

A STUDY OF MANAGEMENT OF DISPLACED SUPRACONDYLAR FRACTURES OF HUMERUS IN CHILDREN BY OPEN REDUCTION AND INTERNAL FIXATION WITH K-WIRES

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Article Info

Received 29/01/2016

Revised 16/02/2016

Accepted 25/02/2016

Keywords :-

Supracondylar Fracture of Humerus in Children;
K-wire.

ABSTRACT

Children usually fall while playing or while riding the bicycle and sustain injury to the supracondylar region of the humerus and complete displacement of the fragments occurs in many of the cases. This is the most common fracture seen in the children and makes up to 60% of all elbow injuries. Elbow being an important region for the patient as well as the treating surgeons, request early intervention to get an excellent reduction and to avoid complications. Elbow injuries also demand respect because of their vascular and nerve damages. Open reduction and internal fixation is a useful option for the treatment of supracondylar fracture of humerus. The results of displaced supracondylar fracture treated by open reduction and internal fixation with K wire and the complications on thirty children who had come to the Department of Orthopaedics, Mamata General Hospital, khammam with history of supracondylar fracture of humerus was studied. Thirty children who presented with displaced supracondylar fracture of the humerus to the Department of Orthopaedics, Mamata General Hospital, khammam was treated with open reduction and internal fixation with K-wire after thorough pre-operative investigation during the course of the study. Children below the age of 11 were selected irrespective of the sex. An excellent result was obtained in 54% of the patients, good in 30% and fair in 10% and poor result in 6% of the patients. The poor results were due to the open fracture and in one case the patient presented very late to the hospital. Complications such as nerve injuries, vascular injuries, infections were seen in the study which healed following short course of the treatment. Five patients had cubitus varus and two patients had flexion loss on follow-up study. To conclude, open reduction and internal fixation with K-wire is an easy, simple, inexpensive method, which gives excellent results and good outcome.

INTRODUCTION

Supracondylar fractures of humerus are the most common elbow injury in children and makes up approximately 60% of all elbow injuries [1].

It is the fracture, which involves the lower end of the humerus usually involving the thin portion of humerus through olecranon fossa, or just above the fossa or through metaphysis [2]. Considering, the number of patients injured and the severity of the initial injury that occurs great diligence is required to secure an excellent result and to avoid or minimize the crippling complications, such as Volkmann's ischaemic contracture,

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Research Article



myositis ossification, stiffness, permanent nerve injuries and malunion [3]. It is general belief that accurate reduction in children is not essential for a good result, because growth may correct a deformity [4]. It is true that functional end results of malalignment are generally very good but it is also true the cosmetic end results are very poor [5]. Stiffness of the elbow which sometimes follows relatively minor injuries, remarkable sensitivity of the injured joint and too early passive movement add to the difficulties of treatment and prognosis [6-8]. Recurrence of displacement occurs in spite of accurate closed reduction and immobilization in flexion [9-11]. These injuries of elbow demand respect because for their vascular damage and nerve injury they cause than any other injuries in the body [12]. There is no controversy regarding management of undisplaced and partially displaced fracture but the treatment of a completely displaced fracture is not one but many [13-16]. Others have devised blind pinning after reduction or pinning under x-ray control [17-20]. Some even advocate to the extent to accept an unsatisfactory closed reduction, perform an osteotomy to correct the deformity at a later stage [21]. In the region of elbow, however, there are often more indications for aggressive treatment, including operative management.

This present study evaluates causes of failed closed reduction and to study the effectiveness of supracondylar fractures treated by open reduction and internal fixation with criss cross k-wires and its complications.

METHODOLOGY

In the present series, thirty cases which had completely displaced supracondylar fractures of the humerus were studied. The study was made in children up to the age 11 years between August 2009-october 2011 in Mamata Medical College and General Hospital, Khammam. The average period from injury to presentation was ten hours, the mean age being 6.8 years. There were twenty three boys and seven girls. Seven patients suffered from open fracture (Grade I Gustilo-Andersons classification). 30 cases of Gartland's Grade III type of supracondylar fractures [22] were included in this series. These were further grouped into fractures with postero-medial, postero lateral and posterior displacement. Out of these thirty cases, sixteen had posterior-medial, eleven had posterior-lateral, two had posterior displacement. Out of thirty cases, eleven were given one trial and three cases were given two trials of closed reduction under sedation, taking care to maintain good radial artery pulsation. In six cases the radial artery pulsation had to be restored by open reduction and internal fixation (Figure 1). Check X-ray of these fourteen patients who underwent closed reduction was taken. They proved unsatisfactory and were admitted for open reduction and internal fixation the reasons being. Remaining sixteen cases were taken up for primary open reduction and internal fixation, the reasons being a)

