

Delayed presentation of a traumatic brachial artery pseudoaneurysm

Geç başvuran bir travmatik brakiyel arter psödoanevrizması

James C. FORDE, John B. CONNEELY, Sayed ALY

Delayed presentation of a brachial artery pseudoaneurysm following penetrating trauma is infrequently reported. We report the case of a 23-year-old male who presented three months following a penetrating trauma to his antecubital fossa with a sudden exacerbation of swelling and tenderness of his elbow. Doppler ultrasound and computed tomography arteriography confirmed the presence of a large pseudoaneurysm. Surgical reconstruction was performed using the long saphenous vein as an interposition vein graft, restoring normal arterial circulation.

Key Words: Brachial artery; delayed presentation; false aneurysm; penetrating trauma; pseudoaneurysm; upper limb.

Brakiyel arter psödoanevrizmasının penetran travma sonrası geç başvurusu nadiren bildirilmiştir. Bu yazıda, antekübital fossa bölgesine nazım penetran bir travma ve arkasından da dirseğinde ani bir şişlik ve duyarlılık oluşmasından üç ay sonra başvuran 23 yaşında bir erkek olgu sunuldu. Doppler ultrasonografi ve bilgisayarlı tomografi anjiyografisi büyük bir psödoanevrizma varlığını doğruladı. Normal arteriyel dolaşımı sağlayacak şekilde araya yerleştirilen bir safen ven interpozisyon greftiyle cerrahi rekonstrüksiyon gerçekleştirildi.

Anahtar Sözcükler: Brakiyel arter; gecikmiş başvuru; sahte anevrizma; penetran travma; psödoanevrizma; üst ekstremité.

Brachial artery injuries can occur as a result of blunt or penetrating trauma, with pseudoaneurysm formation a recognized complication. This has been reported as a result of blunt trauma, where presentation may be delayed.^[1] However, delayed presentation following penetrating trauma has been reported infrequently. Management of traumatic brachial artery pseudoaneurysm ranges from compression with an ultrasound probe^[2] to the use of an interposition vein graft depending on the size of the pseudoaneurysm.^[3]

CASE REPORT

A previously healthy 23-year-old male presented to the Emergency Department (ED) of a regional hospital, having sustained a knife stab wound to the left antecubital fossa during an altercation outside a nightclub. Brachial, radial and ulnar pulses were all present on examination, and a wound exploration confirmed no evidence of acute vascular injury.

Following a soft tissue repair, the patient's arm was placed in a plaster cast. Upon removal of the cast three weeks later, he complained of reduced power on flexion and extension of the elbow. He attended regular physiotherapy with minimal improvement.

Three months later, he presented again to the ED with a several-hour history of swelling and tenderness of the left elbow and forearm. Examination revealed a large tender swelling in the left antecubital fossa (Fig. 1). The swelling was warm to the touch and non-pulsatile. Power in the left upper limb was reduced, as was the range of movement. The elbow was held at 45 degrees of flexion at rest, and extension was limited. Handheld Doppler examination demonstrated normal brachial and proximal radial signals. The distal ulnar pulsation was palpable; however, the distal radial pulse was neither palpable nor present on Doppler. Ultrasound examination identified a possible pseudoaneurysm, and the patient was



Fig. 1. Arrow indicates left antecubital fossa swelling.

transferred to a specialist vascular surgery center.

Upon transfer, computed tomography (CT) angiography of the left upper limb was performed (Fig. 2), which demonstrated a patent brachial artery. At the bifurcation of the brachial artery, a large soft tissue swelling was identified. A small caliber radial artery was seen to communicate with the soft tissue mass and there was active extravasation of contrast. The ulnar artery was patent to the wrist. These findings were consistent with a pseudoaneurysm arising at the bifurcation of the brachial artery, compressing the radial artery distally.

