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RESEARCH ARTICLE

A COMPARATIVE STUDY OF APPROACHES OF TRICEPS TONGUE FLAP AND V SHAPED OLECRANON OSTEOTOMY FOR THE TREATMENT OF FRACTURE DISTAL HUMERUS.

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Abstract

INTRODUCTION: Fractures of distal humerus remain challenging problem despite of advances in techniques and implants. The goal of treatment is anatomical restoration of articular surface with stable internal fixation that allows early mobilization. This study was carried out to analyze the functional outcome of open reduction and internal fixation of distal humerus fracture using two different posterior approaches namely: Olecranon osteotomy approach, triceps tongue approach.

MATERIALS AND METHODS: This randomized observational study of 25 cases of supracondylar-intercondylar fracture of humerus was conducted in the Department of Orthopaedic Surgery at C U Shah Medical College and Hospital, Surendranagar. The fracture was treated with Olecranon Osteotomy Approach in 14 cases and Triceps aponeurosis tongue approach in 11 cases. The cases were followed up to 18-24 months.

RESULTS: The result was assessed with Broberg and Morrey scoring system. For Triceps tongue flap group: excellent in 2 cases, good in 4, fair in 3 and poor in 2. For Olecranon osteotomy group: excellent in 8 cases, good in 3, fair in 2 and poor in 1.

CONCLUSION: Olecranon osteotomy approach provides excellent exposure of posterior articular congruity and also anterior articular congruity visualized, facilitates accurate articular reduction even in complex type of fractures and early mobilization can be instituted, which is the crux for the final outcome while Triceps tongue approach provides adequate exposure of only posterior articular surface.

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Introduction:-

Fractures of distal humerus remain challenging problem despite of advances in techniques and implants. They are mostly multifragmentary, and have a complex anatomy with multiple options for internal fixation. Joint function is often compromised due to stiffness, pain and weakness.

The goal of treatment is anatomical restoration of articular surface with stable internal fixation that allows early mobilization (1). In younger patients, open reduction and internal fixation of distal humerus fractures using modern fixation principles is gold standard. In elderly patients, restoration of joint anatomy and obtaining rigid internal fixation may be difficult because of poor bone quality and comminution of articular surface and metaphysis.

Complications associated with poor outcomes include malunion, nonunion, delayed union, infection, heterotopic ossification, hardware failure, and symptomatic prominent hardware. Open reduction internal fixation (ORIF) of distal humerus fracture is the gold standard treatment but controversies exist regarding surgical approaches, type of

implants, operative techniques, need for transposition of ulnar nerve, and type of rehabilitation after surgical treatment.

Posterior approaches provide proper exposure to articular surface (2). Therefore, it is said that “Front Door” to elbow is “From Back” as the extensor mechanism is interposed between the surgeon and fracture.

This study was carried out to analyze the functional outcome of open reduction and internal fixation of distal humerus fracture using two different posterior approaches namely: Olecranon osteotomy approach, triceps tongue approach.

Materials and methods:-

This randomized observational study of 25 cases of supracondylar-intercondylar fracture of humerus was conducted in the Department of Orthopaedic Surgery at C U Shah Medical College and Hospital, Surendranagar.

The fracture was treated with Olecranon Osteotomy Approach in 14 cases and Triceps aponeurosis tongue approach in 11 cases.

The fractures were classified according to Riseborough and Radin Classification and treated with either distal humerus anatomical plating, 3.5 mm reconstruction plate or DCP/LCDCP/LCP depending upon surgeon's choice or patient's financial capability.

The cases were followed up to 18-24 months and the result was assessed with Broberg and Morrey scoring system (3).

All cases were admitted. History was recorded, followed by clinical examination. The presence or absence of vascular or neurological deficit and other complications were specifically noted. Routine investigations were done.

The clinical diagnosis was confirmed by anteroposterior and lateral radiograph.

Inclusion criteria:-

1. Patients age: - 18 to 70 years.
2. Patients with Supracondylar Intercondylar humerus fracture.

Exclusion criteria:-

1. Patients with associated midshaft or proximal radius-ulna fracture.
2. Patients with associated midshaft humerus or proximal humerus.
3. Patients with previous history of elbow dislocation.

