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RESEARCH ARTICLE

FUNCTIONAL OUTCOME OF NEGLECTED POSTERIOR ELBOW DISLOCATION MANAGED SURGICALLY BY OPEN REDUCTION IN A NORTH-EAST TERTIARY CENTRE OF INDIA

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Abstract

Introduction: Neglected posterior elbow dislocation is common in developing countries. Various treatment methods have been described. Considering the lack of facilities and cost constraints in developing countries, the treatment options are limited. The aim of the study is to evaluate the functional outcome of neglected posterior elbow dislocation managed surgically by open reduction and internal fixation with trans-olecranon Kirschner wire with or without triceps lengthening.

Methods: In a retrospective study from July 2020 to June 2022, 7 patients with neglected posterior elbow dislocation were treated in our hospital with mean follow-up of 11.14 months. The Mayo Elbow Performance Index (MEPI) was used to assess subjective, objective, and functional characteristics before and after operation.

Results: The mean age of 7 patients (4-males and 3-females) was 26 years. The most common mode of injury was fall with mean time interval between injury and surgery of 8.14 weeks. The mean duration of surgery was 75.71 minutes. The mean pre-operative elbow flexion was 17.86° and post-operative elbow flexion was 92.14°. The mean pre-operative elbow PS (pronation-supination) range was 17.14° and post-operative elbow PS range was 109.29°. The mean pre-operative MEPI was 5 and post-operative MEPI was 77.86. Five patients had satisfactory results (2- Excellent and 3- Good) and 2 patients had unsatisfactory results (1- Fair and 1- Poor).

Conclusion: Considering all limitations in developing countries, open reduction with or without triceps lengthening followed by post-operative range of motion exercises is still the mainstay treatment to gain a functional arc of motion in the management of neglected posterior elbow dislocation.

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Introduction:-

Elbow dislocation is the second most common articular dislocation after shoulder dislocation. The incidence rate is approximately 20% of all articular dislocations⁽¹⁾. Dislocations without associated fractures are termed as simple dislocations. Dislocations associated with fractures of the coronoid process, radial head or neck, distal humerus, or olecranon are termed as complex dislocations⁽²⁾. Neglected posterior elbow dislocation is defined as a posterior elbow dislocation not treated within 3 weeks of injury⁽³⁾. Neglected elbow dislocations are common in developing countries⁽⁴⁾. In developing countries majority patients with orthopaedic injury visit traditional bonesetters first before consulting an orthopaedic specialist. This leads to an important initial delay before the first orthopaedic visit⁽⁵⁾. In neglected elbow dislocation, elbow is fixed in either extension or flexion, with only a few degrees of flexion, supination or pronation, and has a range of movement that is inadequate for the activities of daily living⁽⁶⁾.

The treatment of established neglected elbow dislocation is very challenging in developing countries. Time interval between injury and treatment, and age of the patient determine the most effective mode of treatment⁽²⁾⁽⁷⁾. Various treatment methods have been described such as closed reduction, open reduction and internal fixation with k-wire, open reduction with triceps V-Y plasty, medial and lateral collateral ligament release, creation of an intra-articular ligament to stabilize the joint, excision followed by hinged external fixator, inter-positional arthroplasty, arthrodesis, total elbow arthroplasty⁽¹⁾. The aim of the study is to evaluate the functional outcome of neglected posterior elbow dislocation managed surgically by open reduction and internal fixation with trans-olecranon Kirschner wire with or without triceps lengthening.

Objectives:-

1. To determine range of motion post-operatively.
2. To study complications (if any).

Methodology:-**Type of study:**

Retrospective study.

Study duration:

July 2020 to June 2022.

Setting:

Department of Orthopaedic surgery, AGMC & GBPH.

Inclusion criteria:

All patients with neglected posterior elbow dislocation who were managed surgically during study period, were included in the study.

Exclusion criteria:

Patients with elbow dislocation within 3 weeks of injury were excluded.

