



Orthopaedics

STUDY OF FUNCTIONAL OUTCOME OF DISPLACED RADIAL NECK FRACTURE IN CHILDREN TREATED WITH CLOSED REDUCTION INTERNAL FIXATION WITH INTRAMEDULLARY NAILING AT TERTIARY CARE CENTER

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ABSTRACT Radius neck fractures are rare fractures, this study was conducted to learn functional outcome of these fractures managed with closed reduction and intramedullary nailing. 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 : radial neck fracture, closed nailing, children radial neck fracture nailing, functional outcome of displaced radial neck fracture, intramedullary nailing, Percutaneous pinning, joystick technique

INTRODUCTION

Fractures of the radial neck is a comparatively rare injury and accounts for 5% - 10% of traumatic lesions of the elbow in the child.[1] They usually occur between 5 and 13 years of age[2]. Fractures of the neck of the radius in children are an unsolved and difficult problem. It remains a source of considerable controversy and has many possible complications that are usually hazardous for the elbow function.

The complex anatomy of the elbow and its vascular blood supply also makes treatment challenging. The radial head and its blood supply can be damaged by the original trauma and/or by surgical trauma, such as open reduction or forceful manipulations.

The choice of treatment is determined by the degree of radial head angulation, which also affects the long-term results. Severe angulation and translation increases the risk of complications, mainly malunion, avascular necrosis of the head, cubitus valgus and stiffness of the joint. Conservative treatment in the form of closed reduction and plaster immobilization is usually successful for the nondisplaced and minimally displaced fractures while in severely displaced fractures of angulation more than 45 degrees, open reduction is warranted if closed reduction fails[3-7]. Conservative treatment in the form of closed reduction and plaster immobilization is unable to reduce severe displacements, resulting in malunion[1]. Open reduction of severely displaced radial neck fractures is associated with a high incidence of complications[8].

Percutaneous pinning of displaced fragment has been associated with serious complications like wire breakage and nerve injury[6]. In 1980, Metaizeau proposed intramedullary nailing as a surgical option for the treatment of radial neck fractures. The main advantage of intramedullary nailing is that it simultaneously allows accurate and stable reduction without disturbing the blood supply

Fracture of the neck disrupts part of the periosteum with its vessels, more so in severely displaced fractures. Open reduction of the fracture can further damage the vascularity of the radial head [9]. An attempt at closed reduction is recommended for fractures that are angulated more than 30 degrees.

Percutaneous methods of reduction have been developed in an effort to avoid the higher incidence of complications after open reduction. This technique involves direct pressure on the proximal fragment with a Steinmann pin or K-wire that is introduced percutaneously or through a small stab wound [10-12]. This technique of percutaneous "joystick" reduction can injure the posterior interosseous nerve. Intramedullary manipulation of the radial head is another method of percutaneous, indirect reduction of the fracture. This method of indirect reduction does not jeopardize further the vascularity of the radial head which can occur in open reduction. Lateral condyle acts as a buffer to prevent overcorrection in long axis whereas tension produced in the lateral intact periosteum prevents medial overcorrection.

AIMS AND OBJECTIVES

- To assess the epidemiology of radial neck fractures in children
- To compare the functional outcome of displaced fractures of radial neck treated with percutaneous nailing
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METHODOLOGY

MATERIALS AND METHODS

After obtaining approval from the Institutional ethics committee, these patients with displaced radial neck fracture admitted in male and female orthopaedic wards undergoing surgery for closed reduction internal fixation with intramedullary nailing in a tertiary care center, fulfilling the inclusion and exclusion criteria and willing to give the informed consent will be included in the study. The detail history of the patient will be taken regarding personal data history, mode of injury, pre-injury ambulatory status, preexisting local and systemic condition that may affect recovery. Full clinical examination will be done to assess the general condition of the neighbouring joints and any associated injuries.

Patients preoperative xray with anteroposterior, lateral, and oblique (Greenspan) views are obtained. The special Greenspan view is taken with the forearm in neutral position and the X-ray beam centered on the radiocapitellar joint. The view allows for clear visualisation of the radial head without the overlap of the coronoid process.

Accordingly, the patient will be preferred for the surgery depending upon local condition of skin and anaesthesia fitness of the patient. All patient will be assessed with regard to operative time, blood loss, postoperative outcomes and intraoperative and postoperative complications of surgery, hospital stay. The data will be quantified by 'Mayo Elbow Performance Score' in which outcome will be evaluated by clinical measures (pain, motion, stability, function). Dressing will be done on postoperative 2nd day. Patient will be discharged on 2nd postoperative day and followed up after 1st, 2nd, 3rd weekly to assess displacement and after 4th week for k wire removal then after 6 months.

Inclusion Criteria

- Displaced radial neck fractures in children
- Children with age less than 14 years
- Male and female child
- Medically fit for surgery

Exclusion Criteria

- Pathological fracture
- Open fracture
- Medical contraindication to surgery
- Patient age more than 14 years
- Distal neurovascular deficit
- Patient with sign of infection

Statistical Analysis:

Following the above procedure, the findings will be recorded in the proforma. These findings will be entered in Microsoft Excel. The results will be compiled by using suitable tables and graphs wherever necessary. The variations will be analysed as a percentage of the total and reported. Data analysis will be done with the help of appropriate software version.

Quantitative data will be presented with the help of mean, standard deviation, median. Qualitative data will be represented with frequency and percentage tables.

MATERIALS AND METHODS:

Study Design: Prospective observational study STUDY AREA Tertiary care centre.

Study Population: All patients Of Displaced Radial Neck Fracture In Children undergoing surgery at tertiary care centre.

