

DIFFICULT FEMORAL ARTERIOVENOUS FISTULA IN A CHILD

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An arteriovenous (AV) fistula is an abnormal communication between the arterial and venous systems, and can be congenital or acquired. The majority of peripheral fistulas are the result of trauma.^{1,2} The extent of clinical manifestations is related to the size, duration, and the precise location of the fistula, varying from local changes to central changes due to stress on the entire cardiovascular system.³

Chronic peripheral fistulas are typically associated with dilatation and elongation of the feeding artery,⁴ as well as proximal dilatation of the venous system. Venous hypertension, valve incompetence, and venous hypertrophy commonly lead to distal swelling, dermatitis and ulceration, similar to that seen in the post-phlebotic state (Figure 1).

Although physical diagnosis is easy when these fistulas are located in the extremities, arteriography is important in delineating the anatomy in order to plan the appropriate management of the patient. However, with the invasive techniques currently available, there should be few chronic traumatic AV fistulas in the practice of vascular surgery.⁵

Case Report

A three-year-old girl presented with skin ulcer over the left lower leg, which had been debrided several times and skin grafted (Figure 1). The patient was the product of a 32-week gestation pregnancy, and was admitted to the nursery unit. She was diagnosed with left leg lymphangiectasia, based on previous clinical positive lymphangiography findings and recurrent cellulitis. During one of the debridement sessions of the leg ulcer, considerable bleeding occurred which required suturing. The suspicion of AV malformation was raised when MRI showed significant dilated vessels, both superficial and intramuscular. The patient was referred to the vascular surgery service.

Physical examination showed an ill-looking child with low-grade fever, but normal cardiorespiratory system. Abdominal examination was also normal. The whole left lower limb was swollen (Figure 1). There was no sign of a

FIGURE 1. Both lower limbs showing swelling, left leg ulcer and dermatitis changes (large arrow) and skin harvesting from the right leg (small arrow).

previous injury in the left groin, but there was evidence of dermatitis and ulcer on the lower medial aspect of the leg. A thrill and murmur were elicited over the femoral vessels.

Laboratory examinations showed that CBC, renal and hepatic profiles were within normal limits. Histopathology from the ulcer revealed a fibrinous exudate, and *E. coli* was grown. Plain x-ray of the left leg and a bone scan showed periosteal reaction suggestive of possible osteomyelitis.

MRI of the left leg showed increased signal intensity, in comparison with normal muscle bundles seen within the right calf. Numerous superficial vessels were seen, some with increased size, between the various muscle compartments, a finding which was compatible with lymphedema. The left calf common femoral vein was markedly dilated and drained downwards to the foot (antegrade direction) (Figure 2).

An arteriogram of the lower limb showed prominence of the left common iliac system in comparison to the right. Direct opacification of both femoral artery and vein were almost instantly diagnostic of the presence of left femoral AV fistula.

FIGURE 2. Angiogram of the left leg showing both femoral artery and vein. Left common femoral vein is markedly dilated and drained in the antegrade direction (small arrows). The site of the AV fistula is shown (large arrow).

The patient was taken to the operating room and intraoperatively, the fistula was identified, transected, oversewn on the venous side, and closed with interrupted 6/0 prolene in transverse alignment on the arterial side (Figure 3). The distal pulses were palpable. The patient did well postoperatively; the skin inflammation subsided and the ulcer healed completely without a skin graft. On follow-up at 18 months, the patient showed no recurrence of the ulcer, and the swelling was reduced.

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Discussion

An AV fistula may be associated with a false aneurysm, or there may be a clean endothelial channel formed in the chronic one, as was the case in our patient (Figure 3). The focus of this presentation was to emphasize the role of different diagnostic and therapeutic modalities and the difficult clinical presentation of arteriovenous fistulas.

Studies of the natural history of pseudoaneurysms and arteriovenous fistulae that result from accidental or violent trauma reveal a low incidence of spontaneous resolution and high likelihood of complications, including bleeding, arterial thrombosis, skin erosions, adjacent nerve compression, venous hypertension, or congestive heart failure. Because of the rapid disease progress, operative treatment of such cases should be performed as soon as possible. This is supported by good follow-up results in operatively treated patients.^{6,7} The goals of surgery are the early eradication of the fistula, prevention of complications and the establishment of arterial and venous continuity.

FIGURE 3. An intraoperative finding of the femoral artery (arrow #1), and the femoral vein (arrow #2) and AV fistula (arrow #3). Arrows show the direction of blood flow.

Operations that merely decrease fistula flow should be avoided if possible.

The natural history of postcatheterization pseudoaneurysms and fistulae, on the other hand, seems to be different. Since an original report by Korval et al.,⁸ a number of studies have suggested that a proportion of these injuries do resolve spontaneously without the need for any form of intervention.⁹⁻¹⁴

Percutaneous closure with stent grafts for cases with unsuccessful ultrasonic compression repair is an attractive, safe, effective alternative to conventional surgery.^{15,16} Short-term follow-up is encouraging, however, long-term follow-up of these procedures is warranted to assess durability of the repair and absence of complications.¹⁷ Recently, an experimental study was done on a rat groin flap model to assess the possible effects of arteriovenous fistulas on the viability of skin flaps. It was concluded that island skin flap circulation is negatively affected by an AVF proximal to the flap pedicle.¹⁸

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