Data collection:

Based on inclusion and exclusion criteria, 7 patients were managed in our hospital during study period. These patients were retrospectively evaluated. Their personal data, mechanism of injury, delay in presentation, main symptomatology and enquiry regarding initial consultation and treatment of a bonesetter were recorded. The pre-operative range of motion of the elbow was measured using goniometer.

Surgical technique:

Surgery was done under supraclavicular block or general anaesthesia. Patients were positioned in a lateral position with elbow flexed and forearm pronated over an arm support. A long incision was made over posterior aspect of elbow. Ulnar nerve was identified and secured. The contracted capsule and collateral ligaments were cut to expose the joint surfaces. Dense fibrous tissue was cleared off carefully from olecranon, olecranon fossa, radial head and between distal humerus and proximal radius and ulna. Articular surfaces were found relatively well preserved in all patients. The ulnar nerve was found under tension in one case, managed by anterior transposition. After clearing off fibrous tissue, radiocapitellar and humeroulnar reduction were achieved by gentle manipulation. After reduction,

internal fixation was done with trans-olecranon Kirschner wire (K-wire) to the distal humerus in 90° flexion of the elbow. For trans-olecranon fixation 2 K-wires (3mm/2.5mm) were used. V-Y triceps plasty was done in 3 cases due to difficulties in achieving reduction. Excision of radial head was done in patient with radial head fracture. All procedures were uneventful intra-operatively. The wound was closed in layers over a negative suction drain. A posterior above-elbow plaster of Paris slab was applied with elbow at 90°.

Postoperative Management:

Post-operatively intravenous injection of ceftriaxone (1 gm) was administered 12 hourly for 3 days followed by oral antibiotic (500mg of cefuroxime – twice daily for next 5 days). Active finger movement exercise was started on post-operative day 1. Suction drain was removed on post-operative day 2 and post-operative radiographs were taken. Suture was removed on post-operative day 12–14. Slab and K-wires were removed 3 weeks postoperatively, following that range of motion exercises were initiated. The elbow was supported on an elbow bag in between exercises. Depending on individual progress, use of the sling was discontinued after 6 weeks to 3 months.

Functional evaluation:

All patients were followed-up at 3 weeks, 6 weeks, 12 weeks, 6 months, 12 months post-operatively. The Mayo Elbow Performance Index (MEPI) was used to assess subjective, objective, and functional characteristics before and after operation⁽⁸⁾. This scoring system has four parameters: 45 points are given for a pain-free elbow, 20 points for normal elbow movement, 10 for a stable elbow, and 25 for performance of five activities of daily living. Stability of the elbow is rated as stable (no apparent varus/valgus), moderate instability (<10° varus/valgus), and gross instability (>10° varus/valgus). Depending on the score, results were rated as excellent (90–100), good (75–89), fair (60–74), or poor (<60).

Results:-

From July 2020 to June 2022, 7 patients with neglected posterior elbow dislocation were treated in our hospital with mean follow-up of 11.14 months (range 9-12 months).

Out of 7 patients, 4 were males and 3 were females. The mean age was 26 years (range 15-40 years). The meantime interval between injury and surgical intervention was 8.14 weeks (range 4-14 weeks). The most common mode of injury was fall followed by road traffic accidents (RTA). One out of 7 patients, had radial head fracture. Right sided elbow dislocation was common.

One patient had ulnar nerve paraesthesia pre-operatively, which was recovered by 3 weeks post-operatively. The mean duration of surgery was 75.71 minutes (range 66-90 minutes). The mean pre-operative elbow flexion was 17.86° (range 10°-25°). The mean post-operative elbow flexion was 92.14° (range 70°-105°). The mean pre-operative elbow PS (pronation-supination) range was 17.14° (range 10°-20°). The mean post-operative elbow PS range was 109.29° (range 90°-130°). During follow-up, one patient developed myositis ossificans around elbow associated with greater limitation of movement, for which intralesional steroid was given. The mean pre-operative MEPI was 5. The mean post-operative MEPI was 77.86. Five patients had satisfactory results (2- Excellent and 3- Good) and 2 patients had unsatisfactory results (1- Fair and 1- Poor). Five patients had no pain, one had mild pain and one had moderate pain during performing activities of daily living.

