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Original Research Paper

Orthopaedics

"FUNCTIONAL OUTCOME OF RADIUS ONLY NAILING IN BOTH BONE FOREARM DIAPHYSEAL DISPLACED UNSTABLE FRACTURE "

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ABSTRACT Radius and ulna fracture are are common fracture in children. study was conducted to learn functional outcome of both bone forearm fracture managed with radius only nailing with ulna managed conservatively. In this study we have total 30 paediatric patient were included. detail history and clinical finding are confirmed and noted. after surgery patient followed on 1st, 3rd and 6th month for their radiological and functional outcome.

KEYWORDS :

INTRODUCTION:

Paediatric fractures present significant challenges to the orthopaedic community. Distal diaphyseal fractures of the radius & ulna, commonly referred to as Quadratus fractures, are the common fracture in the paediatric population and account for 10 to 25% of all paediatric fractures. Unlike distal radius fractures in adults, which are generally treated by open reduction and osteosynthesis with plate and screw fixation, 90% of paediatric forearm fractures are successfully treated conservatively by closed reduction and casting. But a recognized failure rate has been reported up to 7%-32% and some of the indications for operative intervention are irreducible fractures, unstable fractures with closed or open reduction with a mini-incision and physis sparing intramedullary nailing, open reduction and osteosynthesis with plate and screw fixation. fractures can be regarded as articular fractures as slight deviations in the spatial orientation of the radius may significantly decrease the forearm's rotational amplitude and thereby impair the positioning and function of the hand.[1]

Diaphyseal fractures of the forearm constitute 6-10% of all fractures in children. The treatment depends on the age and the type of displacement.

There are many methods for treatment of displaced diaphyseal fracture both bone of forearm in children.

Like
- Closed reduction and POP plaster cast
- Closed reduction and intramedullary nailing with physis sparing entry for nailing of both bone.
- Open reduction and internal fixation with plate and screw

The objective is to show the radiological and functional results, and the complications of intramedullary fixation with Nailing. As per references and result patient treated with closed reduction and intramedullary nailing with physis sparing entry of radius only for displaced both bones diaphyseal forearm fracture in children gives the following **advantages**,[2]
- Early mobilization with good functional outcome
- Full range of movement of supination and pronation with less complication
- Early radiological union
- Smaller scar
- Less operative time
- Less blood loss

Biomechanically, these implants have shown to act as internal splints.[3] The radius square nail (Talwalkar nail), elastic nailing system provides the following four properties: flexural stability, axial stability, translational stability, and rotational stability. All four properties are essential for achieving optimal results.[5] It also maintains introsseous space which is important for pronation and supination movement with less cosmetic deformity. The elastic stable intramedullary nailing with physis sparing entry has benefits of immediate stability to the involved bone segment which permits early mobilization and returns to normal activities with low complication rate. [4,5]

AIMS AND OBJECTIVES:

- To Assess the Epidemiology of Displaced Both Bones Diaphyseal
- Forearm Fracture in Children
- To study the functional outcome of this modality.
- To study the various complication and rate of complication

MATERIAL AND METHODS:

Study Setting:

The present study was concluded in the department of Orthopaedics in a tertiary care hospital and medical college. The study was undertaken after approval from Institutional Ethical Committee.

Study Designing:

It was prospective observational study.

Study Population:

Children walking in patient with displaced unstable radius ulna diaphyseal.

Both bone forearm fracture in Orthopaedic OPD and Casualty.

Study Sample:

30 Children who followed complete enumeration method

Study Duration: 18 Months

A) Inclusion Criteria:

- Displaced and Unstable Diaphyseal fracture both bone of forearm in children
- Children age less than 12years
- Male and female children
- Medically fit for surgery

B) Exclusion Criteria:

- Pathological fracture
- Open fracture
- Medical contraindications to surgery
- Patient age more than 12years
- Distal neurovascular deficit
- Patient with sign of infection Patient who refused to give consent for Surgical intervention.

METHODOLOGY:

After approval from the ethics committee and with a written informed consent from the patients & relatives, between 01/01/2019 to 30/06/2020 (18 months), 30 cases of fractures involving the both bone forearms diaphysis in children were treated surgically with closed reduction and intramedullary nailing for radius only with physis sparing entry, were included in the study. The study is a type of cross-sectional study done over a period of 18 months with short term follow up done at 1, 3 and 6 month, with the data being collected from the patients admitted under the orthopaedic wards and trauma intensive care units of the tertiary health care centre.

