



## Outcome of Long Standing Ulna-Humeral Dislocation Managed by Open Reduction and Stabilization with V-Y Plasty; Our Experience

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Received: February 4, 2017

Revised: June 10, 2017

Accepted: August 1, 2017

### ▶ ABSTRACT

**Objective:** To assess the outcome of long standing ulno-humeral dislocation managed by open reduction and stabilization with V-Y plasty.

**Methodology:** This prospective cross sectional study included 14 patients with elbow dislocation that was more than 3 months without joint ankylosis, myositis ossificans or nerve injury. The surgical management not only included open reduction of the elbow joint, but also elongation of the triceps aponeurosis, collateral ligament repair along with the stabilization of the elbow joint. The results were analyzed using the Mayo Elbow score and the range of motion at 3 months and results were compared with the function of the patients elbows before surgery.

**Results:** Among the 14 included patients, there were 9 men and 5 women. The mean age of the patients was 27.8±8.3 years. The average ROM Increased from 37.0°±25.8° to 99.7°±23.3° of flexion in the postop followup. Whereas the extension lag changed from 15.5°±14.6° to 19.6°±18.3°. The mean Mayo score increased from 47 in the preop period to 87 in the postop period.

**Conclusion:** This study demonstrates that relative good function with a pretty low risk can be obtained when comparing the functional results after 3 months with preoperative status. Based on these results we recommend that neglected elbow dislocation should be managed by surgical intervention even if the dislocations are old.

**Keywords:** Mayo elbow score; Neglected elbow dislocation; Speeds V-Y plasty.

Please cite this paper as:

Khanna V, Gupta A, Kumar S. Outcome of Long Standing Ulna-Humeral Dislocation Managed by Open Reduction and Stabilization with V-Y Plasty; Our Experience. *Bull Emerg Trauma*. 2017;5(4):259-265. doi: 10.18869/acadpub.beat.5.4.426.

## Introduction

Neglected elbow dislocations or “untreated elbow dislocation” may be defined as dislocation which has not been reduced within 3 weeks of injury [1-4]. These patients may present with their elbows nearly fixed in a few degrees of flexion, extension, pronation or supination which is inadequate for the activities of daily living [4]. An unreduced elbow poses a challenge to the orthopedic surgeon especially in the developing countries [3]. This is because patients still go to the local bone setters for the management of dislocation with the risk of being managed by wrong manipulations and massages [2]. The bonesetters generally immobilize the elbow in extension which leads to contracture and shortening of the triceps muscles and the collateral ligaments. This results in a non-functioning elbow that surgically is very demanding to treat [5, 6] and the functional outcome is usually not satisfactory. Many surgeons recommend open reduction for late presenting cases [1, 7, 8]. The postoperative functional outcome decreases with the increase in the time elapsed [2, 7].

The surgical management not only includes the open reduction of the elbow joint but also elongation of the triceps aponeurosis, collateral ligament repair along with the stabilization of the elbow joint [9-16]. The aim of our study was to study the outcome of surgical management of such neglected dislocation of elbows and to compare the outcome to the studies done before.

## Materials and Methods

### Study Population

This prospective cross-sectional study was conducted between January 2012 and December

2014. Seventeen patients reported during the study period to Eras Lucknow Medical College out of which 3 were excluded from the study (1 heterotrophic calcification and 2 due to fracture dislocation and nerve palsy). All the patients had received treatment from local bone setters or quacks in the form of massages, manipulations and splinting. The main cause of concern for the patient was elbow stiffness and inability of the patient to perform the activities of daily living. In all the cases the three-point bony relation was disturbed between the olecranon, medial and lateral epicondyle. Cases with nerve involvement, fractures near elbow and heterotrophic calcification were excluded from the study whereas all the remaining cases were included in the study. After an informed consent radiography of the affected elbow was taken (Figure 1). The preoperative range of motion was evaluated along with the Mayo Clinic Elbow Performance Index<sup>15</sup>. This is a clinical score based on pain, ROM, stability and basic functions with the score ranging from 10-100. The clinical grading of the result based on the score is >90 is excellent, 75-89 is good, 60-74 is fair and <60 is considered poor. After all the preoperative workup, the patients were operated under general anesthesia.

