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A Clinical Study on Internal Fixation of Supra Intercondylar Fractures of Adult Humerus

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ABSTRACT
The aim of the study is to assess the outcome of the increasing trend of operative internal fixation for such fractures. The clinical study also included a detailed assessment of surgical treatment and its operative principles.
Objectives: *To evaluate the usefulness of internal fixation as a treatment modality for these fractures and to assess the results.*
Materials and Methods: *A prospective study of 40 cases of supra intercondylar fractures of adult humerus treated at Govt. Medical College Trivandrum, whose clinical and preoperative and postoperative assessment were done.*
Result: *Operative internal fixation proved to have very good results assessed by clinical and radiological parameters and had very few complications.*
Conclusion: *Excellent modality of treatment for supraintercondylar fractures of adult humerus.*
Keywords: *Supra intercondylar fractures, double plating, intercondylar fixation, early mobilization.*

Background

Supra intercondylar fractures present a formidable challenge to the orthopaedic surgeon. In the past considerable disabilities had been unavoidable after intercondylar humeral fractures. The traditional view was that internal fixation; despite apparent radiographic success, did not necessarily give functional benefit and occasionally resulted in gross stiffness.

Recommendation for treatment have ranged widely from essentially no treatment to operative reduction and extensive internal fixation.

The recent trend has been immediate open reduction, stable internal fixation and early post operative active range of motion. The anatomic complexity of the distal humerus combined with the frequency of comminution and displace-ment makes surgical reconstruction difficult. The fabrication of new implants however has increased the reliability of open reduction while placing additional demands upon the surgeons expertise. This study is an attempt at evaluating the merits and demerits of internal fixation, to assess the functional result of the elbow after internal fixation, and to know whether the possibility now exists to achieve improved and more predictable results with the operative treatment of even the comminuted intercondylar fracture.

Materials and Methods

We used the Muller classification system for it versatility and is almost similar to AO classification but simpler to understand. This system divides these fractures in to three major groups, each with three subgroups. Group 'A' encompasses all extra articular fractures. Group 'B' and 'C' comprise the intra articular fractures. Group 'B' contains the unicondylar fractures where as the group 'C' consists of the bicondylar fractures. The subgroup C1 of 'C' fractures represents the classic 'Y' fractures with or without separation of the condylar fragments, subgroup C2 includes all C1 fractures with supracondylar comminution. Subgroup C3 fractures have both articular and supracondylar comminution.

This Chief goals of open reduction and internal fixation of distal humeral fractures include exact reduction, stable fixation and early joint motion with an end result of a normal elbow that is one with normal anatomy and normal function.

Our armamentarium

1. 1/3 Tublar plate
2. 3.5 System Narrow DCP
3. SCREWS : 4 mm cancellous Screw – mainly used in the fixation of the intercondylar element.
4. System cortical screws are used along with plates to reconstruct the pillars.
5. Different size kirschner wires are also needed for the temporary fixation
6. Basic Orthopaedic set

Surgical approaches for open reduction of the T & Y fractures can be broadly classified in to.

1) Triceps Approaches
2) Transosseous (Transolecranon) approach. Both these are posterior approaches
3) Posterolateral approach
4) Anterior approach

The following surgical principles should be strictly observed in the internal fixation of this fracture.

1) Articular fragments must first be assembled and stabilized.
2) If there is loss of articular surface the condyles should be fixed with a non-lag screw and the gap is bone grafted.
3) In re-establishing condylar shaft fixation the epitrochlear ridges, which are often separate fragments, serves as essential buttresses to the condyles. Their continuity with the humeral metaphysis must be re-established before the condyles can be stabilized to the shaft.
4) Proximally directed screws must engage the opposite cortex to achieve fixation; the cacellous bone of the distal humeral shaft will not adequately hold a screw.
5) In reattachment of the condyles to the humeral shaft the placement of the screw must be within the centers of the supracondylar columns. Inaccurate placement of these screws, or imperfect reduction of the condyles will decrease the size of the olecranon fossa. If this occurs, the olecranon will not fit in to the fossa and elbow extension will thus be limited.
6) The olecranon fossa must be cleared of bone, and debris. The entire bone of the olecranon fossa and even the tip of the olecranon my be excised with impunity and even benefit.
7) Restoration of the alignment of the axis of motion through the center of the capitullum and trochlea and in line with the anterior cortex of the humerus maintaining the proper anterior angulation of the condyles is necessary to prevent loss of motion due to impingement.

Post operatively if a stable fixation has been obtained the arm may be placed in a removable splint. However, immediate active mobilization without any splint is preferable. Active flexion and extension exercises, at first in a horizontal place to exclude gravity, should be started within two days.

Results

Table -1 Of fractures – Muller et al

Type of fractures	No. of patients	Percent
C1	20	50
C2	10	25
C3	10	25

Table -2 Complication

Complication	No. of patients	Percent
Neuropraxia of ulnar nerve	4	10
Infection	2	5
Myositis Ossificans	4	10
Delayed union	2	5
Implant failure	2	5

Result were graded according to Jupiter criteria. An excellent rating was given for extension to 15 degrees and flexion to 130 degrees; good rating for extension to 30 degrees and flexion to 120 degrees: fair rating, for extension to 40 degrees and flexion to 90 to 120 degrees; and poor rating for extension to 40 degrees and flexion to less than 90 degrees. The data on the elbow motion were combined with the patients subjective symptoms to provide an overall functional rating. An excellent rating was given for a symptom free elbow with normal or nearly normal range of motion with some subjective symptoms; a fair rating for a fair range of motion with or without symptoms; and a poor rating for both limited mobility and limited function.

Table -3

	Range of movement (degree)			
	Loss of extension	Flexion	Pain	Disability
Excellent	<15	>130	None	None
Good	<30	>120	Slight	Minimal
Fair	<40	>90	With activity	Moderate
Poor	<40	>90	Variable	Severe

Table -4

Result	No. of patients	Percent
Excellent	24	60
Good	10	25
Fair	4	10
Poor	2	5

Table -5 Average movement achieved in each type of fracture

Fracture type	Total degree of flexion / extension
C1	120
C2	100
C3	80

Discussion

Operative internal fixation of supra intercondylar fractures of the adult humerus gives consistently better result than conservative management. Intra articular realignment of fragment at the earliest opportunity with stable fixation and early active mobilization is the key to success. In difficult cases with communition posterior approach with olecranon osteotomy and transposition of ulnar nerve yielded the best results. Present trends are using locking plates in osteoporotic bone $90^0 90^0$ configuration (ie medial plate medially and lateral plate posteriorly) and bilateral tension band.

Conclusion

Even though a difficult fracture to treat immediate open reduction and internal fixation and early active movement of the elbow will offer consistently good results even in severely comminuted fracture. Posterior approach given the best exposure in most cases.

Accurate reconstruction of the trochlea and maintaining the depth of the olecranon fossa area is important in deciding functional outcome.

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