Table 1:- Showing patients' data.

Age (years)	Sex	Duration of injury (weeks)	Mode of injury	Side involved	Associated injury	Neurovascular status	Duration of surgery (mins)
15	F	8	fall	L	-	-	72
40	F	10	fall	R	radial head fracture	-	90
35	M	6	RTA	R	-	-	80
22	M	9	fall	L	-	-	70
29	M	14	RTA	R	-	Ulnar nerve paraesthesia	82
26	F	6	fall	R	-	-	70

15	M	4	fall	L	-	-	66
F – Female, M – Male; RTA - Road traffic accident; L – Left, R - Right							

Table 2:- Showing results of the study.

Pre-operative flexion range	Post-operative flexion range	Pre-operative PS range	Post-operative PS range	Pre-operative Mayo score	Post-operative Mayo score	Follow-up duration (months)
10°	100°	15°	130°	5	95	12
20°	90°	20°	120°	5	85	12
25°	90°	10°	110°	5	85	9
15°	100°	20°	105°	5	80	12
20°	70°	15°	90°	5	45	12
20°	90°	20°	110°	5	65	12
15°	105°	20°	100°	5	90	9
Mean-17.86°	Mean-92.14°	Mean-17.14°	Mean-109.29°	Mean-5	Mean-77.86	Mean-11.14
PS - Pronation supination						



Figure 1:- Elbow radiographs in anteroposterior and lateral views showing 8 weeks old untreated posterior elbow dislocation with radial head fracture.



Figure 2:- Elbow radiographs of same patient (post-operative) showing reduced elbow with 2 K-wires in-situ with excised radial head.

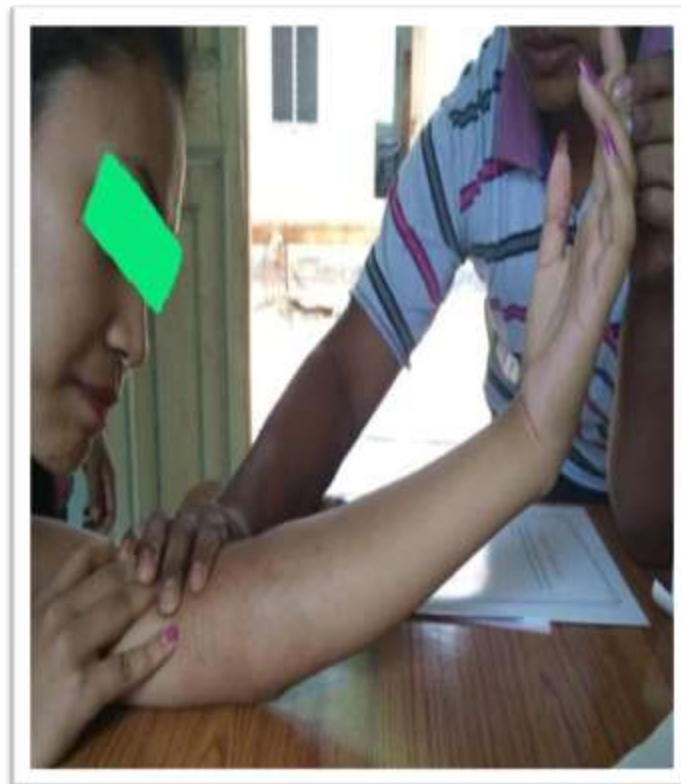


Figure 3:- Pre-operative photograph showing restricted range of motion.



Figure 4:- Post-operative photograph showing improved range of motion.

