CASE REPORT

Brachial artery pseudoaneurysm arising from the stump of a ligated arteriovenous fistula

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SUMMARY

An 85-year-old man presented to A&E department with a bleeding, pulsatile mass within the left antecubital fossa. He reported a 3-month history of an increasing, painless swelling. He had a history of end-stage renal failure secondary to antglomerular basement membrane disease. 14 years prior, he had a left brachiocephalic fistula created, which was ligated shortly after its creation due to Steal syndrome. Examination revealed a 10×15×10 cm pulsatile, non-tender mass with overlying ulceration in the left antecubital fossa. Arterial duplex demonstrated a pseudoaneurysm arising from the left distal brachial artery with a 9 mm neck. The patient underwent surgical exploration and repair. At surgery, a large brachial artery pseudoaneurysm at the site of the previous fistula ligation was found. The overlying ulcerated skin and pseudoaneurysm were excised en masse, and the arterial defect repaired by transection and end-to-end anastomosis. This is the first reported case of a brachial artery pseudoaneurysm occurring following arteriovenous fistula ligation.

BACKGROUND

This is the first reported case in the literature of a brachial artery pseudoaneurysm occurring following arteriovenous fistula ligation.

CASE PRESENTATION

An 85-year-old man presented to accident and emergency (A&E) department with bleeding from a swelling within the left antecubital fossa. He had a history of end-stage renal failure secondary to antglomerular basement membrane disease, and had been on haemodialysis for the past 15 years, currently dialysing using a lumbar tesio line. Fourteen years prior, he had a left brachiocephalic fistula created. This was ligated shortly after its creation due to Steal syndrome. He reported an increasing, painless swelling within the left antecubital fossa over the past 3 months, and over the past 3 days had developed an ulcer overlying the swelling. He attended A&E department with brisk bleeding from the ulcer, which was controlled with a pressure bandage.

He had a medical history of hypertension and atrial fibrillation, and his medications included aspirin, calcichew, irbesartan, atorvastatin, omeprazole and dialyvit.

On examination, he was afebrile and haemodynamically stable. There was a 10×15×10 cm, pulsatile, non-tender mass within the left antecubital fossa with overlying mild erythaema and ulceration (figure 1). The axillary, brachial and radial

Figure 1 Pulsatile mass in left antecubital fossa.

arteries were palpable, and the ulnar artery was non-palpable. The left hand was cool and pale compared to the right, with no neurosensory compromise.

INVESTIGATIONS

Haematology and biochemistry results were haemoglobin 99 g/L, white cell count $5.1 \times 10^9/L$, C reactive protein 22.6 mg/L, Na 146 mmol/L, K 5.5 mmol/L, creatinine 799 mmol/L and urea 17.0 mmol/L. The patient's renal function reflected his normal dialysis levels.

An arterial duplex scan was performed and demonstrated a pseudoaneurysm arising from the distal left brachial artery with a neck of 9 mm. There was good flow to the proximal ulnar and radial arteries; the ulnar artery was occluded distally.

DIFFERENTIAL DIAGNOSIS

The differential in this case includes a true brachial artery aneurysm, a brachial artery pseudoaneurysm or an aneurysmal fistula.

TREATMENT

The patient was taken to theatre for repair of his brachial artery pseudoaneurysm and to prevent further bleeding. Initially, an elliptical incision was made around the mass (figure 2). A large pseudoaneurysm of the brachial artery was found at the site of the previous fistula ligation (figure 3). The overlying ulcerated skin and pseudoaneurysm were excised en masse and the tissue sent for both microbiology and histology. The defect in the brachial artery was repaired by transecting the brachial artery and performing an end-to-end anastomosis using 6/0 prolene. The surrounding skin was then closed primarily (figure 4).

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Figure 2 Initial elliptical skin incision.

OUTCOME AND FOLLOW-UP

The postoperative course was complicated by a wound haematoma, which required surgical evacuation, after which the patient was successfully discharged.

Tissue microbiology and culture were negative and the histology was unremarkable.

DISCUSSION

Arteriovenous fistulas are the vascular access of choice in patients with end-stage renal failure requiring haemodialysis. They are, however, associated with a variety of complications, which include haemorrhage, aneurysm formation, thrombosis, limb oedema, Steal syndrome and high-output cardiac failure.^{1 2}

If an arteriovenous fistula is symptomatic, as in this case, where the patient developed Steal syndrome, or if it is no longer necessary due to renal transplantation, ligation of the arteriovenous fistula is performed and the venous outflow is disconnected from the artery at the site of the initial anastomosis.

In the brachial artery, pseudoaneurysms are more common than true aneurysms.^{3 4} However, pseudoaneurysms of the brachial artery are still uncommon, with only a limited number of cases reported in the literature.⁴ Pseudoaneurysms can be classified as either congenital, for example, due to an underlying connective tissue disorder, such as Marfan's disease or Ehlers-Danlos syndrome; or acquired. The latter are typically mycotic in aetiology (ie, due to local or systemic infection) or arise following trauma, for example, due to a fracture or vascular cannulation.⁴ Repeated cannulation of arteriovenous fistulas during

Figure 3 Brachial artery pseudoaneurysm (white, proximal brachial artery; yellow, distal brachial artery; red, ulnar artery; blue, venous branch).

Figure 4 Postresection—prior to primary closure.

haemodialysis is the commonest cause of a brachial artery pseudoaneurysm with a reported incidence of 1/13 000 haemodialysis sessions.⁵ Cases of pseudoaneurysm in a stump following arteriovenous ligation have not been reported in the literature.

In this case, infection was thought a less likely cause of pseudoaneurysm formation as the arteriovenous fistula was never cannulated prior to ligation, the histology and microbiology results were negative and the inflammatory markers were not greatly elevated. Therefore, the more likely aetiology of the pseudoaneurysm in this case would be traumatic; however, given the patient's relative immunocompromise due to his chronic renal failure, a mycotic aetiology cannot be excluded completely. This would be the first reported case of a brachial artery pseudoaneurysm occurring following arteriovenous fistula ligation.

An erythaematous, painful, pulsatile swelling, sometimes accompanied by a thrill or bruit on examination, is the commonest presentation of a brachial artery pseudoaneurysm, with associated neuropathy, venous thrombosis and signs of arterial insufficiency if there is extrinsic compression of the surrounding structures.^{4 5} For these reasons it is important to diagnose and treat these cases. Rupture⁶ and infection⁵ may also complicate cases. In the former, bleeding may be life-threatening and requires urgent surgical intervention, as in this case.

The gold standard for diagnosis is selective arteriography;⁷ however, arterial duplex, CT and MR angiograms are other useful imaging modalities.⁴ In this case, arterial duplex imaging provided a reliable, non-invasive and rapid diagnosis prior to emergency theatre.

Treatment for a pseudoaneurysm depends on the size of the aneurysm, the size of the neck, location of the aneurysm and the aetiology. Treatment options include ultrasound-guided compression, percutaneous thrombin injection, endovascular stenting and open surgical repair. In our case, immediate surgical repair was necessary due to ulceration of the skin and bleeding.

Learning points

- ▶ Consider arterial pseudoaneurysm as a cause of a pulsatile mass.
- ▶ Arteriovenous fistulas can present complications years after ligation.
- ▶ A bleeding, expanding pseudoaneurysm requires surgical intervention.
- ▶ Trauma is the commonest cause of a brachial artery pseudoaneurysm.

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