### Operative Procedure

The patient was operated in a lateral decubitus position. The affected arm with tourniquet was supported by a pad with the forearm and hand hanging. A posterolateral approach was used over the elbow and extended midline proximally. After superficial dissection the ulnar nerve was identified and tagged. Triceps aponeurosis was raised from the olecranon by sharp dissection whereas; the fibres of the triceps muscle were split from about 7.5 cms proximal to the elbow along the midline (Figure 2). Sub-periosteal dissection of distal humerus

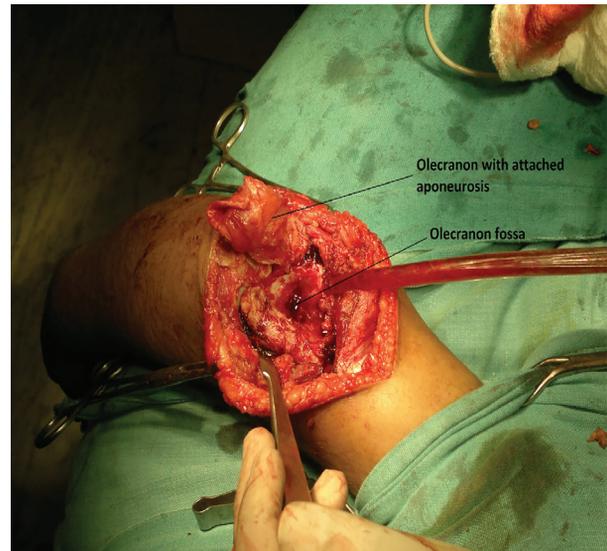


Fig. 1. Preoperative radiography of a 5-month-old neglected elbow dislocation.



**Fig. 2.** Intraoperative image of the triangular flap of triceps aponeurosis with the base attached to olecranon.

was done. With the distal humerus mobilized the joint was reduced after clearing the olecranon fossa under vision (Figure 3). Any callus or hypertrophic calcification if found was excised and removed. Due to extensive soft tissue clearance the elbow was found to be unstable. The joint was reduced and a 2mm K-wire was passed from the olecranon to the distal humerus with the elbow at 90° (Figure 4). The periosteum and the triceps muscle was then sutured back to the posterior aspect of humerus. The proximal part of the triceps aponeurosis was then closed with each other so that the flap was attached distally so as to elongate the triceps aponeurosis (Speeds V-Y plasty) [16] (Figure 5). This was followed by direct collateral repair. Anterior transposition of the ulnar nerve was done so as to avoid any strain on the ulnar nerve. Closure was done and the patient was given an above elbow POP slab. radiographies were read by author 1; all operations were done by author 1 and 2 whereas the pre and postoperative analysis

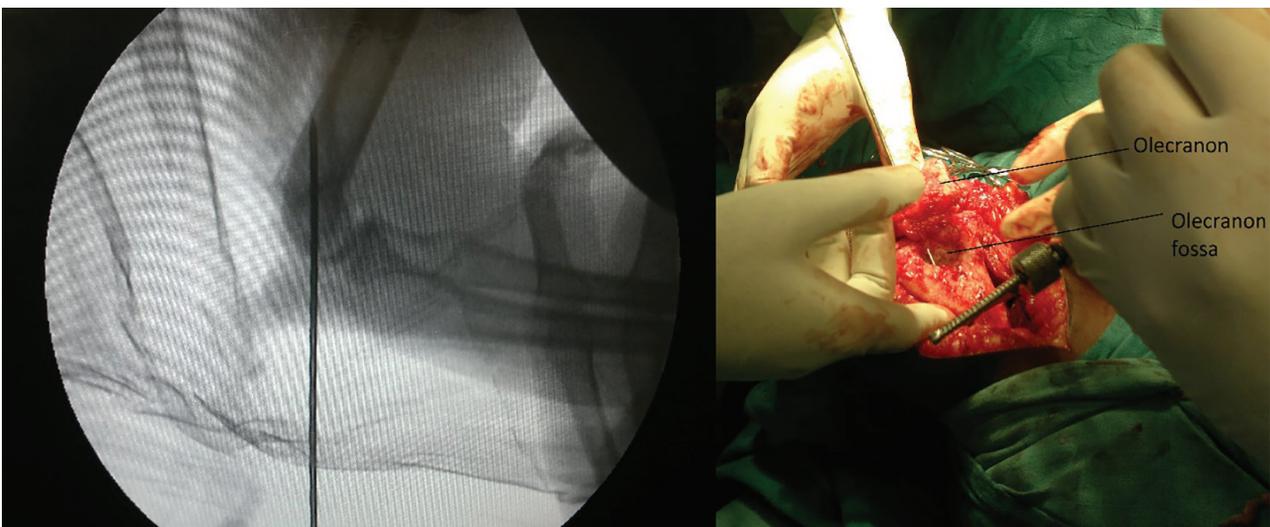


**Fig. 3.** Intraoperative image of the triceps aponeurosis lifted and olecranon along with olecranon fossa exposed and cleared of the debris.

