

THE IMPORTANCE OF ELBOW ASPIRATION IN TREATING RADIAL HEAD FRACTURES

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ABSTRACT

Background: radial head fractures are common; usually occur after fall on outstretched hand. Mason classified these fractures into 4 types; types I and II are treated conservatively with the aim of early mobilization, but types III and IV are treated surgically with fracture fixation or excision. Elbow aspiration for hemoarthrosis is not famous as in the knee, although it is advised to relieve pain. The aim of this study is to evaluate the effect of elbow aspiration on intra-articular pressure and pain relief in treatment of radial head fractures. **Patients and methods:** eighteen patients with radial head fractures were included in this study; they were 12 males and 6 females, their ages averaged 35 years (range 21 - 49 years), right elbow was affected in 10 cases and left in 8 cases. According to Mason classification 13 cases were type I and 5 cases type II. All cases were treated by elbow aspiration and posterior slab for 10 to 14 days. Pain was evaluated using the 10- point Visual Analogue Score (VAS) before and after aspiration. Elbow flexion- extension and forearm supination- pronation were measured before and after aspiration. Intra-articular pressure was measured using White-sides method before and after aspiration. Follow up averaged 8 months (range 6- 12 months). **Results:** pain according to visual analogue score (VAS) improved from average 7 (5- 9) before aspiration to average 2 (1- 3). Elbow flexion- extension improved from average 62° (range 50°- 75°) before aspiration to average 110° (range 100°- 125°) after aspiration. Forearm supination- pronation improved from average 44° (range 35°- 75°) before aspiration to average 100° (range 90°- 110°) after aspiration. Intra-articular pressure decreased from average 75 mmHg (average 62- 115) before aspiration to average 16 mmHg (range 12- 28) after aspiration. The aspirated amount averaged 9 ml (range 7- 15). At latest follow up 15 cases regained full range of motion (83, 3 %) and all cases showed radiological union. No infection occurred in this study, no cases of posterior interosseous nerve palsy occurred before or after aspiration. **Conclusion:** We recommend elbow aspiration in treating radial head fractures types I and II as a routine technique; to decrease intra-articular pressure, relieve pain, and allow early mobilization. Elbow aspiration is a simple, safe technique, no need for special skills or equipment and give dramatic pain relief. **Key words :** (Radial head fractures. Elbow aspiration).

INTRODUCTION

Radial head fractures are common; accounting for approximately 20% of all elbow fractures; approximately 5 to 10% of elbow dislocations are associated with radial head fractures. The most common mechanism of injury is fall on the outstretched hand with forearm in pronation; less common mechanisms are direct trauma, valgus loading and associating elbow dislocations¹. Mason classified these fractures (figure 1) into four types: type I, undisplaced segmental (marginal) fracture; type II, minimally displaced segmental (marginal) fracture; type III, comminuted fracture; and type IV as type III and associated with posterior dislocation of the elbow². The principle of surgical intervention for management of types III and IV radial head fractures is well established³,

but in management of types I, II most texts advocates early mobilization immediately or after a period of rest in a sling or plaster^{4,5}. Many of orthopedic literature have suggested that pain relief and early return of function may be achieved by aspiration of the hemoarthrosis which accumulates in the elbow following this fracture^{6,7}; this management is an accepted practice for knee hemoarthrosis; but in the elbow not established as the standard treatment. This study evaluates elbow aspiration as a step in treatment of radial head fractures (types I and II) for pain relief and early return of function.

PATIENTS AND METHODS

Between July 2007 and September 2009, we have treated eighteen patients with radial head fractures at Zagazig University Hospitals, Orthopedic Department. They were

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12 males and 6 females; their ages averaged 35 years (range 21 - 49). Right elbow was affected in 10 cases and left in 8 cases. Thirteen cases were type I and 5 cases were type II. The trauma was fall on outstretched hand in 14 cases, valgus trauma in 2 cases and direct trauma in 2 cases. **Exclusion criteria:** were types III and IV fractures and open fractures. All patients presented with history of trauma, elbow pain and difficulty in elbow motion. Pain, according to the Visual Analogue Score averaged 7 (5- 9), it was severe enough in 2 cases to present with neurogenic shock. By examination there was a bulge over the radial head just lateral to anconeus muscle (figure 2). Flexion-extension averaged 62° (range 50°-75°), pronation- supination averaged 44° (range 35°- 75°). X-rays of the elbow were done antero-posterior and lateral and repeated in varying degrees of pronation and supination. Also CT was done in 4 cases to confirm the Mason type. With the patient prone on the examination table (figure 3) and the forearm hanging over the edge of the table, Wide pore needle was inserted under aseptic technique just lateral to the olecranon⁸ (figures 4, 5) at the summit of soft tissue bulge over radial head; first the pressure was measured using White-sides method used for measurement of tissue pressure in cases with compartment syndrome⁹, the intra-articular pressure averaged 75 mmHg (range 62-115 mmHg). The aspirated amount averaged 9 ml (range 7 and 15 ml). After aspiration intra-articular pressure averaged 16 mmHg (range 12-28 mmHg). After aspiration there were dramatic relief of pain and improvement in range of motion. In 15 cases there were no pain at rest, only pain was present by palpation of radial head and at last degrees of motion. In three cases with type II fracture; there was slight pain at rest and more at last degrees of motion. Flexion- extension averaged 110° (range 100°-125°). Also supination-pronation averaged 100° (range 90°-110°). Posterior elbow plaster slab was done for all cases for 10-14 days. All patients received medical treatment in the form of antibiotics, analgesics

