



Orthopaedics

A COMPARATIVE ANALYSIS OF FUNCTIONAL AND RADIOLOGICAL OUTCOME BETWEEN SURGICALLY AND CONSERVATIVELY MANAGED TYPE 2 SUPRACONDYLAR HUMERUS FRACTURE: PROSPECTIVE ANALYSIS IN 121 PATIENTS

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ABSTRACT **Introduction:-** Supracondylar humerus fracture is one of the common feature in paediatric age group. Although there are clear cut guidelines for management of type- 1 and type- 3 supracondylar humerus fracture, literature is still lacking for type-2 supracondylar humerus fracture. Here we have conducted a study in our tertiary care hospital and try to a formulate optimal management approach in type- 2 supracondylar humerus fracture cases.

Materials and methods:- It was a retrospective study, comprising total 121 patients in a tertiary care hospital. Out of 121 patients , 73 patients were managed by conservative method with closed reduction and plaster cast in group-1 and 48 patients were managed with operative intervention using closed reduction and K wire in group-2. The outcome measures were assessed at 6 month by final radiograph bony alignment in both sagittal and coronal plain, rotational malalignment by clinical examination, range of motion in elbow joint, pain as per VAS score and complications in the form of neuro-vascular injury, infection, avascular necrosis of trochlea, iatrogenic fracture and complication related to anaesthesia.

Results: The functional and radiological outcome in both the groups are comparable. Complications rate in the form of ulnar nerve neuropraxia was found to be significant in group-2 in comparison with group-1.

Conclusion:- The conservative method of treatment has good functional and radiological outcome as that of operative method. All patients can be given a conservative trial with maintenance of reduction with plaster cast before planning operative intervention.

KEYWORDS : type-2 supracondylar humerus fracture; children; closed reduction; K wire.

INTRODUCTION:-

Supracondylar humerus fracture is the commonest fracture in children, occurs due to fall on outstretched hand (1). As per the wilkin's modified Gartland classification it is divided into type 1, type 2 and type 3. Type 1 supracondylar humerus fracture involves undisplaced or minimally displaced fracture. Type-2 supracondylar humerus fracture involves angulation of the distal fragment with cortical contact and Type- 3 supracondylar humerus fracture involves displaced distal fragment (2). Although there are clear cut management protocol type 1 and type 3, type 2 being a borderline condition associated with lot of controversy regarding management and it is usually managed by both conservative as well as operative methods (3-12). Similarly the classification system is also insufficient to address vast variation of fractures depending upon extent of fracture, saggital and coronal alignment of fracture configuration and rotational component in the fracture geometry in type-2 supracondylar humerus fracture(1,11,13).

Here we have conducted retrospective study to evaluate functional and radiological outcome with type 2 Gartland supracondylar humerus fracture managed either conservatively or operatively. The aim of the study is to evaluate the functional and radiological outcomes in patients with type 2 Gartland supracondylar humerus fracture managed by both the procedure (conservative/ operative) in the form of bony alignment, range of motion, pain and complications to reach at a consensus of optimum treatment protocol. Our hypothesis was to achieve better functional and radiological outcome in the group of patients who have undergone conservative management as patients who have undergone operative intervention were supposed to sustain more traumatic injury and with failed closed manipulation procedures.

MATERIALS AND METHODS:-

The study was a retrospective analysis conducted at a tertiary Care Hospital from november 2014 to november 2018. Patients of age group less than 14 years with type 2 supracondylar humerus fracture were included in the study. Patients with collagen disorders, neurovascular injury, compartment syndrome, open injury, pathological fracture, abnormal opposite side elbow, delayed presentation after one week and with infection we are excluded from the study. The patients who denied for a valid consent and who were unfit for surgery were excluded from the study as well.

Following strict inclusion and exclusion criteria total 121 patients were selected for the study. Out of 121, 73 patients (60.3%) were found to be managed by closed reduction (with and without anaesthesia) and immobilised by plaster cast at 100-110 degree flexion for 6 weeks were included in group-1. In remaining 48 patients (39.6%) operative intervention was carried out in the form of closed reduction and fixation with K wire under anaesthesia and were included in group-2. All the patients were operated in the same Institute and by single chief surgeon. All patients were immobilised for 6 weeks and similar rehabilitation protocol was carried out. All patients with operative intervention were advised for regular pin tract dressing daily.

