



Case report

Surgical Treatment of an Open Elbow Dislocation with Vascular Injury: A Case Report

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SUMMARY

Open elbow dislocations with vascular injury are rare injuries and they most commonly occur after a fall from a high or in sports accidents. Close anatomic proximity of the joint to the neurovascular structures put them at risk of concomitant injury. The aim of this paper is to present the method of treatment of this severe injury.

Herein we present a case of a female patient, 43 years old. She had suffered an open elbow dislocation with vascular injury as a result of a fall from the height of 1.5 meters. Seven hours after sustaining the injury and short preoperative preparation, reposition of the elbow, reconstruction of the vascular injury, adequate surgical treatment of the wound and external fixation of the elbow with the Mitković type external fixator were performed under general anesthesia. Four weeks after elbow stabilization with the external fixation, the external fixator was removed. The neurovascular status and final functional result of the treatment after six months were good.

Urgent reposition, artery and vein reconstruction, and external fixation are essential in achieving good results in patients with open cubital dislocation accompanied with vascular injury. The Mitković type external fixator provides fast and stable fixation of the elbow after reposition and good conditions for wound care.

Key words: open elbow dislocation, vascular injury, external fixation

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INTRODUCTION

Elbow dislocations are common injuries with the incidence of 6 to 8 dislocations per 100,000 people (1, 2). Of all the elbow injuries, dislocations account for 11-28% (3). The treatment of this injury includes orthopedic reposition, immobilization and adequate rehabilitation. This treatment has good prognosis with possible mild restrictions of movement (4, 5).

Due to the anatomic proximity to the neurovascular structures, elbow dislocations are accompanied by a higher risk of damage to these structures in the upper extremities. The frequency of associated neurovascular lesions in the elbow dislocation is greatly lower in comparison to the dislocations of the knee (6).

Open dislocations of the elbow with vascular injuries are rare injuries. The determination of the approximate frequency of these injuries is accompanied by numerous difficulties because the reference literature only reports small series and sporadic cases.

These injuries are typically caused by falling from a height on the extended hand, traffic accidents, work-associated activities or sports activities (7).

These injuries require emergency and adequate surgical treatment in order to manage their severe complications, reducing them to a minimum. The aim of this report is to show the treatment of this serious

injury.

CASE REPORT

The female patient, 43 years old was injured due to a fall from a tractor trailer (about 1.5 meters high) on the extended left hand. Initially, the wound was washed and bandaged in a small health center. The left arm was immobilized with Cramer's wire splint. She was taken by the ambulance to the Department of Orthopedics and Traumatology, Clinical Center Niš, where she was admitted five hours after sustaining the injury. The patient was re-bandaged after admission. There was a wound in the cubital fossa (an ellipsoid-shaped wound, 6 x 5 cm in size) from which the distal part of the humerus protruded (Figures 1a and 1b). After clinical examination, an x-ray was done, which showed a posterior elbow dislocation (Figure 2). Parenteral three-component antibiotic therapy was initiated. The patient received tetanus prophylaxis during the protocol. Neurological examination of the injured hand was normal. There were no radial artery pulsations. Because of the clear clinical signs of ischemia of the left forearm, arteriography was not performed. After a short preoperative preparation (seven hours after sustaining the injury) the patient was operated under general endotracheal anesthesia.



Figures 1a and 1b: Open elbow dislocation and an x-ray of the elbow on admission to the clinic

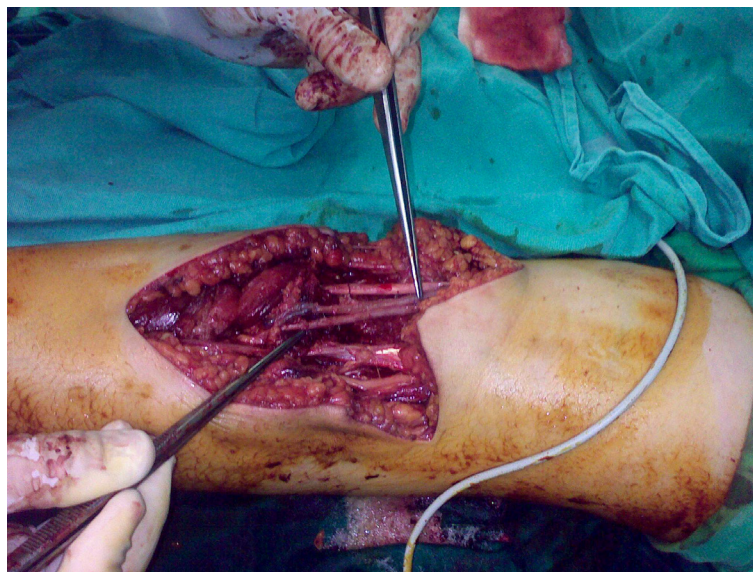


Figure 2. The reconstruction of vascular injury



Figures 3a and 3b. The patient's condition after wound closure and external fixation of the elbow

Reposition of the elbow with the suture of the anterior capsule was made after extensive washing and surgical debridement of the wound. After expansion and exploration of the wound, the complete disruption of brachial arteries and veins was seen. The major nerves were not injured. By the vascular team, the reconstruction of brachial artery and vein (shunting using the great saphenous vein) and the left forearm fasciotomy were done (Figure 2). After vascular reconstruction, stabilization of the left elbow to 110 degrees was performed using the external fixator Mitković (with two pins in the distal humerus and two pins in the ulna). The wound was closed with skin stitches (Figures 3a and 3b).

Antibiotic therapy was continued postoperati-

vely for five days. Anticoagulant therapy with low molecular weight heparin was administered.

