

A Comparative Study between Double Tension Band Wiring and Reconstruction Plate and Screws for the Treatment of Displaced Bicondylar Intra-Articular Fractures of the Distal Humerus

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ABSTRACT

Objective: In this study our main goal is to evaluate the outcome of double tension band wiring and reconstruction plate and screws for the treatment of displaced bicondylar intra articular fractures of the distal humerus.

Methodology: This perspective and randomized study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka from July 2003 to 2005. Where out of 24 patients 12 were selected for operative treatment by reconstruction plate and screws (Group –I), and 12 were selected for operative treatment by double tension band wiring (Group-II) as on random basis.

Results: During the study, in group-1 and group-2 most of the patients belongs to 18-30 age group., 75% patients' injury in left limb whereas, 35% had injury in left limb in group-2. 33.33% patients with reconstruction Plate and Screw, had excellent recovery after treatment where as 25% had excellent recovery when they had double Tension Band Wiring.

Conclusion: From our study we can conclude that, operative treatment of displaced bicondylar intra-articular fractures of the

distal humerus by reconstruction plate and screws gives a more rigid fixation with better functional outcome than by double tension band wiring.

Keywords: Double Tension Band Wiring, Reconstruction Plate and Screws, Displaced Bicondylar Intra Articular Fractures.

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INTRODUCTION

Along with the rapid development and industrialization in our modern world of today, the accident and trauma are also rising. Bicondylar intra – articular fractures of the distal humerus are more common in young masses and are usually due to moderate to severe trauma. The appropriate management of this fracture is important, as they can severely compromise the elbow function.¹

Fractures of the distal humerus can be divided into three types. Type – A, an extra – articular supercondylar fracture; Type – B, an intra- articular unicondylar fracture and Type – C, bicondylar intra-articular fractures with varying degree of comminution. Type – C fractures are considered in this study. A severe blow on the point of the elbow drives the olecranon process upwards, splitting

the condyles apart. The fracture consists of a vertical component through articular surface, most commonly through trochlear sulcus into the humeral fossae. From this area there is either a single transverse or two diverging oblique fractures pass through supracondylar humeral columns.

Preoperative evaluation of neurovascular status, evidence of infection is important. Radiograph of elbow in at least two planes, supplemented by computed tomography scan when radiographs are difficult to interpret the fractures. After anaesthesia and application of pneumatic tourniquet, turn the patient prone and support the abducted arm on a short arm board with the elbow at a right angle.^{2,3}

Expose the elbow posteriorly through an incision beginning 5 cm distal to the tip of the olecranon and extending proximally medial to the midline of the arm to 10 – 12 cm above the olecranon tip. Reflect the skin and subcutaneous tissue to either side carefully to expose the olecranon and triceps tendon. Expose the distal humerus through a posterior Campbell approach or a transolecranon approach.⁴ In this study our main goal is to evaluate the outcome of double tension band wiring and reconstruction plate and screws for the treatment of displaced bicondylar intra articular fractures of the distal humerus.



Figure 1: Type C complete articular (bicondylar) fracture of the humerus.⁵

OBJECTIVES

General Objective

- To assess the outcome of double tension band wiring and reconstruction plate and screws for the treatment of displaced bicondylar intra articular fractures of the distal humerus.

Specific Objective

- To detect clinical characteristics
- To identify status of the Elbow Pain

METHODOLOGY

Study Types

This was a perspective and randomized study

Place and Period of the Study

This study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka from July 2003 to 2005.

Study Population

Thirty patients with bicondylar intra-articular fracture of humerus were selected for this series. Six patients were lost during follow up because of various reasons and, therefore, excluded from the study. The remaining twenty-four patients were available for follow up. Out of 24 patients 12 were selected for operative treatment by reconstruction plate and screws (Group –I), and 12 were selected for operative treatment by double tension band wiring (Group-II) as on random basis.