and anti-edematous drugs. After slab removal, patients were encouraged to move elbow in flexion and extension; also supination and pronation was encouraged within the range of pain tolerance. Then all cases were seen weekly for one month then every other week for two months and monthly to complete 6 months. Five cases continued follow up for one year. Three cases were non-cooperative and were referred to physiotherapy. Every visit, range of motion was measured and the patient was asked about pain tolerance and any interference with daily activities and his work. X-rays were done at slab removal, at 6 weeks and 3 months. Follow up averaged 8 months (range 6-12 months). At the latest follow up, 15 cases regained full range of motion (figures 6, 7, 8, 9, 10 and 11) and in 3 cases with type II fracture there were an average 15° limitation of full extension (range 10°-20°) and an average 14° limitation of full supination (range 10°-18°).

RESULTS

After aspiration pain according to the visual analogue score (VAS) improved from average 7 (5- 9) before aspiration to average 2 (1- 3). Elbow flexion- extension improved from average 62° (range 50°- 75°) before aspiration to average 110° (range 100°- 125°) after aspiration. Forearm supination-pronation improved from average 44° (range 35°- 75°) before aspiration to average 100° (range 90°- 110°) after aspiration. Intra-articular pressure decreased from average 75 mmHg (average 62- 115) before aspiration to average 16 mmHg (range 12- 28) after aspiration. The aspirated amount averaged 9 ml (range 7- 15 ml). Follow up averaged 8 months (range 6-12 months). Fifteen cases (83,3%) regained full range of flexion-extension at average 8 weeks after slab removal (range 6-12 weeks) and full range of pronation- supination at average 10 weeks after slab removal (range 8-14 weeks). Three cases (16.7%) with type II fracture had slow improvement in range of motion and were referred to physiotherapy 6 weeks after slab removal but at latest follow up there were still limitation of extension by average 15° (range

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10°-20°) and supination by average 14° (range 10°-18°). As regard pain 15 cases (83.3%) showed no pain either at rest or at extremes of motion. The three cases (16.7%) who suffered limitation of full range of motion had slight pain at extremes of movement. All cases

returned to their pre-injury level of activity and job. At latest follow up all cases showed radiological union. No cases of infection occurred following aspiration; none of our cases had posterior interosseous nerve palsy before or after aspiration.

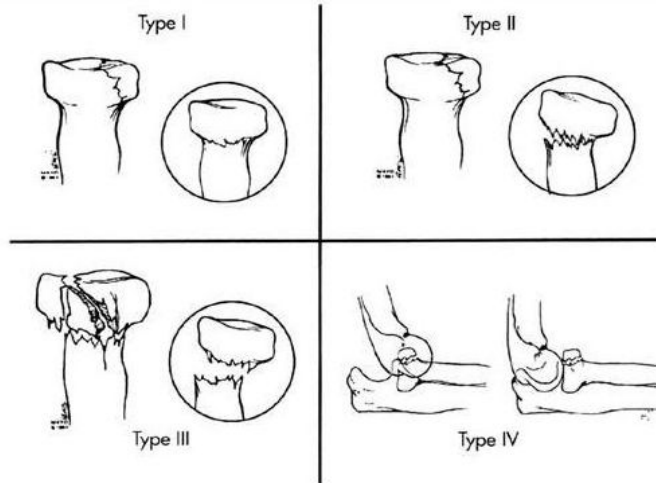


Figure (1) Mason Classification



Figure (2) Bulge over radial head



Figure (3) Position for aspiration

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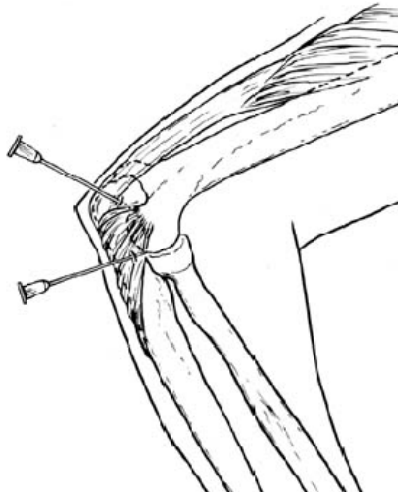


Figure (4) Site for needle insertion



Figure (5) Aspiration



Figure (6) Male patient 44 years with Mason type I fracture head radius



Figure (7) United fracture after 9 months

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Figure (8) Full extension left elbow

