



THE APPROACH OF SUPRACONDYLAR HUMERUS FRACTURES IN CHILDREN

Orthopaedics

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ABSTRACT

Surgical techniques of supracondylar fractures in children are repeatedly the subject of discussion. This study compared the experience with the technique of crossed Kirschner wires at our hospital with current literature.

METHODS:- This study was performed from April 2020 to May 2021, a total of 80 children aged 2 to 12 years were treated using crossed K-wire osteosynthesis. This study was performed in the Department of Orthopaedics, MGMMCH, Jamshedpur, Jharkhand. Follow-up was conducted at an average of 32 months. Results were evaluated based on von Laer's criteria.

RESULTS:- The complications were migration of the K-wires in seven percent of cases and secondary dislocation and re-operation in 4% of cases. Lesion of the radial nerve was diagnosed postoperatively in two cases. On average, the hospital stay was two days postoperative immobilization in an upper arm splint and implant removal after six weeks. More than half of children received physiotherapy during treatment. Satisfactory results were recorded for 83% of patients.

CONCLUSION:- K-wire osteosynthesis is connected with a low difficulty rate and is a safe procedure for stabilizing supracondylar humerus fractures.

KEYWORDS

paediatric fractures, supracondylar humerus fracture, Kirschner wires.

INTRODUCTION:-

The most repeated fracture pattern at the elbow in children is the supracondylar humerus fracture.^[4,9] However, undisplaced fractures or a bit displaced remain the territory of conservative therapy and are treated with an upper arm splint or Blount sling.^[1] On the other hand, a colorful variety of treatment direction is on offer for the more severe, displaced fractures, whereby surgery is always recommended. The techniques advocated by the various authors range from K-wire osteosynthesis to external fixator to ESIN,^[2,3] although the different methods are constantly under controversial discussion. These discussions focus mainly on expected outcomes, stability, and aftercare, as well as possible complications. The latter include vascular and neurological lesions and axial deviations such as Cubitus varus. Which may guide to asymmetries and permanent restriction of movement. The present study aimed to compare our outcome after crossed K-wire fixation of supracondylar humerus fractures with the clinical result reported in the literature, including a study of economic considerations such as operation time, hospital stay time, and the frequency of physiotherapeutical aftercare.

MATERIAL AND METHODS:-

In the period from April 2020 to May 2021, a total of 80 children (aged 2 to 12 years) were treated using crossed K-wire osteosynthesis. This study was performed in the Department of Orthopaedics, MGMMCH, Jamshedpur. A total number of 80 children (aged 2 to 12 years) with a supracondylar humerus fracture were treated surgically using crossed K-wire osteosynthesis. Patient record were collected retrospectively from the patient files and radiographs at our hospital. The follow-up were inspected by the assessment method of von Laer. According to this method, evaluation of treatment success is based on joint orientation and restriction of movement compared with the contralateral side, as shown in table-1.

Tab. 1. Table showing evaluation according to von Laer.

Outcome	Axial deviation	Restricted movement
Satisfactory	0° - 5°	0° - 10°
Unsatisfactory	>5	>10

An outcome is observed unsatisfactory if there is an axial deviation >5° and a functional deficit of >10°. In the evaluation of treatment outcomes for any patient, the poorer result determines the overall outcome.^[4]

RESULT & DISCUSSION:-

A total of 73% of children who had received crossed K-wire osteosynthesis were accessible to follow up. Twenty-one of these

children were operated in open technique and 66.1% in closed technique. Seven children needed repeat surgery, and six of them came to follow up. At the accident time, the average patient age was 6 to 7 years. Of the total sample, 14 children experienced peri- or postoperative complications. In 6 children, the migration of the K-wires required reosteosynthesis in two cases but only premature implant removal in the four other cases. In 4 cases (4.7%), fracture-dislocation was diagnosed in the postoperative period leading to subsequent open revision. One boy was re-operated to treat consolidation in malalignment. The surgical procedure intricated open reduction and stabilization by plate fixation. At follow up there was still apparent axial deviation and flexion contracture. One-third of the fractures treated were identified as von Laer Type III fractures and more than half as von Laer Type IV fractures [Fig 1 & 2].

Pre - operative

Post - operative



Figure -1:- 7-year-old boy with a Type 3 fracture

Pre - operative

Post - operative



Figure -2:- 8-year-old boy with a type 4 supracondylar fracture

The patients also complained of recurrent pain in the shoulder and arm and numbness in the forearm. Open surgery was performed in 30 patients because closed trimming was impossible. Repeat surgery was required in 7 cases due to various complications. In the patient under

investigation, 35 children (56%) attended physiotherapy during the aftercare period, whereby the number of physiotherapy sessions varied considerably. Twenty-seven children (43.5%) were not prescribed physiotherapy. In 7 children (11%), unsatisfactory restoration of the anatomical axis of the arm was identified. A slight varus axis of the injured arm was apparent in all these cases, whereby two children were clear cases of cubitus varus.

