



"OUTCOMES OF DISTAL HUMERUS FRACTURES TREATED SURGICALLY THROUGH ALONSO LLAMES PARATRICIPITAL TWO WINDOW TRICEPS SPARING APPROACH – A SINGLE CENTRE STUDY"

Orthopaedics

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ABSTRACT

Background: To evaluate the utility and constraints of the paratricipital two window triceps sparing method for treating complicated distal humerus fractures. **Methods:** At the Government General Hospital (GGH) in Srikakulam, a series of 14 patients with closed complex distal fractures with a mean age of 39 years (range, 22-62 years), were surgically treated between June 2020 and June 2022. Using the Mayo Elbow Performance Score (MEPS), the functional outcome was evaluated, and complications were noted. **Results:** After three months, all cases have fracture union. 120° of mean flexion was actually attained, and 10° of extension lag. The average motion arc was 111°. Supination and pronation averages were 72° and 76°, respectively. Infection was observed in one case, post-operative transitory ulnar nerve palsy in one case, hardware significance was identified in another case. MEPS of 80 is the mean score. **Conclusion:** The paratricipital two window triceps sparing technique used by Alonso Llamas to treat these fractures had satisfactory functional results and less complication. In particular, for Type C1 & C2 complex distal humerus fractures, we advise using this method.

KEYWORDS

Paratricipital, MEPS, Distal humerus.

INTRODUCTION

Distal humerus fractures account for 2% of all fractures. Distal humeral fractures of the intercondylar and low transcondylar types frequently necessitate surgical exposure, anatomical reduction of the articular surface, and stability of the medial and lateral columns^[1].

These injuries have historically been managed operatively using a variety of extensor mechanism-disrupting surgical techniques, which frequently result in conspicuous implants associated to osteotomies, triceps weakness, and delayed or non-union of the olecranon. Several extensor mechanism-sparing strategies, such as triceps-splitting and reflecting procedures, have been reported that give bi-columnar exposure of the distal part of the humerus and in order to circumvent the issues with the olecranon osteotomy method for complex comminuted distal humerus fractures, the two window approach was devised.

AIMS & OBJECTIVES

To evaluate the utility, functional outcome and complications of paratricipital two window triceps sparing approach for complex distal humerus fracture (AO type B, C1 & C2) by evaluating pain, stability, range of motion & function {Mayo's Elbow Performance Score (MEPS)}.

MATERIALS & METHODS:

Type of study:

- Prospective interventional study

Source of data:

- Adults (>18years) with Distal humerus fractures [AO: 13B & C] admitted to department of orthopaedics, GMC & GGH, Srikakulam.

Study duration:

- From June 2020 to June 2022.

Sample size: 14

Inclusion Criteria:

- Age group 18 to 65 years.
- Distal humerus fractures AO type B, C1 & C2

Exclusion Criteria:

- Patients age less than 18 years and more than 65 years.
- Pathologic fractures from primary or metastatic tumors.
- Neurovascular deficits

METHODOLOGY

Preoperative:

- Detailed clinical assessment
- Radiograph in AP and lateral views were obtained.
- Neurovascular status was assessed.
- Fractures were classified according to AO classification.

Operative Procedure:

Type of anesthesia:

- Brachial block /General anesthesia was used

Patient positioning:

- Patient in Prone or Lateral decubitus position with affected arm over a support or bolster, shoulder with 90° flexion & the elbow beyond 90°

Approach:

- Alonso Llamas^[2] paratricipital two window triceps sparing approach was used in all cases.



Fig 1: Posterior Midline Longitudinal skin Incision.