Postoperative vascular status on the left hand was regular. A milder degree of paresthesia of the ulnar and median nerves was observed postoperatively. The patient was discharged from the clinic 15 days after sustaining the injury, with the recommendation to continue with anticoagulant therapy and regular bandaging per seven days.

The external fixator was removed from the left arm four weeks later, and the patient was referred to the physical therapy.

At the follow-up examination six months later, the patient had a moderately stable elbow with the limitation of movement (the impossibility of full ex-

tension in the elbow). Neurovascular status of the left hand was normal. The patient returned to her professional and life activities.

DISCUSSION

Dislocations of the elbow most often occur after falls on the hand with elbow in extension or small flexion. Open dislocation occurs after a prior severe trauma (a fall from a height, traffic accidents, contact sports) when humerus damages the skin (8).

The frequency of injury of blood vessels associated with elbow dislocations in the literature ranges from 0.4% to 12.7%. Determination of the precise incidence continues to be a problem because the literature only reports sporadic case studies or short series (9, 10).

Knowing the anatomy of this region and the proximity of the elbow joint to the neurovascular structures, it is a bit surprising that the frequency of elbow dislocations associated with vascular injury is low. Brachial artery and median nerve are mostly exposed to injuries during the posterior dislocations of the elbow (4).

An injury to the brachial artery can be followed by many diagnostic problems. Sometimes, the brachial artery disruption is clinically clearly manifested due to the absence of the radial pulse and palleness of the hand. Occasionally, the clinical picture can be masked even after repositioning due to the incomplete thrombus or temporary bridging circulation via collateral arteries (11, 12). Good estimation of the neurovascular status of the hands is necessary after each dislocations of the elbow. If there is suspicion of vascular injury, it is necessary to immediately reposition the elbow, perform arteriography or less invasive but less reliable method of echo-Doppler blood vessels of the hands (13, 14).

Arterial injuries in dislocations of the elbow include complete or subadventitial rupture, incarceration and thrombosis (15, 16). Vascular reconstruction depends on the type of lesion. It is usually performed with reverse shunting using the great saphenous vein.

Magna saphenous vein is the ideal solution: there is no limitations in length, an appropriate lumen diameter can be chosen, and it cannot be easily damaged during subsequent orthopedic operations for the stabilization of the elbow joint (17, 18).

Fasciotomy is always necessary when compartment syndrome is present with severe tissue and vein injury. Fasciotomy is also necessary in cases where ischemia was longer than four hours (16, 19).

Therapy of elbow dislocation requires immediate repositioning but still there are different attitudes how to stabilize the joint and the need for stitching the damaged ankle ligaments. Vascular reconstruction requires the total joint stability during vascular reconstruction and postoperatively. Fixation of the elbow at 90 degrees is recommended (8).

Fixation of the elbow using an external skeletal fixator was recommended by Reynerds et al. It provides the maximum stability and easy vascular access and also excellent conditions for the care of wounds in open dislocation or after fasciotomy (7).

If there is good stability of the elbow joint after repositioning and elbow capsule suture, external fixation can be done after the reconstruction of injured blood vessels. In case of elbow instability, external skeletal fixation should be done before vascular reconstruction.

Functional results after adequate and emergency surgical treatment of this severe injury in the literature are generally good and are accompanied by a smaller decrease in range of motion in the elbow joint and often mild neurological disorders (8).

CONCLUSION

Emergency reposition, surgical reconstruction of damaged blood vessels and external fixation of the elbow are essential in saving the functional recovery of the upper extremity after open elbow dislocation with associated vascular injury. The unilateral external fixator Mitković enables fast and stable fixation of the elbow after reposition and provides excellent conditions for vascular reconstruction of the injured blood vessels and postoperative care of the wound.

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Hirurško lečenje otvorene luksacije lakta sa povredom magistralnih krvnih sudova: prikaz slučaja

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SAŽETAK

Otvorene luksacije lakta su retke povrede i najčešće nastaju pri padu sa visine i sportskom traumatizmu. Zbog anatomske blizine neurovaskularnih struktura praćene su rizikom oštećenja nerava i magistralnih krvnih sudova ruke. Cilj rada bio je da se prikaže način lečenja ove teške povrede.

U radu se prikazuje žena stara 43 godine, koja je zadobila otvorenu luksaciju levog lakta nakon pada sa traktorske prikolice (visina oko 1,5 m) na opruženu ruku. Nakon sedam sati od povrede, urađena je repozicija lakta nakon obilnog ispiranja rane, sutura kapsule zgloba i rekonstrukcija pokidanih magistralnih krvnih sudova autovenoznim graftovima uz fasciotomiju od strane vaskularnog tima. Nakon toga, urađena je stabilizacija zgloba lakta spoljnim skeletnim fiksatorom Mitković. Spoljni fiksator je skinut nakon četiri nedelje. Neurovaskularni status leve ruke i funkcionalni rezultat nakon 6 meseci od povredivanja i sprovedene fizikalne terapije bio je dobar.

Blagovremena repozicija, rekonstrukcija oštećenih magistralnih krvnih sudova i spoljna skeletna fiksacija lakta predstavljaju bazične elemente u spašavanju i funkcionalnom oporavku ruke nakon otvorene luksacije lakta sa pratećem vaskularnom povredom. Spoljni skeletni fiksator Mitković omogućava brzu i stabilnu fiksaciju lakta nakon repozicije i zbog unilateralne montaže sa lateralne strane, obezbeđuje odlične uslove za negu rane.

Ključne reči: luksacija lakta, povreda krvnih sudova, spoljna skeletna fiksacija