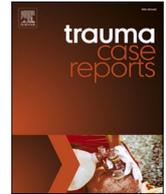




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Case Report

Delayed presentation of an iatrogenic, traumatic brachio-brachial fistula[☆]

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ABSTRACT

Iatrogenic arteriovenous fistulae are rare occurrences after venepuncture, line placement or trauma. Presentations and symptoms can vary but they are usually identified soon after the causative injury due to the development of a visible, palpable, and pulsatile lump that can be concerning for patients. We describe the presentation and management of an unusual case of delayed presentation of an iatrogenic, traumatic brachio-brachial fistula.

Case history

A 76-year-old man was seen in an outreach vascular clinic in regard to a pulsatile lump in his left antecubital fossa over the past few months. His significant background includes obesity, hypertension, smoking and a St Jude's Aortic valve replacement for bicuspid valve over 20 years ago. He is on Warfarin for this. Further history revealed he was a regular blood bank donor with repeated venepunctures as well as INR checks from the left antecubital fossa. The first documented abnormality in the area was in a clinical letter from 13 years ago where it states he had a bruit over the area.

Examination revealed a 4 cm pulsatile mass over the left antecubital fossa with an associated bruit. There were no concerns regarding venous congestion or distal hand perfusion.

Doppler ultrasound revealed a 35x17x22mm pseudoaneurysm communicating with the distal brachial artery via a 2 mm neck. There was turbulent flow in the pseudoaneurysm with the classical "Ying-yang pattern." It was also in communication with the distal brachial vein resulting in a brachio-brachial arteriovenous fistula (AVF) (Fig. 1). He was booked for elective surgical excision.

His warfarin was stopped 4 days prior to his surgery date. His INR 2 days before admission was 1.4 and he was admitted for continuous heparin infusion for bridging to protect his aortic valve. He underwent excision of the brachio-brachial AVF and pseudoaneurysm under a brachial plexus block. The mass was isolated after division of the bicipital aponeurosis, with inflow/outflow controlled prior to excision from the artery and vein (Figs. 2 and 3). The artery was directly repaired with 6-0 prolene. Heparin was restarted post-operatively. The patient was discharged day 1 post op with warfarin and bridging enoxaparin. A telephone follow-up at 8 weeks post-op revealed no complications.

Discussion

We present an unusual case of a 13-year delayed presentation of a presumed iatrogenic AVF, which was only brought to attention

[☆] This work has not been presented at any scientific meeting.

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Fig. 1. Left - Doppler USS depicting arterial and venous communication with the pseudoaneurysm. Right – “Ying-yang” pattern caused by turbulent blood flow in the pseudoaneurysm.

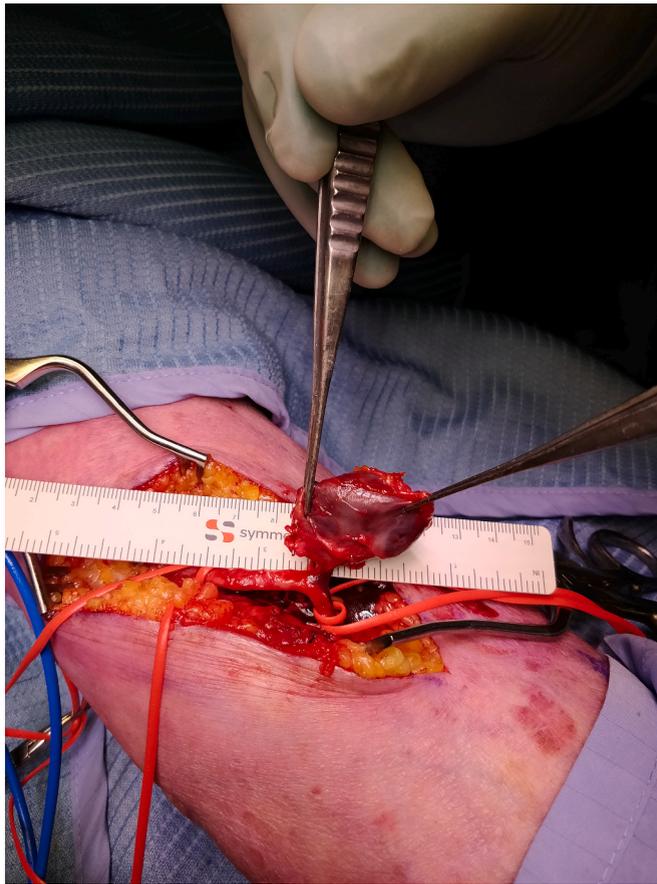


Fig. 2. Intraoperative view of the pseudoaneurysm sac and its attachment to the brachial artery.

due to development of a pseudoaneurysm. To our knowledge, there has been only one other case of delayed presentation of an iatrogenic brachial AVF in an 18-year-old which was the result of venepuncture as an infant 17 years prior [1]. Other case reports of iatrogenic brachial AVFs are in regard to children and infants [2,3] and about 5 cases after blood donation [4]. These patients presented early and had relatively prompt surgical repair.

