RESULTS OF TYPE-III SUPRACONDYLAR FRACTURE HUMERUS WITH OPEN REDUCTION AND INTERNAL FIXATION IN CHILDREN AFTER FAILED CLOSED REDUCTION

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Background: Supracondylar fracture of humerus is the second most common fracture in children which account for 60–75% of all fractures around the elbow. There are various treatment modalities for type-III fracture, i.e., closed reduction and casting, skeletal traction, close reduction and percutaneous pinning and open reduction and internal fixation. This study was conducted to see the outcome of open reduction and internal fixation after failed closed reduction. **Methods:** This study was conducted in the Orthopaedics Departments of Khyber Teaching Hospital Peshawar and Ayub Teaching Hospital Abbottabad from February 2007 to Nov 2007 on 30 children. Patients included were of either gender with age range from 5–12 years with displaced supracondylar fracture (type-III) after failed closed reduction. All fractures were fixed with two cross K-wires by open reduction and internal fixation. The patients were assessed both clinically and radiologically and results were tabulated according to Flynn criteria. **Results:** Twenty-eight patients had excellent results while two had good results according to Flynn criteria. None of the patients had either fair or poor result. **Conclusion**: Open reduction and internal fixation is a good and reliable method after failed closed reduction and gives stable fixation with anatomical alignment.

Keywords: Type-III Supracondylar fracture, open reduction and internal fixation

INTRODUCTION

Supracondylar fracture of humerus is the second most common fractures in children. It accounts for 60-75% of all fractures around the elbow in children. These fracture are seen in the first decade of life and reaches a peak at around the age of 8 years.[1–3] The incidence falls significantly after that .[4–5]

Typically these fractures occur due to fall on the outstretched hand with extended elbow.[6] The distal fragment displaced posteriorly in more than 95% of cases extension type and anteriorly in less than 5% flexion type. Gartland[7] classified extension type fractures into three categories based primarily on the degree of displacement.

Table-1: Gartland Classification

Type I	Un-displaced
Type II	Displaced with intact posterior cortex
Type III	Completely displaced with no cortex between the fracture fragments

Type-I undisplaced, type-II displaced with intact posterior cortex, type-III displaced with no cortical contact. Type-III occurs almost twice as frequently as type-II.

Type-I fractures require only simple external immobilization. The literature is full of numerous methods of treatment of displaced fractures. These fractures were previously treated by closed reduction with casting and traction but by the turn of this century the treatment began to change from simple passive methods to more aggressive and active methods. Gartland type-III supracondylar fractures need either close or open reduction and percutaneous pin fixation. If closed reduction fails, then open reduction is the only option. Open reduction must be carried out carefully to prevent complications like varus or valgus deformities, myositis ossificans, stiffness of the elbow, neurovascular complications and compartment syndrome.[8–11]

We share our experience of treating of those supracondylar fractures in whom closed reduction failed and had to be treated with open reduction and internal fixation with Kirchner wires (K-wires)

MATERIAL AND METHODS

The study was conducted on 30 patients. Children 5–12 years of age of either gender, and Type-III supracondylar fracture, in whom close reduction failed were included in this study.

All patients were operated under general anaesthesia with the patient in supine position. After proper scrubbing and draping closed reduction was attempted first. In the event of failure of closed reduction, a midline incision was given. Skin along with subcutaneous tissue was dissected and ulnar nerve was identified, dissected and isolated. Triceps muscle was elevated from medial and lateral side without cutting from either end. The fracture side was cleaned, washed, reduced and fixed with 2 crossed K-wires of appropriate diameter. In all these patients brachialis muscle was found to interposed between the two fragments and was responsible for the failed closed reduction. The ends of the wires were left outside the skin for easy removal.

The patients were seen at two, six and twenty four weeks. At two weeks, sutures were removed. At six weeks, K-wires were removed in the out-patients without anaesthesia after taking a radiograph of the elbow. Range of motion (ROM) exercises was started. The patients were assessed finally at twenty-four weeks for their final assessment. At that time a radiograph of both the elbows was taken. Patients were assessed clinically and radiologically for carrying angle and range of motion of elbow. The clinical outcome was assessed using Flynn criteria.[12]

Table-2: Flynn Criteria for fracture assessment

Results	Cosmetic factor-loss of carrying angle (degree)	Functional factors-loss of motion (degree)
Excellent	0–5	0–5
Good	6–10	6–10
Fair	11–15	11–15
Poor	>15	>15

RESULTS

Among the thirty patients with type III supracondylar fractures there were 20 (66.6%) males and 10 (33.3%) females with their mean age of 7 years (range 5–12 years). Left side were involved in 21 patients (70%) and right side in 9 patients (30%). None of the patients was lost to follow-up.

