TECHNICAL NOTE

Percutaneous Closure Devices in Synthetic Graft Punctures: a Case for Concern?

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Introduction

Percutaneous closure devices were developed to minimise haemorrhagic complications after percutaneous femoral arterial puncture in diagnostic and interventional radiology. The use of these devices in day case arteriography in the U.K. is increasing, although most experience has been in North America, from where there have been several reports of complications.1-3 Although these devices have been shown to decrease the time to haemostasis and ambulation in patients undergoing femoral catheterisation,4 there is a reported 0.25% incidence of infective arteritis associated with their use in native arterial puncture.5 We report a potentially life-threatening complication following the use of one of these devices after puncture of a synthetic graft.

Report

A 65-year-old male presented with symptoms of right calf claudication. Two years earlier, he had undergone aorto-biprofunda bypass grafting with simultaneous bilateral femoro-popliteal bypass grafts for bilateral ischaemic rest pain.

Duplex arteriography demonstrated that all three grafts were still functioning well, but showed a critical (95%) stenosis in the right tibioperoneal trunk. The decision to intervene was made to protect the graft outflow, maintain patency and for symptom relief. Angioplasty to the right tibioperoneal stenosis was performed through a percutaneous puncture of the left aorto-biprofunda graft. Direct puncture of the Dacron graft was selected because the alternative approaches, transradial or transbrachial, were considered too remote for the length of catheters available. The puncture was closed with a suture mediated percutaneous closure device (Perclose Inc, Redwood, CA, U.S.A.) with no immediate complications. Prophylactic antibiotics were not given.

Six weeks later, the patient presented with a painful discharging sinus at the puncture site. He remained afebrile, and blood tests revealed a normal leucocyte count, erythrocyte sedimentation rate, and C-reactive protein. Serial swabs of the purulent discharge were taken for culture, but there was no significant growth. A white cell scan highlighted the area of the sinus but showed no evidence of more extensive graft infection. An empirical trial of antibiotics produced no improvement and surgical exploration was undertaken.

At operation, the limb of the aorto-biprofunda graft was exposed proximally from under the inguinal ligament to the anastomoses with the popliteal graft and profunda femoris artery. The graft was found to be well incorporated into surrounding tissues by fibrosis, with the only signs of graft infection confined to the base of the sinus (Fig. 1). Based on this observation, a limited distal section of the graft was excised. The wound was debrided and irrigated with rifampicin.
Fig. 1 The excised section of the limb of the aorto-bifemoral graft. The proximal and distal margins of the graft are well-incorporated into the surrounding fibrotic tissue. However, there are characteristic signs of graft infection at the base of the sinus, with loosening of the graft material and exposure of the Dacron. The braided suture of the percutaneous closure device can clearly be seen in the centre of this area.

(600 mg). A rifampicin-soaked, collagen impregnated interposition Dacron graft (8 mm Fluoropassiv, Sulzer Vascutek) restored flow from the aorto-bifemoral graft to the distal graft, with a Carrel patch to the profunda femoris artery. Microscopy of the excised graft and sinus tissue failed to identify any organism, and further culture still produced no significant growth. Prophylactic broad-spectrum antibiotics were given postoperatively and the wounds healed uneventfully. The patient remains symptom-free 6 months later with no sign of recurrent infection.

Discussion

Punctures of synthetic graft materials carry a substantially greater risk of haemorrhagic complications than in native arteries. This is generally attributed to the lower compliance of prosthetic graft materials than in native arterial wall, giving poorer elastic recoil and puncture sealing after catheter removal. A percutaneous closure device may be expected to minimise such haemorrhagic complications.

An infection of the graft may have occurred without the use of a closure device although this is a rare occurrence when native arteries are punctured. The use of a percutaneous closure device increases the complexity of the procedure and requires additional exchanges of catheters through the puncture site. This might be expected to increase the risk of bacterial inoculation, especially as most angiography suites are not designed and maintained to the same levels of sterility compared to an operating theatre.

The device we used leaves a permanent non-absorbable 3/0 braided polyester suture at the arterial puncture site. There is a higher risk of infection in general surgery with braided sutures than with monofilaments, and this may also have been a factor in the development of infection. It is not uncommon for routine bacterial cultures of a graft to fail to identify a causative organism especially after antibiotic therapy. Some authors have reported that sonic disruption of infected graft tissue significantly increases the rate of identification of Staphylococcus epidermidis graft infections.

This case report highlights the risk of infection associated with the use of non-absorbable suture mediated percutaneous closure devices. A spreading graft infection could have been disastrous and required extensive excision of all the synthetic material. Such potentially life-threatening implications of graft infection should be carefully weighed up before using a suture mediated percutaneous closure device in synthetic graft puncture. Although antibiotic prophylaxis reduces wound infections in vascular surgery, they have not been proven to decrease the incidence of graft infection. Despite this, the authors would recommend antibiotic prophylaxis and avoiding the use of percutaneous closure devices when puncturing synthetic grafts.

References


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