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Study on Epiphyseal injuries treated with K wirefixation

Dr. M.Prasanth[1], Dr.P.Anil Babu[2]
[1](Former Prof.&HODOf Orthopaedics,Guntur Medical College,Guntur,AP,India)
[2](Assistant Prof. Of Orthopaedics,,Guntur Medical College,Guntur,AP,India)

Abstract: *The Fractures and soft-tissue injuries in children are different from those in adults. The periosteum is thicker in children than in adults and usually remains intact on one side of the fracture, which helps stabilize any reduction, decreases the amount of displacement. The peculiar function of the physis and the need to preserve their integrity, makes choosing what treatment methods to employ, very important. Our study is done with Epiphyseal injuries, with the following inclusion criterion : Salter - Harris Type II to IV physeal injuries, Closed type. Our exclusion criterion was:Associated fractures,Vascular deficit. The epiphyseal injuries are treated with Manipulation and Kwire fixation. The results in our study are evaluated in terms of anatomical reduction on radiographs, Clinical deformity and ROM regained at the joint.*

Keywords: *Epiphyseal injury, K wire fixation, Range of movements, clinical radiological deformities.*

I. Introduction

The Fractures and soft-tissue injuries in children are different from those in adults. The periosteum is thicker than in adults and usually remains intact on one side of the fracture, which helps stabilize any reduction, decreases the amount of displacement. Fractures adjacent to joints and angulated in their plane of motion in younger children remodel; however, varus and valgus angulation and rotational malalignment may not correct so readily. The long bones of children have epiphyses and physes, the latter of which seem to be the weakest points in the child's skeleton. These weak links account for the significant difference between the location of fractures in children and adults. The epiphyses and physes are parts in which the normal anatomy should be preserved. The dilemma is as follows: the physes, the weakest points in the bones and the sites of many children's fractures, also are the structures that must be preserved in as nearly normal condition as possible to avoid growth arrest and angular deformities.

The peculiar function of the physis and the need to preserve their integrity, makes choosing what treatment methods to employ, very important. Function often returns to normal unless the fracture occurs near the end of the growth period. Angulation in any other direction is likely to persist at least to some extent. Rotational deformities are permanent.Lower extremity fractures and fractures that required prolonged immobilization had a more negative impact on the child and the family unit than other fractures. Injuries that involve the physis and the epiphysis historically have caused cessation of growth and resultant angular deformities. These injuries have been classified by Weber et al., Poland, Ogden, and others, but the most commonly used classification is that of Salter and Harris, which is based on the radiographic appearance of the fracture (Fig.1). This classification depicts the amount of involvement of the physis, the epiphysis, and the joint. The higher the classification, the more likely is physeal arrest or joint incongruity to occur. Type I fractures are epiphyseal separations through the physis only, with or without displacement. Stress radiographs are useful in determining whether this fracture is present. Type II fractures have a metaphyseal spike attached to the separated epiphysis (Thurston-Holland sign) with the separation also through the physis. Type III is a physeal separation with a fracture through the epiphysis into the joint with joint incongruity when the fracture is displaced. Type IV is a fracture through the metaphysis, through the physis, through the epiphysis, and into the joint, also with possible joint incongruity. Type V fracture, which can be diagnosed only in retrospect, is a compression fracture of the physis, producing permanent damage. Most type I and II fractures can be treated by closed reduction. Type III and IV fractures often require open reduction and internal fixation to reposition the fragments anatomically and to fix them securely so that growth in the physis may continue and the joint may be congruous.

Conservative treatment should be performed for patients with SalterHarris type I and II distal tibial epiphyseal fractures, and surgery should be performed in patients with SalterHarris type III and IV distal tibial epiphyseal fractures to reduce the incidence of premature physealclosure.Surgical treatment of lateral condyle fractures displaced >2 mm, but with nosignificant articular surface incongruity has good outcomes with both CRPP and ORIF. CRPP,however, minimizes surgical time, avoids an incision and is thus our preferred treatment approachwhen joint congruity can be confirmed.

Angular deformity seems to correct to an acceptable alignment in patients less than 10 years of age, but these younger patients seem to be at higher risk for symptomatic shortening if a growth arrest occurs. Redisplacement after reduction is fairly common, and other more severe complications such as pain, loss of

motion, and nerve injury can occur.Our study consists different epiphyseal injuries treated with both open and closed methods for reduction and fixation with a K wire. The study involves Salter- Haris Type II to IV injuries.

II. Materials and methods

Our study is done with Epiphyseal injuries, with the following inclusion criterion: Salter - Harris Type II to IV physeal injuries, Closed type. Our exclusion criterion was :Associatedfractures,Vascular deficit. We have included the cases presented to GGH, Guntur, treated by Department of Orthopaedics from Jan 2007 to Dec 2016.All the cases are evaluated for any life threatening injuries initially, the surgical profile is evaluated for the fitness for surgery. The limbs were absolutely elevated to counter the oedema. The cases are observed forany development of impending compartment syndrome. All together 59 cases of epiphyseal injuries are taken into this study. The cases were posted for manipulation and reduction of the epiphyseal injuries.

All the cases were initially done with traction and counter traction under general anaesthesia. The reduction is assessed under image intensifier guidance for anatomical reduction. The average acceptance for K wire fixation is taken as $<5^0$ variation from the normal. The epiphyseal injuries are reevaluated for stability after reduction with AP and Lateral views. Any deviation that occurs after releasing traction is considered as unstable reduction and proceeded with K wire fixation.

