Results of Closed Reduction and Early Rehabilitation in Simple Elbow Dislocations

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ABSTRACT

Objective: To share the outcomes of closed reduction and early mobilization in patients with simple elbow dislocation.

Methods: From 2008 to 2015, 18 adult patients with simple elbow dislocations were enrolled in the Emergency Department of our hospital. All the patients received closed reduction under sedation. After reduction, a long arm cast was applied to all patients for one week. Early active movement was begun at the end of this week. Patients were not allowed to do passive stretching exercises for three weeks. All patients were followed up at the first week, sixth week and first year. Patients were evaluated both radiographically and functionally with Quick-DASH and Oxford Elbow Score. The results were evaluated by comparison with patients' contralateral elbow.

Results: Quick-DASH scores at 1 year were 5.0 in the dislocation group versus 4.0 in the contralateral elbow. Oxford Elbow Scores at 1 year were 91 in the dislocation group versus 95 in the contralateral elbow. There was no significant relationship between the two groups at the first year controls ($p>0.05$). There was no significant difference in terms of range of motion ($p>0.05$). Patients returned to work sooner after early mobilization (average of 12 days). No recurrent dislocations occurred. After one year, there was no significant deterioration with radiographic joint integrity in any patient.

Conclusion: Early active mobilization is a safe and effective treatment for simple elbow dislocations. Patients recovered faster and returned to work earlier compared to plaster immobilization.

Keywords: Simple elbow dislocation, closed reduction, early rehabilitation

INTRODUCTION

Elbow dislocation is the second most common joint dislocation among adults. Its incidence is 5–6/100,000 people per year (1, 2). Elbow dislocations are generally simple dislocations. To evaluate them as simple elbow dislocations, there must be no accompanying fractures and recurrent instability findings. Although ligament rupture is seen, fractures mostly do not coexist with dislocation. After simple dislocation, the elbow is stable. Stability of the elbow joint is provided by primary and secondary stabilizers. The primary stabilizers of the elbow are the ulnohumeral joint, medial collateral ligament, and lateral collateral ligament. The secondary stabilizers of the elbow are the radial head, joint capsule, and insertions of the flexor and extensor muscles.

Conventional treatment is immobilization with a long arm splint following closed reduction (3, 4). Simple elbow dislocations can also be treated by early mobilization after closed reduction (5, 6).

The most frightening issue after early immobilization is the risk of re-dislocation. However, long-term immobilization can lead to stiffness and contractures in the elbow (7). In the literature, there are retrospective studies reporting that early mobilization is better at 6-month follow-ups in terms of pain and movement restriction (8, 9).

In the present study, the results of patients undergoing early mobilization after closed reduction were compared with those of the contralateral healthy elbow. This study aimed to reduce the time for immobilization and return to work and to decrease long-term complications such as restricted movement of the joint by beginning early movement in patients who underwent closed reduction due to the diagnosis of simple elbow dislocation.

METHODS

Among 38 patients who underwent reduction in the emergency unit between 2008 and 2015, 18 adult patients who underwent closed reduction and had simple elbow dislocation were included. Patients with polytrauma, fracture dislocation, open dislocations, an additional injury in the same arm, a history of a previous elbow dislocation, painful elbow in the same extremity, and a neurological disease were excluded.

After observing that there was no fracture in the radiographic evaluation of patients who presented to the emergency unit because of elbow dislocation, the neurovascular state of the ex-

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tremity was controlled (Figure 1). First, closed reduction without anesthesia was tried (Figure 2). However, reduction under general anesthesia was performed in two patients in whom reduction could not be performed without anesthesia in the emergency unit.

After closed reduction, splinting was performed for a week. After 1 week, a shoulder sling was used for pain control and active early mobilization was initiated. During the first 3 weeks, passive stretching was not allowed. Patients were asked to come for a control examination after 1 week, 6 weeks, and 1 year. Four patients did not come for the control examination after 1 year, and they were excluded. At the 1st and 6th week, x-ray evaluations were performed and patients were assessed in terms of functions and range of motion by comparing the same features with those in the other contralateral healthy elbow through the Quick-DASH and Oxford scoring systems. Angles were measured for the movements of flexion, extension, pronation, and supination. Varus and valgus instability was tested in the elbow extension. The hand was evaluated in terms of the neurovascular state, grip strength, and sensation disorder by comparing the same features with those in the healthy contralateral extremity. Using the Quick-DASH and Oxford scoring systems, functions and ranges of motions were evaluated and were compared with those in the contralateral healthy elbow.

