



COMPARATIVE STUDY TO FIND OUT THE OUTCOME OF TENSION BAND WIRING AND PLATE OSTEOSYNTHESIS FOR OLECRANON FRACTURE IN ADULTS

Orthopaedics

Dr Amit Raj	Junior resident, Department of orthopaedics, MGM medical college and LSK hospital, kishanganj, Bihar
Dr Anubhav Jain	Assistant Professor, Department of orthopaedics, MGM medical college and LSK hospital, kishanganj, Bihar
Dr Rahul Raj	Junior resident, Department of orthopaedics, MGM medical college and LSK hospital, kishanganj, Bihar
Dr Avinash Kumar*	Assistant Professor, Department of orthopaedics, MGM medical college and LSK hospital, kishanganj, Bihar *Corresponding Author

ABSTRACT

Aim: To find the outcome of TBW and plate osteosynthesis in olecranon fracture in adults. Material and methods: This study is prospective postoperative evaluation of 40 patients of olecranon fracture (Mayo classification Type 2A and 2B) who were admitted in department of orthopaedics in MGM medical college and LSK hospital, kishanganj and treated with either TBW(group A) or anatomical plate(group B). All patients were treated with open reduction and internal fixation with TBW or anatomical plate, and their outcome were assessed at the end of 6 months **Result:** Mayo elbow performance score at 6 months were noted as excellent(60%) and (75%) in group A and B respectively, and good (30%) and (25%) in group A and B respectively. The occurrences of complications were observed higher in group A compared to the group B. **Conclusion:** TBW has been in use but plate osteosynthesis is also a good alternative with better functional outcome and lesser complications.

KEYWORDS

olecranon fracture, Mayo type 2, TBW, plate osteosynthesis

INTRODUCTION:

Olecranon fractures (OF) may be defined as the disruption of the semilunar notch of ulna¹. OF's relatively common injury accounting for about 10% of upper extremity fractures in adults². It may result from direct trauma to the point of the elbow or indirectly via the forceful contraction of Triceps muscle in semi flexed elbow or by both direct and indirect forces acting at the same time^{3,4}. Fracture of the olecranon involves the elbow joint through the trochlear notch of the ulna hence causes loss of congruity of the articular surface which leads to restrictions in the range of motion of the elbow, early degenerative changes, and hence requires anatomic reduction and early mobilisation to achieve better functional outcome⁵. Intra-articular and displaced OF's requires internal fixation and many modalities are present, such as tension band wiring (TBW), recon plate, hook plate, anatomical plate^{6,7}. There is controversy regarding superiority of surgical options^{8,9}. The aim of present study is to compare the outcome of internal fixation with TBW and anatomical plate.

MATERIAL AND METHODS:

In the present study, 40 cases of OF's in adults were admitted in the Department of Orthopaedics, Mata Gujri Memorial Medical College and LSK hospital, Kishanganj, Bihar from July 2017 to August 2019. On admission, the patients were carefully examined after taking a thorough history, possible mechanism of injury with date and time. The cases were distributed alternatively to two specific groups where Group A comprised patients treated with Open reduction and Internal Fixation with TBW and the Group B comprised of patients treated with Open Reduction and Internal Fixation with anatomical plating. The cases were classified as per Mayo classification [10].

> Mayo Type I Undisplaced



> Mayo type II Displaced A-Non comminuted B-Comminuted



> Mayo type III Accompanying lesions-Instability A-Non comminuted B-Comminuted



Fig 1: Mayo classification of olecranon fracture

This analysis was restricted to Mayo II fracture which has displaced but a stable ulnohumeral joint. These patterns represent the most frequently treated olecranon fractures¹⁰. Patients were included in this study if they were age 18 or older, close and open grade 1 (Gustillo-Anderson classification), sustained a Mayo type II olecranon fracture that underwent surgical management with TBW or plating, and had a minimum of 6-month follow up. Exclusion criteria were age less than 18 years, open grade 2 or 3 fracture (Gustillo-Anderson classification), having a fracture pattern other than Mayo II, less than 6 months of follow up, not consented for treatment with a TBW or plating, or those who presented for revision of a prior surgery. Post-operatively the range of motion was initiated within 2 weeks and all the patients were examined at once at three weeks in first 3 months and then once in 6 week in next 3 months. On every visit patients were examined clinically and x-rays of the elbow taken in anterior-posterior and lateral view. Radiological signs of union, and implant loosening or failure were recorded. Any metal reaction or loosening of screws was also recorded. Clinically, patients were examined for any tenderness, infection, pain, implant exposure, stiffness of elbow joint, and movements of elbow were recorded. During the period of follow up, only active exercises were advocated. Functional recovery was recorded on Mayo Elbow Performance Score (MEPS). The MEPS evaluates pain, motion, stability, and function. Score values are categorised as follows: excellent, >90; good, 75–89; fair, 60–74; and poor, <60¹¹.

