 Chronic post-traumatic arteriovenous fistula - treatment by embolisation

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Section: Interventional radiology
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Case Type: Clinical Cases
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Patient: 39 years, male

Clinical History:

The patient, who had suffered pelvic trauma 15 years previously, presented with a slowly enlarging buttock mass with associated claudication and paraesthesia symptoms.

Imaging Findings:

This patient from Greece had a previous medical history of trauma due to a road traffic accident that occurred at the age of 24, some 15 years prior to presentation. He was knocked off his bicycle by a car, fracturing his pelvis and injuring his spleen, for which he required a splenectomy. He spent 3 months in traction for treatment of his pelvic fracture.

On presentation at the age of 39 he complained of right buttock swelling which had been gradually increasing in size since the time of the accident. He also gave a 2-year history of cramp-like pain in the right buttock on walking 100 metres, and a 1-year history of numbness in the inner aspect of the right thigh and perineum; in fact he had not walked properly since the time of the accident.

A plain radiograph and a CT scan performed in Greece were reported as showing a large tumour involving the right buttock and he was referred for further management of this abnormality. This initial CT was not available for review at the time of transfer but on the basis of the report an open biopsy of the lesion was performed under a general anaesthetic. At this time profuse bleeding occurred, and histology of the tissue sample taken was reported as being consistent with an intramuscular haemangioma.

A repeat CT, MRI and bone scintigraphy were performed. The CT showed an expansile lesion involving the right iliac blade, within which an area of marked contrast enhancement was seen (Fig. 1). The appearances were felt to be consistent with an arteriovenous fistula (AVF), secondary to the previous pelvic fracture.

Arteriography was performed via a left femoral artery puncture, which confirmed the presence of a high flow AVF between the right superior gluteal artery and the adjacent superior gluteal vein (Fig. 2). Selective fourth lumbar, right internal iliac, right superior gluteal, and right inferior gluteal angiograms were performed in order to document fully the anatomy of the arterial injury. The selective right inferior gluteal (Fig. 3) and right fourth lumbar arteriograms (not shown) demonstrated complete filling of the distal branches of the superior gluteal artery beyond the arteriovenous fistula with no filling of the AVF from these vessels. They also showed that the superior gluteal vein was occluded.
with no normal venous drainage into the common iliac vein and inferior vena cava. There was, therefore, retrograde filling of markedly dilated gluteal veins within the buttock.

The specific anatomy of this case, as demonstrated by angiography (Figs 2 and 3), shows the importance of full documentation of arterial injury before embolisation is performed. Fig. 3 demonstrates that there was no anastomosis between the distal right superior gluteal artery and the AVF seen in Fig. 2 and there was, therefore, no "back door" to the arteriovenous fistula, which would have required occlusion by embolisation before any more proximal occlusion could be performed. It was also important to embolise the fistula very close to its neck in order to obviate the potential for arteries proximal to the fistula and distal to the embolic material forming anastomoses via collaterals, and thus re-perfusing the fistula. The AVF was embolised at the site of arteriovenous communication using 10 MRI compatible metallic coils, and complete occlusion was achieved (Figs 4 and 5).

**Discussion:**

The incomplete traumatic disruption of an artery and its accompanying vein may result in the formation of an AVF. Penetrating injury is more often the cause although blunt trauma, with or without associated fracture, may also lead to AVF formation (1). In the case of injury to an artery alone, it is thought that the formation of a false aneurysm with subsequent rupture into an adjacent vein may be the cause of delayed AVF formation (1). In this case, however, complete disruption to both artery and vein must have occurred, as evidenced by the fact that the superior gluteal artery proximal and distal to the arteriovenous communication was not in continuity and the superior gluteal vein was completely occluded.

There was massive venous hypertension due to occlusion of the superior gluteal vein distal to the fistula, and consequently the peripheral superior gluteal veins were at arterial pressure. The chronic venous hypertension had resulted in muscularisation of vessels and this presumably accounted for the profuse bleeding that occurred at the time of surgery as well as the false positive histological diagnosis of an intramuscular haemangioma.

The best form of treatment of an AVF depends on its anatomical location. When an arteriovenous fistula involves a "vital" vessel (i.e. one that cannot be safely occluded without causing symptomatic ischaemia), surgery is often preferred; an example would include a femoral AVF following cardiac catheterisation. In certain circumstances, however, such as a post-traumatic AVF involving the subclavian artery and vein, where surgery is likely to be hazardous, the angiographic placement of a covered stent may be preferable. An AVF involving a "non-vital" vessel, as was the case in the patient presented here, is best treated by embolisation.

Complete angiographic assessment of the vascular anatomy of an AVF is mandatory before embolisation is performed. In this case selective arteriography confirmed the absence of a "back-door" to the fistula and thus proximal embolisation alone was required.

**Differential Diagnosis List:** Traumatic pelvic arteriovenous fistula

**Final Diagnosis:** Traumatic pelvic arteriovenous fistula

**References:**

3. Robbs JV, Carrim AA, Kadura AM, Mars M.
Traumatic arteriovenous fistula: experience with 202 patients.

4. Khoury MB, Contractor FM.
Impotence caused by traumatic pelvic arteriovenous communication - A case report.
Angiology. 1988 Sep;39(9):849-51. (PMID: 3421517)
Description: Axial CT through the pelvis with IV contrast medium demonstrates an expansile lesion of soft tissue density within the right iliac blade with an eccentric rounded area of contrast enhancement. Note also the dilated vein within the superficial fat lateral to the markedly enlarged gluteal muscles.

Origin:
**Figure 2**

Description: Right internal iliac arteriogram which demonstrates a massive arteriovenous fistula between the superior gluteal artery and an aneurysmally dilated superior gluteal vein. Note that the vein does not drain superiorly into the common iliac vein due to an occlusion, and there is therefore retrograde filling into enlarged buttock veins. Origin:
Description: Selective right gluteal arteriogram which demonstrates filling of the normal distal superior gluteal artery branches (arrow) in the buttock. Note that there is no filling of the arteriovenous fistula from these vessels. Origin:
Description: Control film following embolisation demonstrates a 'nest' of tightly packed coils within the superior gluteal artery immediately proximal to the arteriovenous fistula. Origin:
Description: A right internal iliac artery angiogram following embolisation demonstrates complete occlusion of the arteriovenous fistula with preservation of the normal gluteal branches. Origin: