Case Series

Early Outcome of Open Reduction and Cross Kirschner's Wire Fixation of Neglected Elbow Dislocation: A Case Series

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Abstract

Background: Neglected dislocation of the elbow joint is mainly seen in developing countries and is not uncommon. It is usually associated with marked reduction in the range of movement and functional impairment. Although it presents a surgical challenge, open reduction is routinely indicated. **Materials and Methods:** This was a retrospective study over a 3-year period (June 2017 to June 2020) that included patients presenting with a neglected elbow dislocation. A total of seven patients (six females and one male) met the inclusion criteria. A posterior triceps splitting approach was used in all the patients with one patient requiring triceps lengthening. **Results:** Reduction was achieved in all seven cases. There was a statistically significant difference between the preoperative range of motion (14.29 ± 3.45) when compared to the postoperative range of motion (102.86 ± 16.04). **Conclusion:** Neglected old elbow dislocation, a pathology seen mainly in developing countries, can be managed by open reduction and cross Kirschner's wire fixation.

Keywords: Pannus, reduction, triceps lengthening

Introduction

Neglected old dislocation of the elbow refers to dislocations of the elbow, which are not reduced within 3 weeks of injury.[1] It is usually associated with a marked reduction in the range of motion of the affected elbow, limiting its use for routine daily activities.[2] It is mainly found in developing countries, where both access and funding of healthcare are inadequate. Further, due to misconceptions and ignorance, patients occasionally resort to traditional bone setters for hitherto simple elbow dislocation that would have been managed nonoperatively. After three weeks, further attempts at closed reduction of elbow dislocation become harzadous, and is fraught with several complications including fractures and vascular damage,[1] making operative treatment almost mandatory. The resulting nonfunctional unreduced elbow dislocation usually presents as surgical challenge. There may be accompanying fractures, contractures of both the triceps muscle, and elbow collateral ligaments.

Several operative methods have been proposed, including open reduction and cross Kirschner's wire (K-wire) fixation (for old dislocations <3 months), total elbow replacement, excision arthroplasty, and arthrodesis (for cases presenting after 3 months).[3] Although total elbow arthroplasty was originally developed to manage end-stage rheumatoid arthritis,[4] its current indications include severely comminuted fractures of the elbow and osteoarthritis of the elbow joint, including posttraumatic arthritis.[5] However, despite its increased use and acceptance, complications such as infection, aseptic loosening, and periprosthetic fractures remain a source of major concern.[6] Further, because this procedure is relatively rare and its implants expensive, many surgeons have less experience with total elbow arthroplasty when compared to arthroplasty of the hip or knee joint.[7]

Arthrodesis of the elbow joint is a rare salvage procedure of the elbow with significant disabling effects on the patient; this is because the loss of motion is generally not tolerated by the patient when trying to perform activities of daily living.[8]

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Further, the need for a triceps lengthening has also been debated. Triceps lengthening has been routinely done during open reduction for posterior elbow dislocations. Triceps lengthening can be done using the procedure described by Speed's[9] (a V-Y tricepsplasty) or that described by Vangorder[10] (who lengthened the triceps using an Achilles tendon or fascia lata graft after the triceps is cut transversely). Although a V-Y plasty is simple to perform, drawbacks of this procedure include more pain after surgery, extension deficit, and less available strength for manual work.[11]

The aim of this study is to present the outcome of patients who had open reduction of neglected posterior dislocation of the elbow joint (with or without tricepsplasty), regardless of the duration of injury.

Materials and Methods

This was a retrospective study done over a 3-year period (June 2017 to June 2020). Inclusion criteria were patients presenting with neglected posterior elbow dislocation (therefore, elbow dislocation of 3 weeks or more). All of the seven patients had taken some forms of traditional nonmedical therapy. The preoperative and postoperative range of motion of the elbow joints was obtained using a hand-held goniometer. The preoperative X-rays were also obtained [Figure 1]. All the patients had the same treatment regimen: open reduction of elbow dislocation and cross K-wire fixation; however, only one patient had tricepsplasty. Postoperative physiotherapy was commenced after 2 weeks in an elbow immobilizer, and the range of motion permitted was controlled. Elbow immobilizer was discarded after 3 weeks, and full range of motion was then permitted. The outcome was then assessed using the Mayo elbow performance index, which assesses four parameters: pain (with a maximum score of 45), range of motion (with a maximum score of 20), stability (with a maximum score of 10), and function (with a maximum score of 25). Depending on the Mayo score, results are rated as excellent (90–100), good (75–89), fair (60–74), or poor (<60).