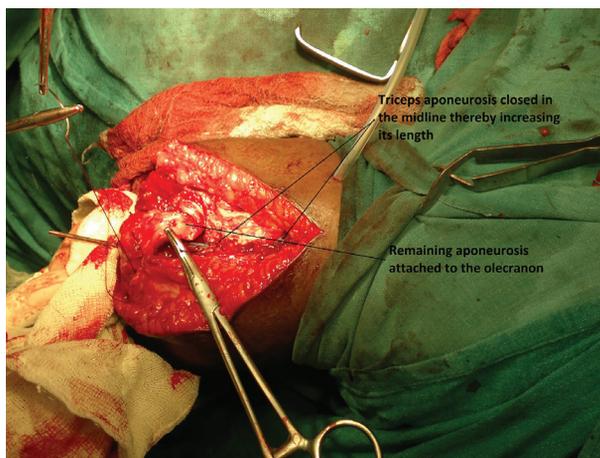
was done by author 3.

#### *Follow-up and Outcome Measures*

The K-wires were removed on the 21<sup>st</sup> postoperative day and gentle mobilization was started with intermittent removal of the splint. This was continued till 6 weeks' postoperatively when night splinting was used allowing gentle mobilization without heavy weight lifting during the day. A strict and supervised exercise routine was followed for a period of 2-3 months. The patients were evaluated using the Mayo Clinic Elbow Performance Index at the end of 3 months. Radiographies were done to check the condyle-radius and olecranon-humerus alignment immediately after operation and at the time of removal of the K-wire. Range of motion (flexion, extension and range of motion) was registered preoperatively and at follow up. The posttraumatic arthrosis and the articular alignment were measured with the help of Broberg and



**Fig. 4.** Intraoperative and Image intensifier images of K-wire being inserted from the olecranon into the distal humerus after reducing the dislocation.



**Fig. 5.** Intraoperative image of the triceps aponeurosis lengthening using Speed's V-Y plasty.

Morrey scale [17]. No radiological arthrosis=Grade 0, slight narrowing=Grade 1, moderate narrowing with minimal osteophytes=Grade 2 and severe degeneration=Grade 3.

**Statistical Analysis**

All the statistical analysis was performed utilizing the statistical package for social sciences (SPSS Inc., Chicago, Illinois, USA) version 20.0. The data are presented as mean±SD and proportions as appropriate. The parametric variables were compared using the independent t-test and the proportions were compared using the chi-square test. A two-sided *p*-value of less than 0.05 was considered statistically significant.

**Results**

Among the 14 included patients, there were 9 (64.3%) men and 5 (35.7%) women. The mean age of the patients was 27.8±8.3 (ranging from 21 to 34) years. The right hand of all patients was the dominant hand and 33% of dislocations were seen in the dominant arm. The baseline characteristics of the patients are summarized in Table 1. The follow up period was 3 months. In one (7.1%) patient in the immediate postoperative period subluxation of the reduced joint was seen. This was managed by a revision surgery with closed reduction and stabilization with 2 K-wires. Pin track infection was seen in 3 patients who were managed with antibiotics and regular dressings and they healed without any problem and the postoperative management did not vary (Table 2). None of the patients could flex their elbow more than 65°. The average ROM at the time of admission was found to be 37.0±25.8° (10° to 65°) in flexion and 15.5±14.6° (0° to 30°) in extension lag. Patients' preoperative Mayo clinic elbow performance assessment showed an index score of 47.3±10.3 (range of 35 to 53).

**Postoperative**

In one case after reduction and stabilization of the

**Table 1.** The baseline characteristics of 14 patients with neglected elbow dislocations included in the current study.

| Variable                            | Value      |
|-------------------------------------|------------|
| <b>Age (years)</b>                  | 27.8±8.3   |
| <b>Duration of neglect (months)</b> | 6.3±1.8    |
| <b>Gender</b>                       |            |
| Men (%)                             | 9 (64.3%)  |
| Women (%)                           | 5 (35.7%)  |
| <b>Job</b>                          |            |
| Household (%)                       | 5 (35.7%)  |
| Manual laborers (%)                 | 5 (35.7%)  |
| Student (%)                         | 4 (28.6%)  |
| <b>Mechanism of Injury</b>          |            |
| Road traffic accident (%)           | 7 (50.0%)  |
| Household injuries (%)              | 4 (28.6%)  |
| Fall (%)                            | 2 (14.3%)  |
| Assault (%)                         | 1 (7.1%)   |
| <b>Type</b>                         |            |
| Posterolateral (%)                  | 10 (71.4%) |
| Posteromedial (%)                   | 3 (21.3%)  |
| Pure Posterior (%)                  | 1 (7.1%)   |