The outcome measures were assessed at 6 month by final radiographic bony alignment in both sagittal and coronal plain, rotational alignment by clinical examination, range of motion in elbow joint, pain as per VAS score and complications in the form of neuro-vascular injury, infection, avascular necrosis of trochlea, iatrogenic fracture and complication related to anaesthesia. All data were evaluated and compared using SPSS version-19 software.

RESULTS:

At 6 week post operative period varus and valgus malalignment was estimated from radiograph by comparing with the normal limb. More than 2 degree of variation from the normal side was accepted as significant and termed as malalignment. 6.8% of patients in group-1 and 6.2 % patients of group-2 were found to be united in varus and 4.1% of patients in group-1 and 6.2% patients in group-2 were found to be united in valgus. By clinical examination 8.2% patients in group-1 and 8.3% in group- 2 were found to have rotational malalignment of more than 20 degree as compared to that of normal side. Similarly malalignment in extension was observed in 8.2% of patients in group-1 and 6.2 % patient in group- 2. The relative arch motion with less than 80% of normal side was found in 4.1% of patients in group-1 and group-2. In 2.0% patient in group-2 , pain with VAS score=3 was present. In 2% cases in group- 2 superficial as well as deep infection was found. In 4.1% population of group-2 associated with ulnar nerve neuropraxia and it improved in 2 weeks, at the time of suture removal. There was no post operative radial nerve palsy, avascular necrosis of trochlea, iatrogenic fracture or anaesthetic complications associated with the patients in the study group. Out of all parameters studied, only

the difference in ulnar nerve palsy was found to be significant between the two groups.

Post operative parameters	Group-1 (conservative) (n=73)	Group-2 (operative) (n=48)
Varus Malalignment	5(6.8%)	3(6.2%)
Valgus Malalignment	3(4.1%)	3(6.2%)
Rotational Malalignment	6(8.2%)	4(8.3%)
Extension Malalignment	6(8.2%)	3(6.2%)
Relative arch of motion <80 % of normal side	3(4.1%)	2(4.1%)
Pain (VAS Score>2/10)	0(0.0%)	1(2.0%)
Radial nerve palsy	0(0.0%)	0(0.0%)
Ulnar nerve palsy	0(0.0%)	2(4.1%)
Avascular necrosis of trochlea	0(0.0%)	0(0.0%)
Superficial pin tract infection	0(0.0%)	1(2.0%)
Deep pin tract infection	0(0.0%)	1(2.0%)
Iatrogenic fracture	0(0.0%)	0(0.0%)
Anaesthetic Complication	0(0.0%)	0(0.0%)

DISCUSSION:-

There is no definite consensus in the present literature on treatment of type- 2 Gartland supracondylar humerus fracture. Surgical management is described in most of the literature (3-9), where as conservative treatment is preferred in few literature (10-12). But it is a known fact that, surgery is an unnecessary procedure that is being practised in about 77% of cases (10). For a successful management, detailed clinical examinations, thorough radiological analysis and proper reduction technique is paramount (11,12).

Fracture geometry has also major role in deciding the type of treatment. Fitzgibbons et al. showed in their retrospective study of 61 patients that increased failure in the non operative treatment in fractures with increased degree of extension deformity in preoperative period. Due to extension deformity there is increased chance of failure of reduction and failure of maintenance of reduction in the plaster cast (13).

In our study, both conservative and operative procedures have similar radiological and functional outcome. In non operative methods, it is important to maintain the reduction which was achieved during the intra-operative manoeuvre by putting the above elbow cast in about 100-110 degree. Failure to obtain the reduction or maintain reduction, is an indication for surgery.

The complications rate in our study is comparable to that present in the literature (9,14). Incidence of ulnar nerve palsy is significant in operative group as compared with conservative group. Other parameters like malunion, pain, radial nerve palsy and infection rates are comparable between the two groups. But the incidence of malunion is more in non operative group mainly because of failure of maintenance of reduction in the plaster cast.

The limitation of this study is that, it is a retrospective study. The radiological and clinical observations were subjective and it was not standardised. Similar study including more number of cases can be useful to provide more evidence about type-2 supracondylar humerus fracture management.

CONCLUSION:-

Both conservative and operative intervention in type- 2 supracondylar fracture humerus have similar radiological and functional outcome. All patients with such fracture should be tried with conservative treatment to reduce and maintain the fracture in plaster cast. Failure to reduce or failure to maintain the fracture invites surgical intervention. Care should be taken to avoid nerve injury during pinning.

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