



Outcome of Management of Unstable Elbow Injuries

Authors

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Abstract

Introduction: Reconstruction of complex elbow fracture-dislocations represents one of the most troublesome and unpredictable procedures that orthopaedic surgeons face. Complex fracture-dislocations of the elbow can often be either irreducible or unstable, with an inability to hold the reduction or with the delayed development of subluxation or dislocation

Aim: To assess the Stability, Range of movement and complications of unstable elbow injuries.

Material & Methodology: The study comprised of 20 patients with unstable elbow injuries, treated by various methods of internal fixation with or without ligamentous reconstruction and with or without replacement, study period was from August 2016 to October 2017 at Rajah Muthiah Medical College, Chidambaram. Outcome analysed by MEPS score.

Results: There were 20 cases with unstable elbow injuries. The mean duration of immobilisation was 25.5 (range, 17-38) days. After rehabilitation, the mean range of motion of the elbow improved to 130° flexion (24% recovery), 18° extension (35% recovery), 73° supination (142% recovery), and 85° pronation (25% recovery). The greatest gain in range of motion occurred within 3 to 4 months. Complications included heterotopic ossification, restricted joint stiffness, degenerative articular changes, skin necrosis.

Conclusion: Every fracture pattern needs to be managed differently which will give enough stability to start early mobilisation and each fracture pattern has separate complications which needs to be addressed individually.

Keywords: complex elbow fractures, outcome, various modalities of management.

Introduction

Complex injury around the elbow can often be either irreducible/unstable with any ability to hold the reduction or with the delay development of subluxation/ dislocation. The aim of the present study is to evaluate the outcome of unstable elbow injuries that includes (Both osseous and ligamentous structures.

Improved understanding of the mechanism of elbow injuries, the primary and secondary constraints the soft tissue injury pattern and better methods of surgical repair lead us to develop a consistent surgical strategy of these injuries. These include

1. Fixation / replacement of radial head
2. Fixation of coronoid fragment

3. Repair of LCL
4. Repair of MCL
5. Fixation of Proximal Ulna

This protocol reliability restores congruent elbow stability allows early motion. Enhances functional outcome and minimize complications.

Materials and Methodology

Prospective study was conducted, the data for this study was collected from the patient admitted to Rajah Muthaih Medical College and Hospital, Annamalai University, Chidambaram diagnosed to have unstable elbow injury. 20 patients (19 - treated surgically; 1 - conservatively) during the period of June 2016 – July 2017.

Total MEPS Score = 100, Pain (45) none = 45, Mild = 30, Moderate = 15, Severe = 0, Motion(20) = Arc $>100^{\circ}$ = 20, Arc 50° - 100° = 15. Arc $<50^{\circ}$ = 5 Stability(10): Stable = 10, Moderate instable = 5, Gross instable=0, Function(25): Come Hair=5, Feed = 5, Hygiene = 5, Wear shirt = 5, Wear shoes = 5

The clinically and radiologically outcomes are assumed and recorded the ethical committee clearance was obtained from the institution.

Inclusion Criteria

1. Patient with unstable elbow injuries aged between 18 and above
2. Fracture- dislocation.
3. Radial Head fracture (Mason type 3, 4).
4. Coronoid process Fracture.
5. MCL with/without capsule injury.
6. LCL with/without capsule injury.

Exclusion Criteria

1. Paediatric Fracture
2. Open Wounds
3. Patients not willing for treatment.
4. Patient not fit for surgery.

Diagnostic Criteria

Initially the fracture pattern was assessed by standard plain radiograph of AP, lateral views and traction views. Further the stability could not be assessed in emergency room as the patient is

having severe swelling and tenderness. Initially managed by above elbow slab and anti edema measures were taken. After clearing of edema the patient was taken up for surgery. After giving anaesthesia the stability was checked in the operating room and documented. Then after reducing and fixing primary fractures the stability was again checked as follows

Medial collateral ligament, capsule and articulation assessed by valgus in extension

Lateral collateral ligament, capsule and articulation assessed by varus in extension

Medial collateral ligament is mainly (80%) assessed by valgus in flexion

Articulation is mainly assessed by varus in extension

Surgical Approach

There are several ways to approach elbow surgically. According to recent literature, use of the unique posterior approach seems to be used most often. It allows access both lateral and medial side of the elbow. However separate lateral and medial approach also used according to surgeons preferences. For most patients, the radial head was exposed using posteriolateral Kocher's approach varus valgus instability with the elbow was assessed at the time of surgery and a duration was made at that time and also for excision of radial head, and replacement of radial head with prosthesis and repair of medial & lateral collateral ligaments.

Imaging

Anteroposterior, lateral view of the elbow usually provides sufficient information for the diagnosis and treatment of radial head fracture, coronoid fracture and proximal ulna fracture. CT scan can be useful for evaluating selected fractures that are difficult to classify and can be helpful for pre-operative planning.

