International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(3): 897-900

www.orthopaper.com
Received: 15-05-2021
Accepted: 29-06-2021

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Outcome of closed reduction and Percutaeous fixation of k wire in the management of supracondylar humerus fractures in children at pravara rural hospital

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DOI: https://doi.org/10.22271/ortho.2021.v7.i3m.2854

Abstract
Introduction: Supracondylar humerus fractures in children is the second most common fracture in children accounting to 16.6% due to fall on out stretched hand.
At present, the preferred and most widely practiced method to treat Supracondylar humerus fracture in children is by k wire fixation by closed reduction in Garland's type 2 and 3.
Method: 20 patients (4 female and 16 male) patients aged 3-15 years with supracondylar humerus fractures treated with percutaneous k wire fixation were included in the study.
Result: Result was calculated based on Flynn criteria and was found to be excellent in 70% patients, good in 20% patients and fair in 5%patients and poor results were obtained in 5% patients.
Conclusion: The incidence of supracondylar humerus fractures in children is seen in a higher in male children as compared to females as males have higher exposure to the outdoors.
Falling on an outstretched hand is the most common method of injury and resulted in extension type fractures.
The management of such a fracture is difficult because of maintance of reduction of fracture and preserving neurovascular status of the limb.
The main goal of treatment was to recover normal range of movements with restored anatomy of distal humerus, which was achieved with k wire fixation.
Anatomical reduction and k wire pinning in the management of supracondylar humerus fractures in children provide good results and provide full range of movement with relatively fewer complications.

Keywords: Fracture, humerus, k wire, paediatric age group

Introduction
Supracondylar humerus fractures in children is the second most common fracture in children accounting to 16.6% [1] due to fall on out stretched hand with peak incidence between 5-8years [2, 3]. Complications may be seen even in uncomplicated fractures if they are not treated adequately.
There are many modalities of treatment of supracondylar humerus fractures like traction methods, reduction followed by above elbow cast or a slab, but many studies have proven that these methods have increased risk of complications, not only in view of biomechanical aspects but in such fractures there is a lot of soft tissue swelling making the anatomical reduction difficult and delaying the procedure. So inorder to maintain the reduction and allow early mobilization of the joint, primary fixation with k wires is of utmost importance.
Supracondylar humerus fractures are considered emergency and is operated usually within 72hrs in order to prevent complications like brachial artery injuries, ulnar nerve palsy, wrist drop and delayed complications like cubitus Varus deformity [4, 5, 6, 7].
At present, the preferred and most widely practiced method to treat supracondylar humerus fracture in children is by k wire fixation by closed reduction.
There are many methods described for percutaneous pinning with k wires, usually 2 k wires are used and crossed one from medial epicondyle and the other from lateral epicondyle.

There is a risk of iatrogenic ulnar nerve palsy when the medial pin inserted and it carries a higher risk than lateral pinning. So, the optimal pinning technique should provide adequate stability and avoiding iatrogenic nerve injury.
The main goal in treating such fractures is to restore the anatomy of the humerus distally to near perfect alignment and to reduce the complications with stability that is enough to allow early and painless mobilization of elbow joint.

Material and Method
Place of study- this study was carried out in department of Orthopaedics at Pravara rural hospital, Loni
Study population- children aged 3-15years diagnosed with supracondylar fracture humerus treated with percutaneous k wire fixation between June 2019 to June 2020

Procedure
All the patients selected for this study according to inclusion criteria were admitted and proper history and clinical examination was done followed by radiographic evaluation in AP AND LATERAL views was done.
Supracondylar humerus fractures in this study was classified according to GARTLANDs Classification

Type1: Undisplaced supracondylar humerus #

Type 2: Displaced supracondylar humerus # with intact posterior cortex

Type 3: Displaced supracondylar humerus # with no cortical contact

Further divided into a) postero-medial and b) postero-lateral
The initial management was to provide stability by temporary closed reduction with above elbow slab and giving adequate limb elevation to reduce the swelling.
The relatives of the patients were explained about surgical procedure and informed consent was taken and all the patients were taken up for surgery as soon as possible after the necessary routine work up was done.

