

Case Report

Open reduction, triceps lengthening, and collateral ligaments reconstruction in neglected elbow dislocation: a case report

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ABSTRACT

Neglected elbow dislocations are common in developing countries. Neglected elbow dislocation leads to retraction of triceps muscles and collateral ligaments. This cause limitation of range of movement that is inadequate for the activities of daily living. A 48 years old man presented with stiffness on the left elbow. He fell down with arm in extension position 8 months prior to admission and was treated by a traditional bonesetter before seeking medical treatment. Active ROM of the left elbow was limited to 15° during flexion. The patient diagnosed as left elbow contracture due to neglected left elbow dislocation. Open reduction, MCL-LCL reconstruction and triceps lengthening was performed. Left elbow ROM was improved and MEPI score was good on 5 months evaluation. Open reduction surgery was done to avoid the risk of fracture or articular surface damage. The posterior approach provides good exposure to the retracted posterior structures and give easier access to perform V-Y plasty used for triceps lengthening. Collateral ligaments repair provides immediate stability and give better functional results. Docking technique was used for collateral ligaments repair using fascia lata tendon graft. Immobilization and physical rehabilitation are done to improve elbow joints range of movement. Open reduction surgery, triceps lengthening and collateral ligaments reconstruction using tendon graft from tensor fascia lata give satisfactory outcome for elbow contracture due to neglected left elbow dislocation.

Keywords: Neglected elbow dislocation, Triceps lengthening, Collateral ligaments reconstruction

INTRODUCTION

The elbow joint is a complex structure that provides an important function as the mechanical link in the upper extremity between the hand, wrist and the shoulder. Loss of elbow function can cause significant disability and affect activities of daily living, work-related tasks, and recreational activities.¹ Elbow dislocation is a common orthopaedic injury with an incidence of approximately 20% of all articular dislocations.^{2,3} Neglected elbow dislocations are common in developing countries.^{3,4} The main reason for the delayed diagnosis is that patients initially seek treatment from bonesetters. This leads to

retraction of triceps muscles and collateral ligaments which can result in disabling consequences for the patient.^{3,5}

CASE REPORT

A 48 years old man presented with stiffness on the left elbow. He had a limited ability to flex his left elbow. The patient had a history of falling 8 months prior to admission. He fell with extended arm and bump into bamboo trees. During the past 8 months the patient was treated by traditional bone setter for more than 10 times before seeking medical treatment.

During physical examination of the left elbow region, there was muscular atrophy on the left forearm muscles and 22° valgus deformity. There was no tenderness on the effected region, sensory examination was normal, AVN distal was normal, and CRT less than 2 seconds. Active range of movement (ROM) left elbow was 0° during extension and 15° during flexion. Active ROM MCP/IP was 0/90.

Anteroposterior and lateral left elbow radiograph were obtaining. It showed displacement of ulnar and proximal radial bone to superomedial. Decreasing bone trabeculation was showed on radius, proximal ulna, and distal humerus. No fracture line was showed and no soft tissue swelling. Disuse atrophy was suspected.

Based on the history, clinical, and radiograph findings, the patient was diagnosed left elbow contracture due to neglected left elbow dislocation. Decision was made to perform surgery for open reduction, soft tissue release, MCL and LCL reconstruction, and triceps muscle lengthening.



Figure 1: (A) Valgus deformity on the left forearm and (B) Limited flexion on the left elbow.

Posterior approach was used for the surgery. Ulnar nerve was identified, then isolated. The olecranon fossa was fibrotic, soft tissue was released and fibrotic tissue was resected. During surgery, we found lateral radial head dislocation, anterior subluxation of the capitulum, and lateral radial subluxation. Olecranon and radio-capitellar reduction was done to stabilize the elbow joints. The cartilage was preserved during the surgery. The triceps and collateral ligaments were found retracted. Elbow flexion stretching was done and we did VY plasty technique for triceps lengthening. Tensor fascia lata was harvested from the left thigh for donor graft. The graft was used to reconstruct medial collateral ligament (MCL)

and lateral collateral ligament (LCL) using docking technique.

