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Clinical Outcome in Management of Both Bone Forearm Fractures in Children Using Titanium Elastic Nailing System and Non operative method

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ABSTRACT

Background&Aim: The most common mode of management for forearm fractures in children remains nonoperative management with closed reduction and immobilization with above-elbow plaster cast. But complications of conservative management with plaster cast make it unfavourable . The titanium elastic nailing system (TENS) has changed the treatment scenario. Our aim was to compare titanium elastic nailing and conservative management by plaster cast in management of forearm fractures in children.Methods:30 patients in the age group 5 to 12 years with both bone forearm fractures were treated by closed reduction and internal fixation using TENS and another 30 patients treated nonoperatively by plaster cast. Prospective follow-up were done for one year and outcome were analyzed.Results: 27 (90 %) cases have excellent functional outcome, 2 (6.66%) have good and 1 (3.33%) has fair outcome in patients treated with TENS. In patients treated nonoperatively with POP cast, 24 (80 %) cases have excellent functional outcome, 4 (13.33%) have good and 2 (6.66%) have fair outcome.Conclusion:TENS has better outcome than non operative management in terms of functional outcome with minimal complications.

I. INTRODUCTION

Fractures of the radius and ulna Pediatric, usually known as both bone forearm fractures, are the third most common fracture in the pediatric population & account for 13- 40% of all pediatric fractures [1] . Traditionally, the majority of these fractures have been treated with non-operative management relying on closed reduction and casting [2] . Recently, however, there has been a trend towards increased surgical management of these fractures in an effort to improve clinical outcomes. The management of these fractures depends on the age, type of fracture and fracture displacement. Given a child's physeal growth potential, varying degrees of angulation can be accepted depending on the age of the child and their ability to remodel. Long arm cast immobilization remains a viable treatment option for many of these fractures that fall within acceptable alignment parameters, and children are generally at low risk for developing significant elbow stiffness following cast immobilization. For fracture patterns, which are unable to be closed reduced to an acceptable position, surgical management is recommended. Surgical treatment options include both rigid plate fixation and elastic intramedullary nails. Recently there has been an increased interest in determining which method provides superior results, but the optimal treatment remains controversial. The aim of this study is to review on treatment of paediatric both bone forearm fractures in younger children (ages 5-12), and offer useful treatment algorithms for these injuries. However, many of the studies in the literature on this topic are retrospective in design and are limited in the number of patients they contain [3] .

II. MATERIALS AND METHODS

The aim of this Prospective study is to compare the clinical outcome between operative and non operative management of both bone of forearm fracture in children Study being done at: Department of Orthopaedics, Mata Gujri memorial medical college .,Kishanganj , Bihar,for 1 years, from Sept 2021 to Sept 2022.. Sample size 60 (30 each group)

Inclusion criteria

- Children aged 5-12years with displaced diaphyseal forearm fracture
- Fracture of proximal , middle and distal part

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Exclusion criteria

- Children older more than 12 years age
- Children younger than 5 years of age
- Children having physeal injury
- Cases having pathological fracture and refracture
- Cases having compound forearm fracture

Patient were enrolled after institutional review board approval.

Patients who were included for management by non operative methods were given sedation and manipulation and reduction of the fracture was carried out. Then immobilisation was done with above elbow POP cast (fig 1). The patient was observed for any immediate complications like swelling, ischemia. The patient was advised to keep limb elevated , active/passive finger movement and report immediately to hospitals if there is any bluish discoloration of fingers or severe pain is felt. Active and passive movements of fingers started. The POP cast was removed after 4 weeks. Patients were reviewed at end of 1st week, 4th week, 6th week, 3rd month ,6th month ,9 month and at one year for functional and cosmetic outcome.

Surgical management by TENS done .(fig .2,3)

patient was put in the supine position on operating table with the affected arm placed on a radiolucent arm table. Titanium elastic nails of appropriate diameter were chosen. The nail diameters were about two-thirds of the medullary isthmus of each bone. Then, the awl was used to make entry point in the bones. Entry point in the radius was either just proximal to the radial styloid or through Lister's tubercle[4] The antegrade entry point in the ulna can be either at the posterior aspect of the olecranon or a lateral approach through the proximal metaphysis.[4] The retrograde entry point in the ulna was through the distal metaphysis. Because the radius is often more difficult to reduce, it should be splinted first. Radial nail was inserted manually with the inserter for TEN into the medullary canal, with the nail tip at right angles to the bone shaft. Then, the nail was rotated through 180° with the inserter, and the nail tip was aligned with the axis of the medullary canal. The nail was advanced up to the fracture site with oscillating movements. The radial nail tip was aligned with the medullary canal of the proximal fragment. Then, the nail was advanced with smooth oscillating movements until the tip reaches the proximal fragment metaphysis. Ulna nail was then introduced and progressed in similar manner such as radius nail. When the nails were correctly positioned in the opposite metaphysis, protruding nail ends are cut approximately 1 cm from the bone. Postoperatively, majority of the patients required no external immobilization. However, in some patients, plaster of Paris slab was given for 2 weeks to encourage soft-tissue healing. Patients were followed up at 1,2,4,6,12 months. Early range of exercises was started, and results were evaluated as per Price et al.[5] [Table 1] criteria taking pain and range of motion of forearm (supination/ pronation) into consideration

