



Indian Journal of Orthopaedics Surgery

ISSN 2395-1354(Print)
e-ISSN 2395-1362(Online)

IJOS

A COMPARATIVE STUDY OF OLECRANON OSTEOTOMY APPROACH AND TRICEPS REFLECTING APPROACH IN OSTEOSYNTHESIS OF DISTAL HUMERUS FRACTURE IN ADULTS

Ramesh Krishna. K^{1,*}, Aradhana. T. R², Preetham. N³

¹Professor, ²Senior Resident, ³Post graduate, Department of Orthopaedics, Bangalore Medical College and Research Institute, Bangalore

***Corresponding Author:**

E-mail: drrameshkrishna@gmail.com

ABSTRACT

Introduction: Olecranon osteotomy provides a good exposure of the fracture site for distal humerus fracture fixation. However, it is not without its potential disadvantages of delayed union, non-union at osteotomy site and other implant related complications. Triceps reflecting approaches are known to avoid these complications. The aim of our study was to compare the outcomes in the two surgical approaches by assessing the radiological union, the functional outcome by MEPI score and complications associated with each approaches.

Methods: 40 consecutive patients were alternatively allotted into two groups. Group A had 20 patients treated surgically by trans-olecranon approach. Group B had 20 patients treated surgically by triceps reflecting approach. Patients were followed up for period of 24 months. Patients were assessed for stability of fixation, radiological union, the functional outcome using MEPI, and the complications in each group were reported.

Results: Regardless of the fracture and implant type, functional mobility, elbow function, patient satisfaction, and quality-of-life assessments were comparable between the groups at three and twelve months. No significant differences were found in the functional outcome. But olecranon osteotomy approach group were associated with more complications

Conclusion: Trans-olecranon and triceps reflecting approaches are similar in their functional outcomes but complication rates are higher in trans olecranon approach.

Keywords: AO classification; Distal humerus locking plates; MEPI, Trans-olecranon approach, Triceps reflecting approach, orthogonal plating.

Introduction:

Intra articular fractures of distal humerus constitute 0.5-7% of all the fractures and 30% of fractures around elbow¹. The distribution of distal humerus fractures follows a bimodal age distribution. High-energy injuries tend to occur among younger patients, while low-energy injuries are more common in older patients.

The primary goal in management of intra articular fractures of distal humerus is to achieve stable and mobile elbow¹. The chances of functional impairment and deformities are very high following conservative treatment of such distal intra-articular fractures of humerus. Malunion, stiffness, and osteoarthritis are very common following conservative management. Significant stiffness, pain, and deformity can be seen following improper treatment of the fractures in both the adult and the child. Prolonged

immobilization usually leads to this Stiffness, as would traction. In order to overcome this, stable reduction and fixation of the fractures are required so that active motion can be started early to produce the best possible result. Since 1950s the trend has shifted to open reduction and stable fixation with early mobilization. Good anatomical alignment, stabilization and early mobilization can provide satisfactory results. The operative treatment poses certain difficulties due to the intricate anatomy of the elbow joint which is composed of three distinct articulations, proximity of neurovascular structures, minimal soft tissues attached to the fragments and long operative period².

The standard surgical techniques are used for fixation of both columns, using a combination of reconstruction plates, dynamic compression plates, locking compression plates and screws and k-wires. Rare situations primary total elbow replacement may be considered. Various surgical approaches have been described for fixation of intra articular fractures of distal humerus. Olecranon osteotomy provides a good exposure of the fracture site for distal humerus fracture fixation. However, it is not without its potential disadvantages of delayed union, non-union and other implant related complications. Concerns about healing and symptomatic implants have led to more frequent use of a triceps-reflecting (Bryan-Morrey) approach. In this study, we compare the outcome of a series of intercondylar fractures of distal humerus in adults, treated by open reduction and internal fixation by trans-olecranon approach to the outcome obtained by triceps reflecting approach.

Materials and Methods

40 Patients attending in Department of Orthopaedics in teaching hospitals (Victoria hospital and Bowring and Lady Curzon hospital) attached to Bangalore Medical College and Research

Institute from Nov 2012 to Oct 2014, who are diagnosed with intra articular fracture of distal humerus were allotted alternatively into two groups. Group A had 20 patients treated surgically by trans-olecranon approach. Group B had 20 patients treated surgically by triceps reflecting approach. Fractures were classified by AO classification. All the patients underwent orthogonal plating for internal fixation and stabilization. Physiotherapy started from 3rd day post-op with passive ROM exercises. Patient was followed at 1month, 2 months, 3 months, 6 months , 1 year and 2 year. Clinical outcome was assessed using **MEPI (Mayo Elbow Performance Index)** score and radiological union.