Extensive separation of the fracture fragments; b) Open fractures; c) Severe vascular compromises even at the slightest attempt of manipulation. Average range of period from injury to surgery was 24-36 hours.

RESULTS

Two cases (6%) had poor results as assessed by Flynn et al [23], which are considered as failures. Both cases had a limitation of elbow movement of more than 20 degrees flexion, and cubitus varus of 20 degrees, associated with medial pillar comminution, out of which one was open fracture and one who presented late to the hospital.

Feeble radial pulse in six cases, before reduction. The pulse had returned immediately after open reduction. Four cases of median nerve and four cases of radial nerve involvement were noted pre operatively which were transient and recovered spontaneously over the period of ten to twelve weeks. Pin tract entry wound irritation was seen in seven of the cases, which presented as points of hypergranulation tissue on the skin. This could have been avoided by burying the K wires subcutaneously (Figure 2). Two cases had superficial wound infections, which subsided immediately after the irrigation of the wounds and appropriate antibiotic cover. These minor complications like pin tract entry wound irritation and superficial wound infection had no influence whatsoever on the final functional result. There was not a single case of secondary nerve lesion of Volkmann's ischaemia or myositis ossificans (Figure 3).

DISCUSSION AND CONCLUSION

Supracondylar fractures of the humerus in children are common injuries and complete displacement of the fragments occurs in many of the cases. Vascular complication is preventable to a great extent. However, cubitus varus deformity seems to be the most common complication with any of the methods of treatment. None of the complications mentioned above had any effect on the functional aspect of the involved extremity. The only residual complication seen was the cubitus varus deformity of more than 15 degrees in two cases and on average eight degrees in three cases.

The reasons for the above being varying degrees of medial pillar comminution, and perfect anatomic realignment of the pillars then became difficult which led to inadequate reduction. Open reduction of displaced supracondylar fractures in children is based on the principles of treatment of intra-articular fractures namely, anatomic restoration, stable internal fixation, and early mobilization. The underlying philosophy encompasses the mechanical understanding of the distal end of the humerus and should be applied to displaced fractures where inaccurate alignment of the fracture ends is difficult to maintain and rotational malunion may jeopardize the end results.



The results of open reduction are therefore predictable and good if early anatomic restoration is carried out. This achieves soft tissue decompression and eliminates the inaccuracies of conservative management, which may be imprecise and cumbersome for the patient. Conservative treatment necessitates hospitalization of the patient and demands supervision of the patient constantly. Open reduction of supracondylar fractures is a safe and effective procedure, for which one should lower their threshold regarding its indications. Clinical findings that suggest vascular injury warrants a more aggressive approach by surgical exploration especially to avoid the

dreaded complication of Volkmann's ischemic contracture. Traumatic neuropraxia of one or more of the three adjacent peripheral nerves is a common complication of displaced supracondylar fractures, with a great majority of these lesions responding to conservative treatment. The major complications of surgical management appear to be a loss of range of motion and residual cubitus varus deformity. Most patients will regain full function of the elbow if the K wires are removed and motion started 3 weeks after injury. (Early motion is the key). Cubitus varus is mainly due to inadequate reduction as a result of medial pillar comminution.

