We present a patient with an arteriovenous fistula of the peroneal artery acquired after a left dome tibial osteotomy with midshaft fibular osteotomy. He had subsequently had a total knee replacement on that side. The arteriovenous malformation was only diagnosed when he represented with symptoms and signs of venous hypertension with sterile recurrent haemarthroses in the left knee. Percutaneous obliteration of the fistula, by a combination of coil embolisation and balloon occlusion, cured the symptoms.

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Acquired peripheral arteriovenous fistulae are rare (Rich, Hobson and Collins 1975), usually occurring after penetrating injury (Snyder, Binet and Thompson 1982), but sometimes after blunt trauma (Singh and Gorman 1972; Kurihashi, Tamai and Saotome 1994). They may be difficult to diagnose and manage (Khoury et al 1994).

We present a case of a peroneal arterial fistula after a fibular osteotomy performed with a dome tibial osteotomy (Maquet 1976). This was undetected at first and presented as recurrent haemarthroses after a total knee replacement.

CASE REPORT

A 54-year-old ex-professional footballer presented with a long history of bilateral knee problems. He had had an arthrodesis of the right knee and on the left multiple arthroscopies had been performed plus a medial meniscectomy. A diagnosis of osteoarthritis of the left knee affecting the medial compartment had been made in 1991; he had a dome osteotomy of the tibia under tourniquet with excision of 1 cm of the midshaft of the fibula. There were no early complications but his symptoms were not relieved.

In 1993, left knee replacement with no patellar button was performed. His knee, however, continued to swell and he still complained of severe pain. There was no clinical, haematological or microbiological evidence of sepsis and a patellar button was inserted in 1994. There was no synovitis, heat or erythema and aspiration of the effusion yielded sterile haemoserous fluid. A bone scan showed a diffuse increase in uptake in the proximal tibia and fibula, but no suggestion of loosening or infection.

At arthroscopy without a tourniquet, a markedly hyperaemic synovium was noted. Examination of his lateral fibular scar then showed a continuous bruit with a palpable thrill. On arteriography there was a very dilated popliteal artery with a high-flow arteriovenous fistula arising from the peroneal artery (Fig. 1). Digital subtraction angiography confirmed the diagnosis and percutaneous embolisation was performed using coils (Fig. 2) and balloons (Fig. 3). The bruit and thrill disappeared, the knee pain resolved and there was no further swelling.

DISCUSSION

The peroneal artery usually arises from the posterior tibial artery 2 cm below the lower border of the popliteus and passes obliquely towards the fibula to descend along its medial crest in a fibrous canal between the tibialis posterior and the flexor hallucis longus (Williams and Warwick 1980). Since it lies close to the fibula and attached to it by the fibular nutrient artery it is susceptible to injury and subsequent formation of arteriovenous fistulae. Anatomical dissections (Rupp, Podeszwa and Ebraheim 1994) suggest that in osteotomy of the middle third of the fibula, it is safest to direct the osteotome towards the midpoint of the subcutaneous tibial surface. The more distal the level of fibular osteotomy, the lower the chance of neurovascular injury (Rupp et al 1994; Wootton, Ashworth and MacLaren 1995).

Arteriovenous malformations fed by the peroneal artery are rare but have been well described particularly in relation
to Fogarty catheter embolectomy (Davidson 1989). In our case, it arose after an unrecognised arterial injury at the time of fibular osteotomy, either directly at that time or later due to erosion by a false aneurysm of the peroneal artery (Richardson, Vitale and Flint 1987). Fibular union was unaffected by the lesion, although this has been reported (Harris 1963).

Although this was a high-flow arteriovenous fistula, it did not cause systemic haemodynamic problems or distal ischaemia. The venous hypertension caused recurrent knee haemarthroses and intermittent oedema, but did not give the appearance of a post-phlebitic leg. All the symptoms disappeared when the fistula was secured.

The inaccessible site of the lesion and the excellent collateral supply, together with the patient’s wish to avoid further open surgery, made it suitable for percutaneous embolisation (Franklin et al 1987), a technique more often used for hepatic and mesenteric fistulae (Rosenthal et al 1987) in which end-organ function is not threatened. There are previous reports of success in the peroneal artery (McIvor and Treweeke 1988; Peeters et al 1991).

Fibular osteotomy is part of a number of procedures, but we could find no previous reports of arteriovenous fistula associated with dome tibial osteotomy. Our case supports the hypothesis that most of the neurovascular complications of tibial osteotomy are secondary to damage at the time of division of the fibula (Wootton et al 1995). Fibular osteotomy should be carried out as distally and in the least traumatic manner as possible.

This case also illustrates the obscure clinical picture that mild venous hypertension can present, and reveals a unique cause for the failure of a joint replacement to alleviate symptoms. It also confirms the role of percutaneous transcatheter embolisation in dealing with lesions of the peroneal artery.

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References