Results

All 40 patients had completed all postoperative physical therapy at the time of the study and were assessed for functional outcome at 6months. Patients were followed up for two years to assess the complications. **In group A** the mean MEPI score was 90 points (range, 0 to 100 points) indicating mild impairment. The mean arc of flexion was 97.5° (range, 85 to 122). Mean pronation was 70.5° (range, 60-82) and supination was 72.5° (range, 60-80). The mean loss of range of motion, as compared with that of the contralateral elbow was 13 degrees. 2 patients had extensor lag of 10 degrees, five patients underwent a second procedure for hardware removal, one patient had transient ulna nerve neuropraxia, two had non-union at osteotomy site which was revised and two patient had superficial infection. **In group B** the mean MEPI score was 93 points (range, 0 to 100 points). The mean arc of flexion was 103° (range, 85 to 122). Mean pronation was 78.1° (range, 60-85) and supination was 78.6° (range, 60-80). The mean loss of range of motion, as compared with that of the contralateral elbow was 12 degrees. 2 patients had extensor lag of 5 degrees, one patient had superficial infection.

Table 1: Outcome Measure at 6 months follow-up

	GROUP A	GROUP B
MEPI	90	93
FLEXION EXTENSION ARC	97.5	103
PRONATION	70.5	78.1
SUPINATION	72.5	78.6
LOSS OF MOVEMENT	13	12

Table 2: Complications

	GROUP A	GROUP B
MEAN EXTENSOR LAG	5	10
HARD WARE PROMINENCE	5	-
ULNAR NERVE NEUROPRAXIA	1	2
NON-UNION AT OSTEOTOMY SITE	2	-
INFECTION	2	1

**Figure 1 : 6months follow up radiograph showing non-union at osteotomy site****Discussion:**

The principles of surgical management of intra-articular fractures of the distal humerus are anatomical restoration of the articular surface and stable fixation of the fracture fragments to allow for early motion. Careful preoperative planning, surgical expertise, and aggressive postoperative rehabilitation are essential for optimizing outcome. Olecranon osteotomy is most commonly used approach, triceps reflecting approach is gaining popularity which prevents complication of osteotomy. Olecranon osteotomy is associated with hardware prominence, delayed union and non-union at the osteotomy site. It requires longer learning curve to reduce these complications. Triceps reflecting

approaches prevent the osteotomy associated complications but however they are associated with extensive soft tissue dissection and lead to triceps muscle weakness and transient ulnar nerve palsy.

Conclusion:

Trans-olecranon and triceps reflecting approaches are similar in their functional outcomes at short term but complication rates are higher in trans-olecranon approach. Trans-olecranon approach offers the best exposure of the articular surfaces. As more familiarity is gained with fracture patterns and reduction techniques, a triceps-reflecting approach may be selected to reduce complications.

References:

1. Sudhir Babhulkar et al. Controversies in the management of intra articular fractures of distal humerus in adults. Indian Journal of Orthopaedics. May 2011; vol. 45 issue 3 :216-225
2. Rajesh Chandra et al. Internal fixation of intra articular fractures of the distal humerus through transolecranon approach. Indian journal of Orthopaedics. July 1999; vol33 no3:170-174
3. Zagaroski JB, Jnnings JJ, Burkhalter WE et al. Comminuted intra articular # of distal humeral condyles, surgical versus non surgical treatment. clinical orthopaedics, 1986; 202:197-204
4. Sudhir Babhulkar et al. Controversies in the management of intra articular fractures of distal humerus in adults. Indian Journal of Orthopaedics. May 2011; vol. 45 issue 3 :216-225
5. Amite Pankaj et al. Surgical management of intercondylar fractures of the humerus using triceps reflecting anconeus pedicle (TRAP) approach. Indian Journal of Orthopaedics. 2007; vol41 issue 3 :219-223
6. Michael D Mckee et al. Functional outcome following surgical treatment of intra-articular distal humeral fractures through a posterior approach. The journal of Bone & Joint Surgery. 2000; 82:1701-1701
7. Jason M. Erpelding et al. Outcomes following distal humerus fracture fixation with an extensor mechanism-on approach. The Journal of Bone and Joint Surgery Am. 2012; 94:548-553
8. Macko D, Szabo RM. Complications of tension band wiring of olecranon fractures. JBJS Am. 1985;67:1396-401.
9. Ring D, Gullota L, Chin K, Jupiter JB. Olecranon osteotomy for exposures of fractures and nonunions of distal humerus. J Orthop Trauma. 2004;18:446-9.
10. Athwal, George S, Rispoli, Damian M, Steinmann, Scott P. The anconeus flap trans-olecranon approach to the distal Humerus. Technical tricks. J Orthop Trauma.