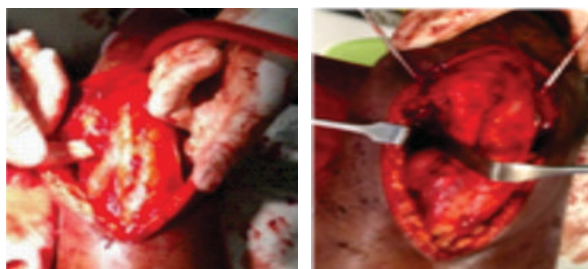


Fig 2: Triceps on with two windows developed



Fig 3: Full thickness skin flap developed. Ulnar nerve and ulnar window exposed

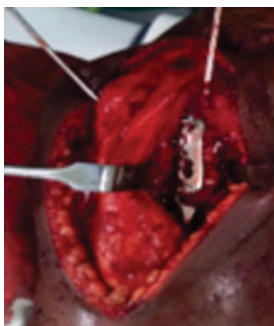


Fig 4: Radial window exposed and plate applied



Fig 5: Pre and Post OP xray of C1 type of distal humerus fracture

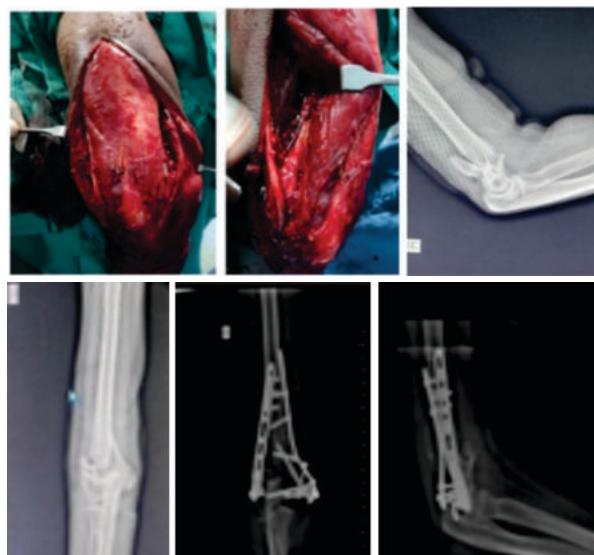


Fig 6: Intra-operative pictures, Pre and Post OP Xray of C2 type distal humerus fracture

Postoperative protocol:

- The Elbow was immobilized by using a shoulder sling and arm pouch.
- The wound was checked on the 2nd, 5th, 10th postoperative day and the sutures were removed on the 14th day.
- Postoperatively limb elevation and active finger movements will be advised depending on pain tolerance.
- Unrestricted active range of motion is encouraged (flexion, extension, pronation, and supination)

Follow up:

Patients had been followed up at 6 weeks, 12 weeks, 6 months, 9 months for functional assessment.

- With each follow up clinical and radiological evaluation has been done.
- Outcomes for pain, stability, range of motion, and function are assessed using the Mayo's Elbow Performance Scoring (MEPS) system.

Functional grading used in the evaluation

Mayo's Elbow Performance Scoring (MEPS) system^[3]:

- This scoring system consists of four variables
- The subjective variables
- Pain (45) and ADL (25) which give a total of 70 points.
- The objective variables
- Range of motion (20) and Stability (10) which gives a total of 30 points. Altogether there are a total of 100 points

Interpreting Mayo's Elbow Performance Score (MEPS)^[4]

MEPS are a 4 part test where clinical information is rated based on a 100 points scale.

- <60 - poor
- 60-74 - fair
- 75-89 - good
- 90-100 - excellent

Table – 1 The Outcomes of Patients Based on Meps

MEPS	Male	Female	Total (%)
Excellent (90-100)	2	2	4(28.6)
Good (75-89)	2	4	6(42.8)
Fair (60-74)	4	0	4(28.6)
Poor (<60)	0	0	0(0)
TOTAL	8	6	14(100)

RESULTS

In the present study, the male was more affected than females and a mean age of 39 years (range, 22-62 years). Most of the fractures 7(50%) cases were due to Road Traffic Accidents. The majority of cases 7(50%) were AO type C1 distal humerus fractures. All cases unite by the end of 3 months. Mean flexion achieved was 120° and extension lag was 10°. Mean arc of motion was 111°. Mean Pronation and Supination was 72° and 76° respectively. MEPS and motion arc were weak negatively co-related with surgical delay and progress in age. Post-operative transient ulnar nerve palsy was noted in one case, infection seen in one case and hardware prominence noted in one case. Mean MEPS was 80. MEPS was excellent in 28.6%, good in 42.8%, fair in 28.6%

DISCUSSION

The mechanical advantage is procedure avoids disruption of the extensor mechanism and no postoperative restrictions required related to the approach. Additionally, the method can be changed to an osteotomy or Bryan & Morrey triceps reflecting approach if the surgeon finds it difficult to achieve articular reduction [5, 6]. Few studies have been done on the viability of the paratricipital method for functional outcomes.

Some researchers hypothesised that decreased reattachment or the ensuing fibrosis of direct injury would have a deleterious effect on muscle strength in triceps splitting or reflecting approach [7]. However, this paratricipital technique does not affect the triceps attachments and muscle bellies, allowing for quick, dynamic motion of the elbow. In comparison to the literature [8, 9, 10], we obtained a good to excellent result for MEPS.

Additionally, our study has limitations. First, there were insufficient controls for outcome comparison and a small number of patients, mostly of type C3 were included. Second, the follow-up time was only short to medium term, which was insufficient due COVID-19 pandemic. Third, scoring systems rather than unbiased functional assessments were used to evaluate the outcome. Fourth, because we did not include elderly patients, it is impossible to draw any valid conclusions about the relationship between age and result.

CONCLUSIONS

Alonso Llamas paratricipital two window triceps sparing approach for these fractures had good functional outcome with lesser complications. We recommend this approach when handling with

these complex distal Humerus fractures particularly, in AO type B, C1 and C2. This method can be troublesome for Type C3 and multi-fragmentary fractures, an area that requires extensive study.

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Ethical statement:

This study was conducted with authorization from the departmental review board and the ethical committee.

Conflicts of interest: The authors declared no conflicts of interest.

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