

Irreducible Posterolateral Elbow Dislocation: A Rare Injury And Mechanism. Case Report And Literature Review.

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Abstract: *Posterolateral elbow dislocation is a high-energy traumatic event. The association with joint fracture makes reduction impossible. Very rarely, and in the absence of fracture, it can be irreducible and need surgical intervention. We found only five cases of pure irreducible elbow dislocation in the literature. We describe a case of young adult woman who presents an irreducible posterolateral elbow dislocation following direct arm trauma. Reduction was blocked by interposed capsuloligamentous and muscular structure on both lateral and medial compartments. We were forced to repair both lateral and medial structure to have a stable and congruent elbow. The particularity of our case in comparison with other cases is in the mechanism of trauma and blockage.*

Keywords: Pure elbow dislocation, irreducible elbow, posterolateral instability.

INTRODUCTION

Acute elbow dislocation is an emergency that accounts for 10-25% of elbow trauma and ranks 2nd after shoulder dislocation [1]; fractures are associated in 17% of cases [2]. Emergency reduction is the rule of any elbow dislocation, it is done with closed focus by external manoeuvre; this reduction is usually easy after muscle relaxation [2-4]. The situation of isolated dislocation of the irreducible elbow is extremely rare, only 5 cases have been published in literature in the last fifty years [5-9]. We report the case of an irreducible pure elbow dislocation.

CASE REPORT

We report the case of a 45-years-old right-hand dominant woman who consults the emergency service after direct blowout to the 1/3 lower arm with flexed elbow and blocked forearm. She was complaining about pain and total functional impotence of the left upper limb. No history of prior trauma of the concerned elbow or known hypermobility was reported. On physical examination, the patient presented a swollen elbow with ecchymosis of the inner face of the elbow, the palpation was painful and the anatomical landmarks of the elbow were no longer palpable; distal pulses were present and the patient reported paraesthesia in the territory of the ulnar nerve; furthermore, no other traumatic lesions including wrist and shoulder were found.

An initial radiological assessment objectified a posterolateral elbow dislocation without visible fracture (figures 1, 2). A first attempt at a closed reduction under conscious sedation was unsuccessful. We completed our investigations by CT-Scan searching for fracture or intra-articular fragments preventing reduction. Subsequently, the patient was admitted to the operating room for open reduction.

Radiological assessment: the initial assessment included a standard x-ray face and profile of the elbow, after failure of the first attempt to reduce, we carried out a CT-scan which objectified a contusion of the radial head and the posterior face of capitellum without articular fragment that could explain the irreducibility (figure 3).

TREATMENT

The patient was admitted to the operating room for surgical reduction. In supine position upper limb on hand table. An external elbow approach (Kocher's approach) was used to replace the radial head which was directly under skin; lateral collateral ligament complex (LCLC) and lateral epicondyle muscle (LEM) were partially detached from lateral epicondyle; the persistent forepart was blocking the radial head (figure 4). After joint washing and removing of the hematoma, we removed the small articular cartilage fragments (figure 5). To reduce the radial head, we proceed to releasing the persistent LCLC (figure 4). Subsequently, the lateral collateral ligament complex and LEM were reinserted by using points through a bone tunnel at the epicondyle (figures 6, 7). After closing, the elbow was reduced but unstable at 30 degrees of flexion and valgus stress, so we decided to explore the medial compartment. Medial exploration objectified contuse but continuous ulnar nerve, and rupture in muscle belly of the medial epicondyle muscles (MEM) (figure 8), leaving a voluminous capsulo-muscular cuff that came between humerus and ulna during the reduction manoeuvres; this may also explain the initial irreducibility. We repair the internal compartment (muscles and capsule) by direct sutures. After closing, the elbow was stable at all range of motion. Postoperative control shows a congruent joint (figure 9).

Upon awakening, a new vascular and neurological examination was performed, the patient was hospitalized for 48 hours; passive mobilization was started the day after the

surgery. Patient was given instructions for self-education, analgesic treatment, and Indomethacin for 3 weeks to prevent the occurrence of heterotopic ossifications. The patient underwent post-operative immobilization by shoulder fixed arm sling for 10 days followed by a standard arm sling. The patient was encouraged to begin active and active mobilization assisted bending elbow extension from the 10th day under cover of a sling.

At the last control (3 months), the patient was very satisfied with the result with complete disappearance of pain and paresthesias, she resumed activities of daily life, the joint amplitudes improved compared to the first control, bending sector were 15 to 130 degrees, pronation at 80 and supination at 80 degrees (figure 10 to 13).

DISCUSSION

Pure elbow dislocation is a common reason for consultation in trauma emergencies and accounts for 10-25% of elbow injuries [10-11]. Closed reduction by external means is the rule of any pure dislocation of the elbow [2-4], it is done by gentle traction on the forearm, the other hand pressing against the 1/3 lower of arm. After the passage of the coronoid process in front of the trochlea the elbow is bent to reduce the humero-ulnar joint.

In the literature, only 5 authors reported cases of irreducible pure elbow dislocation [5-9]. The first description of this entity was by Devados and colleagues in 1967 [5]; the authors report the case of a 7-year-old girl whose surgical exploration objectified that the radial head buttonholed through the lateral capsule and lateral ligament complex. The same blocking mechanism was reported by the other authors [7-9]. Pawlowski et al. [6] presents a case where the blockage was due to the "bowstring" effect of radial collateral ligament and the annular ligament, which is similar to the blockage mechanism for our patient (Table 1)

Postero-lateral elbow dislocation usually occurs by indirect mechanism after falling on outstretched wrist and elbow slightly flexed, this mechanism is reported by the different authors [5-9]. In our case the mechanism was different by direct mechanism by stick stroke to the 1/3 lower arm with flexed elbow and forearm blocked by another person; usually this traumatic mechanism is responsible for a fracture of the distal part of humerus or fracture dislocation of the elbow especially in elderly.