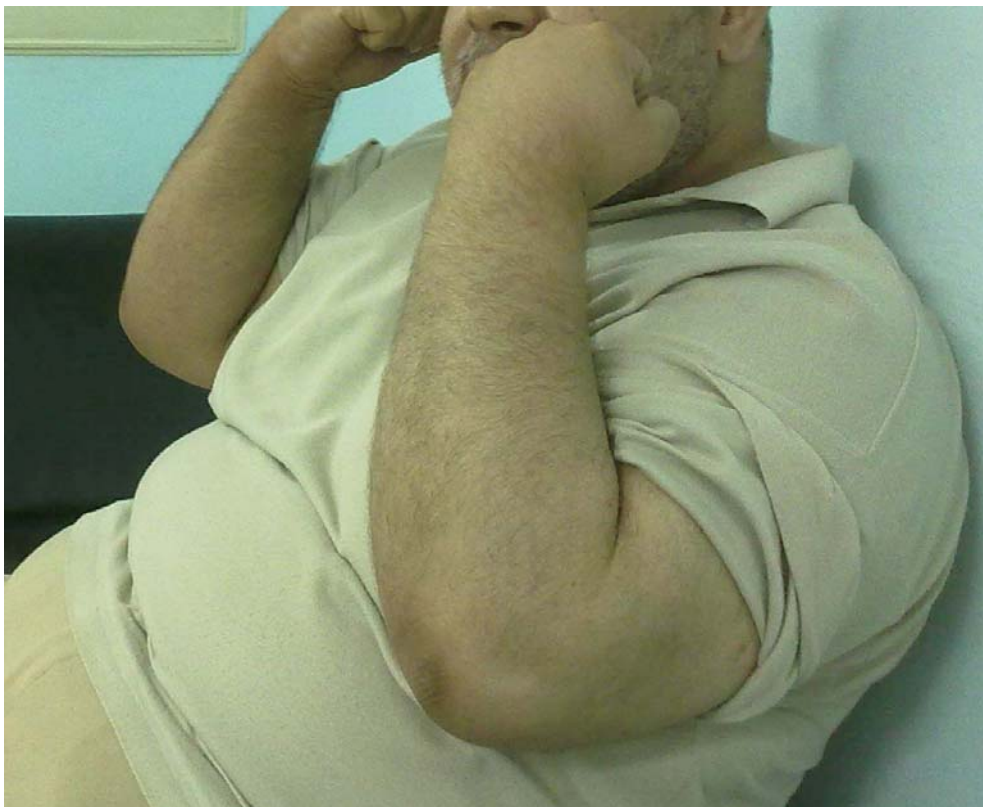


Figure (9) Full flexion

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Figure (10) Full supination



Figure (11) Full pronation

DISSCUSION

Patients with radial head fractures usually present with severe pain, the severity of pain is related mainly to the increased intra-articular pressure. O'Driscoll et al¹⁰ in their study on 13 thawed fresh-frozen human elbows found that the capacity of the joint capsule was 23 +/- 4 ml and the maximum pressure the elbow capsule can withstand before rupture averaged 80 mmHg.

Aspiration of hemoarthrosis is well established in the knee but in the elbow it is still not popular. In this study aspiration was done in 18 patients with radial head fractures

types I, II with immediate relief of pain and improvement of the range of motion. Improvement in pain and movement is due to the decreased joint pressure from average 75 mmHg before aspiration to average 16 mmHg after aspiration as no analgesics were given before aspiration and no local anesthetic was injected intra-articular after aspiration. This technique is simple, can be done at outpatient clinic and needs no special skills or special equipments like C-arm. Theoretically this is an invasive technique and carries the risk of infection and nerve injury but this had not occurred in this study.

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Dooley and Angus³ in their study on 28 cases with radial head fractures treated by aspiration in 13 cases versus mobilization in the other 15; noted that there is dramatic improvement in pain and range of motion after aspiration, all their cases were types I, II and this is nearly similar to our results.

Holdsworth et al⁶, in their study on 80 patients with radial head fractures treated by elbow aspiration and bupivacaine injection in 41 cases versus 39 cases treated by early mobilization alone noted that improvement in pain was significant but improvement in range of motion or success of aspiration was not significant but he did not mention the fracture type. In type III fractures motion may be blocked by displaced fragment also in type IV fracture - dislocation the capsular may rupture with extra-articular spread of hematoma. The improvement in pain is mainly due to local anesthetic.

Ditsios et al⁷ in their study on 16 cases with type I radial head fractures treated by aspiration found that intra-articular pressure decreased from average 76.5 mmHg before aspiration to 17 mmHg and the aspirated amount averaged 2.75 ml. In our study the pressure before aspiration averaged 75 mmHg and the aspirated amount averaged 9 ml, this larger amount can be explained by the presence of 5 cases type II fractures in our study which represents a more severe type of fracture with more bleeding.

Ditsios et al⁷ used the Stryker Intra-Compartmental Pressure Monitor System for measurement of intra-articular pressure which was not available in our hospital and we used the White-sides method used for measurement of intra-compartmental pressure in cases with suspected compartment syndrome.

CONCLUSION

The cause of severe pain and limitation of movement associated with radial head fractures is the elevated intra-articular pressure, so aspiration of the elbow results in acute pressure decrease and pain relief. We recommend routine elbow aspiration in types I, II radial head fractures for pain relief, early mobilization and return of function.

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