

Dorsalis Pedis Artery Pseudoaneurysm

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SUMMARY

An unusual case report is described here, of a young man who developed a pseudoaneurysm of the left Dorsalis Pedis Artery (DPA) ten years earlier, following a blunt injury. He sustained a recent injury to the same foot following which, the lump became enlarged and painful. Doppler flow studies and angiography confirmed the diagnosis and revealed the causative ostium through which this partially thrombosed aneurysm had arisen. Successful aneurysmectomy and end-to-end LSV bypass graft surgery was followed by complete recovery.

Keywords:

Dorsalis Pedis Artery
Aneurysm
Pseudoaneurysm
Angiography
Bypass graft

Case Report

A young male student (IA) of 22, had sustained a cricket ball injury to his left foot 10 years earlier. A month after this injury he had noticed a pulsatile painless swelling in the region of the dorsum of his left foot. This had persisted unchanged, causing him only some difficulty with foot wear, until three months prior to his presentation when a large brick fell on his foot. The lump became more painful and enlarged to twice its previous size in a month's time. This continued to increase in size and resulted in local pains on walking, attempted squatting and on sitting on the floor.

Clinical Examination revealed an "incompressible", pulsatile, ovoid and tender swelling in the dorsum of his left foot, measuring 5 cm x 4 cm (Figure 1), associated with a systolic thrill and a harsh systolic bruit. Dorsalis Pedis Artery (DPA) was not palpable proximal to the swelling but a firm compression of the

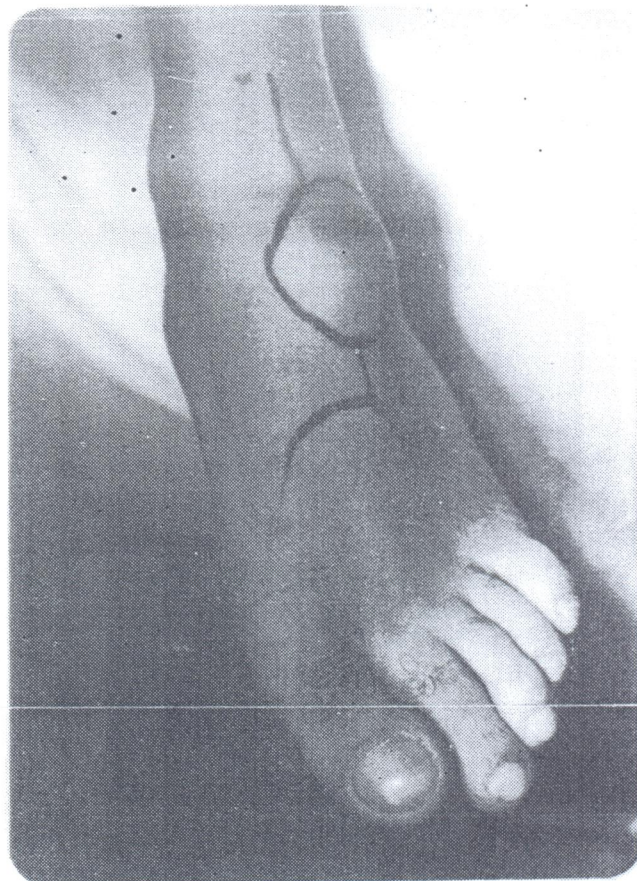


Figure. 1

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lower anterior leg or the popliteal fossa abolished the aneurysmal pulsations and diminished but not fully emptied the aneurysm. The Posterior Tibial Artery (PTA) was palpable but the DPA below the aneurysm was not palpable. The forefoot and the toes were warm and pink without any trophic changes. Sweating was normal. Proximal vasculature was clinically normal and the contralateral (right) foot was normal with easily palpable pedal pulses. The patient was otherwise normal and apyrexial.

Doppler examination revealed an arterial systolic harsh bruit of the DPA (left) with maximal signal in the region of the aneurysm. Proximal compression of the leg abolished the bruit. The Digital artery of the first web space was not audible. The other digital arteries were easily audible. No attempt was made to forcibly compress the aneurysm but gentle manual compression and leg elevation, whilst compressing the Anterior Tibial Artery (ATA), failed to empty it. The contralateral doppler study was within normal limits. Clinical and doppler evaluation of the venous tree of both lower limbs revealed no abnormal varicosities or fistulae.

