

# Pseudoaneurysm of High Origin Ulnar Artery After Penetrating Trauma

Vascular and Endovascular Surgery  
44(7) 609-612  
© The Author(s) 2010  
Reprints and permission:  
sagepub.com/journalsPermissions.nav  
DOI: 10.1177/1538574410373664  
http://ves.sagepub.com



Nevzat Erdil, MD<sup>1</sup>, Cengiz Colak, MD<sup>1</sup>, Koksal Donmez, MD<sup>1</sup>,  
Hasan Cihan, MD<sup>1</sup>, and Bektas Battaloglu, MD<sup>1</sup>

## Abstract

High origin ulnar artery from the brachial artery is rare and lies superficially in the forearm. Its reported frequency ranges from 0.17% to 2%. Pseudoaneurysms of peripheral arteries are very rare, and mostly these are the result of penetrating injuries. Here, we report a case pseudoaneurysm of high origin ulnar artery from the brachial artery and its surgical approach method.

## Keywords

Pseudoaneurysm, upper extremity, vascular malformation, surgery

## Introduction

Ulnar artery of high origin lies superficially in the forearm. Its reported frequency ranges from 0.17% to 2%. Ulnar artery of high origin does not represent any clinical findings. That is why studies are mostly with cadaver research.<sup>1,2</sup>

Pseudoaneurysms of peripheral arteries are very rare and mostly these are the result of penetrating injuries, such as gunshot or stab wounds, and iatrogenic arterial injury. Blunt trauma and fractures are also reported as causes.<sup>3</sup> These aneurysms occur much less frequent in the upper extremity than in the lower extremity, and they can even cause the loss of the extremity.

According to our knowledge, the case of penetrating trauma to high origin ulnar artery has not reported in the literature. Therefore, in this case report, we present a rare case of pseudoaneurysms of high origin ulnar artery after penetrating trauma and its surgical approach method.

## Case Presentation

A 28-year-old male, who sustained a knife stab wound on his right upper arm lateral to medially about 7 cm high from cubital fossa was examined by emergency room doctors. There were no signs of bleeding and ischemia. Only numbness and weak ulnar pulse were present on his right arm. Wounds were stitched conventionally. Patient presented in emergency room with pain and pulsatile mass 6 days later (Figure 1). There were no signs of bleeding or acute ischemia. Radial and weak ulnar pulses were present on examination.

Patient was hospitalized for further investigation. After admission to cardiovascular surgery department, doppler ultrasonography (USG) scan showed a pseudoaneurysm was beginning from ulnar artery of yin and yang sign and size of the sac

was  $1.7 \times 2.6 \times 3.7$  cm on his right upper arm. An area near the sac showed consistent hematoma. Sac and hematoma were compressing the nearby median nerve and upper extremity veins. Selective right upper extremity angiography was performed in the patient. Results showed that both radial and ulnar arteries were bifurcating from higher origin. Pseudoaneurysm sac was visualized at proximal one third of the ulnar artery, and distal parts were filling slowly (Figure 2). Distal segment of the radial artery and palmar arches were filling normally. Weak ulnar pulse was present on examination. Neither radial artery nor palmar arteries were traumatized. There was no any additional vascular pathology detected.

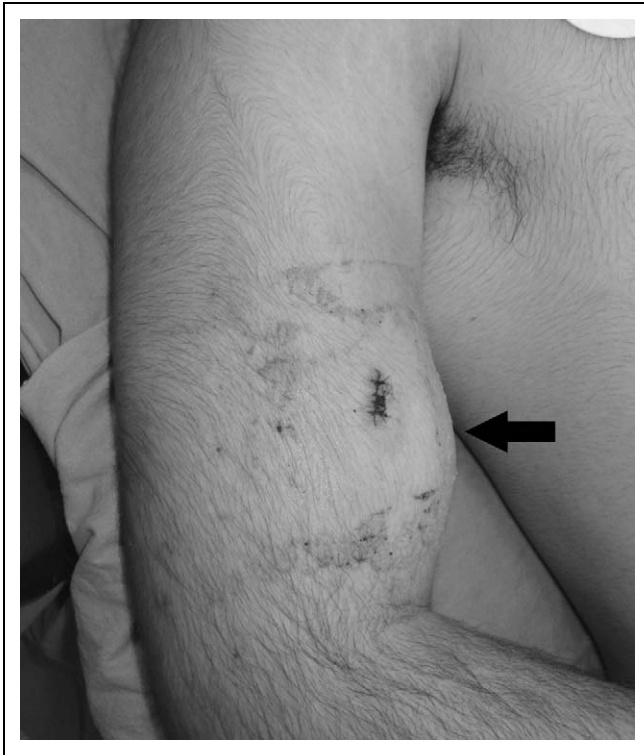
## Surgical Technique

Under general anesthesia, we performed standard incision over the pulsating mass. Exploration was first completed proximally and then the distal part of both ulnar and radial artery were done. Sac was freed from the surrounding tissue. Median nerve and upper extremity veins were under compression of pseudoaneurysm sac, decompression performed to median nerve (Figure 3A). After administering 1 cc heparin (5.000 IU) intravenously, the proximal and distal vascular structures were clamped. The capsule of the pseudoaneurysm was passed with a direct incision. Organized thrombus was found and was removed carefully. Both ulnar artery and adjacent vein were

