CASE REPORT

Brachial artery pseudoaneurysm

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SUMMARY

We describe a case of an elderly man who presented with an upper arm swelling that had developed following a humeral fracture 8 months previously. The swelling was painless but associated with significantly diminished motor function of his right hand and concurrent paraesthesia. On examination, a large pulsatile mass was identified and CT angiography confirmed the presence of an 11×7 cm brachial artery pseudoaneurysm. The patient underwent surgical repair in which a fragment of the humerus was found to have punctured the brachial artery resulting in a pseudoaneurysm. The patient had an uncomplicated postoperative period and was discharged 2 days later having regained some motor function in his right hand.

BACKGROUND

Pseudoaneurysms of the brachial artery are a rare phenomenon and this in part led to the diagnosis not being readily recognised. This case highlights the importance of considering all differential diagnoses of a swelling at a fracture site particularly in cases where the patient demonstrates persistent neurological symptoms.

CASE PRESENTATION

An 82-year-old man presented to our surgical admissions unit with significant swelling of his right upper arm ([figure 1](#)). Eight months previously he had suffered a comminuted fracture of his right humerus following a mechanical fall. The mass was painless, but associated with paraesthesia and significant weakness of his right hand. Since the incident he described loss of dexterity in his right hand and was unable to carry out fine motor skills such as buttoning up shirts and writing. The fracture had been managed conservatively in a hanging cast, and the swelling had been attributed to 'residual haematoma'. Follow-up X-rays of the injury showed some angulation and shortening, but the fracture had healed well. The patient reported a gradual increase in the size of the swelling over the past 6 months and had seen a number of doctors.

His medical history included myelofibrosis, aortic stenosis and hypertension, but the patient was still fit and active; he was a non-smoker and admitted minimal alcohol consumption.

On examination the mass was approximately 11 cm in diameter. It was pulsatile and demonstrated a systolic bruit on auscultation. Inspection of the right hand revealed wasting of the thenar and lumbrical muscles. Both radial and ulnar pulses were palpable. A peripheral neurological examination of his right hand demonstrated reduced power (4/5) on movements of the intrinsic muscles;

the patient was unable to form a fist, but pincer grip was preserved. Sensation in the median nerve distribution was also diminished.

General examination confirmed his known ejection systolic murmur with radiation into the carotid arteries. Abdominal examination revealed massive splenomegaly, but an otherwise soft abdomen with no evidence of abdominal aortic aneurysm.

INVESTIGATIONS

Routine blood tests demonstrated a normocytic anaemia with a haemoglobin of 90 g/dL and a platelet count of $95 \times 10^3/\mu\text{L}$. White cell counts were low at $47 \times 10^3/\mu\text{L}$ with a neutrophil count of $39.4 \times 10^3/\mu\text{L}$. These findings were all attributed to known underlying haematological illness.

A right upper arm X-ray revealed a significantly displaced proximal humerus, but with evidence of good callus formation ([figure 2](#)). CT angiography confirmed the presence of a large brachial artery pseudoaneurysm. The images demonstrated the right subclavian, axillary and proximal brachial arteries to be patent. The brachial artery was traced down to a fracture site in the right humerus at the level of a large soft tissue swelling measuring 11×7 cm which in part surrounded one of the fracture fragments. The brachial artery had been displaced posterior by the pseudoaneurysm.

DIFFERENTIAL DIAGNOSIS

- ▶ Brachial artery pseudoaneurysm
- ▶ Brachial artery aneurysm
- ▶ Bicep rupture.

TREATMENT

The patient underwent surgical repair of the pseudoaneurysm under general anaesthesia. A medial longitudinal incision was made over the pseudoaneurysm,

Figure 1 Right arm swelling seen at clinical presentation.

