SHORT REPORT

Beware the Kinking Bypass – a Hidden Cause of Graft Reocclusion

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This is a case report of a kinking bypass. This is a recognised but uncommon cause of recurrent femoropopliteal bypass graft occlusion which was successfully treated by thrombolysis. The diagnosis was made by using angiography with the knee in flexion.

Key Words: Kinking supragenicular femoral bypass; Occlusion.

Introduction

Few authors have reported studies about the effects of knee flexion on femoropopliteal bypass grafts and the relation of this to graft kinking and occlusion, and their findings are varied.1–5 Flexion of the knee is thought to be a cause of bypass kinking in autologous venous and synthetic grafts in both above and below knee grafts. This case report describes kinking in a femoropopliteal bypass that was revealed by angiography with the knee flexed after two successful thrombolytic interventions for recurrent occlusion of the bypass.

Case Report

An 80-year old woman was admitted to our hospital with a few days’ history of lower limb ischemia. An aortobifemoral bypass prosthesis had been carried out for aortoiliac disease 10 years prior to this admission. Three years before the present episode an endarterectomy of the right superficial femoral artery (SFA) was performed, followed by endoluminal placement of a polytetrafluoroethylene (PTFE) endoprosthesis and two stents at the distal border to ensure fixation of the PTFE graft. Four months after this procedure she developed a false aneurysm at the distal stent in the right SFA. This was treated with resection of the proximal popliteal artery and insertion of a short PTFE graft. Oral anticoagulant therapy was started.

Two and a half years after the endarterectomy she was admitted for the first episode of ischemia of her right lower limb. Angiography confirmed bypass occlusion which was successfully treated with thrombolytic therapy. Although good graft patency was achieved, the cause of the occlusion was not revealed with certainty. The distal PTFE interposition graft showed a subtle curving course (see Fig. 1). At physical examination no scar tissue was found that might externally compress the graft. A cardiac embolic source was excluded. The patient was therefore discharged free of complaints, without any adjunct therapy.

Six weeks later she returned with further signs of ischemia in the right lower limb. Again successful thrombolytic therapy was instituted and again no obvious cause was found. No signs of intimal hyperplasia were seen. This time a lateral angiogram was performed with the hip and knee in 90 degrees flexion. The interposition graft revealed serious kinking just below the proximal anastomosis, giving rise to a subtotal stenosis when the knee was bent (see Fig. 2). This was thought to be the explanation for the recurrent bypass occlusion. Surgical revision involved implanting a new PTFE graft which was anastomosed to the infragenual popliteal artery. Intraoperative and postoperative angiography showed that the graft was patent and not kinked with the knee flexed (see Fig. 3). The ankle pressure after ten months was 185 mmHg (ABPI 0.97).

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Discussion

There are many factors influencing the patency of femoropopliteal bypass grafts. These include compromised inflow and outflow, anastomotic stenosis, intimal hyperplasia, insufficient anticoagulant therapy and external compression. Kinking is also thought to be an important factor, and two mechanisms are thought to be responsible. The first is direct reduction of the lumen size which reduces flow and eventually leads to thrombosis. The second is repetitive kinking which gives rise to neointimal hyperplasia.

Most femoropopliteal grafts show considerable tortuosity with the knee flexed, but this does not usually affect resting ankle pressures. Chafke et al. investigated stenotic kinking in autologous veins and synthetic grafts by performing angiography. In their series in-situ venous grafts showed less kinking than other grafts. Below-knee synthetic grafts showed stenotic kinking more frequently than above-knee grafts.
No significant decrease in ankle pressure nor morphology were recorded by knee flexion in patients with ringed expanded PTFE grafts; autologous venous grafts demonstrated kinking without a reduced ABPI and one case of a biosynthetic type of graft demonstrated both a drop in ankle pressure and kinking at angiography.

It seems hard to predict which types of grafts will kink enough to cause an occlusion. Perhaps slight curving of the graft on posteroanterior angiography or duplex scanning with the knee in extension should alert the surgeon to the possibility that the graft is too long and this may predispose to kinking on flexion. This was the situation found was in our patient. Although we did not perform pressure measurements in knee flexion we felt that the angiogram provided ample evidence for revision surgery on the basis of graft kinking.

A stenotic kinking bypass is an uncommon and an underdiagnosed cause of graft occlusion. Diagnosis should be made by measuring the ankle pressure in knee extension and flexion followed by biplanar angiography with the knee in flexion and extension. Routine use of intraoperative angiography performed in this way will reduce the number of occluded grafts.

References