Surgical Technique: **Closed** : The K wire fixation is planned and executed in such a way that the growth plate is involved in the fixation only for avoiding rotational deformity that occur persistently. We have opted to stabilize the injury by passing two parallel K wires. Any disruption to the joint is stabilized by passing another K wire perpendicular to the parallel K wires. **Open** : Epiphyseal injuries, where persistent deformity , shows un acceptable reduction are reduced with a bone lever percutaneously. Same stability is given with percutaneous manipulation also.The K wires are left in position for four weeks, along with additional immobilization is provided with POP slab. Pin tracks are taken care for avoiding pin site infections. Patients are allowed active finger and toe movements. Epiphyseal injuries around elbow are advised k wire removal and gradual assisted, supported ROM from third week onwards after removal of K wire.Patients are advised to undergo Physiotherapy with graded increments for ROM exercises. The improvement of ROM is assessed at weekly intervals till three months.

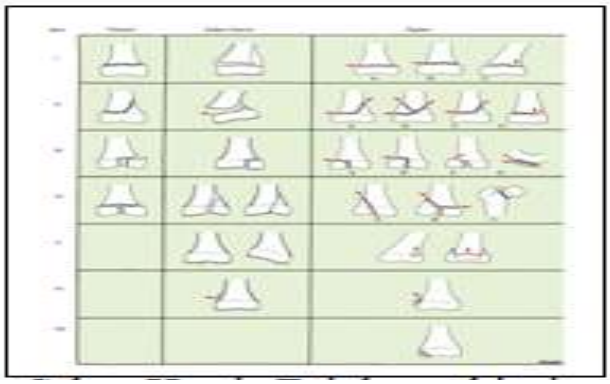
III. Results

The distribution of cases pertaining to each region of epipyseal injury is given in Tab.1 .The results in our study are evaluated in terms of anatomical reduction on radiographs, Clinical deformity and ROM regained at the joint. **Clinical deformity:** Per operatively the deformity is assessed before and after traction counter traction. Reductions which are stable with persistent deformity are re manipulated for anatomical reduction and stabilized by passing K wires. The clinical deformity is once again assessed at the removal of K wire, andthree month follow up. All the cases in the study have shown normal position during the surgery with K wire fixation. All the Cases at three month follow up did not show any clinical deformity..

Radiological assessment: The intra operative and post operative radiographs at 3^{rd} day showed no deviation from normal at the wrist comprising of34 cases in the study. The same is maintained till three month follow up. In case of epipyseal injuriesof distal humerus in the intra operative and immediate post operative period, the angular deformity could corrected with minimal rotational deformity. All these cases continued to have limitation of movements at the extremes of flexion extension arc, and painful limitation of pronation supination arc, they later became painless limitation.

Range of movements: The ROM assessment started with completed fourth week as soon as the k wires are removed, and at third week around the elbow. The improvement in ROM at wrist is superior to Ankle superior to Elbow. At the elbow the fifth week assessment showed 40^0 flexion extension arc which improved to 110^0 at the elbow over three month follow up. At the wrist the fifth week assessment showed 40^0 flexion extension arc which improved to 80^0 at over three month follow up. The radial and ulnar deviations are regained to 40^0 over three month follow up. At the Ankle the fifth week assessment showed 40^0 Dorsi and plantar flexion arc which improved to 60^0 at the ankle over three month follow up. At the Ankleinversion eversions are regained to 30^0 over three month follow up.

Figures and Tables



Salter Harris Epiphyseal juries

Fig. 1: Pre op and Post op Radiographs

Fig .3 Post op clinical mages

Table 1: Epiphyseal injury distribution

Ep.Injury	SH Type II	SH Type III	SH Type IV	Total
Humerus	0	0	5	5
Radius	21	5	8	34
Tibia	11	3	6	20

Table 2 : Regained Range of movements

Region	5^{th} Week	3^{rd} Month
Elbow Fl. – Ex.	40^0	110^0
Wrist Fl. – Ex.	40^0	80^0
Ankle Do – Pl Fl.	40^0	60^0

IV. Conclusion

Our study has showed that the K wire fixation stabilizes the physeal injuries with largely avoiding the angular deformities and rotational deformities. Initial limb elevation avoids lot of oedema. The manipulation to reduce the injury needs to be limited to one or two times to avoid bigger insult to the growth plate. K wirefxation in one or two planes is going to stabilize the fragments to maintain anatomical reduction. The range of movement exercises are better started at third or fourth week to regain ROM to the possible extent. Epiphyseal injuries close to the elbow requires much vigorous physiotherapy.

References

[1]. Orthopedics. 2015 Mar;38(3):e18995. doi: 10.3928/014774472015030555. Surgical indications for distal tibial epiphyseal fractures inchildren. Cai H, Wang Z, Cai H.

[2]. Clin Ter. 2016 NovDec;167(6):e155e161. doi: 10.7417/CT.2016.1961. Apophyseal and epiphyseal knee injuries in the adolescent athlete. Persiani P , Ranaldi FM , Formica A , Mariani M , Mazza O , Crostelli M , Villani C .

[3]. J PediatrOrthop. 2016 Dec;36(8):780786. Closed Reduction and Percutaneous Pinning Versus Open Reduction and Internal Fixation for Type II Lateral Condyle Humerus Fractures in Children Displaced >2 mm. Pennock AT , Salgueiro L, Upasani VV, Bastrom TP, Newton PO, Yaszay B.

[4]. Am J Emerg Med. 2017 Feb 6. pii: S07356757(17)301031. doi: 10.1016/j.ajem.2017.02.015. [Epub ahead of print] Open physeal fracture of the distal phalanx of the hallux: Case study, diagnosis and management. Morris B , Mullen S , Schroeppel P , Vopat B .