

Elbow dislocation with irreparable fracture radial head

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ABSTRACT

Background: Treatment of elbow dislocation with irreparable radial head fracture needs replacement of radial head to achieve stability of elbow. An alternate method in cases of elbow dislocation with radial head fracture can be resection of radial head with repair of medial collateral ligament. We report a retrospective analysis of cases of elbow dislocation with irreparable radial head treated by excision head of radius and repair of MCL.

Materials and Methods: Nine patients of elbow dislocation with associated irreparable fractures of the head of the radius were included in this analysis (6 F:3 M, Age: 35-47 years). Radial head excision was done through the lateral approach and MCL was sutured using no 3 Ethibond using medial approach. Above elbow plaster was given for 6 weeks and gradual mobilization was done thereafter. All patients were assessed at final followup using Mayo elbow performance score (MEPS).

Results: Mean followup was 19.55 ± 7.12 months (range 14-36 months). There was no extension deficit when compared to opposite side with mean range of flexion of $138.8^\circ \pm 6.97^\circ$ (range $130-145^\circ$). Mean pronation was $87.7^\circ \pm 4.4^\circ$ (range $80-90^\circ$) and mean supination was $87.7 \pm 4.62^\circ$ (range $80-90^\circ$). The mean MEPS was 98.8 ± 3.33 (range 90-100). No patient had pain, sensory complaints, subluxation or redislocation. All were able to carry out their daily activities without disability.

Conclusion: Radial head excision with MCL repair is an acceptable option for treatment of patients with elbow dislocation and irreparable radial head fracture.

Key words: Elbow dislocation, radial head fracture, medial collateral ligament

INTRODUCTION

Elbow dislocations without any associated fracture need no special care except closed reduction under sedation or short anesthesia, splintage for a few days followed by active mobilization for elbow rehabilitation.¹ However, those with associated fracture head of radius need repair of head radius or replacement of the radial head along with the reduction of the dislocation to achieve a stable reduction. Results of repair or replacement of radial head are not always satisfactory for supination-pronation movements, although, the elbow remains stable.²

Excision of “isolated fracture of the head radius without elbow dislocation” gives very satisfactory results,³ as MCL

is always intact, though proximal migration of radius after many years has been reported.⁴⁻⁶ While, excision of head of radius alone, in elbow dislocation gives unsatisfactory results as elbow remain unstable due to loss of both stabilizers of the elbow i.e. head of radius, and MCL.⁷ Hence if the radial head is repairable, it must be repaired in such situation.⁸ Elbow dislocation, with irreparable fracture of the head of radius, needs replacement of the radial head to achieve stable elbow.

If, decision is done to excise, isolated head of the radius fracture without dislocation, it must be confirmed under anesthesia, that elbow is stable, and it is not a case of spontaneous, reduction of elbow before patient has reported to the health care services.

Irreparable fracture head of the radius is said to be present when there are more than three fragments.² It also becomes irreparable in the absence of adequate implants on the operating table as well as with a surgical team lacking experience.⁹ Instead of doing inadequate fixation which gives restriction of rotation, it is safer to excise the head and repair the MCL.

In elbow dislocation, the MCL is always injured.¹ If excision of radial head is done for irreparable fracture, there is an increased chance of redislocation of elbow. The radial head must be either repaired or replaced with artificial head prosthesis. Results of replacement of radial head are not

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consistent and many long term and short-term failures are reported.⁸ Repair of the comminuted fracture is technically difficult.¹⁰ The internal fixation should be reserved for minimally comminuted fractures with three or fewer articular fragments, in associated fracture-dislocations of the elbow.²

When the MCL is not injured in an isolated fracture of the head of the radius, head excision gives consistent results.³ Similarly in an elbow dislocation, when the head of the radius is irreparable and needs replacement, if the radial head is excised along with repair of the MCL, it mimics the isolated radial head fracture situation and gave consistently good results.² We report a retrospective analysis of cases of elbow dislocation with irreparable radial head treated by excision head of radius and repair of MCL.

MATERIALS AND METHODS

Nine patients of elbow dislocation with associated irreparable fractures of the head of the radius were included in this analysis (6 F;3 M, Age: range 35-47 years). These patients were treated from 2007-2010 for 14 months followup. Two cases had an associated type grade 1 coronoid fracture which did not need repair.

All elbow injuries with simple dislocations without fracture head of the radius, cases where the head was repairable, cases of terrible triad elbow which needs complex treatment and open fractures were excluded from this analysis.

All patients presented immediately after injury. The elbow dislocation was confirmed on plain X-rays. Elbow was reduced under sedation in all cases except one where short general anesthesia was used. The exact fracture pattern was assessed on post reduction X-rays [Figure 1]. Computed tomography scan was not done in any case.

The joint was exposed using the lateral approach under general anesthesia and tourniquet. The head of the radius

was observed and when irreparable, excised. MCL was exposed, by a medial approach, remaining anterior to the medial condyle, avoiding the ulnar nerve. It was observed that the MCL was completely torn in all cases [Figures 2-5]. Medial flexor muscles were also injured in all cases; in six of them, it was injured in the muscle bulk, and in three cases, it had avulsed from the medial condyle.

