

A REVIEW OF RECENT SUPRACONDYLAR FRACTURES OF THE HUMERUS IN CHILDREN

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INTRODUCTION

Supracondylar fractures of the humerus is one of the commonest injury of the elbow in children. It is a fracture with an excellent prognosis given proper management and treatment. In Singapore many patients with such a fracture come directly to hospital as emergency cases, but a fair number, however, will be seen by the general practitioners and Chinese sinseh before they may be referred here.

The object of this study is to review the number of cases admitted into the wards of the department of Orthopaedic Surgery, 'O' Unit, Outram Road General Hospital, within the duration of one year, and from this exercise, to determine the types of cases seen and their complications, to assess the results of treatment with traction in a Thomas splint, to derive some conclusions from this study and to compare what is being seen here with similar cases elsewhere.

CLINICAL MATERIAL

About 100 cases of supracondylar fractures of the humerus were seen at the 'O' Unit within the period October 1968-69. The present study comprise 53 cases and includes only those cases admitted for treatment—about 50% of the patients were treated at the casualty unit, not requiring any manipulation or reduction, and sent home. The fractures were classified into three types according to the degree of displacement: Grade 1, fractures without displacement (6 cases, 11.3%); Grade 2, displacement in one or more directions but with partial contact between remaining fragments (33 cases, 62.3%); Grade 3, complete displacement with loss of contact between fragments (14 cases, 26.4%).

Table I shows the distribution by age and sex of the 46 male and 7 female patients. There is a high incidence of these fractures between the ages 4 to 8 years. There were 38 Chinese patients, 8 Malays, 5 Indians and 2 of other races. Injuries to the right elbow numbered 22, while there were 31 cases involving the left elbow. Tables II and II(a) compare these figures with other series.

44 cases were seen and treated within 24 hours after the injury was sustained, the others came to hospital within a time interval ranging from 2 days to 1 month. A total of 11 cases admitted to having had initial treatment by a Chinese sinseh, or were treated at home by the patient's parents with herbs and oils, or were seen by general practitioners. There was one case with severe Volkman's ischemic contracture of the right forearm and hand and this patient was treated one month prior to being seen here by a sinseh. There were no compound fractures.

The history most commonly given is a fall off a chair or off bed, or while at play. In nearly 80% of cases, these accidents occurred at home. The cases admitted to hospital were on account of gross soft tissue swelling at the elbow, neurovascular complications, or because they required reduction either by manipulation or by traction. Table III shows the number of cases requiring operation in addition to the standard treatment of manipulation of the fracture while under general anaesthesia or a strong analgesic like pethidine followed by traction in a Thomas splint. The table also shows the average duration of stay in the ward for the different grades of fracture. Table IV shows the results of treatment used in the present series and the complications encountered that required operative treatment are shown in Table V.

DISCUSSION

It is estimated that supracondylar fractures of the humerus occur in Singapore with a frequency of about 200 cases a year; 50% of these being managed by the Orthopaedic 'O' and 'C' Units respectively. Wong (1966) in an epidemiological study of humeral fractures in Singapore over 2 years found 462 cases of supracondylar fractures of the humerus out of 861 cases of fractures of the arm. The male to female ratio was given as 2.2:1.

The treatment for such fractures varies in different centres, and the methods in use today include: (a) skin traction, Dunlop (1939); (b) open reduction with internal fixation, Holmberg (1942); Sandegard (1943); (c) fixation by

TABLE I
DISTRIBUTION OF PATIENTS ACCORDING TO AGE AND SEX

Age in years	1	2	3	4	5	6	7	8	9	10	11	12	13+	Total
Males	0	1	2	2	8	5	7	7	2	2	2	3	5	46
Females	0	0	0	3	1	0	1	1	0	1	0	0	0	7
TOTAL	0	1	2	5	9	5	8	8	2	3	2	3	5	53

TABLE II
COMPARISON WITH OTHER SERIES IN INCIDENCE BETWEEN
MALES AND FEMALES

Present (1969)	Wong (1966)	El-Sharkawi (1965)	Lipscomb (1955)	Hoyer (1952)
53 cases 1968-1969	462 cases 1962-1963	115 cases 1962-1963	108 cases 1943-1952	52 cases 1935-1947
Males 87%	67%	74%	73%	62%
Females 13%	33%	26%	27%	38%

TABLE II(a)
COMPARING RIGHT TO LEFT SIDED INJURIES WITH OTHER SERIES

	Present (1969)	El-Sharkawi (1965)	Mitchell (1961)	Lipscomb (1955)
Right	22	77	31	35
Left	31	38	60	73
TOTAL	53	115	91	108

TABLE III

DISTRIBUTION OF PATIENTS BY GRADES AND SHOWING THE NUMBER OF CASES TREATED BY SINSEHS, THE NUMBER OPERATED, AND THE AVERAGE LENGTH OF STAY IN HOSPITAL

Grade	No. Cases	%	No. Treated by Sinsehs	No. Operated	Average Days in Hospital
1	6	11.3	3	0	4
2	33	62.3	6	3	8
3	14	26.4	2	6	16
TOTAL	53	100	11	9	—