Ethical approval for this study was obtained from the Local Ethics Committee of Gazi University School of Medicine.

Statistical Analysis

The statistical analysis was performed using SPSS 21 for Windows (IBM Statistical Package for the Social Sciences, version 21.0 IBM Corp.; Armonk, NY, USA) software. The dependent t-test was used for investigating the presence of a statistically significant difference between the groups in terms of the mean values of the 6th-week and 1st-year scores. The presence of a statistically significant difference with regard to median values was evaluated using the Wilcoxon signed-rank test. Nominal changes were examined with the likelihood ratio test. $p<0.05$ was accepted to be statistically significant.

Figure 1. Anterior–posterior and lateral radiographs of the elbow before reduction

RESULTS

Fourteen patients who underwent closed reduction due to simple elbow dislocation between 2008 and 2015 and who had regular follow-ups were evaluated.

While the mean Quick-DASH score of the elbow undergoing reduction was 12 in the 6th week, it was 5 in the control examination performed after 1 year. On the other hand, the mean score for the healthy elbow was 4 in the 6th-week and 1st-year examinations. While there was a statistically significant difference in the Quick-DASH score in the 6th week ($p<0.05$), no significant difference was observed at the end of the 1st year ($p>0.05$) (Table 1).

The mean OES was 70 for the dislocated elbow in the 6th week, and it was 91 after 1 year. For the contralateral healthy elbow, this score was 95 on average in the 6th-week and 1st-year control examinations. A statistically significant difference was detected between the treated elbow and the healthy elbow in the 6th week ($p<0.05$), but there was no statistically significant difference at the end of the 1st year ($p>0.05$) (Table 1).

The ranges of motion in the 6th week were evaluated for the elbows undergoing reduction. The mean flexion degree was 132° (range, 124°–136°), and the mean extension degree was 14° (range, 9°–20°). In terms of losses of flexion/extension range of motion, there was no significant difference detected the in the elbows undergoing reduction and the contralateral healthy elbows ($p>0.05$). In comparison to the contralateral healthy elbows, the mean loss of joint range of motion in elbows undergoing reduction was 21° (range, 15°–27°) (Table 1).

None of the patients who underwent treatment were manual laborers. They returned to their jobs after 12 (range, 10–16) days on average.

At the end of the 1st year, no impairment in the integrity of the joint was radiologically detected in any patient. However, heterotopic ossification was found in two patients (14.3%). These patients were evaluated according to the Broberg–Morrey classification and were classified as Grade 2.

Figure 2. Anterior–posterior and lateral radiographs of the elbow in a patient undergoing closed reduction and long arm splint fixation

Table 1. Scores and range of motion values of elbows undergoing reduction and contralateral healthy elbows

	Elbows undergoing reduction	Contralateral healthy elbows
Quick-DASH (6th week)	12	4
Quick-DASH (1st year)	5	4
OES score (6th week)	70	95
OES score (1st year)	91	95
Flexion degree	132	136
Extension degree	14	20
Loss of joint range of motion	21	-

OES: Oxford Elbow Score

DISCUSSION

Elbow dislocations without fractures and recurrent instability findings are referred to as simple elbow dislocations. Carefully performed radiological and physical examinations after reduction are very important. The determination of an accompanying fracture or instability is the most important step in the treatment process. Conventional treatment of simple elbow dislocations include closed reduction and immobilization with a splint, but its results are not satisfactory (3, 4). Therefore, the necessity of immobilization has become controversial over time. In recent years, the popular treatment option is early mobilization after reduction (6).