The irreducibility of elbow dislocation may be due to either an intra-articular bone fragment [11], to incarceration of the soft parts (joint capsule, lateral collateral ligament complex), a buttonholed radial head through the lateral collateral ligament complex and postero-lateral capsule or due to bowstring effect; on these situations the bloody reduction is the only solution. An external approach according to Kocher allows access and repair the external compartment, the reinsertion of the ligament complex as well

as lateral epicondyle muscle can be done by trans-bony points as we did [8] or using anchor.

The peculiarity of our case lies in the fact that despite the repair of the external compartment the elbow remained unstable which is not the case in the other cases [5-9]. We have based our therapeutic strategy on the work of O'Driscoll and colleagues [12] which describes the succession of injury after posterolateral elbow dislocation and recommend to repair des external compartment at first. Recently, Lee et al. [13] described a new strategy for managing posterolateral and posteromedial elbow dislocations based on the work of Rhyou et al. [14]; in their series, 7 cases of posterolateral dislocation had elbow instability at 30-40 degrees of flexion forearm in pronation, these patients benefited from internal compartment repair at first, 3 of them required the concomitant repair of the external compartment due to the persistence of instability; the other 4 patients had only the internal compartment repair. This strategy differs from that proposed by O'Driscoll et al [12].

Emergency management of elbow dislocation must necessarily include a complete vasculonervous examination of the limb concerned before reduction; no vasculonerve complications were reported by the authors [5-9] in our case the patient had paresthesia in the territory of the ulnar nerve. The involvement of the brachial artery has been reported in the literature, it can occur before or after elbow reduction [15, 16].

Even after well-conducted orthopedic or surgical treatment, stiffness is a feared complication after elbow dislocation [11]; hence the interest of encouraging patients to start elbow mobilization as soon as possible, especially in elderly.

CONCLUSION

The irreducible pure posterolateral elbow dislocation is a rare entity, its management must be urgent and methodical. The search for vascular-nerve complication should be kept in mind. The closed reduction manoeuvre should not be attempted several times in case of failure. The surgical reduction begins with the external compartment in order to replace the radial head, repair the external ligament complex and lateral epicondyle muscles at this time, if elbow still of irreducible and/or instable the internal compartment is explored and repaired. The post-operative mobilization is started as soon as possible to avoid stiffness and recover a useful range of motion.

DISCLAIMER

The authors, their immediate families, and any research foundations with which they are affiliated have not received

any financial payments or other benefits from any commercial entity related to the subject of this article.

| Cases | Gender | Age | Mechanism of trauma | Complications | Blocking mechanism |
|---------------------------|----------|-----------|-----------------------|------------------------------|---|
| Devadoss et al 1967 | F | 7 | Indirect (Fall) | No | Buttonhole effect |
| Pawlowski et al 1970 | F | 17 | Indirect (Fall) | No | Bowstring effect |
| Greiss et al 1987 | M | 24 | Indirect (Fall) | No | Buttonhole effect |
| Cameron et al 2014 | F | 84 | Indirect (Fall) | No | Buttonhole effect |
| Fenelon et al 2016 | M | 20 | Indirect (Fall) | No | Buttonhole effect |
| <i>Jellali et al 2021</i> | <i>F</i> | <i>45</i> | <i>Direct blowout</i> | <i>Ulnar nerve contusion</i> | <i>Bowstring effect + Capsulo-muscular cuff</i> |

Table 1: Different cases of irreducible posterolateral elbow dislocation



Fig 1, 2 and 3: 1: A-P radiographie of left dislocated elbow; 2: Lateral view of dislocated elbow; 3: CT-Scan

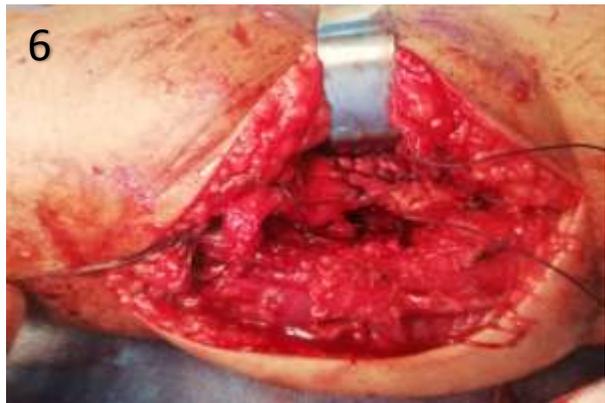


Fig 4, 5, 6, 7, 8: Intraoperative pictures: 4: releasing the persistent part of LCLC and LEM by using a Koshers approach; 5: removing intraarticular cartilage fragment; 6: Reinsertion of LCLC using a lacing system fixed by bony point; 7: reinsertion of LEM tendon; 8: exploration of medial compartment showing capsulomuscular cuff interposed between ulna and humerus.



Fig 9: Anteroposterior and lateral elbow view, postoperative control showing congruent joint.



Fig 10, 11, 12, 13: Range of motion 3 months after surgery.

10: flexion; 11: Extension; 12: pronation; 13: supination

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