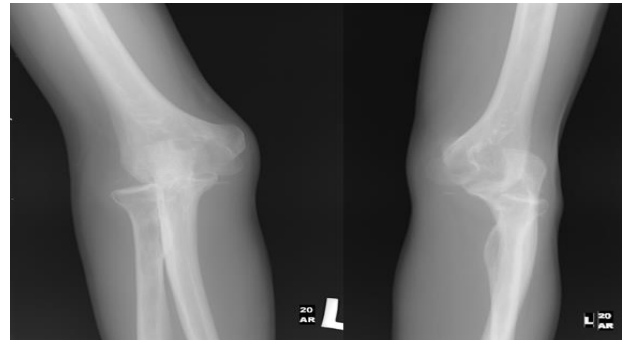


Figure 2: Anteroposterior/lateral left elbow radiograph of displacement of ulnar and proximal radial bone to superomedial.

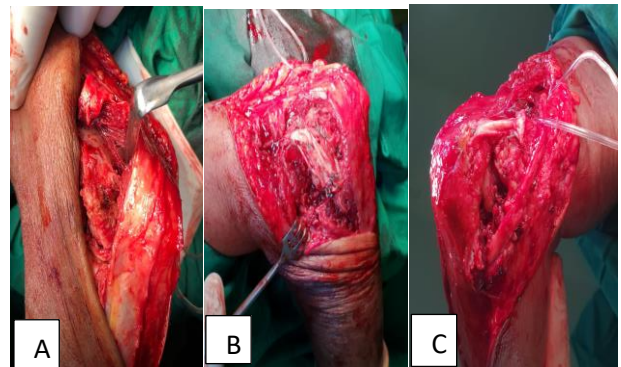


Figure 3: Intra operative triceps lengthening and MCL-LCL reconstruction.



Figure 4 (A) (B): Anteroposterior and lateral left elbow radiograph of a good alignment of bone, no dislocation, and no fracture line.

Follow up left elbow joints radiographs after surgery showing a good alignment of bone, without dislocation, and no fracture line. Immobilization using cast was applied for 3 weeks, followed by sling for 2 weeks. On the fourth week after the surgery, the patient undergo physiotherapy with ROM and isometric exercise to improve the ROM.

Post-surgical evaluation was done 5 weeks after the surgery. On the 5th week evaluation, no swelling and tenderness was found on the surgical area. Flexion ROM

left elbow was 55 degree on the 5th week and 68 degree on the 7th week. Five months evaluation showed left elbow flexion ROM was 90 degree. The MEPI on the 5th months post-surgery was 80.



Figure 5 (A) (B) and (C): Five weeks, seven weeks, and five months post-surgery elbow flexion ROM evaluation.

DISCUSSION

The elbow joint is a complex structure that provides an important function as the mechanical link in the upper extremity between the hand, wrist and the shoulder. The elbow's functions include positioning the hand in space for fine movements, powerful grasping and serving as a fulcrum for the forearm. Loss of elbow function can cause significant disability and affect activities of daily living, work-related tasks, and recreational activities.¹ Elbow range of motion consists of flexion and extension from 0° (full extension) to 140° flexion. Morrey et al showed that most activities of daily living can be performed in the 30° to 130° range and a functional arc of motion of 100° for both flexion-extension and pronation-supination is sufficient to perform most activities in daily life.^{1,6}

Elbow stiffness is the chief complaint in our case. His elbow was locked in extension position and his flexion ROM is only 15°. Elbow stiffness is generally defined as a flexion-extension arc of <100° and/or flexion contracture of >30°. Therefore, ROM less than 30-130° is considered an indication for treatment by many authors.⁶

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Elbow dislocation is a common orthopaedic injury with an incidence of approximately 20% of all articular dislocations. After the shoulder, the elbow is the second most frequently dislocated major joint in adults. At least 80% of elbow dislocations are posterior or posterolateral, resulting in most cases from a fall on the outstretched hand with the forearm pronated. Lateral, posteromedial, medial, or anterior and divergent dislocations (characterised by displacement of the radius from the ulna) are much less common. Neurovascular complications occur in 5–13% of elbow dislocations and include injury to the ulnar, median and, less frequently, radial nerves and the brachial artery, in most cases in open dislocations or penetrating injuries.^{2,3} Based on the history, clinical examination, and radiograph result, our patient was diagnosed neglected dislocation of the left elbow. Intra operative investigation showed anterior and lateral dislocation. There was no fracture and no neurological deficit in this case.