AVFs are abnormal connections between an artery and vein that can be acquired or congenital. Acquired AVFs are either surgically created or as a result of trauma or iatrogenic injury. Iatrogenic AVF are rare and usually the result of accidental arterial injury during venepuncture [5]. Risk factors include female sex, hypertension, anticoagulation, or antiplatelet therapy [6].

The most commonly reported iatrogenic AVFs are in the femoral vessels due to cardiac catheterisation or central venous line insertion [7]. Peripheral iatrogenic AVFs, like in the brachial vessels, are rarer. The incidence of iatrogenic AVF formation in the central vessels is between 0.06 and 0.9% [7] compared to <0.03% in peripheral vessels [8,9]. This is thought to be because central access and cardiac catheterization utilises larger needles and longer procedure time than peripheral puncture and are therefore at higher risk of vascular injury [9].

Presentations of AVFs can vary greatly. AVFs in the extremities may present with varicosities, pain or swelling. Severe, high flow AVFs can result in reduced vascular supply distal to the fistula or progressive heart failure, due to shunting of arterial blood resulting in cardiac volume overload [6]. Acquired AVFs can also remain asymptomatic for many years [1,8]. Indications for treatment include venous or arterial enlargement, congestive heart failure, and compressive symptoms in the distal limb [8].

Doppler USS is a non-invasive and inexpensive way to confirm the diagnosis of an AVF. It can also help differentiate these from pseudoaneurysms, which may also have a bruit or thrill on examination. Other imaging modalities include CTA, MRA or angiography [5]. Although cost, access and the need for trained specialists may limit the availability of these options particularly in a rural setting.

Evidence on the treatment of iatrogenic AVFs have been in the context of femoral AVFs. Therapeutic strategies include surgery, covered stents, and ultrasound-guided compression [6]. Evidence in regard to brachial AVFs is limited and all preceding case reports have all been treated surgically.

Conclusion

Iatrogenic, traumatic AVF is a rare occurrence with only a handful of cases reported in the literature. They vary in presentation but



Fig. 3. Intraoperative view with pseudoaneurysm excised.

are usually found and repaired relatively early. Our patient presented after first having signs 13 years prior and underwent successful surgical repair. The likely cause was their repetitive venepunctures in the area over the years. Although they did not have significant symptoms related to vascular insufficiency, it shows the importance of good technique required with a procedure as common as venepuncture, to prevent more severe complications.

CRedit authorship contribution statement

Jin Xin Lin: Conceptualization, writing – original draft preparation
Andrew Hill: Supervision, Writing – reviewing and editing.

Declaration of competing interest

None declared.

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References

- [1] Youn Y, Kim CW, Park IH, Byun CS. Delayed treatment of iatrogenic brachial arteriovenous fistula. *Korean Journal of Thoracic and Cardiovascular Surgery* 0000/00/00 0000/00/00.
- [2] M. Kotagal, A. Reiss, N. Vo, K. Feldman, G. Drugas, J.R. Avansino, Iatrogenic arteriovenous fistula in the arm in an infant: diagnostic and therapeutic considerations, *J. Clin. Ultrasound* 40 (6) (2012) 381–384.
- [3] S.D. Megremis, M.A. Christaki, N.K. Mourkoyiannis, G.S. Papadopoulos, A.M. Tsilimigaki, Iatrogenic brachial arteriovenous fistula in a child, *J. Ultrasound Med.* 25 (6) (2006) 809–812.
- [4] M.C. Omura, M.D. Haimowitz, S.S. Ahn, Arteriovenous fistula following needle puncture for blood donation, *Transfusion* 45 (2) (2005) 270–273.
- [5] H. Jayroe, K. Foley, *Arteriovenous Fistula*, StatPearls Publishing, StatPearls Treasure Island (FL), 2020.

- [6] Kelm M, Perings SM, Jax T, Lauer T, Schoebel FC, Heintzen MP, et al. Incidence and clinical outcome of iatrogenic femoral arteriovenous fistulas: implications for risk stratification and treatment. *Journal of the American College of Cardiology* 2002 Jul 17;;40(2):291–297.
- [7] Thavarajan D, Bakran A. Iatrogenic arteriovenous fistula in the groin presenting as cardiac failure. *NDT Plus* 2009 /02/01;2(1):46–48.
- [8] M. Kuształ, K. Letachowicz, T. Gołębiowski, E. Wątopek, P. Szyber, J. Garcarek, et al., Iatrogenic or congenital arteriovenous fistula of left upper arm used for hemodialysis after venous superficialization, *Hemodial. Int.* 19 (1) (2015) 140–143.
- [9] T. Ino, K. Yazawa, S. Kawamura, M. Takeoka, N. Yashiro, Secondary arteriovenous fistula after a single arterial puncture, *Pediatr. Int.* 43 (2) (2001) 179–180.