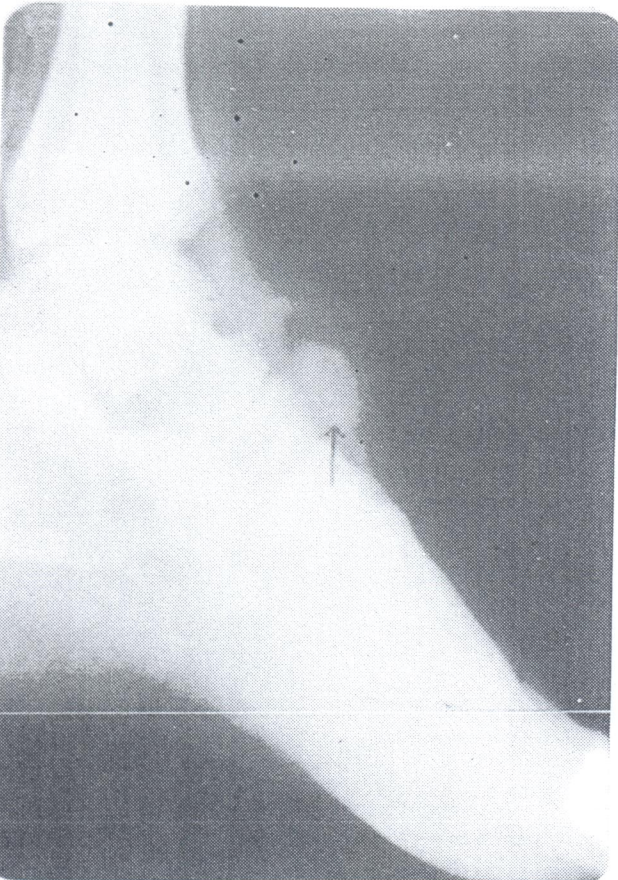


Figure. 2

Investigations

Routine investigations did not reveal any abnormalities. An X-ray of the Left foot: showed a soft tissue aneurysmal shadow anteriorly with no other abnormalities.

Angiography

A Seldinger technique Femoral Arteriography visualised the aneurysm. A multiloculated slowly filling aneurysm was found arising from the proximal Dorsalis Pedis Artery (Figure 2). The ostium was located on the anteromedial wall of the DPA (Figure 3). The dye cleared very slowly through the same ostium into the distal DPA and continued downwards sluggishly into the Digital arteries. The PTA circulation was normal. The aneurysmal cavity was nearly fully thrombosed.

Operation

Via a para-aneurysmal incision, the proximal DPA was controlled with vascular slings (Figure 4). The adjacent LSV, was similarly slung. The distal part of the DPA was dissected with difficulty but was eventually secured (Figure 5). A bolus of Cefuroxime 750mg I/V was infused at this stage.

Under microvascular bulldog clamps of the proximal and the distal DPA (which were perfused with a total of 5000 Units of Heparin in two 5 ml fractions in both directions), an aneurysmectomy allowed extraction of organised thrombus. Both ends of the aneurysm were divided and the aneurysm was