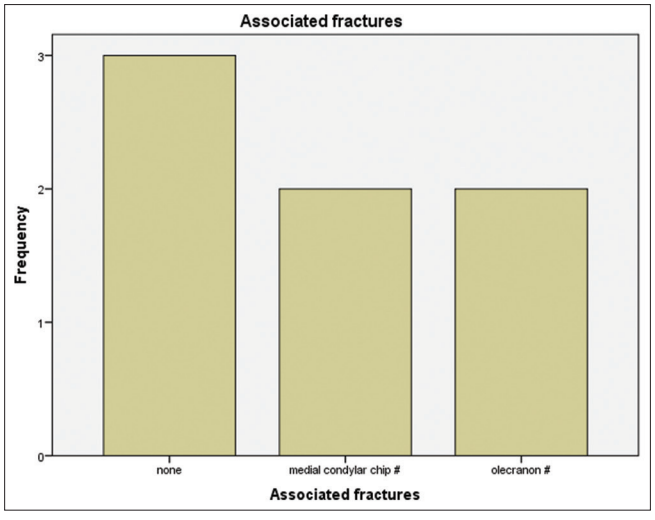

Figure 1: Associated fractures in patients with old elbow dislocation

Surgical operative technique

The patient was positioned supine on the operating table and the affected limb fully adducted on the anterior chest wall. The procedure was carried out under general endotracheal anesthesia, with a tourniquet applied on the mid arm. A midline posterior incision was used, and skin flaps elevated. The ulnar nerve was isolated, a triceps splitting approach was used, and adequate release of the triceps was done. Fibrous tissue filling up the olecranon fossa, contracted capsule, and surrounding myositis ossificans were noted in most cases. Fibrous tissues and myositis ossificans were excised and contracted capsule was incised. Reduction was achieved by manipulation without the need for a V-Y plasty of the triceps muscles, except in one case where it was done to increase range of motion. Reduction was unstable in all seven cases and cross K-wires were thereafter inserted. Wound bed was washed and the wound closed in layers, after a drain was inserted. Sterile dressings were then applied. Postoperative X-rays were then obtained [Figure 2].

A broad arm sling was thereafter applied, and postoperative physiotherapy was commenced 2 weeks after surgery with an elbow immobilizer allowing only 30° of movement for

Table 1: Side of injury

Side	*n* (%)
Right	3 (42.9)
Left	4 (57.1)

All of the patients were right hand dominant, and there was no statistically significant correlation between the side of injury and the hand dominance ($P>0.05$)

Table 2: Duration of injury

Duration (months)	Frequency, *n* (%)
1-3	1 (14.3)
4-6	4 (57.1)
7-9	1 (14.3)
10-12	-
13-15	1 (14.3)

A majority of the patients (57.1%) had an old elbow dislocation of between 4 and 6 months at presentation, with a range of 2-14 months

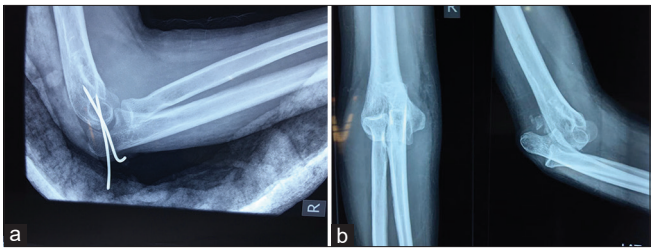

Figure 2: Reduced dislocation of the elbow joint with cross Kirschner's wire fixation (a) Post operative X-ray showing reduced elbow joint with cross K-wires insitu, (b) Pre-operative X-ray showing neglected dislocation of the elbow joint

Table 3: Elbow range of motion pre/postoperatively

Patient	Gender	Preoperative ROM	Postoperative ROM	Mean±SD (preoperative ROM)	Mean±SD (postoperative ROM)
1	Female	15°	90°	14.29±3.45	102.86±16.04
2	Female	20°	110°		
3	Female	18°	100°		
4	Female	22°	105°		
5	Male	10°	120°		
6	Female	30°	108°		
7	Male	14°	100°		
		t=10.95	t=16.97		

ROM: Range of motion

3 weeks, after which the immobilizer was discarded. Cross K-wires were removed after 3 weeks. Follow-up was done for a minimum of 3 months; range of motion and stability were assessed in each visit.

