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Case Report

Terrible than terrible triad of elbow

Monika Verma[1], **Abhishek Shinde**[1,*]

[1]*Dept. of Orthopaedics, M.G.M Medical College and Hospital, Aurangabad, Maharashtra, India*

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ABSTRACT

The brachial artery is rarely injured in closed posterior dislocation, despite the anatomical proximity.Most cases of brachial artery injury after dislocation of the elbow are associated with fracture. The neurovascular examination that comprises checking for the distal pulse is mandatory, and the absence of the same is considered a warning sign. Investigations like doppler and arteriography should be done to prevent potential complications.

Our study is about a patient with closed posterior dislocation with vascular insufficiency in the left ulnar and Radial artery due to following self-fall from a 2-wheeler. We treated her with Tissue reconstruction on the medial and lateral sides, including UCL and Common Flexor Origin and repaired LCL and Common extensor origin with Thrombectomy. At six months follow-up, no complications of vascular injury were noted.

1. Introduction

The association of arterial injury with posterior elbow dislocation depends upon sustained injury. For instance, in cases of open dislocation or penetrating deep injury, it occurs in 5 – 13%. In the case of closed dislocation, it is a rare event. Especially transection of the brachial artery is rare even though it lies near the elbow joint.[1]

When the pain is out of proportion, it should raise a high index of suspicion of vascular injury.

Doctors should assess the vascular status themselves instead of relying on paramedical staff. Once the vascular status is confirmed to be compromised, Surgical repair should be done within golden hours.

Suppose the brachial artery is repaired after the golden hours. In that case, it can lead to complications like gangrene and limb loss and long-term complications of limb ischemia, including reduced range of motion, Volkmann contracture, and cold intolerance.[2]

Soft tissue repair and resection should be done whenever needed.

2. Case Report

2.1. History

A 50-year-old Female sustained a closed posterior dislocation, Following RTA fall from 2-wheeler. She initially went to an outside hospital in Chikli and the pain increased following an attempt to reduce it. She sought an orthopaedic evaluation and was referred here to Aurangabad, which is 2 hours 53 min by road and 3 hours 53 min via railways. She complains of pain and oedema over the left elbow.

2.2. Examination

Swelling and ecchymosis are present around the elbow, and absent distal pulse and median nerve palsy were noted.

* *Corresponding author*.
E-mail address: doctormonikaverma@gmail.com (A. Shinde).

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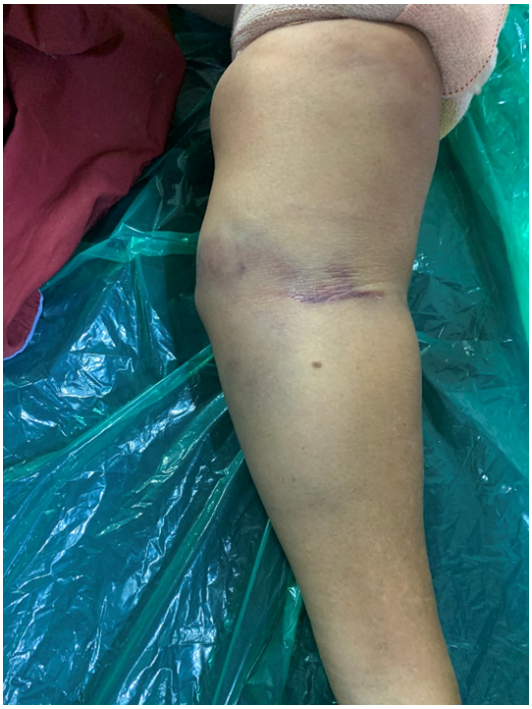


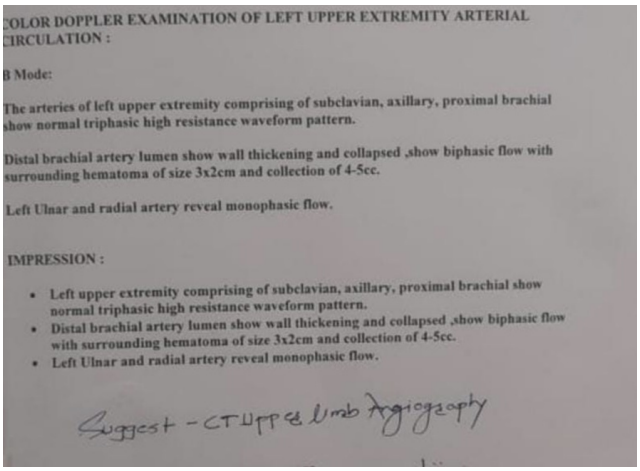
Fig. 1: Pre-op clinical picture

Valgus Instability of the elbow joint was present.