Surgical Procedure :

Operative Technique:

Patient Positioning And Operating Room Preparation:

The patient was placed supine on a radiolucent operating room table with the C arm coming in from the same side.

The surgeon and assistant stand on the side of the affected limb.

A small incision of 2-3 cm is taken on the dorso-lateral aspect of the lower end of the radius. Soft tissue dissection is done using blunt instruments. Small scissors or a surgical clip and small retractors were used to dissect to the bone under direct vision.

Place the awl directly onto the bone after confirming under c arm supervision that it is physis sparing. Following this, we perforate the near cortex, under direct vision, perpendicular to the bone.

We avoided hammer the awl to avoid perforation of the far cortex.

When the medullary canal is reached, the awl was lowered to 45° to the shaft axis and advanced it with oscillating movements to produce an oblique canal. The medullary canal is small, and the nail may deform during insertion. We fixed the nail into the inserter and passed it into the canal and inserted the nail with the tip perpendicular to the shaft axis until the far cortex is felt. Then we rotated the nail 180° and advanced it using the curved side of the tip as a gliding aid. If the tip was stuck in the far cortex and couldn't be the opposite fracture plane, we achieve reduction by a combination of traction, angulation and translation. At this point gentle hammer blows may assist insertion and prevent the nail from advancing into the soft tissues. The nail was then advanced 2 cm into the proximal fragment. If the nails cannot be advanced into the proximal segment, manipulate the distal fragments under image intensification approximate reduction of one fracture is achieved with distraction advanced, the nail was removed and the tip bent to give a slightly more pronounced curvature.

The nail was advanced to the fracture site with an oscillating manoeuvre. pointing the nail tip toward rotation and joystick maneuvers of the nail. Advance the nails up to the strong metaphyseal bone. Place the forearm in supination with the nail facing to tension the interosseous membrane. After confirming the position of the nail under C arm supervision, the wound closure was done in layers.

All patients were given prophylactic antibiotics pre-operatively and post operatively for 7days.

Suture removal was done on post-operative day 12 to14.

Active physiotherapy in the form of flexion-extension and pronation supination was started on post-operative day 2. Active movements gradually increased in accordance with pain. Radiological and functional examination was done on 1st, 3rd& 5thmonth Review for first 6 months and third monthly thereafter.

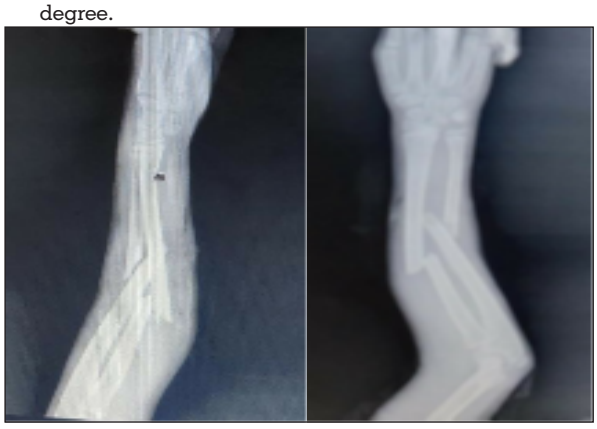
RESULTS:

Total 30 patient involved in our study.

Table No.1: Distribution Of Patients According To Age

Age group (yrs.)	Frequency	Percentage (%)
1 to 5	01	3.33
6 to 10	26	86.67
11 to 12	03	10.00
TOTAL	30	100

- Maximum number patient in our study are between 6 to 10 year.
- The youngest patient in study was 5year old and oldest patient was
- Mean age of patient was 12year old.
- Gender distribution – among 30 patient 18 are male and 12 are female .
- Most common site of fracture was 13 are middle third, 9 had distal third and 8 had proximal third fracture .
- Among the 30 patient 17 right sided fracture and 13 was left sided fracture.
- Among operated 3 patient had 60 to 65 degree of pronation 20 patient had 55 to 60 degree of pronation and 7 had 50 to 55 degree of pronation.
- 3 had supination of more than 70 degree, 20 had 65 to 70 degree of supination and rest 7 had supination of 50 to 65 degree.