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Figure 2 Right arm X-ray illustrating old fracture with a sharp proximal humerus fragment.

extending from the axilla to the top of the antecubital fossa. The proximal brachial artery was initially identified and controlled followed by the median nerve which was retracted to prevent any inadvertent injury. The pseudoaneurysm was opened and approximately 300 mL of blood was removed from the sac. On close inspection, the sac was found to contain a large sharp fragment of humerus in conjunction with a small single puncture wound to the brachial artery; this was identified as the cause of the pseudoaneurysm (figure 3) as the distal brachial artery was normal. The vessel was sutured with 5/0 prolene and the resulting sharp bony fragment trimmed back to prevent any recurrence (figure 4). The wound was closed and a suction drain left in situ for the initial postoperative period (figure 5).

OUTCOME AND FOLLOW-UP

The patient had an uneventful recovery and only required prophylactic low-molecular-weight heparin the following day;

Figure 3 Open wound demonstrating the pseudoaneurysm sac with a proximal bone fragment (arrow).

Figure 4 Open wound demonstrating repair to defect in brachial artery (arrow).

he was discharged 2 days postoperatively. When seen in the outpatient department 4 weeks later there was near normal function and sensation in the affected limb and hand.

DISCUSSION

Humeral fractures are common; usually a result of low-energy trauma in elderly patients or high-energy trauma in the young. Common complications include malunion, non-union, rotator-cuff dysfunction, post-traumatic osteoarthritis, avascular necrosis and impingement; more rarely nerve and vascular injuries are seen.^{1 2}

Pseudoaneurysms of the brachial artery are rare phenomenon and usually a result of either trauma or iatrogenic injury. Pseudoaneurysms as the result of trauma have been found to occur in less than 0.5% of patients.³ They can occur in a patient of any age and their presentation may often be delayed by months or even years.⁴ Complications of pseudoaneurysms can cause serious threat to limb and life. Haemorrhage, nerve injury and venous oedema of the distal extremities can be common.⁵⁻⁷ Additionally, thromboembolic sequela may lead to amputation or loss of limb function; more rarely, rupture can occur, being associated with a high mortality.^{8 9}

Symptoms are usually limited to the mass effect of the lesion: tenderness, pain and swelling. Subsequent neurological and vascular deficits become more prominent as the surrounding structures are impinged.^{4 9 10}

The management of any pseudoaneurysm is dependent on its size, location and pathogenesis. Endovascular intervention has become increasingly more common; however indications for open surgery include rapidly expanding aneurysms, distal ischaemia and neuropathy caused by local pressure.¹¹ In this case the vascular damage was easily repaired; however this

Figure 5 Closed wound postoperatively.

required direct visualisation of and identification of the defect within the sac. Other management techniques range from ultrasound-guided compression (USGC) to the use of interposition venous grafts in larger defects, with the long saphenous vein often utilised to restore circulation.^{4 9}

The literature surrounding brachial pseudoaneurysms identifies them as predominantly an iatrogenic complication after surgical fixation of a fracture.¹² Here we have illustrated a case of pseudoaneurysm as a direct result of mid-humeral fracture—a much more uncommon occurrence.

A high index of suspicion is necessary in a patient with a displaced humeral fracture especially in cases where a sharp bony fragment is identified on X-ray. Should there be any concern, then the use of duplex ultrasound to rule out such complications has been previously illustrated in such patients.¹³ Despite the infrequency of a brachial pseudoaneurysm, the high morbidity and mortality related to them make it a complication of fractures that should never be misdiagnosed or mismanaged.

Learning points

- ▶ Pseudoaneurysms should be considered a differential in any case of upper arm swelling, especially with a history of injury.
- ▶ This case demonstrates the importance of regular routine follow-up after a fracture and how a persistent swelling should warrant further investigation.
- ▶ Brachial artery pseudoaneurysms have the potential to be a limb- and life-threatening injury due to the possibility of thrombosis and rupture.
- ▶ Early identification and prompt treatment should be carried out to prevent secondary complications, in this case diminished motor and sensory nerve function.

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