**Table 2.** Complications of open reduction and V-Y plasty in 14 patients with neglected elbow dislocation.

| Complication              | No. of cases |
|---------------------------|--------------|
| Pin track infection       | 3 (21.4%)    |
| Deep Infection            | 0 (0.0%)     |
| Hardware Failure          | 0 (0.0%)     |
| Myositis ossificans       | 0 (0.0%)     |
| Nerve Injury              | 0 (0.0%)     |
| Vascular Injury           | 0 (0.0%)     |
| Postreduction subluxation | 1 (7.2%)     |

joint with a single K-wire it was seen that there was joint subluxation in the immediate postoperative period. To provide extra stabilization another K-wire was passed through the distal humerus to the radial head and neck after the reduction of the radial head as this joint subluxation was attributed to the radiocapitellar instability (Figure 6). Postoperative Mayo's score was on average score of 87 with a minimum of 65 and a maximum of 100 with 7 excellent results, 2 good results, 2 average results and 1 poor result. The poor result was seen in the case with grade 2 arthrosis.

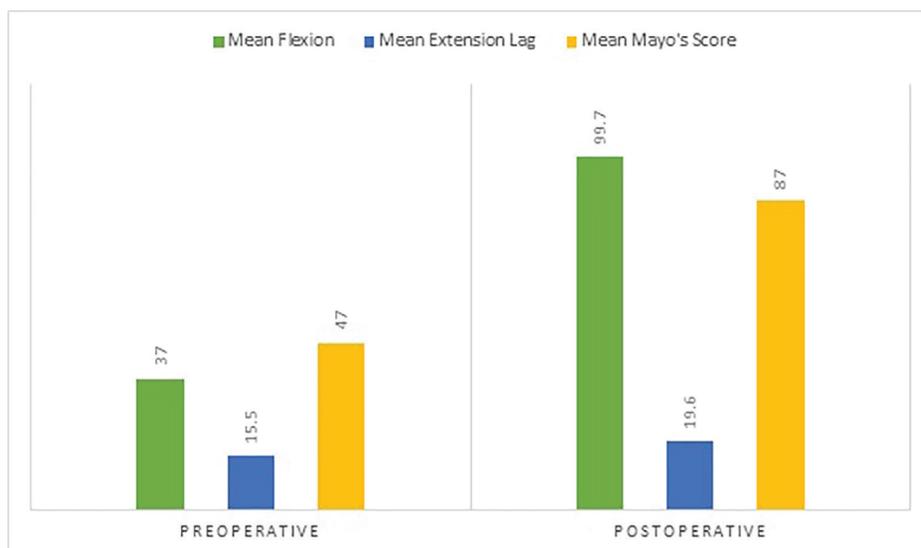
Average flexion was 99.7°±23.3° (75° to 120°) and the average extension deficit was 19.6°±18.3° (0° to 40°). There were no complains or findings of any instability seen in the cases. There was no correlation between the age of dislocation and the improvement in the range of motion.

The functional outcome data is presented in Figure 7. The mean flexion and the Mayo's score improved significantly (*p*<0.05), whereas the improvement of mean extension deficit was not statistically significant.

According to the Broberg and Morrey scale radiographic ulnohumeral and radiocapitellar alignment was achieved in all the cases. Eight cases



**Fig. 6.** Radiocapitellar K-wire passed as the patient had immediate postoperative subluxation of the elbow.



**Fig. 7.** Preoperative and postoperative comparison of the various clinical outcome variables. The mean flexion and the Mayo's score were statistically significant whereas the mean extension lag was statistically not significant. ( $p < 0.05$ )

had grade 0 arthrosis, five had grade 1 arthrosis whereas one had grade 2 arthroses.

## Discussion

The outcome of patients in this study was good, according to Mayo's score, with an increase in the range of motion. The thought behind performing open reduction in all the cases was a fear of provoking a fracture by manipulating a dislocation after 3 weeks. There are also soft tissue contractures associated with neglected dislocations which increases the forces on the joints leading to degeneration and pain [1-4]. There have been concerns about surgical intervention as it was initially thought that the functional benefit was limited [1, 18, 19] but recent papers have shown the good outcomes following open reduction and stabilization surgeries [2, 6, 9-14, 16, 20]. The outcome generally depends on the age of dislocation and the patients' ability to bear pain

[2, 5, 14, 21].