Inclusion Criteria

- Adult patients between the age of 18 to 50 years.
- Displaced bicondylar intra-articular fractures of the humerus.
- Patients of both sexes were randomly selected.
- Closed fresh fracture within 2 weeks of injury was included in the study.
- Type II (separation of the capitulum and trochlea without appreciable rotation of the fragment in the fracture line) and

type III (separation of the fragments with rotatory deformity) were selected.

Exclusion Criteria

- Children (before closure of the epiphyseal plate)
- Open fracture.
- Pathological fracture.
- Polytrauma patients.
- Patients with septic focus.
- Fracture more than 2 weeks old.

Study Procedure

After reporting to emergency department of NITOR, a brief history was taken, clinical examination was done to assess the vital function of the patient. As most of the cases were trauma victims immediate resuscitation was done by following the principles of ATLS (Advanced Trauma Life Support). Some of the patients were admitted in the ward through the outpatient department. After full preoperative preparation then the patient was taken to clean operation theatre for open reduction and internal fixation. Patient was counseled regarding the management procedures, merits and demerits of operative versus conservative treatments, hazards of anaesthesia, possible post-operative sequel. Preanesthetic check-up was done. Kept no food by mouth at least 6 hours before operation. Proper size cancellous screw, Kirschner wire, surgical wire was determined after careful assessment from the study of roentogenogram of the healthy and injured site of the elbow joint. In all cases, prophylactic antibiotic, usually second-generation cephalosporin 1 gm ---intravenous at the time of induction of anaesthesia, thereafter, six hourly for 3 days were given. After 3 days, oral cephalosporin 500 mg 6 hourly for 7 days was given.

Data Analysis Procedure

Once data collection was completed, data were compiled manually according to key variables. All statistical analysis of different variables, were analyzed according to standard statistical method and calculation by using scientific calculator. All the data were checked and edited after collection. Then the collected data were analyzed by SPSS 15th version (statistical package for social science) computer software program. Percentage was calculated to determine the proportion of the findings. Results were presented in tabulated form. Statistical significance was set at p<0.05

RESULTS

In figure-2 shows age distribution of the patients where among 24 patients here, in group-1 and group-2 most of the patients belongs to 18-30 age group. In figure-3 shows gender distribution of the patients where in group-1 male and female percentage were equal, 50%, where as in group-2 41.67% were male and 58.33% were female. In figure-4 shows distribution of patients according to affected limb where in group-1, 75% patients' injury in left limb whereas, 35% had injury in left limb in group-2.

In table-1 shows distribution of the patients according to clinical characteristics where in group-1, no range of Motion loss in 3 (25.00). loss within Functional Margin was 8 cases (66.67%) and loss out of Functional Margin 1 cases (8.33%). Whereas, , no range of motion loss in 2 cases (16.67%), loss within functional margin was 7 cases (58.33%) and loss out of functional margin 3 cases (25.00%) . No loss of pronation and supination was noted.

In table-2 shows status of the Elbow Pain where in group-1,

among the 12 cases, 4(33.33%) were Pain free, 5 (41.67%) had occasional pain and 3 (25%) had heavy activity related pain. Whereas, in group-2 3 (25%) cases were Pain free, 6 (50%) cases had occasional pain and 3 (25%) cases had heavy activity related

pain. In table-3 shows distribution of the patients after treatment where 33.33% patients with reconstruction Plate and Screw, had excellent recovery after treatment where as 25% had excellent recovery when they had double Tension Band Wiring.