Discussion:-

Majority of neglected posterior elbow dislocations are found in developing countries, where patients frequently visit traditional bonesetters before visiting specialist doctors. This leads to loss of precious time, in which closed reduction could have been tried. Most surgeons recommend closed reduction for elbow dislocation before 3 weeks post injury. After 3 weeks due to soft tissue contractures and localized osteoporosis, closed reduction becomes very difficult⁽⁹⁾. Various treatment methods have been described. Most surgeons prefer open reduction for elbow dislocation up to 3 months. After 3 months of injury total elbow arthroplasty, excisional arthroplasty, or arthrodesis are recommended⁽¹⁰⁾. Total elbow arthroplasty may provide a better range of motion but, it is costly procedure in developing countries and it also needs expertise hands. Arthrodesis provides stable elbow but without movement which is not well accepted by patients who is a daily labourer. Functional range of motion at elbow joint is a 100° flexion arc and a 100° supination-pronation arc⁽⁶⁾. In our study, five out of seven patients had achieved nearly functional range of motion to perform activities of daily living.

Arafles (1987) performed open reduction with tendon graft stabilization to create a medial collateral and intra-articular cruciate ligament, with exercises starting 6 days after operation. They reported 33° of valgus-varus instability in patients who underwent triceps plasty⁽¹¹⁾. In our study, one of our patients had instability due to poor compliance.

Mahaisavariya, Laupattarakasem (2005) in their study, recommended that elbow dislocation of 1-3 months can be successfully treated with open reduction without triceps lengthening⁽¹²⁾. Mahaisavariya, Laupattarakasem (1993) however, in another study they performed triceps lengthening and repair of collateral ligaments for patients with elbow dislocation of 1-60 months⁽¹³⁾. In our study, V-Y triceps plasty was done in 3 patients to achieve reduction. These 3 patients had older dislocation as compared to other patients. In our study, the collateral ligaments were not repaired to avoid any unduly tight joint reduction. In their study, assisted flexion exercises were started after 2-3 weeks of surgery. Similarly, we advised range of motion exercises after 3 weeks of surgery after removal of K-wires. The results of our study were comparable.

M. Mansour (2009) in his study, performed open reduction and internal fixation with V-Y triceps plasty for patients with neglected posterior elbow dislocation. He found the change of elbow flexion arc from mean pre-operative 18° to mean post-operative 93° and he also reported greater limitation of movement in patient with myositis ossificans⁽³⁾. In our study, the elbow flexion arc was changed from mean pre-operative 17.86° to mean post-operative 92.14°; and we also found myositis ossificans in one patient associated with greater limitation of movement, which was comparable. However, R. Protzman (1978) in his study, reported that myositis ossificans are not associated with functional limitation⁽¹⁴⁾.

S. Islam, J. Jahangir, R. Manzur et al. (2012) in their study, performed open reduction and internal fixation with or without V-Y triceps plasty for patients with neglected posterior elbow dislocation. They found satisfactory result in 11 patients and unsatisfactory in 2 patients⁽¹⁾. In our study, we found satisfactory results in 5 patients and unsatisfactory results in 2 patients.

L. Nicola, A. Birhanu, G. Aselefech et al. (2016) in their study, performed open reduction using speed's technique⁽¹⁵⁾ for patients with neglected posterior elbow dislocation. They found improved in functional range of motion⁽⁴⁾. The results of our study were comparable.

D. Anderson, J. Haller, L. Anderson et al. (2018) in their study, performed open reduction with 2 separate incisions for patients with neglected posterior elbow dislocation. They found excellent results in 97% patients⁽²⁾. In our study, we performed open reduction with single posterior incision. We found excellent result in 71.14% patients.

Literatures say some surgeons recommend open reduction and hinged external fixation without V-Y triceps plasty to achieve better stability⁽¹⁶⁾⁽¹⁷⁾. But due to lack of facilities and cost constraints, we had very less experience with this method.

Conclusion:-

In the present scenario, the treatment of neglected posterior elbow dislocation is still challenging. Various treatment options such as hinged external fixation, open reduction with 2 separate incisions, total elbow arthroplasty have shown better outcome but these techniques are technically demanding and have cost constraints in developing countries. Considering all limitations, open reduction with or without triceps lengthening followed by post-operative range of motion exercises is still the mainstay treatment to gain a functional arc of motion in the management of neglected posterior elbow dislocation in developing countries.

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