Supracondylar humerus persistent is a frequent injury in childhood age between 4 and 9 years. So far better technique to stabilize displaced fractures has been crossed K-wire osteosynthesis. The difficulty rates found in studies of this technique are surprisingly low. Early functional care has the unique advantage that a full range of motion is soon restored. One advantage of K-wire fixation over ESIN stabilization is the little screening time. Schaffer et al. report a screening time of 5 minutes.^[5]

In comparison, a time of only 1.5 minutes was recorded for the patient sample. In this study, however, the fractures treated with ESIN were 85% Type II fractures, which means that direct comparison will only be feasible when a larger patient sample with more acute fractures becomes available. Given the high risk of ulnar damage explained in the past, several authors investigated lateral K-wire fixation only. Kallio et al. found reduction loss in 14% of cases. In all cases, primary malposition of the wires was established. Hence, the insertion of a third wire was recommended for more acute, unstable fractures. A similar rate of reduction loss (8%) was also initiated in this study, which corresponds more or less to the findings of the multicenter study by Weinberg et al.^[6] with a revision rate of 6%.

In comparison with other published reports, this initially seems to be a high percentage. For example, Schaffer et al. and Skaggs et al. report no revisions repeat the operation. However, if the examination is scrutinized, Mangwani et al. found 11% in the groups with Type III and Type IV fractures alone. The external fixators proved to be the best alternatives. In another biomechanical study, Zions et al.^[7] compared crossed K-wire technique with lateral K-wire fixation alone. More excellent stability was reached with the crossed technique. Given these results and biomechanical findings of our study, we cannot state any clear advantage for lateral technique alone. About the constant demand for cost reduction in the health sector, the patient sample was investigated in terms of possible savings. The hospital stay after closed reduction was one day, and after open reduction, it was two days. It looks that the so-called "savings potential" as addressed in the von Laer et al. multicenter study has been implemented since hospital stay for their patients was five days for closed reduction and seven days for open reduction. A complex problem in our study was that the parents demanded physiotherapy even after adequate explanation. From an economic point of view, the indications for physiotherapy should be critically examined, and prescriptions should be tailored to meet individual needs. It can be assumed that the area of physiotherapeutic aftercare in our patient sample offers great savings potential.

CONCLUSION:-

Crossed K-wire fixation is a well-proven standard procedure in the treatment of supracondylar humerus fractures in children. The best clinical outcome and a low difficulty rate confirm the continued validity of the procedure. In our thinking, further studies of the ESIN method need to be completed before sound recommendations can be given. The current assessment of this method concludes that it is better suited to treating simple fractures, and there is a clear disadvantage in terms of radiation exposure due to the longer screening times. If fractures are challenging to reduce, a valuable alternative to open reduction may be stabilization using an external fixator, whereby this solution is currently under clinical examination. From an economic standpoint, many physiotherapy sessions need to be evaluated as to their necessity and reduced if possible.

REFERENCES:-

1. KIM, W. Y.: Early or delayed surgical treatment of supracondylar humeral fractures in children. *J. Bone Jt Surg.*, 84-A: 1079–1080, 2002.
2. MEHLMAN, C. T., STRUB, W. M., ROY, D. R., et al.: The effect of surgical timing on the perioperative complications of treatment of supracondylar humeral fractures in children. *J. Bone Jt Surg.*, 83-A: 323–327, 2001.
3. MELLOR, S. J., PATEL, V. R.: Early or delayed surgical treatment of supracondylar humeral fractures in children. *J. Bone Jt Surg.*, 84-A: 1078–1079, 2002.
4. SKAGGS, D. L., CLUCK, M. W., MOSTOFI, A., et al.: Lateral entry pin fixation in the management of supracondylar fractures in children. *J. Bone Jt Surg.*, 86-A: 702–707, 2004.
5. SCHAFFER, K., BOHM, R., DIETZ, H. G.: (Elastic stable intramedullary nailing (ESIN) of supracondylar fractures of the humerus in children). *Unfallchirurg*, 110:

852–858, 2007.

6. WEINBERG, A. M., MARZI, I., GUNTER, S. M., et al.: (Supracondylar humerus fracture in childhood—an efficacy study. Results of a multicenter study by the Pediatric Traumatology Section of the German Society of Trauma Surgery—I: Epidemiology, effectiveness evaluation and classification). *Unfallchirurg*, 105: 208–216, 2002.
7. ZIONTS, L. E., MCKELLOP, H. A., HATHAWAY, R.: Torsional strength of pin configurations used to fix supracondylar fractures of the humerus in children. *J. Bone Jt Surg.*, 76-A: 253–256, 1994.