Figure 1. Open reduction and fixation procedure

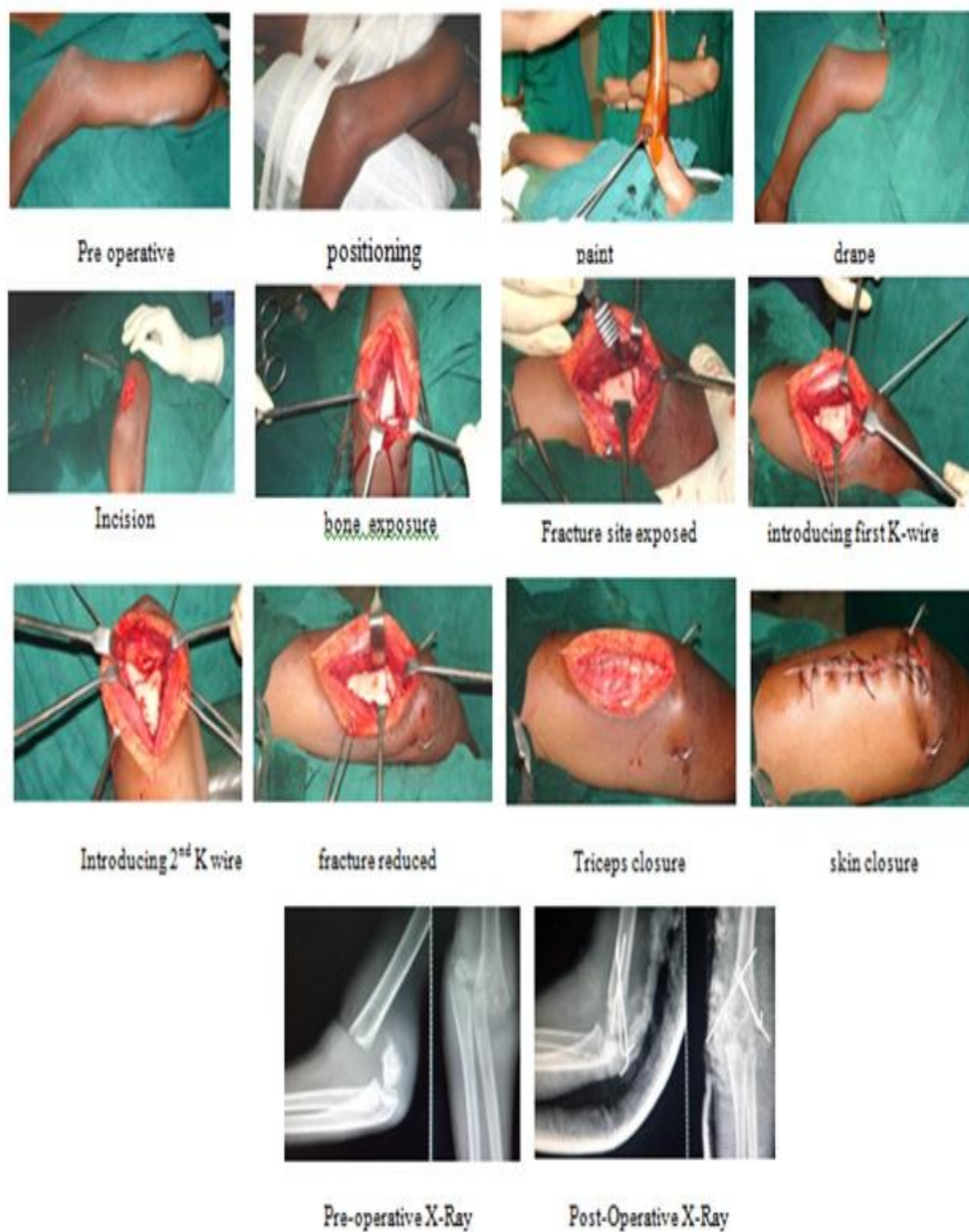
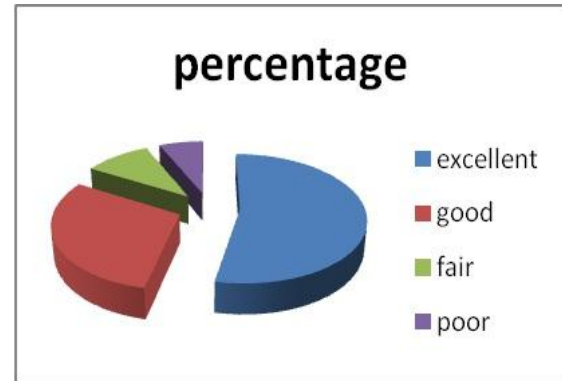


Figure 2. Case profile of a type III supracondylar fracture treated with k wires and functional range of movements.



Figure 3. Assessment of Results in the present case series.



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