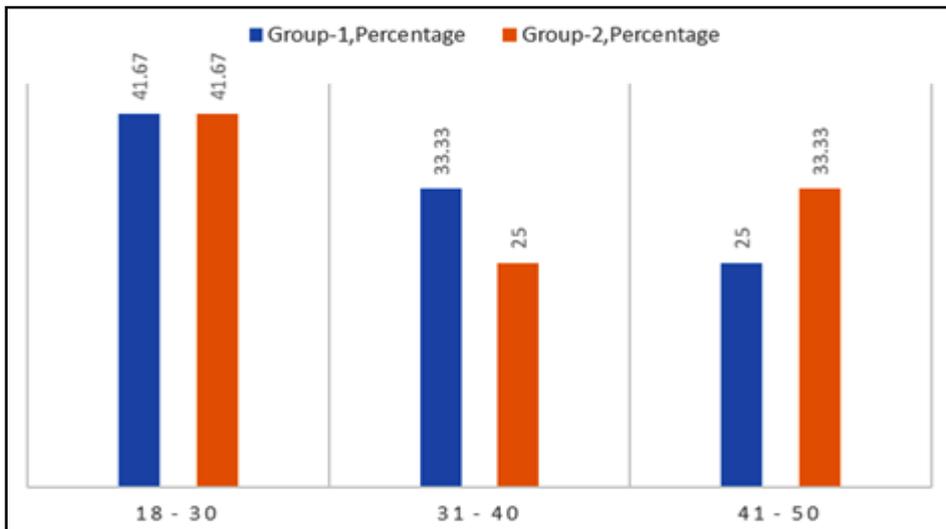


Figure-2: Age distribution of the patients

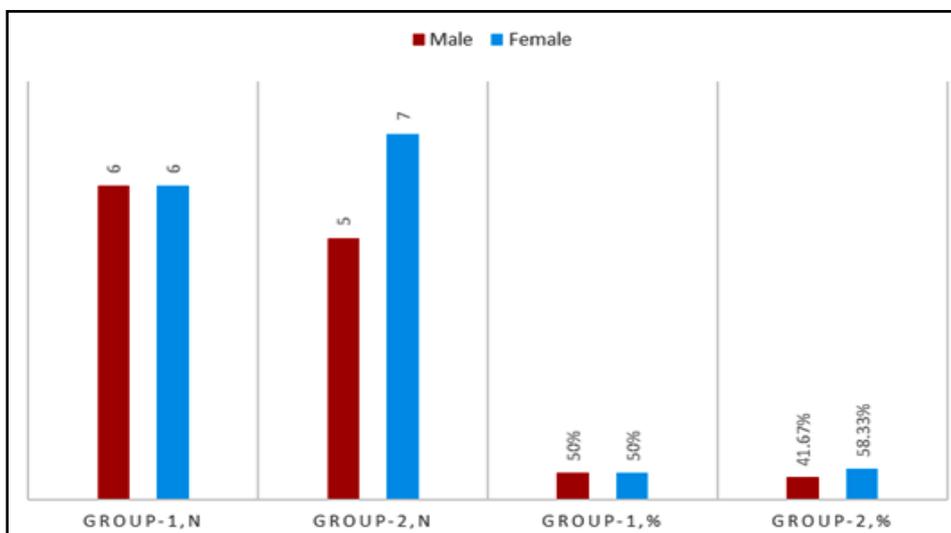


Figure-3: Gender distribution of the patients.