2.3. *Investigation findings*

Fig. 2: Pre-op x-ray of elbow joint

Doppler: Colour doppler revealed monophasic flow in the Left ulnar and Radial artery.



COLOR DOPPLER EXAMINATION OF LEFT UPPER EXTREMITY ARTERIAL CIRCULATION :

B Mode:

The arteries of left upper extremity comprising of subclavian, axillary, proximal brachial show normal triphasic high resistance waveform pattern.

Distal brachial artery lumen show wall thickening and collapsed ,show biphasic flow with surrounding hematoma of size 3x2cm and collection of 4-5cc.

Left Ulnar and radial artery reveal monophasic flow.

IMPRESSION :

- Left upper extremity comprising of subclavian, axillary, proximal brachial show normal triphasic high resistance waveform pattern.
- Distal brachial artery lumen show wall thickening and collapsed ,show biphasic flow with surrounding hematoma of size 3x2cm and collection of 4-5cc.
- Left Ulnar and radial artery reveal monophasic flow.

Suggest - CT Upper Limb Angiography

Fig. 3: Pre-op colour doppler report of left upper extremity

2.4. *Arteriography*

Arteriography is the gold-standard diagnostic test.[3]

Fig. 4: Pre-op arteriography of left upper extremity

2.5. *Procedure*

Tissue reconstruction on the medial side, including UCL and Common Flexor Origin, was done with a 5.5 suture anchor with a needle.

A separate incision was taken for the lateral side to repair LCL, and the common extensor origin was repaired with a 5.5 suture anchor with a needle. Furthermore, Thrombectomy was also done by following the steps. First, we identified the biceps brachii muscle and located the brachial artery. Then vessel loops were placed proximally and distally of the brachial artery, and arteriotomy was done using 11 number surgical blade. After this the Forgati

catheter was inserted into the proximal brachial artery and inflated distal to the thrombus, followed by gently pulling the catheter. The same was repeated for the distal brachial artery, leading to the thrombus excavation. Good Forward bleeding and backward flow were seen, respectively. The arteriotomy was then sutured by proline 6-0.

Good pulsation of the brachial artery was noted, and distal pulses were palpable intraoperatively.

Hence, we confirmed the patency of the artery clinically by the presence of distal pulsation, and good capillary refill. Arteriography was not done intraoperatively and postoperatively.

2.6. *Post-operative care*

The patient was administered Inj. Clexane 40 mg subcutaneously twice daily till post-op day five, followed by Tab. Dabigatran 150 Twice daily for six weeks to prevent thrombus formation. The limb was immobilized for one month, followed by Elbow ROM exercises.

Fig. 5: Intra-op images

2.7. *Follow up*

At six months of follow-up, The surgical scar was healthy. The range of movement at the elbow joint in the current follow-up is 20-140 degrees.

3. Discussion

Brachial artery injury though rare with the elbow dislocation, does occur, which may be in the form of thrombosis, intimal flaps or transection.[4]

The damage to the artery is not always clinically evident. It may present as absent radial and ulnar artery pulsation or decreased capillary refill and decreased saturation reading on the pulse oximeter. These types of limbs have been termed "Pink Pulseless Hands.[5–7]

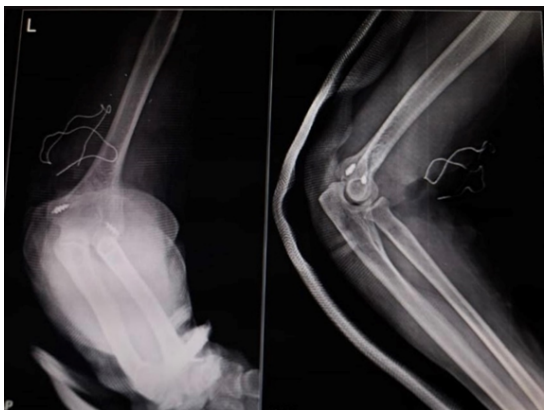


Fig. 6: Immediate post of x-ray

Fig. 7: Demonstrating range of motion of elbow joint at six months follow up

There is sufficient literature to support that there should be immediate intervention in patients with frank ischemia, that is, explore, repair or do grafting in cases of frank ischemia. However, the treatment for the "Pink pulseless hand" is less clearly defined.[3]