<sup>1</sup> Cardiovascular Surgery, Inonu University, Turgut Ozal Medical Center, Malatya, Turkey

## Corresponding Author:

Nevzat Erdil, Department of Cardiovascular Surgery, Inonu University, Turgut Ozal Medical Center, Malatya 44315, Turkey  
Email: nerdil@inonu.edu.tr



**Figure 1.** View of a pseudoaneurysmal mass (Black arrow).

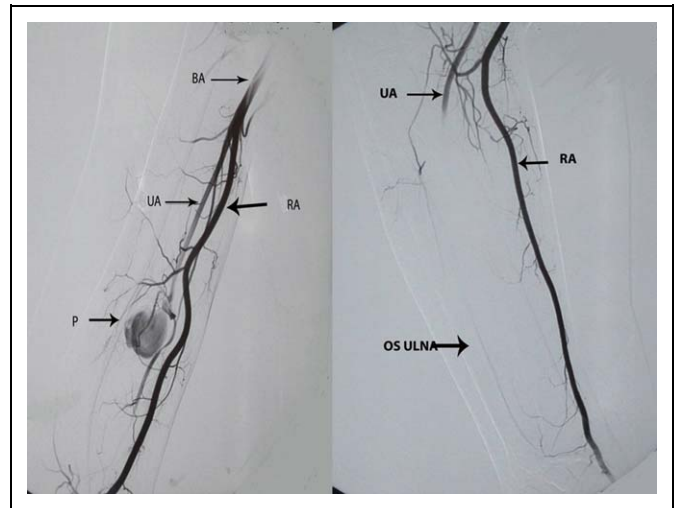
injured. Adjacent vein was ligated. Approximately 3 cm long traumatic ulnar arterial segment including pseudoaneurysmal region was resected. Saphenous vein graft interpositioning to artery was performed (Figure 3B). After hemostasis was achieved, the incision was closed appropriately. Patient was discharged with no neurological and vascular complications. At the time of discharge, both radial and ulnar artery pulses were present.

## Discussion

Arterioarterial variations of upper extremities are rare and usually with brachial to radial artery variation.<sup>1</sup> Ulnar artery of high origin lies superficially in the forearm. Its reported frequency is between 0.17% and 2%.<sup>2</sup> Ulnar artery of high origin runs superficial to the flexor muscles of the forearm, whereas the normal ulnar artery runs deep and then divides into the anterior and posterior interosseous arteries. Bhat et al<sup>4</sup> has described that the artery crosses over the lateral root of the median nerve and supplies the biceps brachii muscle as a rare variation.

Rodríguez-Niedenführ et al<sup>5</sup> carried out a large embryological study and proposed that the normal arterial system develops by selective enlargement or regression of a capillary plexus and not by budding from a main axial trunk.

Apart from the anatomical rarity of a ulnar artery branching from the axillary artery, the persistence of such a vessel, which usually runs along and crosses over subcutaneous veins, is clinically important. Superficial ulnar artery may



**Figure 2.** Right upper extremity angiography shows both radial and ulnar arteries bifurcating from higher origin. BA indicates brachial artery; RA, radial artery; UA, ulnar artery; P, pseudoaneurysm.