Riseborough and radin classification:-

Type I: Undisplaced fracture between the capitellum and trochlea

Type II: Separation of the capitellum and trochlea without appreciable rotation of the fragments in the frontal plane

Type III: Separation of the fragments with rotational deformity

Type IV: Severe comminution of the articular surface with wide separation of the humeral condyles

Approach (4) (5):-

• Olecranon osteotomy approach:-

An apex distal chevron-shaped osteotomy was created 2 cm from the tip of olecranon after isolating the ulnar nerve. A narrow oscillating saw was used to start the osteotomy. A small, straight osteotome was then used to complete it by levering the osteotome proximally and breaking the subchondral bone. This maneuver created an uneven surface that facilitates repositioning and enhanced stability. Osteotomized olecranon and attached triceps was reflected proximally to give excellent exposure of distal humerus. At the completion of humerus internal fixation, the osteotomy was secured using two K-wire and SS wire, and the tension band technique was followed.

- **Triceps tongue approach:-**

After isolating the ulnar nerve the fascia was incised and musculotendinous junction was identified. A “V” shaped apex proximal incision was taken at musculo-tendinous junction and the muscle fibres were retracted proximally and tendinous fibres were retracted distally. We incised the remaining muscle fibers in mid-line and then elevated the periosteum together with triceps muscle from the posterior surface of the distal humerus for 5 cm. For wider exposure, the subperiosteal stripping on each side was continued, releasing the muscular and capsular attachment to the condyles and exposing the posterior surface.

When the fracture was stably fixed, the elbow was flexed at 90 degrees for closure of the wound. The musculotendinous junction was repaired at the end of the surgery.

- **Fracture reduction technique**

Articular fragments were reduced and provisionally fixed with k-wire. Definitive fixation of intra-articular part was performed using 4-mm cannulated cancellous screws. Once intra-articular part was fixed, intercondylar fracture was converted into supracondylar fracture. Further fixation was carried out with either 3.5-mm reconstruction plate, DCP/LCDCP/LCP or precontoured anatomical plate.

Closure: The ulnar nerve was not anteriorly transposed in any case. A negative suction drain was given.

- **Post operative protocol:-**

Directed towards initial post-operative wound management. Splinting the forearm in extension and supination for patients operated with triceps tongue approach for the 1st week and after that extension splints were used in the night.

Active assisted motion and gentle passive exercises were initiated for elbow flexion and extension as well as forearm pronation and supination. Active extension was delayed upto 6 weeks to allow initial healing of the triceps.

For patients operated with olecranon osteotomy, if fixation is stable, early range of motion exercises were initiated. Otherwise after 6 weeks when fracture healing appeared radiologically, vigorous range of motion exercises were initiated.

- **Follow up:-**

Patients were reviewed post operatively at the end of 1st week, 3rd week, 6th week, 3 months and 6 months and then every 3 months up to 2 years and were assessed on: Time taken for functional recovery; range of motion; any specific complaints; and time taken for fracture healing. Broberg and Morrey scoring system was used to grade results.

Results and discussion:-

Average time gap between injury and operation was found to be 7 days. Choice of approach was entirely on surgeon's preference but generally, in osteoporotic patients, olecranon osteotomy approach was not preferred. Average age of patients was 46.8 years.

Visibility of the fracture site was far better in olecranon osteotomy approach than in triceps tongue approach.

10 patients had full range of motion, 7 operated by olecranon osteotomy approach and 3 operated with triceps tongue approach.

Elbow function was evaluated by using Broberg and Morrey Scoring System.

For Triceps tongue flap group: excellent in 2 cases, good in 4, fair in 3 and poor in 2.

For Olecranon osteotomy group: excellent in 8 cases, good in 3, fair in 2 and poor in 1.