III. RESULTS

In this study, 27 (90 %) cases have excellent functional outcome, 2 (6.66%) have good and 1 (3.33%) has fair outcome in patients treated with TENS. In patients treated non operatively with POP cast, 24(80%) cases have excellent functional outcome, 4 (13.33%) have good and 2 (6.66%) have fair outcome. While comparing TENS with conservative management,In patients treated with TENS, 3 (10%) cases have superficial infection and was treated with local antibiotics and healed, 2 (6.66%) cases of neuropraxia involving the superficial radial nerve were detected which resolved after several weeks with no long term complication. In patients treated conservatively with POP cast, 3 (10%) cases have malunion and cosmesis is poor in 2(6.66%) cases. 2 (6.66%) cases have severe restriction of rotational movements of forearm. 10 (33.3%) cases have less than normal range of flexion movements around elbow.(table1)

Table 1: Functional outcome by price et al. Criteria[5]

	Conservative		TENS	
Functional outcome	**Number of cases**	**Percentage**	**Number of cases**	**Percentage**
Excellent	24	80%	27	90%
Good	4	13.33%	2	6.66%
Fair	2	6.66%	1	3.33%
Poor	0	0%	0	0%

IV. DISCUSSION

Fracture both bone forearm is one of the

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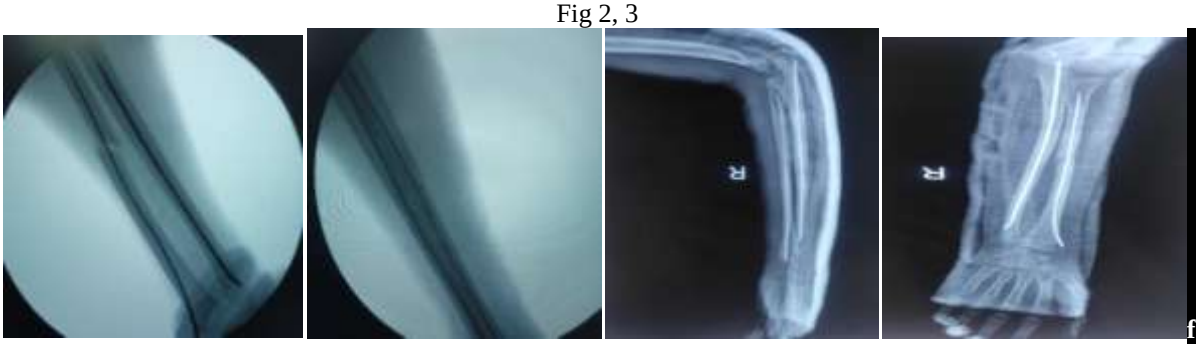
common fracture in children. Most frequently used methods for treatment of both bone forearms are closed reduction and application of cast, open reduction and platting and open or close reduction with internal fixation by titanium elastic nails, K-wire and ender's nail. The aim of the treatment is to achieve functionally and cosmetically satisfactory results and to avoid complications. Current literatures have not established the superiority of one method over the other. In this study, we evaluated the treatment of both bone forearm fractures treated by non operative method and TENS and provided clinical recommendations for optimal treatment, focusing specifically on paediatric age group. As per price etal

criteria,[5]patients treated with TENS had excellent functional outcome in 27(90%)cases, good in 2(6.66%) cases, fair in 1(3.33%) case. Eventually all cases achieved a good range of movements and had no functional deformity or complaints. As per price et al criteria,[5] in patients treated with POP Cast, 24 (80%) cases had excellent, 4 (13.33%) cases good and 2 (6.66%) cases had fair result. Calder and Barry did elastic stable intramedullary nailing diaphyseal forearm fractures in children with excellent outcome.[6]Malek IA, Webster R, Garg NK, Bruce CE, Bass A has achieved good functional outcome, and complications were modest and transient.[7] In the study done by Houshain S, Bajaj SK, in single bone fixation of both bone forearm with radiological union at a median of 6.7 weeks and at follow-up ,a full range of elbow & wrist movements were found in all cases.[8]Lascombes et al.obtained excellent results and full range of motion in 92% patients of 85 patients of forearm fracture treated with elastic intramedullary nail.[9]Vishwanath C and Satheesh GS obtained excellent functional results in the majority of patients of diaphyseal forearm fractures treated withTENS.[10]

Fig 1

Fig 2, 3



V. CONCLUSION

Although the fracture of both bones of the forearm in children can be managed non operatively , they often lead to malunion with restriction of movements at either elbow or wrist joint. In comparison to nonoperative method, titanium elastic nail system showed excellent results in terms of bony union, functional outcome with minimal complications, and cosmesis. Therefore, this minimally invasive method of TENS may be considered as an attractive and effective alternative for displaced forearm fractures in pediatric age group

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