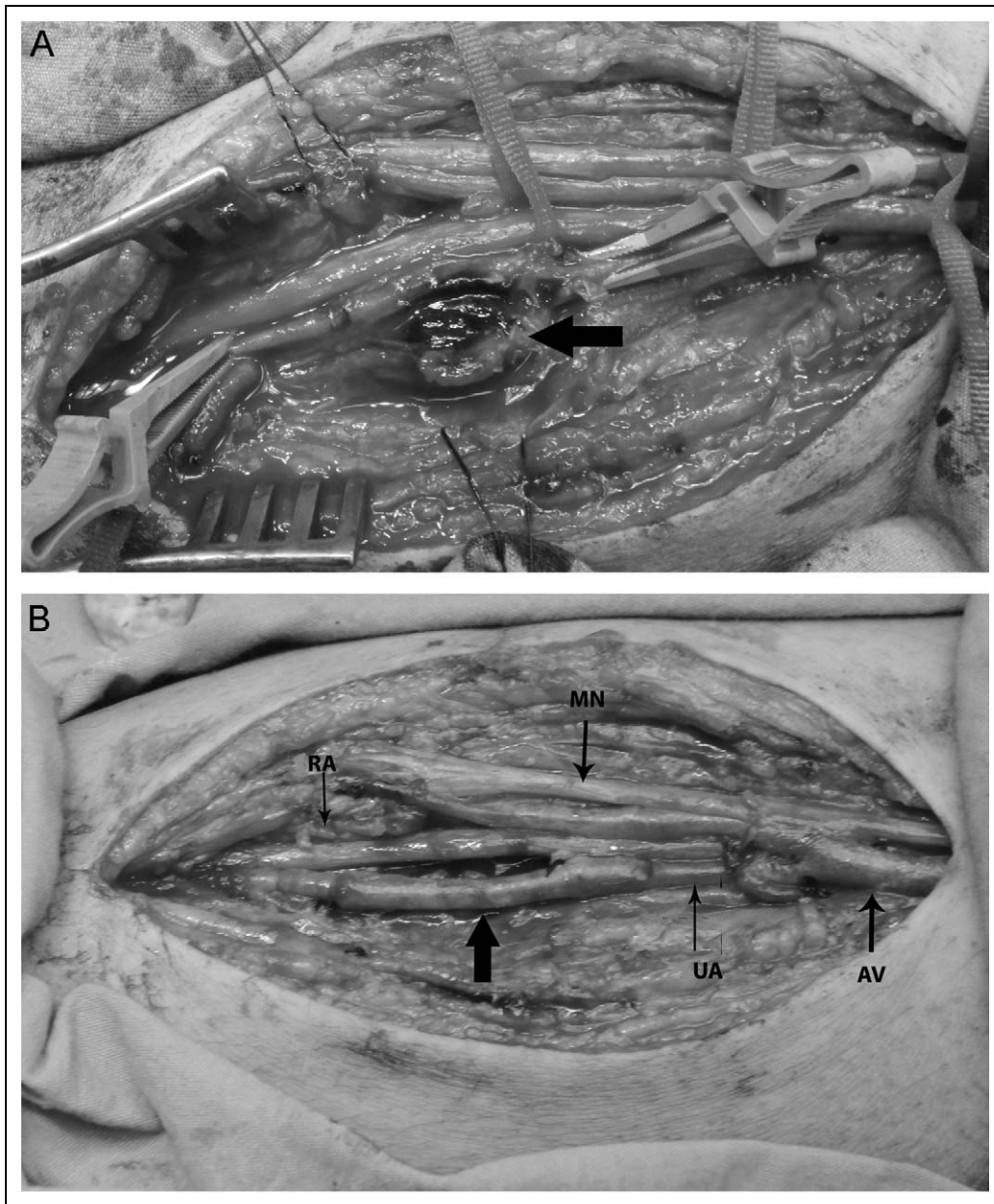
complicate intravenous drug administration with disastrous results, venipuncture in general, and percutaneous brachial catheterization. Owing to its course, it is more prone to injury, resulting in bleeding. Additionally, the artery may be mistaken for a vein, or near the distal end of the forearm, it might be mistaken for a persistent median artery.<sup>6,7</sup>

A high origin of the radial artery and the brachial artery is the encountered arterial anomaly in an upper extremity. This variant is vulnerable to injury because of its more superficial location.<sup>8</sup>

Aneurysms can develop in all arteries of the human body. Aneurysms at less common locations are generally due to major trauma, syphilis, Marfan syndrome, or infection. Atherosclerotic aneurysms are often seen in large arteries and in patients of advanced age, but pseudoaneurysms due to penetrating or blunt trauma are seen in patients of every age and at any location.<sup>9</sup> Pseudoaneurysms in the upper extremities are much more rare than that in the lower extremities.<sup>9</sup> However, as life expectancy increase and diagnostic and evaluation processes improve, the detection of such pseudoaneurysms is becoming more common. Infection, polyarteritis nodosa, congenital arterial defects, and especially trauma play a role in the pathogenesis of upper extremity pseudoaneurysms.<sup>8</sup>

If the only causal factor is trauma, the aneurysm takes the form of a pseudoaneurysm. Most pseudoaneurysms are the result of penetrating injuries.<sup>10</sup>

Edema and pain in the hand and fingers may develop some time after the initial trauma, as a result of adjacent neurological structure compression, distal arterial thrombus, or venous edema. Clinical assessment often reveals pain and swelling of the affected forearm; however, this may be unreliable and definitive imaging is essential. Diagnostic investigations include arterial Doppler ultrasonography, magnetic resonance angiography, and computed tomography angiography (CTA). Computed tomography angiography has increasingly replaced