	Olecranon Osteotomy Approach	Triceps Tongue Approach
Intra-op exposure	Excellent	Good
Average Operative time	140 mins	120 mins
Functional Recovery time	8 months	10 months
Range of Motion (Flexion-Extension Arc)	20 degrees-140 degrees	30 degrees-120 degrees
Nonunion of osteotomy	1 patient	---

Figure:-

- Fig 1 - olecranon osteotomy approach

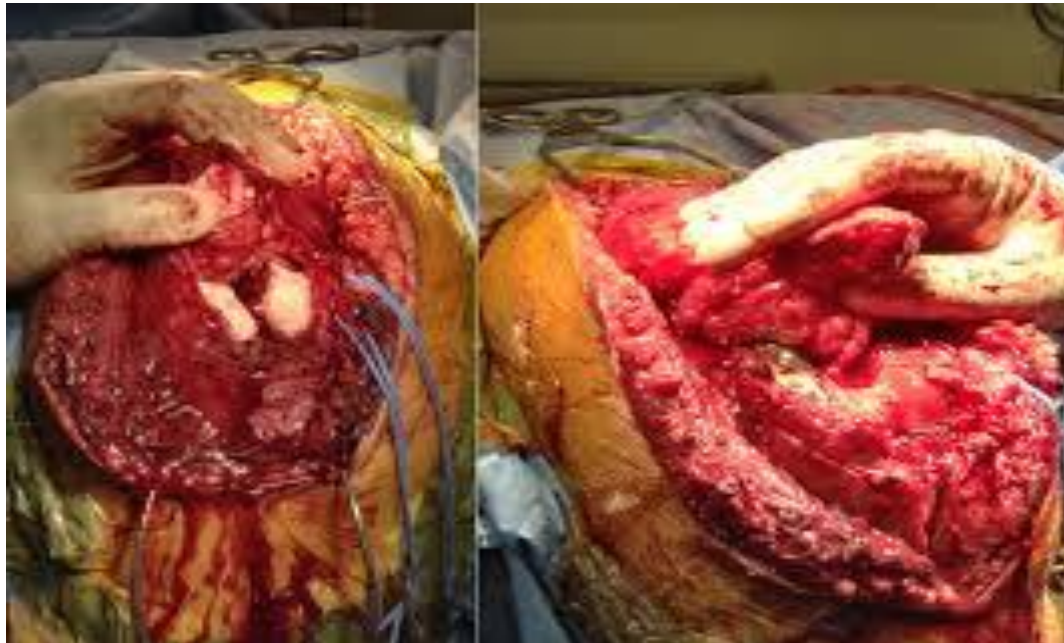


Fig 2 – pre operative and postoperative x ray of distal humerus fracture operated with olecranon osteotomy

