

# Vascular Injury Following a Fall Onto an Outstretched Hand

Keith Hurst, DO; Jimmy Stickles, MD

A 46-year-old man presented for evaluation of an injury to his left elbow after a fall.

A 46-year-old man with a remote history of general tonic-clonic seizures, for which he was taking phenytoin, presented to the ED 30 minutes after sustaining a witnessed mechanical fall. The patient had fallen onto his nondominant left hand, which resulted in an injury to his elbow. He reported neither losing consciousness nor experiencing any seizures following the incident. He denied dislocating the joint or sustaining any other injuries from the fall. He also denied a history of past left elbow injury.

The patient was alert, oriented, and provided a full history of the incident. Regarding medical history, he stated that his last seizure had occurred 10 years prior. Except for the left elbow pain, a review of his systems was negative. The patient appeared in no acute distress, and supported his left upper extremity with a bandana and his right hand.

The patient's vital signs were normal. The physical examination was negative except for the left elbow, which had significant swelling and limited range of motion without skin break, leading to suspicion for a prehospital dislocation with self-reduction. The joints above, below, and at the injury site were assessed for neurovascular injury. The neurological examination

was normal; however, the vascular examination was abnormal for a nonpalpable left brachial pulse and a weak radial pulse, which was only detected by bedside Doppler. A radiograph of the left upper extremity revealed a small avulsion of the medial condyle and significant soft tissue swelling (**Figure 1**).

Computed tomography angiography of the left upper extremity showed a brachial artery occlusion above the elbow, with reconstitution below the joint (**Figure 2**). Vascular surgery services was immediately contacted, and the patient was taken to the operating room for exploration and repair of the injured vessel. Orthopedic services



**Figure 1.** Radiograph of the patient's left upper extremity demonstrating a small avulsion of the medial condyle and significant soft tissue swelling.

**Dr Hurst** is an assistant professor, Dell Medical School, University of Texas, Austin; and an attending physician, department of emergency medicine at Dell Seton Medical Center at the University of Texas and Dell Children's Medical Center, Austin. **Dr Stickles** is a recent emergency medicine graduate of the Dell Medical School, University of Texas, Austin.

**Authors' Disclosure Statement:** The authors report no actual or potential conflict of interest in relation to this article.

DOI: 10.12788/emed.2017.0039



**Figure 2.** Computed tomography angiography of the patient's left upper extremity demonstrating a brachial artery occlusion above the elbow with reconstitution below the joint.

was also consulted, and the orthopedic surgeon on call stabilized the joint after vascular repair. During surgery, the patient was found to have transected the brachial artery, brachial vein, and basilic vein. The veins were ligated, and the brachial artery was repaired using a saphenous vein graft from the left thigh. The patient did well postoperatively and was discharged the next day with full neurovascular function.

### Discussion

There is a paucity of information on vascular injury from elbow dislocation in the emergency medicine literature. A recent literature search referenced orthopedic pitfalls in the ED,<sup>1</sup> but most data appear in the orthopedic and vascular literature. A case report from the orthopedic literature in Brazil cites a vascular injury after ED relocation of a dislocated elbow following an assault.<sup>2</sup>

The elbow is the second most commonly dislocated joint (not including the patella) after the shoulder.<sup>3</sup> Posterior dislocations make up the majority of these injuries. Simple versus complex injuries can be differentiated by the presence or absence of fracture.<sup>4</sup> Simple complications include stiffness; loss of mobility, especially with full extension; neurovascular injuries; and compartment syndrome. Complex injuries

involve fractures and potential neurovascular injuries, stiffness, pain, and loss of mobility.

Soft tissue injuries, fractures, and neurovascular complaints represent the majority of ED encounters, and are commonly related to falls. The elbow is the articulation of the humerus, ulna, and radius bones. Range of motion includes, but is not limited to, flexion, extension, supination, and pronation. Tears in the lateral ulnar ligament, joint capsule, and medial collateral ligament lead to instability of the joint and increase risk of dislocation.

Fractures make up to 20% of injuries to the elbow. These include fractures of the radial head and neck (most common), olecranon, and distal humerus.<sup>5</sup> Open elbow fractures are rare, as are vascular injuries (5%-13% of cases).<sup>6</sup> When present, vascular elbow injuries usually involve the brachial artery, and display abnormal palpable and Doppler assessment of the brachial and radial arteries.<sup>6</sup>

Nerve injuries may include injury to the radial nerve. Manifestations of radial nerve injury include abnormal sensation to the dorsum of the hand, trouble straightening the arm, and wrist-drop. Ulnar nerve injury typically presents with abnormal sensation to the fourth and fifth digits and decreased grip strength.

### Conclusion

Vascular abnormalities are rare complications following elbow injuries. Our patient sustained a lacerated brachial artery, which was repaired via saphenous graft; brachial and basilic vein lacerations, which were ligated; and an avulsion fracture with an unstable joint, which was stabilized with external fixation and stabilization. He was discharged the following day with full neurovascular function.

A methodical approach to assessing patients presenting with elbow injury is essential to making the correct diagnosis. This should include a careful evaluation of the joints above and below the area of injury.

ry, as well as attention to the neurovascular examination, with a heightened suspicion for a vascular abnormality in complex injuries. Doppler and ultrasound evaluation with multiple rechecks can assist with

the diagnosis. Our patient was rapidly assessed with a concern for a vascular injury, and was emergently referred to vascular surgery for repair of the brachial artery and stabilization of the joint.

## References

1. Carter SJ, Germann CA, Dacus AA, Sweeney TW, Perron AD. Orthopedic pitfalls in the ED: neurovascular injury associated with posterior elbow dislocations. *Am J Emerg Med.* 2010;28(8):960-965. doi:10.1016/j.ajem.2009.05.024.
2. Miyazaki AN, Fregoneze M, Santos PD, do Val Sella G, Checchia CS, Checchia SL. Brachial artery injury due to closed posterior elbow dislocation: case report. *Rev Bras Ortop.* 2016;51(2):239-243. doi:10.1016/j.rboe.2016.02.007.
3. Beingessner J, Pollock W, King GJW. Elbow fractures and dislocations. In: Court-Brown CM, Heckman JD, McQueen MM, Ricci WM, Tornetta P, eds. *Rockwood and Green's Fractures in Adults*. Vol 1. 8th ed. Philadelphia, PA: Wolters Kluwer Health; 2015:1179-1228.
4. McCabe MP, Savoie FH 3rd. Simple elbow dislocations: evaluation, management, and outcomes. *Phys Sportsmed.* 2012;40(1):62-71. doi:10.3810/psm.2012.02.1952.
5. Jungbluth P, Hakimi M, Linhart W, Windolf J. Current concepts: simple and complex elbow dislocations—acute and definitive treatment. *Eur J Trauma Emerg Surg.* 2008;34(2):120-130. doi:10.1007/s00068-008-8033-9.
6. Marcheix B, Chaufour X, Ayel J, et al. Transection of the brachial artery after closed posterior elbow dislocation. *J Vasc Surg.* 2005;42(6):1230-1232. doi:10.1016/j.jvs.2005.07.046.