Case Report

Iatrogenic fistula between prosthetic haemodialysis access graft and autogenous vein: unusual cause of graft thrombosis

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Introduction

Haemodialysis access graft is so important as to be called a lifeline for the patient on maintenance haemodialysis. The vascular access problem is the leading cause of admission in patients with end-stage renal disease. Many complications of the prosthetic vascular access graft are reported, such as graft thrombosis, infection, aneurysm or pseudoaneurysm, and arterial steal syndrome [1]. We recently experienced two cases of graft thrombosis related to the iatrogenic fistula between haemodialysis access graft and autogenous vein at the needling site during haemodialysis. We report our cases with their clinical manifestation and the treatment outcome and possible methods of prevention [2].

Case 1

A 76-year-old female on long-term haemodialysis was referred to the Division of Vascular Surgery due to increased venous pressure >150 mmHg during haemodialysis. She had left prosthetic brachial-cephalic forearm loop access with expanded polytetrafluoroethylene (ePTFE) 6 mm standard wall performed on her 22 months previously. On physical examination, graft thrill on the arterial limb was active, but that on the venous limb was weak. Graft stenosis in the venous anastomosis site due to intimal hyperplasia was suspected and so fistulography and subsequent balloon angioplasty were planned. However, fistulography revealed a graft-to-vein fistula in the mid-portion of the arterial limb of the graft. The venous limb was not opacified due to thrombosis. We therefore marked the location of the fistula on the skin and performed an operation immediately. There was a 4 mm fistula between the posterior wall of the graft and the underlying small vein. The fistula was closed by suture ligation on the venous side and a graft thrombectomy using a Fogarty catheter was performed successfully. The venous anastomosis site stenosis was mild, and no additional procedure was performed. The graft was patent with good function for more than 6 months.

Case 2

A 73-year-old male on maintenance haemodialysis was referred due to absence of blood regurgitation from a venous limb puncture. He had a left prosthetic brachial-antecubital forearm loop access with ePTFE 6 mm standard wall performed on him 6 months previously. On physical examination there was active thrill in the arterial limb of the graft, but no thrill in the venous limb, and the thrill in the arterial side was somewhat laterally extended. We suspected graft-to-vein fistula and graft thrombosis in the venous limb by physical findings. Fistulography was performed to confirm the diagnosis and to mark the site of fistula (Figure 1). During the operation, we found a 5 mm fistula between the anterior wall of the graft and the overlying small vein. The fistula was obliterated with 6-0 monofilament polybutester running sutures and graft thrombectomy was performed successfully. On the venous site of anastomosis, moderate stenosis was detected and corrected by patch angioplasty with ePTFE. The post-intervention primary patency was >6 months [2].
We recently experienced two cases of AV graft thrombosis with iatrogenic graft-to-vein fistula which were successfully treated by surgical intervention. The locations of the fistulas were the middle of the arterial limb of the graft, where frequent cannulation was performed during haemodialysis. We suspected that the cause of the fistula was inadvertent concomitant cannulation of native vein and the AV graft; we therefore defined it as iatrogenic. The cause of graft thrombosis is not clear. In both patients, the graft thrombosis was detected 2 days after a successful haemodialysis session. We suspected that the graft-to-vein fisula is a causative factor to graft thrombosis by steal phenomenon, or it may predispose to graft thrombosis when other factors of graft occlusion may have occurred concomitantly.

Iatrogenic fistula at the needling site during haemodialysis is difficult to detect early because of active thrill around the access graft and the rarity of the disease. The iatrogenic fistula has developed between the needling site of the graft and the overlying or underlying small unnamed subcutaneous veins, which formed a multiple dilated collateral network. Small but significant amounts of blood steal through the iatrogenic fistula, can possibly decrease blood flow in the venous limb of the graft and may cause venous limb thrombosis, especially in the presence of venous anastomosis site stenosis. The arterial limb is still usable for haemodialysis, but the iatrogenic fistula shorts the usable length of the graft, especially in the case of fistula in the arterial limb. Eventually iatrogenic fistula jeopardizes long-term use of the haemodialysis graft.

For the diagnosis of iatrogenic fistula, careful physical examination is important. In the first case, iatrogenic fistula was not suspected clinically, but diagnosed by fistulography. But in the subsequent case, we made a clinical diagnosis by careful physical examination, which was confirmed by fistulography. In addition, the immediate surgical correction could achieve post-intervention primary patency over 6 months in both cases.

Another important subject is how to prevent this rare complication. Because the cause of the fistula is inadvertent cannulation of native vein and the AV graft concomitantly, careful selection of the cannulation site and proper cannulation technique is mandatory to prevent it. Complications related to cannulation include back wall sticks or laceration, needle placement outside or against the lumen, cannulation of dilated collaterals and aspiration of clots [3]. Needle placement complications can be avoided by careful attention to the flashback. If flashback is diminished or absent.

Fig. 1. (Left) Fistulography of left forearm brachial-antecubital prosthetic access graft. Arterial limb of the AV graft 3 cm distal from the anastomosis site was cannulated. Subsequent fistulography shows a fistula in the middle of arterial limb of the graft to small veins draining into the basilic vein. The graft distal to the fistula site is not opacified due to graft thrombosis. (Right) Delayed film at the same position was taken. Multiple venous collaterals draining into the basilic vein can be seen.
until the needles are moved, they should be repositioned before starting treatment. Cannulating dilated collaterals is prevented by pre-treatment access assessment. Any visible veins over the AV graft are carefully preserved from cannulation, and the back-wall infiltrate should be minimized. After withdrawal of the needle, careful pressure to the puncture site is important to prevent persistent connection between the graft and the native vein [4].

In conclusion, careful cannulation technique is important to prevent the complication of iatrogenic fistula, and careful clinical assessment of AV fistulae and grafts at regular intervals is of high importance. When no thrill or no venous return from venous limb of the graft is detected in spite of active thrill in the arterial limb, iatrogenic fistula between haemodialysis access graft and autogenous vein should be suspected and corrected surgically. If there is a combined stenosis in the venous anastomosis site, it should be corrected concomitantly either by balloon angioplasty or surgery [3].

Conflict of interest statement. None declared.

References


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