The literature is divided on the role of open reduction in the management of neglected elbow dislocation in adults [3]. Wilson [19], in his study, concluded that there was no requirement of open reduction management of late elbow dislocation in an adult patient. The explanation offered was that the functional outcome of patients was better when open reduction was attempted in children whereas in adults the functional outcome was not satisfactory. This attitude was later challenged by Eppright & Wilkins [22], Krishnamoorthi *et al.*, [11] and Billet [9] who were of the opinion that open reduction should be done in all the cases but it was not useful in cases more than 3 months old. Naidoo [2] and Mehta *et al.*, [3] however, advocated the use of surgery in dislocations even older than 3 months and in individuals older than 40 years. In this study the mean duration of dislocation was 6.3 months and the age was 21.8 years and the functional

outcome was good which goes in favour of surgical management in the form of open reduction for all the patient irrespective of the age or the duration of the dislocation

There are different views concerning indications for surgery with respect to elbow flexion as Martini et al., [7] find 89-90 degrees functionally acceptable whereas other authors consider this as indication for surgery [22, 23].

In cases if the dislocation is less than 6 months old generally there is very little difficulty in reducing the dislocation as the ligaments and tendon contracture is minimum [24]. However, in this study we resorted to lengthening of the aponeurosis in all the patients. If the dislocation is more than 6 months, then according to the literature [7] the dislocations are not to be managed surgically if the range of motion is up to 90°. However, in our study none of the patients had a range of motion up to 90° and hence, had problems in performing activities of daily living and hence, all the patients were managed surgically. The posterior approach was used as it is easier and also provides a good exposure to do the V-Y plasty with the ulnar nerve transposition. The joint can also be reduced under vision and also can be checked for any irregularities. Also with a combined approach there are 2 scar marks whereas in this there is only 1 scar mark.

In case of shortening of the triceps aponeurosis there are procedures described for the lengthening of the aponeurosis. Among these, the V-Y plasty described by Speed [9] was used in this study. The V-Y plasty may lead to more pain in the postoperative period along with an extension lag and decrease in the power of the elbow [6, 24]. But still it is a very easy procedure and provides adequate length of the triceps aponeurosis along with good exposure required for the good reduction of the elbow joint. If the elbow dislocation is less than 6 months, then it can generally be reduced with the help of traction. However, in this study the authors found elbow reduction and stabilization after V-Y plasty to be much easier rather than otherwise. Although, one predicting factor for plasty is the preoperative flexion range. Elbows stuck in extension have more

shortening of the triceps aponeurosis compared to elbows immobilized in flexion.

Greatly retracted or long standing dislocations require repair of the collateral ligaments. This can be done by many methods including Arafilis [6], direct repair, intra osseous sutures or bone tunnel sutures. These procedures give the advantage of extra stability which can cause the decrease in the immobilization time of the elbow. In this study the collaterals were repaired either directly or by intraosseous suture as no augmentation was thought to be required.

K-wires and the above elbow slab were used to immobilize the elbow to provide soft tissue healing. Prolonged immobilization was avoided to prevent further ankylosis of the joint as it was seen that with increase in the duration of immobilization there was increase in the extension deficit along with a decrease in the functional range of the joint.

A comparison table has been given comparing the outcome of the study with the outcome of other studies (Table 3). It shows that the results of this study were comparable to other studies found in literature.

This study is significant as has been able to study the outcome and efficacy of a single surgical technique in a rare and harassing condition in a sizeable sample size. However, there were a few limitations in the study. The dislocations were not studied with CT scan that could have ruled out or disclosed minor coronoid fracture fragments or other articular injuries. The study has a small follow up period and hence, joint arthrosis cannot be ruled out (mainly due to the patients being lost to follow up after 3 months). Sample size is low and hence, further studies are required if any sort of guidelines are to be made.

In conclusion, surgical approach in the form of open reduction and stabilization can performed in all the cases of neglected dislocation. This gives good functional results when comparing to the preoperative status at a pretty low risk. Hence, it should be preferred over non operative treatment.

**Conflicts of Interest:** None declared.

**Table 3.** Summary of results from present and earlier studies regarding the functional outcome of V-Y plasty in neglected elbow dislocation

| Authors           | Essi et al., [8] | Mehta et al. [15] | Naidoo [16] | Fowles et al. [4] | Mahaisavariya and Laupattarakasen [7] | Current study |
|-------------------|------------------|-------------------|-------------|-------------------|---------------------------------------|---------------|
| Extension deficit | 94.5°            | 13                | 40.4        | 55                | 40                                    | 19.6          |
| Flexion           | 53°              | 115               | 116         | 112               | 122                                   | 99.7          |
| Range of motion   | 41.5°            | 102               | 75.6        | 67                | 82                                    | 80.1          |

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