The MCL was sutured with thick nonabsorbable 03 number ETHIBOND (Johnson and Johnson, New Jersey, USA) sutures and medial stability was established. Muscles, which were torn, were sutured. A small fragment of coronoid was not sutured. At the end of the procedure, stability was assessed through range of motion from full flexion till 15° extension. The elbow was found to be stable throughout this range and wound was closed. An above-elbow plaster slab was given for 6 weeks, for soft tissue healing.

Gradually range of motion exercises and muscle-strengthening exercises were started. All patients were followed up till 4 months after removal of plaster, and were assessed for range of motion and elbow stability. All elbows were assessed by the Mayo Elbow Performance Score (MEPS).¹¹

RESULTS

All the patients were available for followup with mean followup of 19.55 ± 7.12 months (range 14-36 months). No patients reported pain at elbow or any subjective instability. There was no extension deficit when compared to opposite side with mean flexion of $138.8 \pm 6.97^\circ$ (range 130-145°). Mean pronation was $87.7 \pm 4.4^\circ$ (range 80-90) and mean supination was $87.7 \pm 4.62^\circ$ (range 80-90°) [Table 1]. The mean MEPS was 98.8 ± 3.33 (range 90-100) [Table 2]. No patient had any sensory complaints, or subluxation, or redislocation till final followup. None of the patients had to change their occupation and all were able to carry out their daily activities without disability.



Figure 1: X-ray elbow joint lateral (a,b) and anteroposterior (c) views of a 47 year old male (case 6) presented with acute injury showing right elbow dislocation and displaced fractures radial head. Closed reduction was done to relocate the joint and medial laxity can be well appreciated after reduction



Figure 2: X-ray elbow joint anteroposterior and lateral views of a 36 year old female with elbow dislocation showing relocation of elbow with comminuted fracture radial head

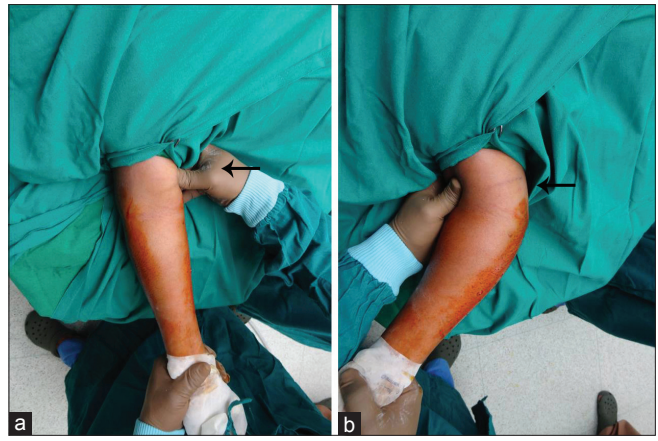


Figure 3: Intraoperative demonstration of gross medial laxity (arrow is on medial side)

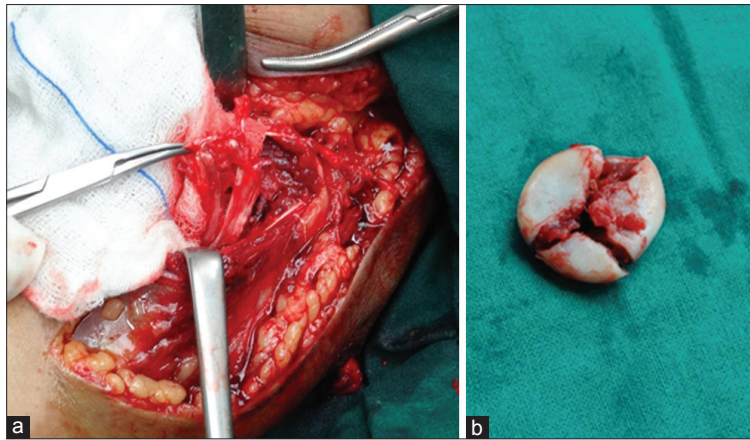


Figure 4: Intraoperative photographs excision of the radial head (a) showing lateral approach to the elbow with damaged soft tissues (b) irreparable excised radial head