Twenty-eight (93.3%) patients were found to have excellent results while 2 had good outcome according to Flynn criteria. None had either fair or poor results. Three patients developed pin sites infection that resolved with local care and oral antibiotics. One patient developed transient ulnar nerve palsy after K-wire removal, which resolved after 3 months.

DISCUSSION

Open reduction and internal fixation for displaced supracondylar humerus fracture is a good modality of treatment when closed reduction fails. The crossed k-wires give more stability as compared to two lateral k-wire,[13–15] although this procedure is associated with soft tissues trauma and risk of infection, still it is associated with excellent outcome. Anatomical reduction can be achieved with this procedure. We evaluated our results according to Flynn criteria and achieved excellent results in 28 patients (93.3%) and good results in two patients (6.66%) which is comparable with the results of Ababneh *et al*[16] and Umer *et al*[17], who reported 87% and 100% excellent results respectively.

In another study[18] on 71 patients, boys were 47 (66.2%) and girls were 24 (33.8%) with left elbow in 22 (30.9%) patients and having good to excellent results in 91.8% which is comparable to this study.

CONCLUSION

Open reduction and internal fixation for type III supracondylar fractures of humerus is a good method of treatment of supracondylar fractures in patients with closed reduction failure. It is a stable fixation and ensures good to excellent results.

REFERENCES

1. Eliason EL. Dressing for supracondylar fractures of humerus. JAMA 1924;82:1934–5
2. Wilson PD. Fractures and dislocation in the region of elbow. Surg Gynecol Obstet 1933;56:335–59.
3. Cekanauskas E, Degliūte R, Kalesinskas RJ. Treatment for supracondylar humerus fractures in children,according to Gartland classification. Medicina 2003;39:379–83.
4. Henrikson B. Supracondylar fracture of humerus in children. Acta chir Scand Suppl 1966;369:1–72.
5. Gillingham BL, Rang M. Advaces in children elbow fractures (editorial). J Pediatrr Orthop 1995;15:419–21.
6. Shim JS, Lee YS. Treatment of completely displaced fracture of the humerus in children by cross-fixation with three K-Wires. J Pedtiatr Orthop 2002;22(1):12–6.
7. Gartland JJ. Management of supracondylar fracture of humerus in children. Surg Gynecol Obstet 1959;109:145–54.
8. Davis RT, Gorczyca JT, Pugh K. Suprracondylar humerus fractures in children. Comparison of operative treatment methods. Clin Orthop Relat Res 2000;376:49–55.
9. Shim JS, Lee YS. Treatment of completely displaced supracondylar fracture of humerus in children by cross-fixation with three kirschner wires. J Pediatr Orthop 2002;22(1):12–6.
10. Lee SS, Mahar AT, Miesen D, Newton PO. Displaced pediatric supraconular humerus fractures: Biomechanical analysis of percutaneous pinning techniques. J Pediatr Orthop 2002;22(4):440–3.
11. Skaggs DL, Hale JM, Bassett J, Kaminsky C, Kay RM, Tolo VT. Operative treatment of supracondylar fractures of humerus in children. The consequences of pin placement. J Bone Joint Surg Am. 2001;83:735–40.
12. Flynn JC. Mattews JG. Beriot RL. BUCD pinning of displaced supracondylar fracture of humerus in children. J Bone Joint Surg 1974;56-A:263–72.
13. O, Hara IJ. Barlow JW. Clarke NM. Displaced supracondylar fractures of the humerus in childrens. Audit changes practice. J Bone Joint Surg Br 2000;82:204–10.
14. Mostafavi HR. Spero C. Cross pin fixation of displaced supracondylar humerus fracture in children. Clin Orthop 2003;376:56–61.
15. Minkowitz B. Busch MT. Supracondylar fracture of humerus. Current trends and controversies. Orthop Clin North Am 1994;25:581–94.
16. Ababneh M. Shannak A, Agabi S, Hadadi S.The treatment of displaced supracondylar fractures of the humerus in children. A comparison of three methods. Int Orthop 1998;22:263–5.
17. Umar M, DeSousa OP. Supracondylar fractures of humerus in children. An analysis of different treatment modalities at the Aga Khan University Hospital Karachi. Pakistan. Pak J Surg 1991;7:16–22.
18. Diri B, Tomak Y, Karaismailoglu TN. The treatment of displaced fractures of the humerus in children (an evalution of three different treatment methods). Ulus Trauma Derg 2003;9(1):62–9.

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