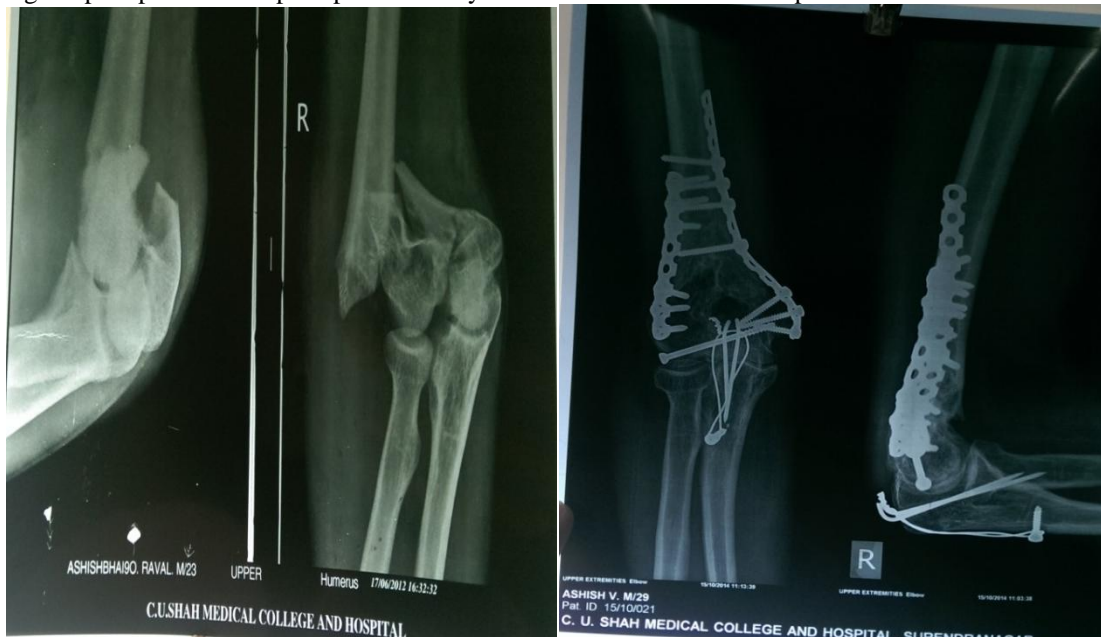


fig – 3 triceps tongue approach

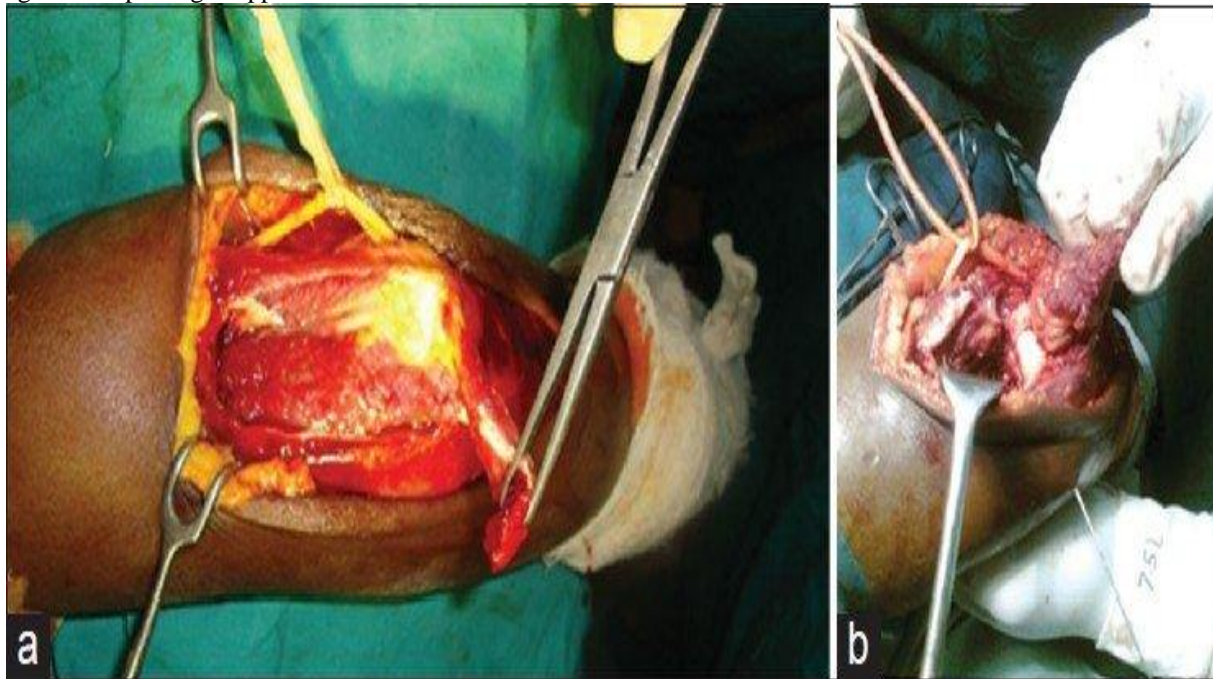


Fig- 4 pre operative and postoperative x ray of distal humerus fracture operated with triceps tongue approach



Conclusion:-

It can be concluded that among the two approaches being studied for intercondylar fracture humerus, Olecranon osteotomy approach provides excellent exposure of posterior articular congruity and also anterior articular congruity visualized, facilitates accurate articular reduction even in complex type of fractures and early mobilization can be instituted, which is the crux for the final outcome while Triceps tongue approach provides adequate exposure of only posterior articular surface.

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