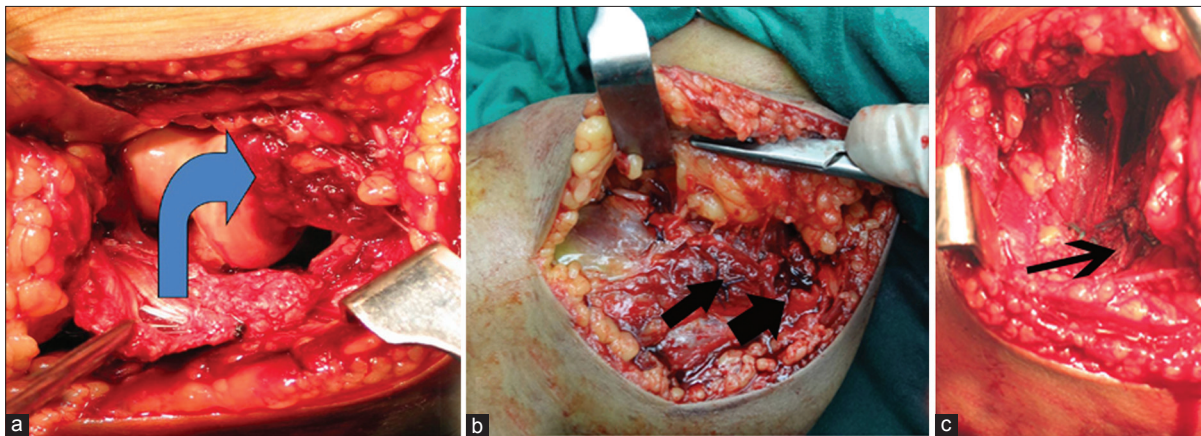


Figure 5: Intraoperative photographs showing (a) The two ends of medial collateral ligament that are approximated (b) appearance after suturing the medial collateral ligament MCL with thick nonabsorbable no 3 Ethibond sutures and medial stability was established (c) appearance after suturing the medial collateral ligament

DISCUSSION

The primary stabilizers of the elbow are the intact bones, namely, olecranon and coronoid, head of radius, and lower

end of the humerus. Medial and lateral collateral ligaments are the secondary stabilizers of the elbow. The radial head provides 30% of the valgus stability. With an intact MCL complex, removal of head of radius results in no instability.

Table 1: Range of motion

Variables	Age	Gender	Final supination	Final pronation	Final flexion
Case 1	42	M	90	90	145
Case 2	35	F	90	90	140
Case 3	39	F	90	90	145
Case 4	36	M	80	80	130
Case 5	44	F	90	90	140
Case 6	47	M	80	90	130
Case 7	38	F	90	80	145
Case 8	36	F	90	90	130
Case 9	40	F	90	90	145
Case 8	36	F	90	90	130
Case 9	40	F	90	90	145

Table 2: Mayo elbow performance score

Variables	Pain	Motion	Stability	Comb hair	Feed self	Hygiene	Shirt	Shoe
Case 1	45	20	10	5	5	5	5	5
Case 2	45	20	10	5	5	5	5	5
Case 3	45	20	10	5	5	5	5	5
Case 4	45	20	10	5	5	5	5	5
Case 5	45	20	10	5	5	5	5	5
Case 6	45	20	10	0	5	0	5	5
Case 7	45	20	10	5	5	5	5	5
Case 8	45	20	10	5	5	5	5	5
Case 9	45	20	10	5	5	5	5	5

Irreparable fracture head radius is said to be present when there are more than three fragments.² The repair of multi fragment head of radius is demanding procedure as it requires quality implants and surgical skills of high order.

This injury used to be treated by keeping the shattered head intact and elbow cast immobilization for 4 weeks when radial head prosthesis was not available. The delayed excision of radial head was after about 2 to 3 months was advocated to regain supination/pronation. Unfortunately, range of motion did not return fully in these cases and poor results were more frequent.¹² Later, time, head of the radius was excised at time of primary treatment, and elbow was stabilized by Steinmann pin till soft tissue healing (3 weeks). However, it was observed that the elbow could not be maintained in a stable position and had restriction of movements. Results improved with the excision of the head of the radius and reparation of the MCL. The elbows were stable and full range of movements were achieved.

Fracture of the head of the radius cannot be excised with associated elbow dislocation, where the MCL is always torn. If the head is excised, both primary and secondary stabilizers are lost and the elbow usually re-dislocates even in plaster. So if any one of the stabilizer is intact, the elbow remains stable like in the case of an excised head without dislocation where the MCL is intact. Likewise, if the irreparable head of

radius is replaced without repairing the torn MCL, the elbow remains stable. So, only one stabilizer of the elbow is enough for stability. Elbow is unstable only when both the stabilizers are absent. However, controversy still exists regarding which fractures are optimally treated with reduction and internal fixation as well as whether a fracture may be too comminuted to fix. Tashjian and Katarincic⁷ concluded that the radial head is a constraint secondary to the MCL for both valgus displacement and internal rotation. Isolated repair of the ligament was superior to isolated prosthetic replacement and may be sufficient to restore valgus and internal rotatory stability after excision of the radial head in MCL deficient elbows. Moro *et al.*⁸ opined that the radial head should be preserved, if possible, to lower the risk and prevent severe instability; and if the radial head must be resected, suturing of torn ligaments and muscles at the epicondyles was essential. Ring *et al.*⁹ reported that at the 12-year followup, following open reduction and internal fixation of radial head fractures, 80% had good or excellent results; however, only 30% were completely pain-free, and 45% had evidence of arthritis.

To conclude, repairing the MCL is a better, easier, and more predictable approach, when irreparable head radius fractures needs excision, in complex elbow dislocation.

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