All the children were given GA
For closed reduction, supine position was given with ipsilateral shoulder at the edge of operating table, following which parts were scrubbed painted and draped
Traction was given along the longitudinal axis keeping the elbow in extension and supination while counter traction was given by assistant holding the proximal arm.
Medial and lateral displacements were corrected by valgus and Varus forces respectively.
Following which the posterior displacement and angulation was corrected by flexing elbow and applying a force which acts posteriorly from the anterior aspect of proximal fragment and anterior force from posterior aspect of distal fragment.
Reduction was confirmed under image intensifier in AP and lateral views.

After satisfactory alignment was achieved, reduction was maintained by percutaneous k wire fixation and above elbow slab was applied with elbow flexion at 100-110 degree.
K wires of around 1.2-2mm were usually used and were inserted by either of the methods

1. 2 crossed k wires one from medial and one from lateral epicondyle
2. 2 lateral k wires

After achieving satisfactory reduction under c-arm guidance, the k wires were introduced with the help of drill.
The entry for medial pin was taken from the tip of medial epicondyle and tip of lateral epicondyle was the entry point for lateral pin.
Both these pins were directed at 40degree angle to the shaft pf humerus in the sagittal plane and 10degrees posteriorly.
Precautions were taken inorder to engage both the cortices above the fracture site and care was taken not to cross the olecranon fossa, following which the k wires were bent and kept at least 1cm outside the skin and dressing was done in sterile condition.

Postoperative protocol
Patient was given above elbow slab and adequate limb elevation with close watch on distal pulse and wound site was checked on post op day 2
Patient was discharged on post op day 3 or 4 on oral antibiotics with above elbow slab.

Follow up
Patients were called on day 14 for suture removal
K wires were removed after 6 weeks post check xray in AP and lateral views to check for callus formation
Slab was discarded and active range of motion was encouraged and was adviced not to lift heavy weights for 12weeks

Results:
According to FLYNN Criteria [8] results were calculated and out of 20 patients
14 patients had excellent result with almost no loss of carrying angle and full range of motion
4 patients had good results
1 patient had fair results
1 patient had unsatisfactory result

This patient had pin tract discharge and pricking sensation at the entry point of k wire

Table 1: FLYNN criteria

Rating	Loss of motion	Loss of carrying angle
Excellent	0-5	0-5
Good	6-10	6-10
Fair	11-15	11-15
POOR	>15	>15

Case 1

Pre op X-ray Post op X-ray

Case 2

Pre op x-ray Post op x-ray

Discussion

Supracondylar humerus fractures are the most common injuries around the elbow joint and usually occurs in the first decade of life.

Management of displaced supracondylar humerus fractures is one of the most difficult fractures to manage in children. The main concern always has been reduction and maintenance of fracture reduction and restoration of anatomy while maintaining adequate circulation to the limb.

Initial and definitive treatment of such a fracture is very important.

The study shows majority of patients with a mode of trauma by falling on an outstretched hand with extension type of fractures being the most common type.

Posteromedial displacement of fracture fragments were commonly seen and were reduced adequately by percutaneous pinning with k wires.

Displaced supracondylar humerus fractures in children with percutaneous k wire fixation has improved results and reduced complications.

Post reduction patients were discharged mostly on Day 3 post-operative period with above elbow slab for 6 weeks and were rehabilitated with full elbow range of motions of the involved limb after discontinuing the slab.

One patient with pin tract site infection recovered after adequate antibiotic treatment.

Most of the patients had regained full range of motion with less than 10degree loss of flexion and the difference in carrying angle between both the limbs was found to be minimal.

All the patients had good cosmetic results with the average union time being 4 weeks.

This study shows that proper anatomical reduction with percutaneous k wire fixation in supracondylar humerus fractures in children is a cost effective, convenient method showing better results in terms of fixation of fracture, early mobilization, duration of stay in the hospital with reducing the risk of neurovascular complications and Varus deformity in the later stages.

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