Neglected elbow dislocation is defined as dislocation which is left unreduced for more than 3 weeks.³ Neglected elbow dislocations are common in developing countries.^{3,4} The main reason for the delayed diagnosis is that patients initially seek treatment from bonesetters. Patients first consult bonesetters, who use massage, forcible manipulations and immobilisation in extension to address the problem. This approach not only delays the diagnosis and treatment, but also leads to retraction of the triceps muscles and collateral ligaments.³ This condition also happened to our patient, who was treated by a bone setter for more than 10 times in 8 months before seeking medical treatment.

Neglected elbow dislocations, incomplete examination and assessment of elbow instability, or inadequate therapy may lead to chronic dislocation of the elbow. This exceedingly disabling condition is generally associated with severe instability, limitation of elbow function and significant pain.² Elbow dislocation 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.⁷ This leads to retraction of triceps muscles and collateral ligaments, also cause some complications such as heterotopic ossification, entrapment of the ulnar nerve and compartment syndrome, which can result in disabling consequences for the patient.^{3,5} If the elbow is not reduced, arthritic changes may develop rapidly. The main goals of therapy is to restore a stable, concentric joint and regain a satisfactory arc of motion.²

Soft-tissue contractures and fibrotic tissue filling the joint space make closed reduction dangerous. Closed reduction increases the risk of fracture or articular surface damage, owing to the development of localized osteoporosis after 3 weeks. Open reduction enables restoration of a useful range of motion and is preferred if the duration of dislocation exceeds 3 months.⁸ The resulting non-functional unreduced elbow joint makes the surgical procedure quite challenging. In the cases require surgical treatment, the surgeon has many options to consider the surgical approach, need for triceps lengthening, and stabilization of elbow after reduction and repair of collateral ligaments.⁵

Most authors recommend open reduction for late-presenting cases (up to 3 months after injury).^{4,7} If the dislocation is less than six months old, the surgery is easier since the tissues (triceps and ligaments) are minimally retracted. When the dislocation is older (more than six months) and if the dislocation results in the patient having less than 90° of elbow flexion, it should be surgically reduced.³ Open reduction for dislocation more than 3 months have risk of cartilage damage, but study series by Kachnerkar et al achieved satisfactory results with surgery up to 6 months. These findings are consistent with those of another study achieving similar results by open reduction up to 2 years.⁴ In a study by Kapukaya et al, in cases of elbow dislocations neglected for 7 to 9 months, open reduction with triceps lengthening enables satisfactory elbow flexion. Both triceps lengthening and active movement of the elbow enable satisfactory outcome.⁸

The posterior and lateral approaches are used most often in open reduction. Lateral approach because posteromedial capsule cannot be accessed and the ulnar nerve cannot be controlled. The posterior approach provides good exposure to the posterior structures that are typically retracted; it is also easy to perform a V-Y triceps plasty and an ulnar nerve transposition, when needed. The joint is reduced and fixed under direct visual control. The overall aesthetics are also preferable, since there is only one surgical scar.³

Since the neglected elbow dislocation in our patient has happened for more than 6 months and the triceps muscle and collateral ligaments were retracted, we use posterior approach to provide good exposure to the posterior structures that are typically retracted, as recommended by many authors.^{3,4} During surgery we did soft tissue release and resection of the fibrotic tissue.

