

Management of shaft of femur fracture in paediatric group at district level government & private hospitals of Bangladesh

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Abstract

Background: The Titanium Elastic Nail is generally used in children to repair diaphyseal and metaphyseal fractures. The age of the patient, as well as the nature and location of the fracture, determine if the TEN is required. The treatment of femoral diaphyseal fractures in children aged 5 to 16 years remains debatable. It is a successful and acceptable therapeutic option in eligible cases of femoral diaphyseal fractures. The TEN enables the use of elastically stable intramedullary nailing.

Aim of the study: The goal of this study is to show the efficiency of titanium elastic nailing system (TENS) intramedullary fixation of femoral shaft fractures.

Methods: This study was conducted in 250 Bedded General Hospital, Chandpur, Bangladesh & some private hospitals of Chandpur, Bangladesh, from January 2015 to January 2019. The study included 65 paediatric patients aged 5 to 16 years who had femoral shaft fractures and were admitted into the hospital. All collected data was entered into a Microsoft Excel Work Sheet and analyzed in SPSS 11.5 using descriptive statistics.

Results: The majority of the participants (84.62%) were male. Most of the participants (78.46%) were aged 5-10 years. Sports-related injuries caused fractures in 44.62% of the participants. The fracture began in the middle of the femur in 47.69% of the cases, the proximal region in 43.08% of the cases, and the distal region in 9.23% of the cases. In this study, 58.46% of participants were hospitalised for 7-14 days, while 33.85% were hospitalised for 14-21 days. Only 7.69% of the individuals had to spend more than 21 days in the hospital. The majority of participants in this study had no post-operative difficulties. At the 12-month follow-up, 81.54% of participants reported excellent patient satisfaction, 16.92% reported satisfactory patient satisfaction, and 1 patient reported poor patient satisfaction.

Conclusion: In selected cases of femoral shaft fractures in children aged 5 to 16, titanium elastic nailing is an effective and realistic therapeutic option. TENS is a safe and effective therapy for treating paediatric femoral shaft fractures since it is less invasive, very simple to administer, and produces excellent functional and cosmetic effects.

Keywords: Titanium elastic nail (TEN), Diaphyseal, Femoral, Fractures.

I. INTRODUCTION

Femoral shaft fractures are among the most commonly treated serious paediatric injuries by orthopaedic surgeons. They account for 1 to 2% of all fractures in the paediatric population [1]. Traditionally, therapy has been age-related, determined by the location and type of fracture, as well as any concomitant ailments. Most femoral shaft fractures in children can be treated conservatively by immobilisation in a spica cast either immediately or after a period of traction with favourable long-term results due to quick healing and spontaneous correction of angulation [2, 3]. Operative stabilisation is required when conservative treatments fail to achieve or cannot maintain an adequate fracture reduction or the older children for whom difficult to maintain spica cast or a patient has associated head injury or other numerous associated injuries. External fixation, compression plating, and stiff intramedullary nailing are all means of operative stabilisation for paediatric femoral shaft fractures [4, 8]. Problems and consequences related with these techniques included pin tract infections, loss of reduction, refracture after implant removal, growth stop, and avascular necrosis of the capital

femoral epiphysis [9]. There is minimal debate about how smaller children (typically under the age of 5) and adults (above the age of 16) should be treated. There are numerous surgical and nonsurgical therapy options available for children aged 5 to 16 years, with no clear consensus on the optimum treatment [10]. When early closed reduction and a spica cast are employed, patients in this intermediate age range have a higher risk of shortening and malunion than younger children. The effect of prolonged immobility has also motivated the introduction of surgical methods that allow for quick mobilisation. As a result of the failure of conservative techniques to achieve or maintain an acceptable fracture reduction, surgical stabilisation becomes necessary. Nancy group introduced elastic stable intramedullary nailing (ESIN) for femoral fractures in 1979, and it has grown in favour over the previous two decades [11]. They act as load-sharing devices and are flexible enough to bend without having to cross the physis during insertion. For insertion and removal of hardware, relatively tiny incisions are required, providing a cosmetic advantage over other standard operating techniques, and because of its low invasive methodology, early ambulation is conceivable within 48e72 h. Because of its favourable results and lack of major problems, it remains the treatment of choice for paediatric long bone fracture stabilisation. Many studies have shown that elastic nails are effective and tolerable in the treatment of paediatric femoral fractures.

The purpose of this short-term retrospective study is to evaluate TENS fixation in children aged 5 to 16 years with femoral shaft fractures.

II. METHODOLOGY

This study was conducted in 250 Bedded General Hospital, Chandpur, Bangladesh & some private hospitals of Chandpur, Bangladesh, from January 2015 to January 2019. The study included 65 paediatric patients aged 5 to 16 years who had femoral shaft fractures and were admitted into the hospital. Each participant provided informed written consent, and the research hospital's ethical review committee provided ethical approval. A pre-prepared questionnaire was used to collect information about the patients' age, gender, fracture location, fracture type, cause of fracture, post-operative complications, length of hospital stay, and patient satisfaction. The following preoperative preparations were used for the TENS therapy technique. On the fracture x-ray, the nail diameter was calculated using Flynn's formula. To avoid varus or valgus malpositioning, nail sizes were kept constant. The broken bone was exposed by making opposing longitudinal medial and lateral incisions 2.5-3.5 cm above the physis, and the soft tissues were disseminated in the same direction with blunt tip scissors. To avoid entrance site discomfort, all patients were required to be immobilised for two weeks. On the 14th postoperative day, the knee immobilisation was removed. Each participant had a 12-month follow-up. All collected data was entered into a Microsoft Excel Work Sheet and analyzed in SPSS 11.5 using descriptive statistics.