The results of simple elbow dislocations are generally good, but sometimes, there may be residual stiffness (10, 11). The most frightening complication after early immobilization is recurrent instability. However, long-term immobilization can cause stiffness and contractures in the elbow (7). In the literature, there are a few studies with high evidence value that show a more successful treatment method. In a randomized controlled study, no difference was found between the group undergoing early mobilization and the group undergoing immobilization in terms of flexion and extension at the end of 1 year, but restricted extension was detected in the early mobilization group in the 3-month controls (8, 12). There are some retrospective studies stating that early mobilization was better at 6-month follow-ups for pain and restricted movement (8, 9). Fourteen patients included in the study started immobilization for 1 week and then early mobilization after closed reduction. It was observed that the patients returned to their jobs after approximately 2 weeks. The affected elbows of the patients were compared with the healthy elbows in terms of their functions using the Quick-DASH and OES scoring systems. The results of this comparison were good. No recurrent instability, subluxation, and recurrent dislocation were observed in any patient.

Although the dislocation is called "simple" because of non-accompanying fractures, there may be soft tissue injury around the elbow. Therefore, after closed reduction, splinting from the posterior region was done for the recovery of soft tissue and decrease in pain. When patients came for the control examination after 1 week, fixation with splint was ended. Radiographies were repeated, and instability examinations were performed. Early mobilization was started for the patients, and they were allowed to return to their daily routines. However, they were not allowed to do physically hard work and to carry heavy loads. Similar to our study, Anakwe et al. (13) followed up their patients undergoing early mobilization after closed reduction.

Iordens et al. (14) evaluated the short- and long-term results of simple elbow dislocations; 48 patients who underwent early mobilization were functionally assessed with Quick-DASH and OES systems. While the mean Quick-DASH score was 12 in the 6th week, it was 4 at the end of the 1st year. The OES was 72 in the 6th week, but 93 at the end of the 1st year. Although better functional results were obtained in the 6th week compared to the group undergoing immobilization with a cast for 3 weeks, no difference was found between the two groups at the end of the 1st year. In a study in which 110 simple elbow dislocations were followed up with early mobilization for 88 months, the Quick-DASH score was 6.7 (range, 4–9) and the OES was 90.3 (range, 82.2–89) (13). In our study, while the mean Quick-DASH score was 12 in the 6th week, it was 5 in the controls performed 1 year after. The mean OES was 70 in the 6th week, but 91 in the 1st year. Our results were similar to those present in the literature.

One of the most frequent problems after simple elbow dislocations is movement restriction. In a study comparing early mobilization and immobilization after reduction, it was statistically demonstrated that the joint range of motion in the 6th week was to be better in the early mobilization group, but the results were similar at the end of the 1st year (14). In 43 simple elbow dislocations that were retrospectively evaluated by De Haan et al. (11), while a mean flexion degree of 141.0° was obtained in the long term, a mean extension loss of 5.5° was detected. In the study conducted by Anakwe et al. (13), 135° flexion and 8.1° extension were found. In our study, 6th-week ranges of motion were evaluated as 132°(range, 124°–136°) flexion and 14°(range, 9°–20°) extension. Our results were similar to those present in the literature.

In studies comparing early mobilization and fixation with a cast after reduction, patients undergoing early mobilization returned to their jobs earlier. After early mobilization and fixation with a cast after reduction, the time taken for returning to the job was 10 and 18 days, respectively, in the study by Iordens et al. (14), but 3.2 and 6.6 days, respectively, in the study by Maripuri et al. (9) In our study, patients returned to their jobs after 12 days (range, 10–16 days) on average. In the literature, the rate of repeating dislocation after simple elbow dislocations is 0.6%. In this study, at the end of the 1st year, no radiologically impaired joint integrity and complication such as recurrent dislocation were encountered in any patient.

After simple elbow dislocations, there is a risk of the development of heterotopic ossification. In our study, two patients were found to have heterotopic ossification, which was Grade 2 according to the Broberg–Morrey classification (14.3%). This rate was lower than that found in similar studies in the literature. In a multi-center study, the rate of heterotopic ossification was 55% in the group undergoing early mobilization and 60% in the group undergoing immobilization with a cast (14).

CONCLUSION

Early mobilization after reduction is an effective and safe method for treating patients with simple elbow dislocations. Compared to long-term immobilization, early mobilization does not increase the rates of complications. Patients can return to their social lives and jobs more rapidly. Therefore, early mobilization is recommended for treating patients with simple elbow dislocations.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Gazi University School of Medicine.

Informed Consent: Verbal informed consent was obtained from patients participated in this study.

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