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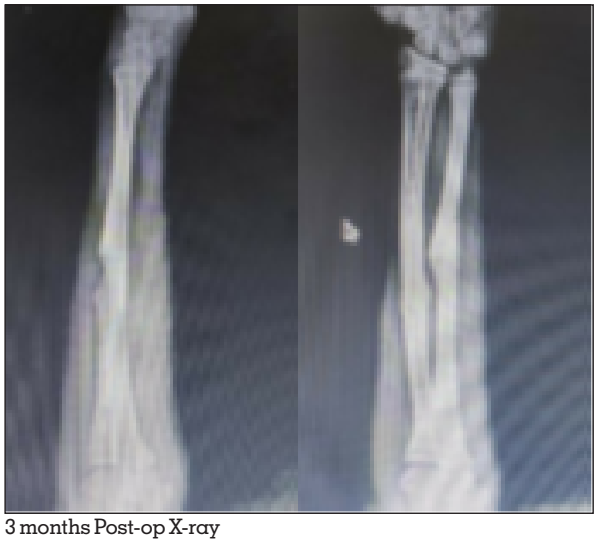

3 months Post-op X-ray

DISCUSSION:

Historically, the majority of pediatric distal diaphyseal

forearm bone (Quadratus fractures with distal ulna) have been treated with non-operative management relying on closed reduction and casting. This treatment is associated with loss of reduction and poor functional results in five to seven percent of the patients. Recently there has been a trend towards increased surgical management of these fractures in an effort to improve clinical outcomes. The clinical results of pediatric forearm fractures mainly rely on residual angulations at the fracture site, decrease in the inter osseous space of forearm, the presence of a rotational deformity, remodelling potential of the bone, the age of the patient, and the location of the fracture.

In our study 86.67% patients were in age group between 6 to 10 yrs. The mean age of the study population was 8.1 yrs. The study by Dhanpal Singh [6] mentioned that the median age was 12 years ranging from 5 to 14 years. The study by Dhanpal Singh [6] mentioned all male patients included in the study.

The study by Biswajit Sahu[7]mentioned that out of 40 patients, fractures involved proximal third of shaft of forearm bones in 15 (37.5%), fracture middle third in 19 (47.5%), and distal third involved in6 (15%) patients In this study, male patients were more than female patients. Ratio of Male to female was 1.5.

In this study anatomical reduction was maximum in number 17 (56.67%) followed by acceptable reduction 13 (43.33%) and 13 patients reported Malunion of Ulna as a complication. The study by Dhanpal Singh [7] mentioned that Out of the 10 patients, 8 patients showed radiological signs of Union in a mean of 6±2 weeks. Cullen et al.[8] reported complications as high as 50% following intramedullary fixation of pediatric forearm bone fractures.

Yalcinkaya et al.[9]reported complications rate ranged from four to 38% in patients treated with intramedullary nailing. The cause of these complications is difficult to determine, it is due to the surgeon"s inexperience with the technique or the surgery itself.

In study conducted by Mohammed et al[10]found good functional outcome in 19 out of 21 patients. Two patients in our study had superficial infection which was subsided by dressing and intake of antibiotics. Three out of our forty patients had pain due to nail prominence.

In our study we used DASH score for assessment of final outcome in which maximum number of patients having Fair score i.e. 12 (40.00%) followed by excellent 10 (33.33%), good 07 (23.33%) and poor score 1 (03.34%). It was observed that the one patient who had a poor outcome had a poor reduction and the intra osseous space was not maintained. Different studies on this topic used different assessment tool for final outcome. The similar results mentioned in study by Yalcinkaya et al[10], Shoemaker SD et al[11] and Flynn JM etal[12].

In this study we assessed the range of motion in which 20 (66.67%) patients achieved 55 to 60 pronation and 20 (66.67%) achieved 65 to 70 supinations.

The main advantages of intramedullary nailing include maintenance of reduction, provision of an inexpensive, minimally invasive, relatively easy application, protection of bone alignment by three-point contact, acceleration of bridging callus formation through micro movements at the fracture site, and thus contribution to rapid bony healing. Intramedullary fixation materials include elastic titanium nails, square radius nail. In the clinical setting, titanium is being used more often than stainless steel because of the elastic properties which allow for improved insertion and rotation but it may be expensive and not easily available in many hospitals in rural set up.

CONCLUSION:

In our short term prospective observational study conducted in tertiary care hospital on fractures of both bone forearm diaphysis in children treated surgically with closed reduction and intramedullary nailing for radius only with physis sparing entry, 30 patients were operated over the span of 18 months.

The Findings Are Summarized Below:

The mean age of the study was 8.1years.

Middle third fracture was common than other type of fractures. Most of the patients came after 2 to 3 days after trauma. Mean duration of surgery was 36.66minutes.

Anatomical reduction (17) was more than acceptable (13) reduction.

Better functional and cosmetic outcome with minimal complications is achieved with internal fixation with nail system.

We recommend that further studies be done on a larger scale in a population based setting for longer duration of follow up.

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