CASE REPORT

Miller Cuff Rupture: Beware of Using Arm Vein

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Introduction

Below the knee bypass procedures using expanded polytetrafluoroethylene (PTFE) have an improved patency if a vein cuff is used at the distal anastomosis. The reason for this extended patency is unclear but increased technical accuracy, less intimal hyperplasia and the cuff functioning as an elastic reservoir have been suggested. Early complications of vein cuff interposition have not been reported in the literature and we describe two cases of early vein cuff rupture leading to revision of the distal anastomosis. In both cases arm vein was used for the cuff.

Case Reports

J.B. is a 79-year-old female who presented with a mixed venous and arterial ulcer on her right ankle. Angiography showed a superficial femoral artery occlusion on the right side and proximal calf vessel stenoses. In January 1997 a right femoro-peroneal bypass was performed, using a composite of long saphenous vein and cephalic vein as conduit, as the saphenous vein was poor distally. In October 1997 she developed rest pain again and the distal part of the bypass was shown to have shrunk to a pin-hole lumen on angiography. She then underwent further distal reconstruction with a PTFE graft from the common femoral to the anterior tibial artery with a Miller vein cuff constructed of cephalic vein material. Fourteen days after this operation she was re-admitted with profuse bleeding from the tibial wound. On exploration the Miller cuff had disintegrated and a hole had appeared in it. The cuff was removed and the PTFE graft was directly anastomosed onto the anterior tibial artery. After this she had no further complications and the graft is still functioning.

J.H. is an 80-year-old male who underwent a left below knee femoropopliteal bypass procedure using in situ long saphenous vein for critical ischemia in November 1998. In January 1999 the graft thrombosed and on exploration the recipient distal popliteal artery and tibioperoneal trunk were blocked. The anterior tibial artery was patent and since arm veins were of poor quality an externally reinforced 6 mm diameter PTFE bypass was constructed from the common femoral artery to the anterior tibial artery with a Miller vein cuff constructed of a length of cephalic vein. On the 10th postoperative day he developed a large swelling in his anterior tibial compartment. A duplex scan confirmed a false aneurysm and on exploration rupture of the vein cuff was confirmed. The PTFE graft was anastomosed directly to the anterior tibial artery. Further recovery was uneventful.

Discussion

Vein material is widely being used for vascular reconstruction. Rupture of vein material has previously been described in patches used in carotid surgery. One study has shown that pressures at which vein wall ruptures are related to the diameter of the original vein. Vein wall from a long saphenous vein with a distended diameter of more than 3.5 mm showed better resistance to pressure than from a vein with a distended diameter smaller than 3.5 mm. As well as thinner walled, arm veins tends to be of a smaller diameter than vein harvested from a lower extremity. This could at least partly explain why arm vein appears to rupture more easily.

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Another factor that could play a role in cuff rupture is the diameter of the cuff. Wall tension increases with the diameter of the vein cuff. In the two cases described here there was no suggestion of abnormal cuff dilatation.

It is thought that a reduction in intimal hyperplasia is one of the reasons why adding a vein cuff gives improved graft patency. A possible explanation for the reduction in intimal hyperplasia when using a vein cuff may be that between prosthetic graft and recipient artery there is a compliance mismatch that is absorbed by the interposed vein cuff. This, however, exposes the venous material to shearing forces that may lead to its rupture as described in these cases. This emphasises the need for good quality vein to be used for formation of these cuffs. Caution should be exercised in the use of arm vein.

References


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