Results

The mean age of the patients was 31 years, with an age range of 5–51 years. There was a female preponderance; six (85.7%) were female, while only one patient was a male. Table 1 shows the side of the limb affected.

A majority of the patients (57.1%) had an old elbow dislocation of between 4 and 6 months at presentation, with a range of 2–14 months. Table 2 shows the duration (in months) of dislocation before presentation.

Two patients each had a medial condylar chip fracture and an olecranon fracture.

Table 3 shows that there was a statistically significant difference in elbow range of motion after open reduction.

Only one patient had tricepsplasty [Table 4]. Although a small sample size was used, there was no correlation between tricepsplasty and the postoperative range of motion achieved.

Table 5 shows that all the patients had a satisfactory outcome.

Table 4: Tricepsplasty and postoperative range of motion

Tricepsplasty	No	Mean postoperative ROM
Yes	1	90
No	6	105

P>0.05. ROM: Range of motion

Table 5: Outcome of elbow reduction using Mayo elbow performance index score

MEPI score	Value	No
90-100	Excellent	6
75-89	Good	1

MEPI: Mayo elbow performance index

Discussion

Old unreduced elbow dislocation, although rare in the developed world, is not uncommon in developing countries. It often results in a contracture of the triceps muscle, the radial and ulnar collateral ligaments, pannus occlusion of the olecranon fossa, and oftentimes involvement of the ulnar nerve.

Old unreduced elbow dislocation is usually managed operatively, and whatever the modality of operative treatment chosen, the goals are usually the same. This includes concentric reduction of the elbow joint and increasing the functional range of motion of the elbow joint. Fair-to-good outcomes have been reported following operative treatment of old unreduced elbow dislocation in patients who present early. In a study done by Rubino *et al*.,[12] satisfactory outcomes were reported following management of a patient who presented 5 weeks postinjury.

However, divergent views still exist with regard to the optimal treatment given when the patient presents after 3 months still exists. Several older studies have reported poor outcomes in patients who had operative reduction of old elbow dislocation presenting after 3 months,[13] with surgeons having preference for open reduction when the dislocation is <3 months, and a total elbow arthroplasty afterward.[4,5] Further, excision arthroplasty which is a cheaper option (especially in resource-constrained environment) can be done, but its morbidity precludes acceptance among patients.[6] In a study by Ivo *et al*[7], they concluded that the benefits of open reduction of old elbow dislocation was limited to old dislocations of <3 months duration.

In this index study, all seven patients presented with elbow dislocations older than 3 months (with a range of 2–14 months) and had satisfactory outcomes after open reduction and K-wire fixation. In a similar study by Kachnerkar *et al*.,[8] satisfactory outcomes were also found in patients who had open reduction for elbow dislocations older than 6 months. Naidoo[14] also reported a case series of patients who had transarticular K-wire fixation postconcentric reduction for old unreduced dislocation of the elbow joint.

The need for triceps lengthening following operative reduction of old elbow dislocation has also been a matter of debate. Mahaisavariya and Lavpattarakasem[11] recommended open reduction without triceps lengthening in dislocations within

1–3 months old. Another study[15] recommended triceps V-Y plasty for elbow dislocations more than 60 months. In a study by Maheswaran and Kamalanathan[16] who managed six patients with old unreduced elbow dislocation, triceps V-Y plasty was done in all the patients, irrespective of the time since injury. In this study, triceps lengthening was done for only one patient, and a satisfactory range of motion was achieved in all patients. In a study by Coulibaly *et al*.,[17] they came to the conclusion that a routine triceps lengthening need not be performed, and no matter the age of the dislocation, reduction can be achieved without the need for triceps lengthening.

Conclusion

Neglected old elbow dislocation, a pathology seen mainly in developing countries, can be managed by open reduction and cross K-wire fixation without the need for routine triceps lengthening. Good functional results can be expected.

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Conflicts of interest

There are no conflicts of interest.

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