Initial Evaluation

Patients with unstable elbow injuries are often seen after higher-energy mechanisms such as motor vehicle accidents. In addition to local symptoms such as pain, swelling, and deformity of the elbow, ipsilateral and contralateral upper-

extremity fractures as well as injuries to other parts of the body can be found.¹⁻¹⁰ A full primary and secondary trauma survey according to Advanced Trauma Life Support (ATLS) guidelines, including a full assessment of the musculoskeletal system, should be performed. Next, a full orthopedic survey should also be performed to look for other musculoskeletal injuries. Areas of deformity and ecchymosis must be noted, including open laceration at the elbow area, which may constitute an open fracture. Ipsilateral shoulder deformities or wrist tenderness

can be signs of associated injuries. A neurovascular examination is mandatory before and after reductions or manipulation. The ulnar nerve is the most vulnerable and commonly injured nerve in complex elbow trauma.^{11,13} Reduction should be attempted with the arm in supination to help the coronoid process clear the trochlea. In addition, coronal displacement as well as posterior displacement must be corrected by posterior to anterior application of pressure on the olecranon tip while flexing the elbow to obtain reduction.¹⁴

Pre Op



Case 1

Immediate Post Op



Clinical Picture



Follow up Clinical Picture





Case 2
Pre OP



Immediate Post OP



Follow up X-ray



Follow up



Clinical Pictures

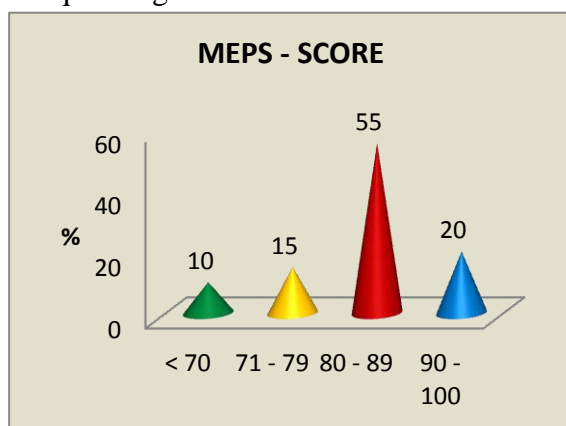


Results

Table –MEPS Score – Descriptive Statistics

MEPS Score	Mean	S.D	Percentile		
			25	50	75
MEPS Score	80	12.46	76.25	80	85

Total MEPS scores are analysed in table 8. The majority of the patients (55%) have total MEPS score in the range of 80 – 89. Even 20% of the patients have MEPS score between 90 to 100. Only 10% of the patients have MEPS score less than 70. The mean MEPS score is 80 ± 12.46 . The 25th percentile of total MEPS score is 76.25, which means, 75% of patients have total MEPS score equal or greater than 76.25.



Discussion

Chen et al.¹⁵ conducted a prospective randomized trial on radial head prosthesis versus ORIF. The authors concluded that using cemented bipolar radial head prosthesis was better than ORIF for the treatment of Mason type III radial head fractures.

Ikeda et al.¹⁶ compared ORIF to resection of the radial head for treatment of Mason type III fractures. Their results report an overall greater loss in strength, pronation and supination in the resection group compared with the ORIF

Janssen et al.¹⁷ performed a long term retrospective study to evaluate the outcome of radial head resection, The authors recommend early resection and mobilization for Mason type III fractures to avoid future functional impairment. The authors also discuss the importance of

humeral chondral damage and heterotopic ossification on the functional outcome of the elbow

Kevin A Hildebrand et al¹⁸ concludes prompt reduction of the dislocation and treatment of the associated fractures the goal is to restore joint stability to allow early active motion within 1 week of injury because evidence shows that the functional outcome is compromised with longer periods of immobilization if elbow instability is present after joint reduction and fracture treatment, further stabilization of the joint can be provided by ligament repair.

Sanchez-Sotelo et al¹⁹ reported 44 cases of LCL repair at a mean follow up of 6 years, the mean mayo elbow performance score was 85 and better results were seen in cases of instability due to traumatic etiology

In our case series report we had included different fracture that was seen around elbow joint. Each having different fracture pattern. Even though there were various modalities for fixation we chose simple methods which would give adequate stability to state early mobilisation. Almost all fracture had ligament injury. So in addition to addressing the fracture the ligaments need to be reconstructed. In our case series, 20 cases were included among them two cases radial head replacement done. In five cases radial excision done with ligament repair done. Two coronoid fixation with K-wire and screw. Four cases medial collateral ligament repair done. In eight cases lateral collateral ligament repair done. In two cases tension band wiring done for olecranon. Two cases stabilized with trans radio capetillar wire. . In this study, the mean duration of immobilisation was 25.5 (range, 17–38) days and almost all patient had elbow stiffness hence, as and when there was adequate signs of union elbow mobilisation was started, after rehabilitation the mean range of motion of the elbow improved to 130⁰ flexion (24% recovery), 18⁰ extension (35% recovery), 73⁰ supination (142% recovery), and 85⁰ pronation (25% recovery). The greatest gain in range of motion occurred within 3 to 4 months

Conclusion

In our study for fracture around elbow joint, each fracture pattern needs to be managed differently depends on the fracture pattern, age and occupation of the patient which will give enough stability to start early mobilisation since joint stiffness is one most common complication and each fracture pattern its own complications which needs to be addressed individually. If ligament injury is present, there is high chance for dislocation. Hence ligament repair should be done otherwise it can lead elbow instability.

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