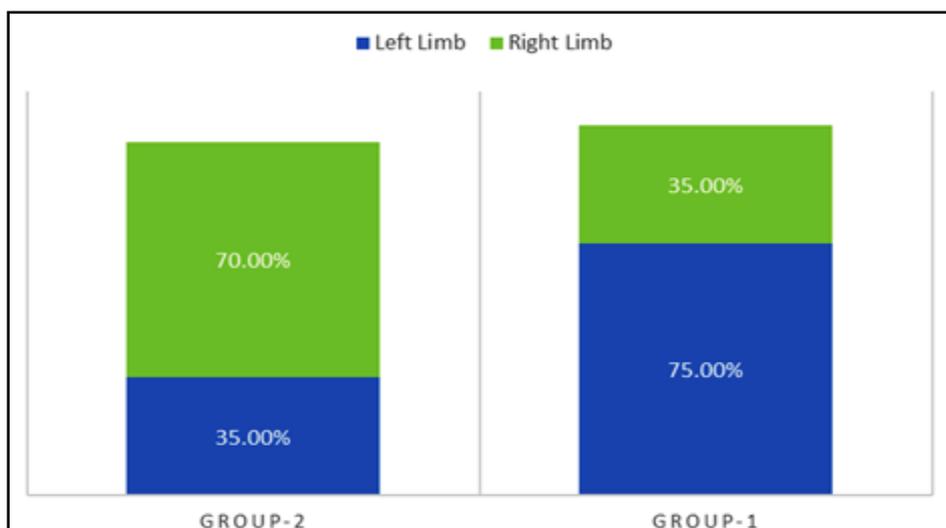


Figure-4: Distribution of patients according to affected limb.

Table-1: Distribution of the patients according to clinical characteristics

Clinical characteristics	Group-1:Reconstruction Plate and Screw, n/%	Group-2:Treated by Double Tension Band Wiring
Type of Fracture		
II	4 (33.33)	3(25.00)
III	8(66.67)	9(75.00)
Pain		
10	-	1
20	3	3
30	6	3
40	4	4
Status of Range of Motion		
No loss of Range of Motion	3(25.00)	2(16.67%)
Loss within Functional Margin	8(66.67)	7(58.33%)
Loss out of Functional Margin (45° - 100°)	1(8.33)	8(25%)

Table-2: Status of the Elbow Pain

Symptoms	Group-1, Percentage	Group-2, Percentage
No Pain	33.33	25
Occasional Pain	41.67	50
Heavy activity related Pain	25	25
Light activity related Pain	0	0
Rest Pain	0	0

Table-3: Distribution of the patients after treatment

Outcome	Group-1, %	Group-2, %
Excellent	33.33	25
Good	41.67	41.67
Fair	16.67	25
Poor	8.33	8.33

DISCUSSION

In this series, 75% were good to excellent results in group – I, cases treated by reconstruction plate; and 66.67% good to excellent results in group – II, cases treated by double tension band wiring. There was 18.75% excellent result and 43.75% good result in another series, where ORIF done by double tension band wiring.⁶

There was 33.77% excellent and 42.31% good result were ORIF done by double tension band wiring.⁷

The evaluation of the results were according to the criteria of one study, where 100-point scoring system based on four parameters such as – Pain, Range of motion, Radiological aspect and Activity level were developed. For pain 40 points were allotted as follows: -- (i) No pain 40, (ii) Occasional pain – 30, (iii) Heavy activity related pain – 20, (iv) Light activity related pain- 10 and (v) Rest pain – 0. For range of motion, 30 points were allotted as follows:-- (i) No range of motion less - 30 points, (ii) Less with in functional margins – 20 points, (iii) Less out functional loss – 10 points and (iv) Both flexion extension or pronation – supination loss out of functional margins - 0 points.⁸ Functional margins are flexion - extension 130° – 30° and pronation – supination 50° - 50°

according to one report. For radiological criteria not accomplished -- reduce 5 points. Articular step less than 1 mm. Articular space reduction less than 1mm, Para-articular calcification less than 10 mm, Pseudo arthrosis gets '0' point.⁹

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The functional status in respect of range of motion, no loss of range of motion, in 3 patients in group – I and 2 patients in group – II, Loss within functional margin – 8 patients in group – I and 7 patients in group – II and loss out of functional margin 1 patient in group – I and 3 patients in group – II. No loss of supination - pronation was found between both groups of patients. As regard the status of the elbow pain, 33.33% cases were found pain free and 41.67% had occasional pain in group – I and group – II. In respect of activity level, 50% cases had some activity level as prior to accident in group-I as compared to 41.67 % in group – II.

CONCLUSION

From our study we can conclude that, Operative treatment of displaced bicondylar intra-articular fractures of the distal humerus by reconstruction plate and screws gives a more rigid fixation with better functional outcome than by double tension band wiring.

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