic nail. ***Materials and Methods:*** A prospective interventional study was conducted in the department of orthopaedic surgery, Jahurul Islam Medical College & Hospital, Bhagolpur, Bajitpur, Kishoregonj from January 2023 to December 2023 among 130 patients. Purposive sampling technique was used. Patients with age between 5-10 years, both sexes, fracture shaft of femur at least 3cm distal to lesser trochanter and 3cm proximal to distal physis post traumatic closed or open GA Type I, II shaft of femur fractures was included. ***Results:*** Majority 90(69.2%) were closed surgery, RTA was the most common mode of injury, accounting for 62 (47.7%). The average time of union was 7.19 (±4.30) weeks. Majority 70(53.8%) of the patients' results were excellent, 40(30.8%) were satisfactory and 20(15.4%) were poor outcome. ***Conclusion:*** The titanium elastic nail is the most suitable and safest option for treating a femur fracture in children between the ages of one and sixteen.

Keyword: Outcome, femur fracture, RTA, elastic nail.

INTRODUCTION

Trauma is the leading cause of mortality and morbidity of human life. Early restoration of joint motion, return to the normal physiologic function and minimal morbidity is now regarded as the ideal fracture treatment [1]. Pediatric fractures account for one-fourth of all pediatric injuries. Stabilizing the fracture, regulating the length and alignment, encouraging bone healing, and minimizing morbidity and problems for the child and family [2]. Elastic intramedullary nailing or titanium elastic nail (TEN) is an alternative method for the treatment of various pediatric long bone fractures. Titanium nails are preferred over plaster cast and stainless steel nails for children older than six years [3]. The ever-changing ways of treating fractures in long bones in children have revealed a preference for the use of intramedullary elastic nails. The majority of long bone fractures in skeletally immature individuals are treated conservatively. Conservative treatment remains the cornerstone for long bone fractures in children under the age of six years, as the rebuilding ability of immature bone in youngsters is great [4]. Intramedullary fixation titanium elastic nailing is an effective treatment of diaphyseal fractures of the femur in properly selected patients of the 6-16 years age group [5]. Elastic intramedullary nailing was preferred in older children due to poor tolerance of immobilization and an uncomfortable cast. In addition, there is less potential for the correction of mal-alignment in long bone fractures in older children nearing adolescence. Flexible intramedullary nailing has become a popular method of fixation of pediatric femoral fractures. The authors analyzed their first 5-year experience with titanium elastic stable intra-medullary nailing, specifically to report the complications associated with this technique and to provide recommendations to avoid these complications [6]. These consist of elastic stable intramedullary nailing, fixation with plates and screws, external fixators, and intramedullary nailing. Submuscular plating is an extensive procedure. Intramedullary nailing can damage the physis. In order to prevent injury to the physis, elastic stable intramedullary nailing has gained popularity as a

treatment for pediatric diaphyseal shaft fractures [7]. For the treatment of femoral shaft (long bone) fractures, the titanium elastic nailing system (TENS) appears to be a more physiologically sound and successful approach [8]. The technique is Straightforward, quick, and safe, and it has the benefits of early union, early mobilization, and an early return to function with little problems [9].

MATERIALS AND METHODS

A prospective interventional study was conducted in the department of orthopaedic surgery, Jahurul Islam Medical College & Hospital, Bhagolpur, Bajitpur, Kishoregonj from January 2023 to December 2023 among 130 patients. Purposive sampling technique was used. Patients with age between 5-10 years, both gender, fracture shaft of femur at least 3cm distal to lesser trochanter and 3cm proximal to distal physis post traumatic closed or open GA Type I, II shaft of femur fractures and whose relatives/parents gave consent for study was included. Open wound like GA type III. Pathological fractures, late presentation (>3 weeks), Bilateral femur fracture, Previous history of fracture to either femur, Patients with associated head, chest, visceral and vascular injuries, Patients with any other fracture in addition to shaft of femur fracture in either extremity, Preoperative neurovascular injury, Patients with definite major illness like malignancy, chronic major system illness and medically not fit for surgical procedure was excluded from study.

Ethical approval was obtained from the institutional review committee (IRC). Radiographs were taken in appropriate views and diagnosis was established by clinical and radiological means. Fractures were diagnosed. Postoperatively patients were given prophylactic intravenous antibiotics 8 hourly for 72 hours followed by oral antibiotics. Patients were followed up clinically at first, third, and sixth month. Functional outcome was assessed by Flynn's criteria. All data were processed, analyzed, and disseminated statistical package for social sciences (SPSS) version 26.