**Figure 3 A.** View of an open pseudoaneurysmal mass intraoperatively (black arrow). **B.** View of saphenous vein graft interposition (black arrow). BA indicates brachial artery; RA, radial artery; UA, ulnar artery; MN, median nerve; AV, adjacent vein.

selective upper extremity arteriography, the previously accepted gold standard diagnostic investigation.<sup>11</sup>

The treatment of pseudoaneurysms can be either surgical or nonsurgical. Surgery is indicated when the pseudoaneurysms are infected, which leads to a significant mass effect, for example when it is associated with distal ischemia or neuropathy requiring rapid removal, and in cases of failed attempts at nonsurgical treatment. Surgery may include a bypass procedure, arterial ligation, and the partial or complete removal of the organ containing the pseudoaneurysms.<sup>10</sup> Nonsurgical treatment of a pseudoaneurysm may consist of UGC, a US-guided thrombin injection, and endoluminal management.<sup>12</sup>

As in this case, penetrating trauma near the tracks of great arteries must be examined carefully. No evidence of bleeding, ischemia or neurological complications may be found and all distal pulses may be present. Presence of arterial variations has to be considered. We suggest that angiographic approach may be limb saving and may reveal an underlying arterial variation. At least a noninvasive method for eliminating the risk of arterial trauma may be due to penetrating trauma.

In our case, traumatic ulnar artery should be ligated because the patient had no signs of limb ischemia and palpable radial and weak ulnar arteries. We think distal segment of the radial artery and palmar arches were filling normally. So weak ulnar

pulse was found on examination. Since the patient was young man, saphenous vein graft interpositioning to ulnar artery was performed.

In conclusion; even if all the pulses are present on examination at the upper extremity trauma, one of the noninvasive methods, angiography surgical approach may be recommended in planning surgical and reconstructive procedures.

### Declaration of Conflicting Interests

The author(s) declared no conflicts of interest with respect to the authorship and/or publication of this article.

### Funding

The author(s) received no financial support for the research and/or authorship of this article.

### References

1. Natsis K, Papadopoulou AL, Paraskevas G, Totlis T, Tsikaras P. High origin of a superficial ulnar artery arising from the axillary artery: anatomy, embryology, clinical significance and a review of the literature. *Folia Morphol (Warsz)*. 2006;65(4):400-405.
2. Uglietta JP, Kadir S. Arteriographic study of variant arterial anatomy of the upper extremities. *Cardiovasc Intervent Radiol*. 1989; 12(3):145-148.
3. Panagiotopoulos E, Athanasis E, Matzaroglou C, Kasimatis G, Gliatis J, Tsolakis I. Compound and acutely ruptured false aneurysm of the brachial artery: a case report. *J Med Case Rep*. 2009;5(3):6627.
4. Bhat KM, Potu BK, Gowda S. High origin of ulnar artery in South Indian male cadaver: a case report. *Rom J Morphol Embryol*. 2008;49(4):573-575.
5. Rodriguez-Niedenführ M, Burton GJ, Deu J, Sañudo JR. Development of the arterial pattern in the upper limb of staged human embryos: normal development and anatomic variations. *J Anat*. 2001;199(4):407-417.
6. Yazar F, Kirici Y, Ozan H, Aldur M. An unusual variation of the superficial ulnar artery. *Surg Radiol Ana*. 1999;21(2): 155-157.
7. Chin KJ, Singh K. The superficial ulnar artery a potential hazard in patients with difficult venous access. *Br J Anaesth*. 2005;94(5): 692-693.
8. Esfe AR, Bozorg SM, Yazdi HR. Pseudoaneurysm of a high origin radial artery treated by ultrasound-guided compression. *Singapore Med J*. 2009;50(7):250-252.
9. Forde JC, Conneely JB, Aly S: Delayed presentation of a traumatic brachial artery pseudoaneurysm. *Turkish Journal of Trauma and Emergency Surgery*. 2009;15(5):515-517.
10. Yetkin U, Gurbuz A. Post-traumatic pseudoaneurysm of the brachial artery and its surgical treatment. *Tex Heart Inst J*. 2003;30(4):293-297.
11. Robbs JV, Naidoo KS. Nerve compression injuries due to traumatic false aneurysm. *Ann Surg*. 1984;200(1):80-82.
12. Saad NE, Saad WE, Davies MG, et al. Pseudoaneurysms and the role of minimally invasive techniques in their management. *Radiographics*. 2005;25(suppl 1):S173-S189.