III. RESULT

The majority of the participants (84.62%) were male, with 15.38% being female (Table-1). Most of the participants (78.46%) were aged 5-10 years, while the remaining 21.54% were aged 11-16 years. The average age of the participants was 7.45 years (Table-2). Sports-related injuries caused fractures in 44.62% of the participants, while road traffic accidents caused fractures in 27.69%. Falling from various heights fractured 18.46% of the participants, while minor trauma fractured 9.23% of the cases (Table-3). The fracture began in the middle of the femur in 47.69% of the cases, the proximal region in 43.08% of the cases, and the distal region in 9.23% of the cases (Table-4). In (Table-5) 58.46% of participants were hospitalised for 7-14 days, while 33.85% were hospitalised for 14-21 days. Only 7.69% of the individuals had to spend more than 21 days in the hospital. The average length of stay in the hospital was 13.2 ± 2.1 days. The majority of participants in this study had no issues, although 15.38% had <1.0 cm of leg length inequality, 1.54% had 1-2 cm leg length inequality, 1.54% had infection, 3.08% had entry site irritation, and 1 patient had soft tissue irritation caused by a prominent nail (Table-6). At the 12-month follow-up, 81.54% of participants reported excellent patient satisfaction, 16.92% reported satisfactory patient satisfaction, and 1 patient reported poor patient satisfaction (Table-7).

Table-1: Sex of the participants (N=65)

Sex	Frequency	Percent
Male	55	84.62
Female	10	15.38
Total	65	100

Table -2: Age of the participants (N=65)

Age in years	Frequency	Percent
5-10	51	78.46
11-16	14	21.54
Total	65	100
Mean ± SD	7.45 ± 1.2	

Table-3: Cause of injury of the participants (N=65)

Cause of Injury	Frequency	Percent
Sports	29	44.62
RTA	18	27.69
Fall	12	18.46
Minor Trauma	6	9.23
Total	65	100

Table-4: Participant distribution by fracture location (N=65)

Location of fracture	Frequency	Percent
Proximal	28	43.08
Middle	31	47.69
Distal	6	9.23
Total	65	100

Table-5: Participant distribution by hospital stay duration (N=65)

Hospital Stay	Frequency	Percent
7-14 days	38	58.46
15-21 days	22	33.85
>21 days	5	7.69
Total	65	100
Mean ± SD	13.2 ± 2.1	

Table-6: Post-operative difficulties among participants

Post-operative difficulties	Frequency	Percent
Infection	1	1.54
<1.0 cm leg length inequality	10	15.38
1.0-2.0 cm leg length inequality	1	1.54
Soft tissue irritation by prominent nail	1	1.54
Entry Site irritatio	2	3.08
No Complications	50	76.92
Total	65	100

Table-7: Outcomes after a 12-month follow-up among participants (N=65)

Outcome	Frequency	Percent
Excellent	53	81.54
Satisfactory	11	16.92
Poor	1	1.54
Total	65	100

IV. DISCUSSION

Femoral shaft fracture is a very prevalent form of fracture in children. To treat a fractured femoral shaft, many steps can be done, and depending on the degree of the fracture, the necessary procedure might be conservative or surgical in character. The current study included 65 paediatric femoral fracture patients treated using the Titanium Elastic Nailing TEN technique. The majority of the participants (84.62%) were male, with 15.38% female. Due to the fact that males engage in more outside activities than girls, paediatric femoral fractures are more common in boys. Several other research have supported the high proportion of male participants in our study [12, 13]. The majority of participants (78.46%) were aged 5-10 years, with the

remainder 21.54% aged 11-16 years. The average age of the participants was 7.45 years. The increasing incidence of fractures at this age group may be due to youngsters getting more interested in various outdoor sports and activities around this age. This was corroborated by an examination of the causes of the incidents, which revealed that 44.62% were wounded in sports-related incidents, 27.69% in road traffic accidents, 18.46% in falls, and the remaining 9.23% suffered fractures from minor injuries. These explanations were similarly consistent with earlier studies on paediatric fracture, however the incidence distribution varied in several circumstances [14, 15, 16]. In 47.69% of the cases, the fracture started in the centre of the femur, 43.08% in the proximal region, and 9.23% in the distal region. 58.46% of participants were admitted to the hospital for 7-14 days, while 33.85% were admitted for 14-21 days. Only 7.69% of people had to stay in the hospital for more than 21 days. The average length of hospital stay was 13.2 ± 2.1 days. This was higher than in prior investigations of TENS fixing of femoral shaft fractures, when patients stayed in the hospital for shorter periods of time [17]. Although 15.38% of individuals in this study had <1.0 cm of leg length inequality, 1.54% had 1-2 cm leg length inequality, 1.54% experienced infection, 3.08% had entry site irritation, and 1 patient had soft tissue irritation caused by a prominent nail, the majority of participants had no difficulties. At the 12-month follow-up, 81.54% of participants said they had excellent patient satisfaction, 16.92% said they had adequate patient satisfaction, and one said they had poor patient satisfaction. These findings were assessed using the TEN grading criteria developed by Flynn et al. [17].

Limitation of the study:

This study had a single focal point and small sample sizes. Therefore, it's possible that the study's findings don't accurately capture the overall situation.

V. CONCLUSION & RECOMMENDATION

According to the study, in selected cases of femoral shaft fractures in children aged 5 to 16, titanium elastic nailing is an effective and realistic therapeutic option. TENS is a safe and effective therapy for treating paediatric femoral shaft fractures since it is less invasive, very simple to administer, and produces excellent functional and cosmetic effects.

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