Sample Size: All patients of Fractures Of Displaced Radial Neck Fracture In Children undergoing surgery during January 2020 to June 2021 at tertiary care centre.

Study Duration: 18 months

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 into radial head and reduction then achieved using rotation of Enders nail. After confirming the position of the nail and reduction of radial neck fracture 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 to 14.

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 & 5th month Review for first 6 months and third monthly thereafter.

RESULTS

Majority 48% were in age group of 10 to 14 years, 36% in 5 to 10 years and 16% had age <5 years.

Majority 68% were males and 32% were females.

Most common aetiology of injury was fall from height (64%), direct trauma (20%), road traffic accident (16%).

Common clinical presentation was pain (96%) followed by swelling (84%).

Majorly left side (68%) was more affected than right side (32%).

On restrictions of movements, 86% had restricted elbow flexion, 76% restricted extension, 72% pronation and in 64% supination was restricted.

After closed reduction, on xray 90% of fractures were in place only 10% were displaced.

After reduction, majority 86% had early mobility.

After reduction, majority 84% had stable fixation Majority 70% had hospital stay <5 days and 30% had >5 days.

On outcome, 48% had excellent, 40% had good, 10% had fair and 25

had poor outcome.

Only one patient had to undergo repeat surgery.

Common complication noted was 10% malunion, 4% AVN and 6% others.

Age and gender

Majority 48% were in age group of 10 to 14 years, 36% in 5 to 10 years and 16% had age <5 years. Majority 68% were males and 32% were females. Study by Ahmet Köse et al (13) showed that 11 (64.7%) were male and 6 (35.3%) were female, with a mean age of 35.76 years (range: 23–61 years).

Presentation

Most common aetiology of injury was fall from height (64%), direct trauma (20%), road traffic accident (16%). Study by Ahmet Köse et al (13) showed that cause of fracture was a fall in 12 (70.59%), traffic accident in 3 (17.65%), and industrial accident in 2 (11.76%) cases.

Clinical presentation

Common clinical presentation was pain (96%) followed by swelling (84%).

Majorly left side (68%) was more affected than right side (32%).

On restrictions of movements, 86% had restricted elbow flexion, 76% restricted extension, 72% pronation and in 64% supination was restricted.

Study by Antuna SA et al (14) found that main common complaint was elbow pain. Study by Ahmet Köse et al (13) showed that supination and pronation was restricted even showed that right side 64.7% was more affected than left. Study by Sun J et al (15) showed that limitation of the elbow extension occurred in 2 cases of the closed reduction group Hospital stay.

Majority 70% had hospital stay <5 days and 30% had > 5 days.

Ahmet Köse et al (13) showed that mean duration of hospital stay was 3.1 days.

Outcome

On outcome, 48% had excellent, 40% had good, 10% had fair and 25 had poor outcome. Study by Andrew D et al (16) showed that majority of radial head and neck fractures can be treated non-operatively, achieving excellent or good results. Ashwood N et al (17) found that 8 patients had an excellent result; five, a good result; and three, a fair result. Study by Ahmet Köse et al (13) showed that results were excellent in 16 (94%) and good in 1 (6%) patient. Study by Lil NA et al (24) showed that 17 patients were excellent, 10 were good, and 4 had an acceptable result. Study by Sun J et al (86) showed that excellent results were achieved in 16 cases and good in 2 cases. Gao et al. (25) reported 72% excellent and good, 17% acceptable, and 11% unacceptable results. Ozkaya et al. (19) reported 80% excellent, 10% good, and 10% acceptable results. Visna et al. (26) reported 88% excellent and good results, and Lee et al. (20) 81% excellent, 11% good, and 8% acceptable results. In the present study, 16 (94%) cases were categorised as excellent and 1 (6%) was categorised as good.

Complication

Only one patient had to undergo repeat surgery.

Common complication noted was 10% malunion, 4% AVN and 6% others. Study by Herbertsson P et al (21) showed that Twenty-nine individuals had no subjective complaints, whereas three had occasional elbow pain and was no objective impairment, and none had elbow osteoarthritis, defined as reduced joint space, whereas there was more radiographic degeneration in the formerly fractured elbow than in the uninjured elbow. Study by Antuna SA et al (22) found that 3 patients complained of wrist pain, which was mild in two patients and moderate in one. Study by Chen CY et al (23) showed that all fractures achieved bone union without major complications. Study by Lil NA et al (24) showed that Union was achieved in 31 out of 34 patients i.e 3 patients had malunion, two cases of superficial infection, one subject had olecranon bursitis, and one case of radio-ulnar synostosis Study by Sun J et al (15) showed that was no avascular necrosis of radial head and epiphyses during follow-up. Intramedullary nailing bears certain risks, as does all treatment methods. The use of nails with too large a

diameter can cause iatrogenic fracture, while nails with too small a diameter can cause rotational instability. Use of nails with proximal locking screws risks damaging the posterior interosseous nerve. There is risk to the extensor pollicis longus tendon and the superficial branch of the radial nerve at the point of entry of the nail. Preoperative planning and a cautious approach during surgery minimizes the rate of complications caused by inappropriate nail selection and incorrect surgical technique. No iatrogenic trauma to the bones, vessels, or nerves occurred in the present study

CONCLUSION

In radial neck fractures in children, enders nailing, as a treatment modality for management of radial neck fracture, gives good to excellent results and can be considered as a good treatment alternative. This intramedullary radius nailing can be done with closed reduction resulting in limited soft tissue injury and less blood loss. Closed reduction with intramedullary nailing requires shorter operating time and spares the elbow joint thus avoiding stiffness. Early painless mobilisation of joint can be elbow achieved by this method. However, further trials are needed to confirm the said results.

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