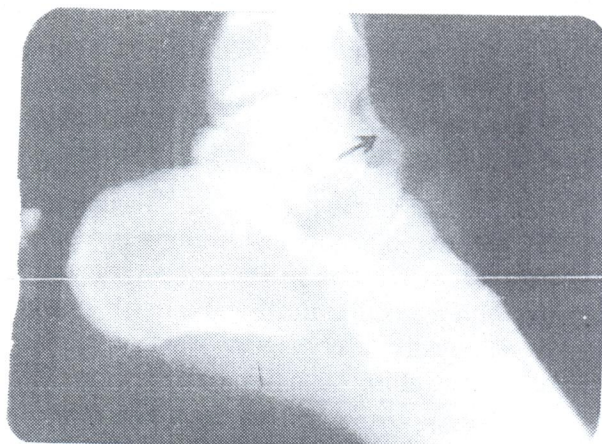


Figure. 3

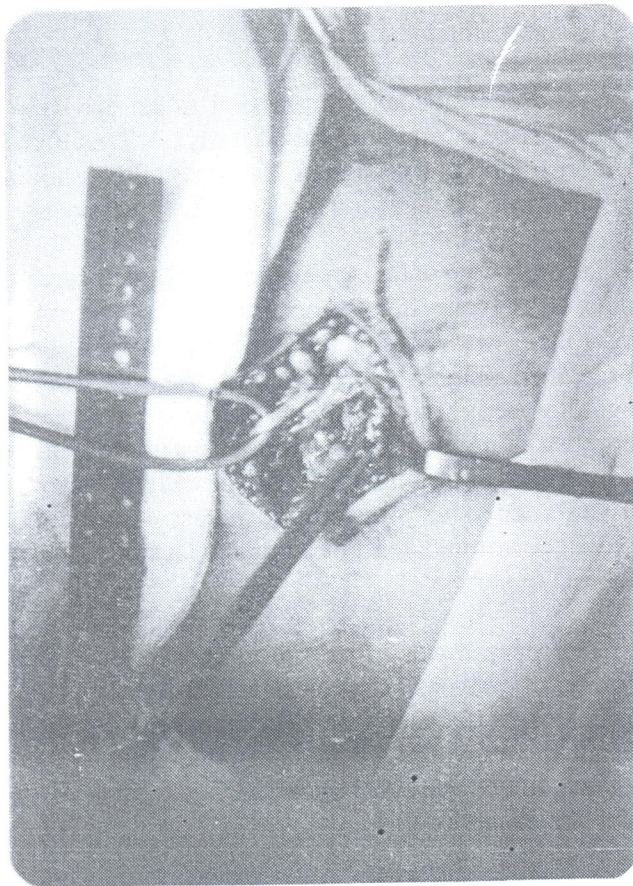


Figure. 4

fully excised. The reversed and prepared LSV graft was grafted end-to-end using a Zeiss Operating Microscope and using 8/0 Prolene sutures, utilising the parachute technique (Figure 6).

An inspection of the excised aneurysm revealed a multiloculated partially thrombosed aneurysm with a single ostium. Histology did not show any other relevant disorders.

Post-Operative Follow-Up

Cefuroxime and Heparin were continued postoperatively through a heparin lock for five days. The patient was rapidly mobilised and was discharged home, symptom-free, ten days after surgery, to be followed up as an Outpatient.

After surgery normal Pedal pulses had been immediately restored and postoperative doppler examination exhibited no fistulae or bruit.

Twelve weeks post-operatively, the wound had soundly healed and he had commenced full un-aided weight bearing and was able to wear cushioned shoes. He was advised to continue with our out-patient physiotherapy programme. Six months post-operatively he was found asymptomatic and wearing normal shoes.

Discussion

This patient's aneurysm was partially thrombosed. A properly performed real time B mode Ultrasound scan can reliably show intrinsic thrombi, the thickness of the aneurysmal wall and the diameter of the functional lumen (1). Because we were able to easily locate the proximal and distal DPA on doppler ultrasound, we did not consider it necessary to undertake ultrasonography (1,2) and proceeded to angiography directly. In difficult cases a preliminary ultrasonography is helpful. In general if an aneurysm is almost fully thrombosed, the angiographic dye will not enter the aneurysmal cavity and the full extent of the aneurysm may not be appreciated (1,3,4). A ganglion