RESULTS

In this study we included 5 to 10 years and the mean age was 6.94 (±2.73) years. Majority 98(75.4%) were male and 32(24.6%) were female (Figure-1). Table 1 showed majority 90(69.2%) were closed surgery and 40(30.8%) open surgery. RTA was the most common mode of injury, accounting for 62 (47.7%), while sports injury, self-fall, and fall from height accounted for 23 (17.7%), 22 (16.9%), and 23 (17.7%) (Figure-2). The most common radiological type of fracture was transverse 70 (53.8%), oblique 17 (13.07%), spiral 15 (11.53%), and communicated 28 (21.5%). The average time of union was 7.19 (±4.30) weeks (Table-II). Figure 3 showed pain was found 43(33.1%) and 87(66.9%) had no pain. Out of the 130 individuals, 82 (63.1%) experienced no complication, whereas 48 (36.7%) complicated. Of the 48 patients with complication, four (3.1%) had a deep infection, twelve (9.2%) had delayed union, twenty-eight (21.5%) had skin irritation at the entrance site, and four (3.1%) had surface infections (Table-III). Majority 70(53.8%) of the patients' results were excellent, 40(30.8%) were satisfactory and 20(15.4%) were poor outcome (Table-IV).

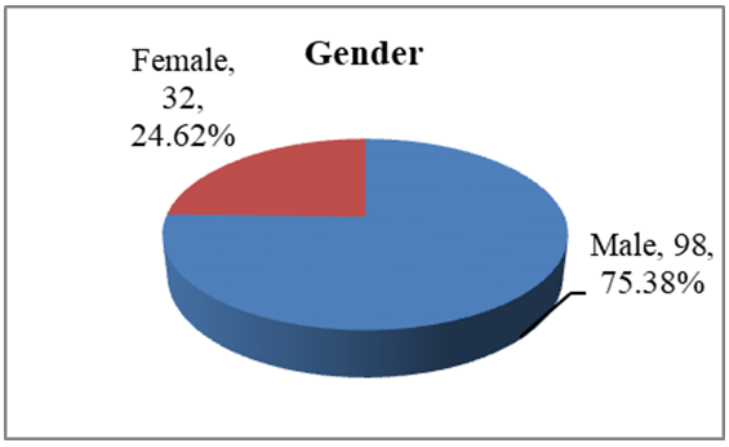

Figure 1: Gender distribution of the study population (n=130)

Table 1: Type of surgery of the study population (n=130)

Surgery Type	Number	Percentage
Closed	90	69.2
Open	40	30.8
Total	130	100.0

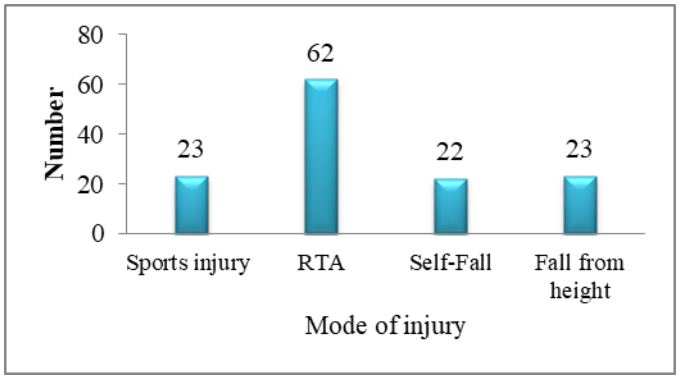

Figure 2: Mode of injury of the study population (n=130)

Table II: Radiological type of fracture of the study patients (n=130)

Radiological type of fracture	Number	Percentage
Transverse	70	53.8
Oblique	17	13.07
Spiral	15	11.53
Communicated	28	21.5
Total	130	100.0
Time of union (wks)	7.19 (±4.30)	1-16 wks

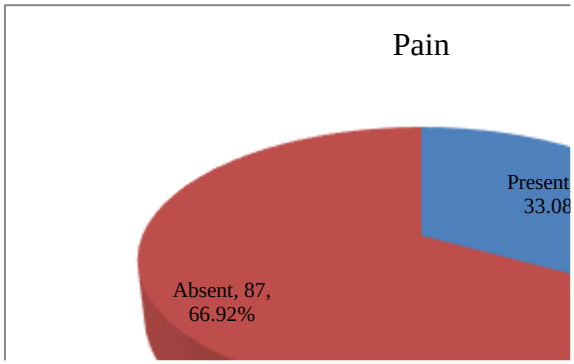

Figure 3: Distribution of study patients according to history of pain (n=130)

Table III: Complication of the study patients (n=130)