The patient was taken to the operating theater for emergency surgical exploration of the left antecubital fossa, where a 10 cm x 6 cm pseudoaneurysm was identified. A 2 cm longitudinal tear in the anterior wall of the brachial artery was associated with extensive thickening of the arterial wall and intimal dissection. Note was made of pressure necrosis and

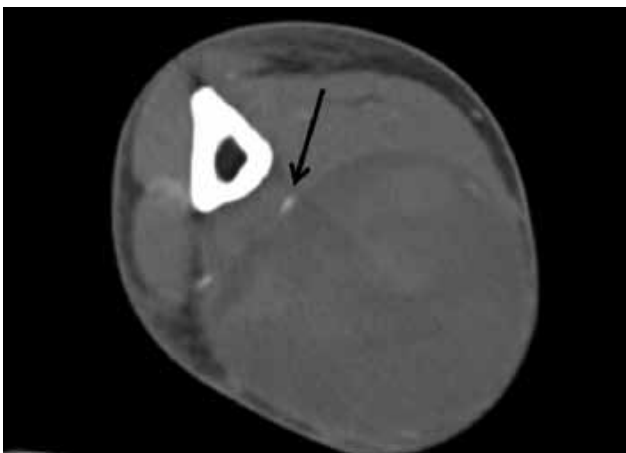


Fig. 2. CT angiogram, arrow indicates radial artery communication with soft tissue mass.

marked destruction of surrounding tissues. Brachial, radial, and ulnar arteries were controlled, and the patient was fully heparinized. The pseudoaneurysm was opened, and the hematoma evacuated. The affected artery was unsuitable for primary closure or patch angioplasty, and the adjacent basilic vein was also unsuitable for use as a conduit. The left long saphenous vein was therefore harvested and employed as an interposition vein graft (Fig. 3). Following the procedure, both distal radial and distal ulnar Doppler signals were once again present. Rehabilitation physiotherapy was commenced on the third post-operative day, with good early recovery of range of motion.

DISCUSSION

Traumatic pseudoaneurysms have become increasingly common as a result of the escalation in civilian violence in society. In an urban environment, most result from penetrating injuries;^[4] however, blunt injuries, usually as a result of motor vehicle accidents or falls, are also a significant cause of vascular injury.^[5] There are case reports of pseudoaneurysms in virtually every artery, with a marked preponderance in the lower limb compared to the upper limb.^[3] There have also been a small number of case reports of an association between intramedullary nailing of the femur and tibia and pseudoaneurysm formation.^[6,7] Delayed presentation of upper extremity traumatic pseudoaneurysm, as in this case, has been reported infrequently.^[8]

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 assess-

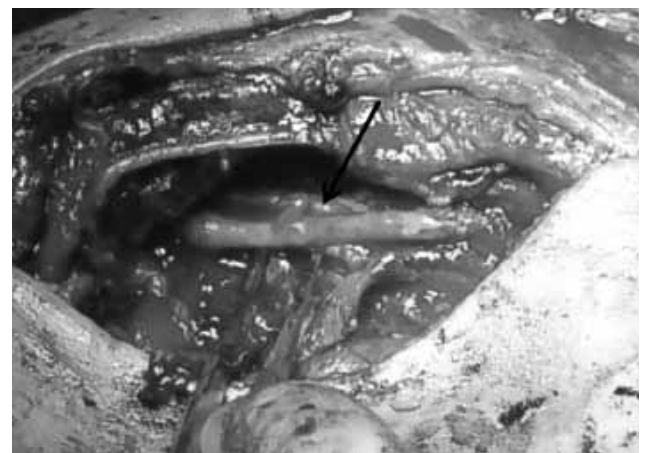


Fig. 3. Arrow indicates vein graft *in situ*.

ment 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 CT angiography. CT angiography has increasingly replaced selective upper extremity arteriography, the previously accepted gold standard diagnostic investigation.^[8]

Management options vary according to the location, size, pathogenesis, and accessibility of the pseudoaneurysm. The limb salvage rate for traumatic brachial artery injuries has improved considerably over the last 20 years, and the amputation rate has decreased to 3.1-3.4%, which can be attributed to advances in surgical techniques as well as in the management of shock and infection.^[9]