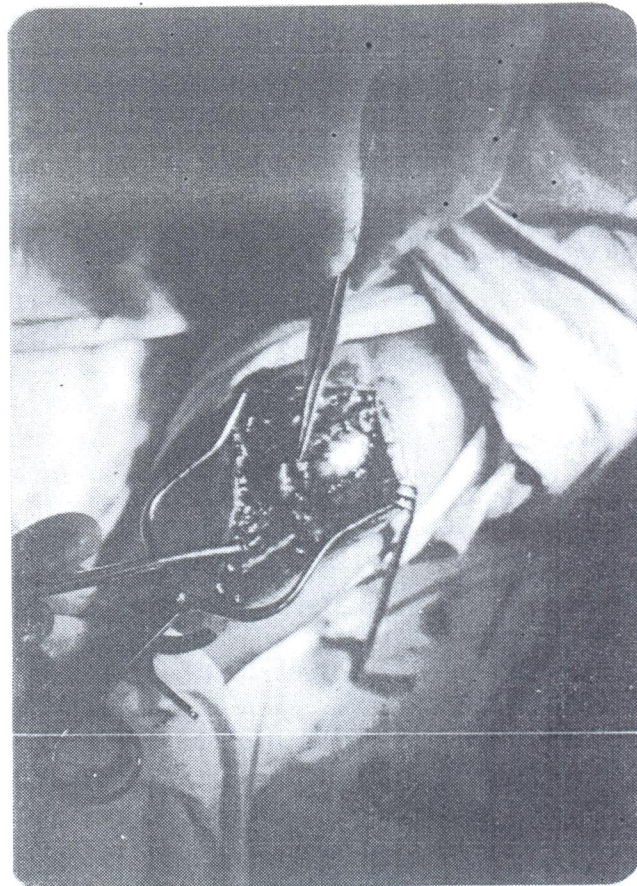


Figure. 5

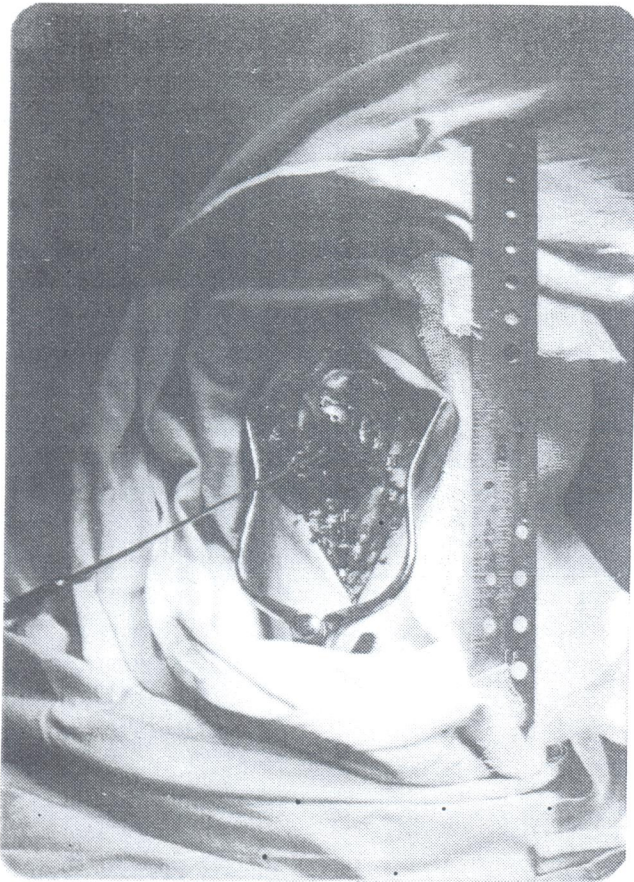


Figure. 6

or a bursa may need to be differentiated from a thrombosed non-pulsatile aneurysm prior to undertaking an excision and therefore a doppler ultrasound examination and in suspected cases, angiography, very often helps in preventing a disaster at "biopsy" (1,5,6).

Isolated aneurysm of the Dorsalis Pedis Artery is very rare. A 10-year search of the English literature revealed no mention of a DPA aneurysm, however in respect of the somewhat more proximal segment of the lower limb, there is a scanty literature available. Dreyfus and Fisherman (7) reported mention of 7 false aneurysms in the leg. Three of these were Anterior Tibial Artery (ATA) aneurysms (8,9,10) whilst the remainder were related to Posterior Tibial Artery (PTA) aneurysms (7,8,11). None were reported below the level of the ankle joint. All of the reported more proximal aneurysms were associated with fractures (7,8,9,10,11). The aneurysms had appeared between 7-18 weeks (7). In our patient no fracture was present and the aneurysm had become manifest a month after sustaining the trauma. PTA aneurysms have also been

reported secondary to Tibial osteochondroma (12) and ankle stabilising procedures (13,14,15,16,17).