Complication	Number	Percentage
Deep infection	04	3.1
Delayed union	12	9.2
Entry site skin irritation	28	21.5
Superficial infection	04	3.1
No complication	82	63.1
Total	130	100.0

Table IV: Outcome of the study subjects (n=130)

Outcome	Number	Percentage
Excellent	70	53.8
Satisfactory	40	30.8
Poor	20	15.4
Total	130	100.0

DISCUSSION

In this study we included 5 to 10 years and the mean age was 6.94 (±2.73) years. Majority 98(75.4%) were male and 32(24.6%) were female. In our country, boys usually play more sports or go outside than girls, so the number of boys is higher in my research. Similar observation was found Khan *et al.*, [10] there were 14 males and 11 females with an average age of 6.8years. Another study also agreement with our observation by Gaurav Gupta *et al.*, [11] the mean age of the patient was 7.71 ± 1.75 years. Majority of the patients 16(45.7%)

were of age group 7-9 years. Most of them 24(68.6%) were male whereas 11(21.4%) were female.

In this study observed that the majority 90(69.2%) were closed surgery and 40(30.8%) open surgery. Gaurav Gupta *et al.,* [13] reported majority of the patients 33(94.3%) had closed fracture and transverse fracture 13(37.1%).

RTA was the most common mode of injury, accounting for 62 (47.7%), while sports injury, self-fall, and fall from height accounted for 23 (17.7%), 22 (16.9%), and 23 (17.7%). Gaurav Gupta *et al.,* [11] reported the study findings showed that more than half 18(51.4%) patients sustained injury due to road traffic accident.

The most common radiological type of fracture was transverse 70 (53.8%), oblique 17 (13.07%), spiral 15 (11.53%), and communicated 28 (21.5%). The average time of union was 7.19 (±4.30) weeks. Gaurav Gupta *et al.,* [11] reported in most of them transverse fracture 13(37.1%) were seen followed by oblique fracture 10(28.6%), spiral fracture 9(25.7%) and comminuted fracture 3(8.6%). Similar results were obtained from study by Ríos *et al.,* there were nine transverse (50%), two short oblique (11.1%), three spiral (16.6%) and three butterfly fractures [12]. Rahman *et al.,* [13] reported that the average time of the time of union ranged from 8 to 11 weeks (mean 9.5 weeks). Gaurav Gupta *et al.,* [11] the study results revealed, radiological union occurred in all cases with range of 10 weeks to 12 weeks with mean of 10.40 weeks. The study result was consistent with study result of Anastasopoulos *et al.,* risk factors for overgrowth after flexible nailing for fractures of the femoral shaft in children in which the mean time to radiological union was 10.7 weeks [14].

In this study observed pain was found 43(33.1%) and 87(66.9%) had no pain. Gaurav Gupta *et al.,* [11] majority of the patients 33(94.3%) complained of no pain whereas only two patients (5.7%) had mild pain in first follow up.

Out of the 130 individuals, 82 (63.1%) experienced no complication, whereas 48 (36.7%) complicated. Of the 48 patients with complication, four (3.1%) had a deep infection, twelve (9.2%) had delayed union, twenty-eight (21.5%) had skin irritation at the entrance site, and four (3.1%) had surface infections. According to Moroz *et al.,* [15] ESIN is associated with two types of complications: minor and major. The complication rates reported after ESIN in several studies vary from 0 to 66% [16,17]. The complication rate in Goudjo, *et al.,* [10] study was 53.23%. Most of these were minor complications. Gaurav Gupta *et al.,* [11] reported regarding complications from the treatment, the study revealed, one case of nail protrusion and one case insertion site got infected. The infection was superficial which was treated with antibiotic and in protruded nail careful monitoring done with nail removed after radiological union and after that the limb was protected with splint. Findings from study by Gupta *et al.,* revealed majority, 70% of patients had no complications, only 20% had irritation at entry site, 5% had infection and proximal nail migration. There was no delayed union, non-union or re-fracture [11].

In this study observed that the majority 70(53.8%) of the patients' results were excellent, 40(30.8%) were satisfactory and 20(15.4%) were poor outcome. Similar observation was found Khan *et al.,* [10] they revealed according to this, 13 (52%) of the patients' results were excellent, 10(40%) were good, and 2(8%) were poor. Rahman *et al.,* [13] reported that the results were excellent in 24 (92.3%) and satisfactory in 2 (7.7%) cases. No patient had poor results.

CONCLUSION

We find that the titanium elastic nail is the safest and most appropriate alternative for a femoral fracture in children aged 1 to 16 years. It is a straightforward and less invasive procedure for fixing pediatric femoral shaft fractures. It has few problems, and the overall outcome is excellent and satisfactory.

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