Two main triceps muscle lengthening techniques are used: The V-Y triceps plasty (most commonly used) and the procedure described by Van Gorder. VY plasty was done by cutting inverted V in the muscle–tendon junction at the medial and lateral head of the triceps muscle and the site of tendon–muscle release was then repaired in an inverted Y.^{3,9} Van Gorder method uses an Achilles tendon or fascia lata allograft after the triceps is

sectioned transversely. This procedure requires another surgical preparation and could affect the healing and mechanical outcomes at the elbow. This method requires much longer procedure times and increases the risk of morbidity because of the second surgical site.³ According to the study by Mahaisavariya et al, the older the dislocation, the greater the need for triceps lengthening. This allowed reduction without putting undue pressure on the already compromised articular cartilage. Other open reduction methods include splitting of the triceps, but this causes a greater degree of postoperative muscular contracture and elbow flexion restriction.^{4,10} Similar to the study by Kapukaya et al. We did triceps muscle lengthening. According to the study, in elbow dislocations neglected for 7 to 9 months, open reduction with triceps lengthening enables satisfactory elbow flexion. In our patient, triceps lengthening was achieved by using VY plasty technique.

Coulibaly et al believe that greatly retracted collateral ligaments do not need to be repaired to restore elbow stability. Most study used K wire to fix the olecranon and provide elbow stability. This procedure need second surgery to remove the wire and need more time for immobilization.^{3,4,7,8,10} In our case, we did collateral ligaments repair. This procedure doesn't require second surgery for wire removal and provide immediate stability, which allows for early mobilization during the first week post-surgery, and results in better functional results. Pundkar et al also used open reduction and cruciate ligament reconstruction along with adding lateral ulnar collateral ligament and medial collateral ligament components to the reconstruction, it was shown beneficial to mobilize the elbow joint immediately and achieve good to excellent stability and functions. It is one of the better methods to treat neglected elbow dislocation in anatomical way.⁵ The technique commonly used for collateral ligament reconstruction is by docking technique, which we used in our case. Docking technique passed the tendon graft through bone tunnel and docked it securely in the tunnel. It has the advantages of minimizing injury to the flexor-pronator mass, avoiding the ulnar nerve, allowing robust graft tensioning, and reducing the amount of bone removed from the medial epicondyle.¹¹

Tensor fascia lata graft was used in our case for MCL and LCL reconstruction. The tensor fascia lata is the deep fascia of the thigh, originating from the tensor fascia lata muscle and inserting into Gerdy's tubercle at the knee. Auto- and allograft fascia lata has been used for many years in the surgical treatment of soft tissue repairs or reconstructions by orthopaedists. No tissue repair technology currently exists for large tendon and muscle defects that is natural, strong, large, has good suture retention and provides enhanced wound healing. Fascia lata potentially offers all of these advantages based on its mechanical, chemical and ultrastructural similarity to tendon.¹²

Following the surgery, the immobilization period is generally 3 weeks, but when collateral ligaments repair was done, immediate stability could be achieved and this allow early mobilization during 1st week after surgery. Rehabilitation was started at week 3 with an adjustable orthosis.⁸ In our patient, we use immobilization with plaster cast for 3 weeks, followed by sling for 2 weeks. Physical rehabilitation started from 4 weeks after surgery.

The mayo elbow performance index (MEPI) was used to assess subjective, objective, and functional outcome at the final follow-up of the case. The maximum score was 100; 45 points were given to a pain-free elbow, 20 for normal elbow movement, 10 for a stable elbow, and 25 for performance of 5 activities of daily living. Scores of 90 to 100 were considered excellent, 75 to 89 as good, 60 to 74 as fair, and <60 as poor. The elbow was defined as stable if there was no apparent varus/ valgus instability, moderate for <10° varus/valgus instability, and gross for ≥10°varus/valgus instability.⁸ The MEPI for our patient was good (score 80) on the fifth months after the surgery.

CONCLUSION

Open reduction surgery, triceps lengthening and colateral ligaments reconstruction using tendon graft from tensor fascia lata give satisfactory outcome for elbow contracture due to neglected left elbow dislocation.

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