Vigorous manual compression of an aneurysm may dislodge intrinsic thrombi distally (3). Traditional demonstration of the "sign of compressibility" should be superseded by non-invasive doppler assessment.

Spontaneous or (as is more likely) traumatic rupture of the DPA aneurysms can occur but this can be easily controlled with manual compression followed by surgical treatment. In keeping with the observations regarding peripheral aneurysms (lower leg and hand), the most common surgery performed, is simple ligation of both ends of the aneurysm with or without excision of the aneurysm. Restorative revascularisation is seldom performed, least of all due to lack of vascular surgical expertise.

Our patient was in pain most certainly due to a variety of reasons. Compressive neuropathy (18), distension of the deep fascia, irritation of the muscle sheath, movement of the aneurysm due to contraction of the involved and adherent muscles etc., can all have been the causes of this local pain.

Aneurysmal thrombus had probably occurred due to repeated minor trauma, prolonged stasis and sluggish emptying of blood (19) as is seen in comparable circumstances of low flow-rate aneurysms. The intra-aneurysmal thrombus becomes loculated due to incomplete thrombus-organisation and capsular adhesions. The clotted aneurysm may rupture, become calcified or embolise distally in fragments. Such emboli can occur in a seemingly stable state (9,10,20).

I/V DSA and isotope angiography do not outline such low flow aneurysms as effectively as in the medium sized arteries elsewhere and therefore the realistic investigation of choice remains angiography which should always be done prior to surgery (7).

The aneurysmal ostium was wide, frayed and unhealthy and it was considered inappropriate to perform lateral wall angioplasty. Accordingly an end-to-end vein anastomosis was carried out after enlarging the anastomotic ends of the graft by oblique trimming. The end result was a tension-free non-stenotic anastomotic repair of the DPA (Fig 10). In inflammatory (mycotic) aneurysms, the friability of the arterial wall may preclude a direct anastomosis (18). With the

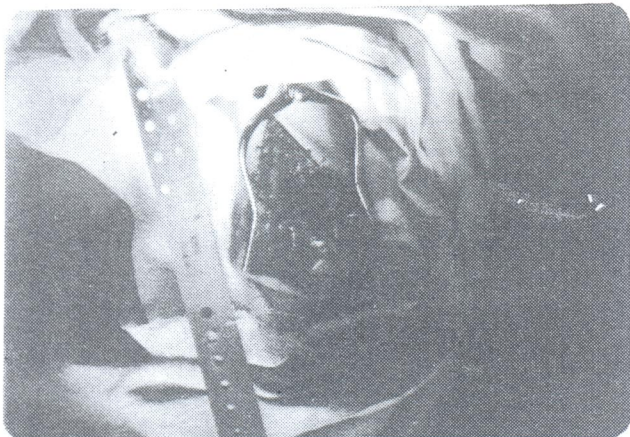


Figure. 7

availability of microsurgical technique, a vascular restorative procedure is preferable (17) although most of the reported cases except for this patient and another (17) underwent simple ligation of the artery with or without excision of the aneurysm.

Sensory nerves are occasionally entrapped by the aneurysm or are damaged during surgery. It remains to be seen if neuropathy develops at a later stage in this patient.

Anastomotic thrombosis is a distinct hazard (8), but this is very often related to age, generalised atherothrombosis and infection. Tension in the anastomosis, mishandling of the vascular segment, prolonged clamp-stasis, contact with damaged and necrotic irritant parts of the adjacent structures are common causes of thrombus-initiation. Preclamp intravascular infiltration of heparin/saline on either side of the clamps, gentle handling and adequate mobilisation of the arterial segment to gain length are keys to a successful outcome. The anastomosis should be embedded in a comfortable compression-free area and the anastomotic site should be protected from irritant contact. Whilst dealing with an inflammatory aneurysm, an extra-anatomic path should be chosen to bed the graft (18,21,22).

In the post-operative phase, we had kept the patient heparinised until he was actively mobilised.

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