An acute, small pseudoaneurysm may be treated using manual compression with an ultrasound probe, with thrombin used as an adjunct.^[2] For larger pseudoaneurysms with delayed presentation, surgical reconstruction is necessary. At the brachial bifurcation, where end-to-end anastomosis is not possible, surgical reconstruction with saphenous vein graft interposition is preferred to maintain arterial continuity.^[3] Special care must be taken with regard to brachial artery ligation. Small pseudoaneurysms distal to the brachial bifurcation can be ligated;^[10] however, an amputation rate of over 50% after brachial artery ligation has been reported, compared to 6% after surgical reconstruction.^[11] Minimally invasive techniques, including endovascular graft implantation, have been used in the management of pseudoaneurysms,^[12] but long-term follow-up data are as yet unavailable. Post-operatively, patients should be followed with Doppler ultrasonography.^[10]

In conclusion, delayed presentation of a brachial artery pseudoaneurysm following penetrating trauma has been reported infrequently. Imaging modalities such as Doppler ultrasound and CT arteriography

provide valuable diagnostic information. For large pseudoaneurysms, where end-to-end arterial anastomosis is not possible, the use of saphenous vein as an interposition graft is preferred.

REFERENCES

1. Moran D, Roche-Nagle G, Ryan R, Brophy D, Quinlan W, Barry M. Pseudoaneurysm of the brachial artery following humeral fracture. *Vasc Endovascular Surg* 2008;42:65-8.
2. Morgan R, Belli AM. Current treatment methods for post-catheterization pseudoaneurysms. *J Vasc Interv Radiol* 2003;14:697-710.
3. Kakar BK, Babar KM, Khan A, Naeem M, Khan I. Surgical experience of post-traumatic pseudo aneurysm of the brachial artery at a tertiary care hospital. *J Pak Med Assoc* 2006;56:409-12.
4. Johnston KW, Rutherford RB, Tilson MD, Shah DM, Hollier L, Stanley JC. Suggested standards for reporting on arterial aneurysms. Subcommittee on Reporting Standards for Arterial Aneurysms, Ad Hoc Committee on Reporting Standards, Society for Vascular Surgery and North American Chapter, International Society for Cardiovascular Surgery. *J Vasc Surg* 1991;13:452-8.
5. Mattox KL, Feliciano DV, Burch J, Beall AC Jr, Jordan GL Jr, De Bakey ME. Five thousand seven hundred sixty cardiovascular injuries in 4459 patients. Epidemiologic evolution 1958 to 1987. *Ann Surg* 1989;209:698-707.
6. Bose D, Hauptfleisch J, McNally M. Delayed pseudoaneurysm caused by distal locking screw of a femoral intramedullary nail: a case report. *J Orthop Trauma* 2006;20:584-6.
7. Han KJ, Won YY, Khang SY. Pseudoaneurysm after tibial nailing. *Clin Orthop Relat Res* 200;(418):209-12.
8. Yetkin U, Gurbuz A. Post-traumatic pseudoaneurysm of the brachial artery and its surgical treatment. *Tex Heart Inst J* 2003;30:293-7.
9. Hardin WD Jr, O'Connell RC, Adinolfi MF, Kerstein MD. Traumatic arterial injuries of the upper extremity: determinants of disability. *Am J Surg* 1985;150:266-70.
10. Yilmaz AT, Arslan M, Demirkiliç U, Ozal E, Kuralay E, Tatar H, et al. Missed arterial injuries in military patients. *Am J Surg* 1997;173:110-4.
11. Rich NM, Baugh JH, Hughes CW. Significance of complications associated with vascular repairs performed in Vietnam. *Arch Surg* 1970;100(6):646-51.
12. Parodi JC, Schönholz C, Ferreira LM, Bergan J. Endovascular stent-graft treatment of traumatic arterial lesions. *Ann Vasc Surg* 1999;13:121-9.