Function	Definition	Points	Score classification
Pain	None	45	Excellent > 90
	Mild	30	
	Moderate	15	
	Severe	0	
Motion	Arc > 100	20	Good, 75–89
	Arc 50–100	15	
	Arc < 50	5	
Stability	Stable	10	Fair, 60–74
	Moderate instability	5	
	Gross instability	0	
Function	Comb hair	5	Poor < 60
	Feed	5	
	Hygiene	5	
	Shirt	5	
	Shoe	5	

Total 100

Fig 2: Mayo Elbow Performance Score (MEPS)

Case 1 (Group A): A 58 years old male patient with fracture of olecranon after RTA



Fig 3: Pre-op x-ray: AP and Lateral view **Post-op x-ray: AP view** **Post-op x-ray: Lateral view**

Case 2 (Group B): A 20 years old male patient with fracture of olecranon with H/o fall to the point of elbow



Fig 4: Pre-op x-ray: AP and lateral view **Post-op x-ray: AP and lateral view**

RESULT:

The present study was a prospective study to find outcome of OF's treated with Open reduction and internal fixation with TBW or Plate at Mata Gujri Memorial Medical College and LSK hospital, Kishanganj, Bihar. The study consisted of 40 patients and was divided into two groups alternatively. The patients ranged from 20 to 76 years (mean 58 years). Mean age of Group A was 42.55 years and Group B was 40.6 years. The OF's was more common in males (27, 67.5%) compared to females (13, 32.5%) and more common in Right (26, 65%) side compared to left (14, 35%). According to Mayo classification, type 2.A was 31 (77.5%) patients and type 2.B was 9 (22.5%) patients. The mode of injury due fall at the point of elbow (29, 72.5%), and due to RTA was (11, 27.5%).

Table 1. Age incidence

Range(in years)	Group A	Group B
20-30	5	9
31-40	5	2
41-50	6	3
51-60	2	4
>60	2	2
Total	20	20

Table 2. Gender incidence

	Group A	Group B
Male	15(75%)	12(60%)
Female	5(25%)	8(40%)

Table 3. Side incidence

	Group A	Group B
Right	15(75%)	13(65%)
Left	5(25%)	7(35%)

Table 4. Mode of injury

	Group A	Group B
Fall to elbow	17(85%)	12(60%)
RTA	3(15%)	8(40%)

Table 5. Mayo classification

	Group A	Group B
Type 2. A	15(75%)	16(80%)
Type 2. B	5(25%)	4(20%)

Table 6: showing complications

	Group A	Group B	Total
Infection	2 (10%)	1 (5%)	3 (7.5%)
Delayed union	-	-	-
Non union	-	-	-
Skin impingement	4 (20%)	1 (5%)	5 (12.5%)
Implant failure (loosening/ prox migration)	1 (5%)	-	1 (2.5%)
Elbow stiffness	3 (15%)	2 (10%)	5 (12.5%)

In the present study, we encountered complications in 14 (35%) cases. Group A had higher complication compared to the Group B. Group A had 10 (50%) cases with complications, and Group B had 4 (20%) cases with complications. Infection occurred in 3(7.5%) cases, 2(10%) in Group A and 1(5%) in Group B, and they were treated by debridement and iv antibiotics. One of the commonest complications was metal skin impingement in 5(12.5%) cases, and Group A had 4(20%), and Group B had 1(2.5%) cases. In the present study, we had 1 case of proximal migration of K-wires in Group A(2.5%). Another common complication was elbow stiffness in 5(12.5%) cases, where Group A had 3(15%) and Group B had 2(10%) case. At the end of 6 months all the patients were categorised using MEPS. In the present study, 27(67.5%) patients had excellent (>90) result where Group A had 12 (60%), and Group B had 15(75%) patients. Good (75-89) result was observed in 11(27.5%) where Group A had 6(30%) and group B had 5(25%) patients. Fair (60-74) and poor (<60) result was observed both in group A, 1(5%) patient.

DISCUSSION:

The goals of treating OF's are to maintain the articular congruity, stability of joint and strength in elbow extensor mechanism. Non-operative treatment may be considered in nondisplaced fractures that does not displace at 90degree of elbow flexion and has intact extensor mechanism or in poor functioning older adults who would not be able to tolerate surgery but operative treatment is required when there is loss of articular congruity and disruption of extensor mechanism¹². Clinically, TBW has been showing acceptable result but the OF's treated but plate osteosynthesis allows for stable fixation and early start of range of motion^{13, 14, 15, 16, 17, 18}. Byron E Chalidis *et al*, showed wound infection in 4(6.5%) patients which is comparable to our study where we had 3(7.5%) patients, and group A had more infection than the group B¹⁹. In a study by Hume *et al* conducted on 41 adult patients with olecranon fractures treated with open reduction internal fixation with k-wires, k-wire migration was seen in 1 patient which is similar to our study²⁰. Laura Wiegand *et al*, in their study found that the most common complication after surgical treatment of olecranon fractures was symptomatic hardware, with TBW having a greater incidence than plate fixation²¹. Decrease in range of motion along with various degree of post-operative elbow stiffness has been reported by Wolfgang *et al*²². The observations of the present study is consistent with observations made by Schliemann B *et al*, where 92% patients had good to excellent result when treated with plate osteosynthesis compared to 77% treated with TBW²³. Study by Wiss *et al* had observed 91% good and fair result when treated with plate osteosynthesis and 79% good and fair result when treated with TBW. It has been observed that the biomechanical properties of plate osteosynthesis is better than the TBW in OF's^{24,25}.

CONCLUSION:

Olecranon fractures requires strong internal and stable fixation though TBW has been in use widely but plate fixation is also a good alternative which allows early mobilisation to achieve high functional recovery. Thus, we conclude that the plate osteosynthesis is good alternative to the TBW to treat OF's as it provides better clinical results with fewer complications.

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