TABLE IV

TO SHOW THE RESULTS OF TREATMENT WITH METHODS USED IN THE PRESENT SERIES

Treatment	No. Cases	Complications Neurovascular-motor Deformity	Recovery that is Satisfactory	No Recovery or Unsatisfactory Results	Too Early to Assess	Total
M & R POP Slab.	14	2	8	3	3	14
M & R with Traction	10	1	7	1	2	10
TRACTION alone	20	2	13	4	3	20
OPERATION	9	9	5	3	1	9
TOTAL	53	14	33	11	9	53

TABLE V

VARIOUS OPERATIVE TREATMENT REQUIRED

Exploration of radial nerve	1 case
Exploration of median and radial nerve	1 case
Exploration of median nerve and internal fixation	1 case
Open reduction alone	1 case
Open reduction with internal fixation	3 cases
Corrective osteotomy	2 cases
TOTAL	9 cases

closed transfixation with a Kirschner wire across the fracture line, Judet (1947); Swenson (1948); (d) traction using Schmerz hook in Sembs abduction frame, Hoyer (1952); (e) fixation by shoulder spica, Madsen (1955); (f) skeletal traction by Kirschner wire, Smith (1960); (g) fixation in full flexion, Mitchell and Adams (1961); Attenborough (1953); (h) fixation in full extension, El-Sharkawi and Fattah (1965).

The method used in this department is essentially the same as that described by Tanna, (1968). For the majority of cases we use traction in a Thomas splint with the arm in near—full extension; the period of traction being variable depending on when the reduction becomes acceptable. Weights ranging from 2 to 6 pounds are used and frequent check X-rays are taken. Once the elbow oedema subsides, and the position of the distal fragment is shown by X-rays to be acceptable, the arm is progressively put into flexion and traction terminated. The elbow is then immobilised in a plaster-of-Paris back-slab for 3 weeks after which time active exercises is encouraged. Passive physiotherapy is not recommended and this has universal agreement. In a few cases where the position of the distal fragment after manipulation and reduction was found to be stable, the elbow was at once immobilised in a plaster-of-Paris back-slab without preliminary traction. With this method patients have been hospitalised for short periods with rapid return of elbow function and decreased length of time required for follow-up.

The age group in this series compares well with other studies and the preponderance of male to female patients is also confirmed. Left sided injuries is the more frequent, and Holmberg, Lars (1945) pointed out that the reason for the greater frequency of accidents affecting the left side is probably due to the fact that in right handed persons, the left arm has weaker muscles and is possibly used in a less skillful way. The left arm is also used more often in motions of protection and guarding than the right and therefore more prone to injury. The fracture occurs more in boys than girls because boys are livelier and their games rougher.

Table IV shows the results of treatment using the methods described above. Of the 53 cases, 9 were either too early in their follow-up for assessment, or did not turn up for follow-up at all. Complications were met with in 14 patients and of the 9 who required operative treatment, there were 5 patients with satisfactory results. Of the remaining 4 cases, two had exploration of radial and median

nerves at a late stage because this complication arose from treatment initially received outside hospital, one case had corrective osteotomy for bad varus deformity which did not improve clinically postoperatively, and the remaining case comes under the category of too early for assessment.

The criteria set here for a satisfactory result includes the return of full function of the elbow, the absence of deformity and recovery from any complications. Of 20 patients treated by traction in a Thomas splint, 13 showed full recovery. 10 patients received manipulation and reduction prior to traction and 7 had satisfactory results. Only 8 out of 14 patients treated by manipulation and fixation in a plaster slab recovered satisfactorily.

It would appear from this analysis that traction alone or traction in conjunction with manipulation gives better results than manipulation and fixation in a plaster slab. If the nine cases are excluded from this assessment, the success rate obtained is 75%. Madsen (1955) with 30 patients had ideal results in 80% of his cases using the same criteria, and El-Sharkawi (1965) with 115 cases scored excellent results in 72.4% of his cases. The former uses a plaster shoulder spica with the arm in lateral rotation while the latter favours a plaster cylinder with the arm in full extension and full supination. Employing the same methods used in this series of traction in a Thomas splint, Tanna (1968) has obtained similar good results in his 48 cases.

In the present study there were 8 recorded cases of cubitus varus deformity ranging from 5 to 30 degrees. In this connection it should be mentioned here that these 53 cases have yet to be followed up further for a few years more before a final assessment of such deformities as cubitus varus or valgus can be made. Deformities such as these are preventable if care is taken in the initial treatment to keep the alignment of the elbow correct and this is facilitated by traction or fixation in extension. Attenborough (1953) firmly believes that provided the alignment is good, remodelling of the humerus towards restoration of normal anatomy is rapid if the fracture is allowed to unite. It is only in children that remodelling can be relied upon.

SUMMARY

The pattern of supracondylar fracture of the humerus in children is studied from cases seen

over a one year period. Initial findings are discussed and compared with other series elsewhere, and treatment used in the department described.

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