Closed dislocation with vascular injury has seldom led to limb loss, though the treatment of choice in these cases is under debate. Our options are observation, ligation, repair or grafting.[4]

Among these, anastomosis reconstruction with an autologous venous graft from a saphenous vein is preferable.[5,6,8]

Arterial ligature, though described in scientific literature, has been only used in hemodynamically unstable patients.[9]

For a pink pulseless hand, observation alone has been successful, but it generally causes complications like cold intolerance and intermittent claudication of the forearm.[3]

Observation alone has been successful because the elbow joint has a surplus blood supply provided by extraosseous and intraosseous anastomosis. The arcades of the prior are located medially, laterally and posteriorly, and the blood supply of the later is derived from feeding perforating vessels of the extraosseous arcade.[10]

Louis et al.[11] did an anatomical study regarding the anatomical patency of collateral arterial circulation of the elbow. He mentioned two critical findings. 1st that collateral circulation around the elbow plays a vital role in

maintaining perfusion to the limb after the brachial artery is injured. It becomes essential to note the second important finding that at least one of these arterial anastomoses is generally injured in a posterior elbow dislocation.

Though the frequency of associated arterial injury with elbow dislocation is challenging to estimate, the incidence of harm to the artery certainly increases with compound dislocation.[5,6,12]

However, in our study, Our patient is a case of closed dislocation with vascular injury. The brachial artery lies just below the bifurcation of the radial and ulnar arteries and thus making it the most common injury site. Here it may get compressed between the rigid aponeurosis of the biceps and dislocated bone. This occurs mainly in the distal epiphysis of the humerus.[6,13–15]

Endean et al.[10] carried out a study in 1992, showing a positive predictive statistical relationship between elbow dislocation and arterial lesions and mentioned that a complete systematic clinical evaluation with the vascularization status of patients should be examined before and after joint reduction.[5–7,12]

If there is any doubt pertaining patency of the artery, it is always wise to get angiography or Angio tomography which is considered the gold standard test for diagnosing Arterial interruption.[6,8,14]

Now that we discussed the arterial injury, let us shift our focus to neurological injury, Endean et al.[10] and Grimmer and Brooks.[16]

Mentioned that most injury related to elbow dislocation is neuropraxia, and they recover spontaneously.

Nevertheless, several authors[5] reported no neurological improvement with conservative management, which suggests that there might be a need for intervention.

Orthopaedic management advocates urgent relocation of dislocated elbow joints.

The discussion arises on how immobilization is to be done or if ligament repair is required. Immobilization of the elbow not only enables more uncomplicated and meticulous suturing of venous graft and also helps in its healing.

Platz et al.[5] concluded that trans articular external fixation provided stability and facilitated local care, particularly in fasciotomy.

However, there have been other authors[6] who state otherwise. i.e. external fixation alone does not provide complete stability to the elbow joint.

Dislocation of the elbow is associated with a fracture or tear of one or both collateral ligaments.[14]

Whether one should repair these ligaments in simple posterior elbow dislocation is debatable.

Some authors[13] consider it redundant to repair these ligaments, whereas some[4,10] advocate repair of the ligaments if there is varus/ valgus Instability.

The anteromedial surgical approach is advocated when the joint is unstable and is associated with brachial artery injury as it facilitates vascular repair and also gives access to the medial capsule ligament, hence enabling its repair.[5]

4. Conclusion

Traumatic Elbow dislocation is quite common. It accounts for 20% of all joint dislocations, and associated arterial injury occurs in about 5-13% and very rarely in closed dislocation (0.5%). Ligament and soft tissue repair are indicated whenever there is severe Instability.

Primary repair of a vascular injury in a closed elbow dislocation with Thrombectomy and immediate reconstruction of ligaments results in good long-term functional outcomes.

5. Source of Funding

None.

6. Conflict of Interest

The authors declare no conflicts of interest.

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Author biography

Monika Verma, Junior Resident https://orcid.org/0000-0002-4102-811X

Abhishek Shinde, Assistant Professor https://orcid.org/0000-0003-1510-0082

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