SHORT REPORT

Surgical Treatment of Local Prosthetic Graft Infection with Fresh Arterial Homograft: Report of Four Cases

A. Pupka*, J. Skóra, G. Kaluза and P. Szyber

Department of Vascular, General and Transplantological Surgery, Wrocław University of Medicine, Poniatowskiego 2, 50-326 Wrocław, Poland

Infection following vascular operations, particularly after synthetic prosthetic graft implantation, remains a serious complication of reconstructive vascular surgery. In this paper, four cases of bifurcated graft infection limited to the distal part of one of the branches are presented. Because of the unsatisfactory results of conventional treatment, the patients underwent in situ replacement of the infected distal part of the prosthesis branch with fresh arterial homograft. Follow-up revealed complete remission of infection. The use of arterial homograft can be limited to the replacement of infected segment of prosthesis.

Key Words: Vascular graft infection; Fresh arterial homograft; Local prosthetic graft infection.

Introduction

The routine use of vascular prosthetic grafts has resulted in an increase in the number of surgically treated patients as well as an increase in the number of infectious complications due to the use of synthetic materials.1 Irrespective of the surgical approach and type of antibiotic prophylaxis, vascular graft infection occurs in 1–3% of patients and it is a frequent cause of morbidity and mortality.1–3 Surgical treatment consists of the complete removal of the infected vascular graft with the preservation of limb circulation.1,2 The poor results of conventional therapy have contributed to the employment of arterial grafts harvested from brain-dead organ donors during multiple organ procurement.1,3–5 The replacement of the vascular graft, particularly of the bifurcated one with the arterial homograft is technically very difficult, prolonged and risky.4,6

In this study the treatment of four cases of local infection of an aorto-bifemoral prosthesis with the use of the arterial homograft is presented.

Case Reports

Four men between the ages of 45 and 60 (mean = 54.25) were treated for the local infection of a bifurcated prosthesis with the use of arterial homograft between 2000 and 2002 (Table 1). The patients were admitted to our surgical ward because of purulent fistulae in the inguinal region and/or the rupture of the anastomosis between the prosthesis and the femoral artery which resulted in haemorrhage—V degree on the Samson scale.7 The treatment of suppuration consisted of local excision of infected tissues, debridement with the use of betadine solution, long-term irrigation and the local application of gentamicin-soaked collagen sponges. Additionally, antibiotic treatment based on culture and sensitivities was administered. Unfortunately, local excision and debridement were unsuccessful, so all of these patients were readmitted after 3–6 months (mean = 4.75), because of rupture of a distal anastomosis. Duplex ultrasound and scintigraphy revealed infection of one limb of the aorto-bifemoral prosthesis between the distal anastomosis and the inguinal ligament. Perigraft fluid collection and migration of Technetium 99m-labelled leukocytes to the graft branch were observed. Bacteriological examination revealed methicillin-resistant Staphylococcus aureus (MRSA) and Staphylococcus...
epidermidis, both Vancomycin sensitive. All patients had MRSA. No features of generalised prosthesis infection were seen. In this situation it was decided to remove just the infected segment of the vascular prosthesis and to replace it with an arterial homograft harvested during multiorgan procurement. All the excised grafts were cultured and bacteriological results were the same as those obtained from the examination of four infected tissues. In all cases arterial allografts were implanted. AB0 compatibility and negative cross-match between the recipient’s serum and donor’s lymphocytes were obligatory. The common and the external iliac arteries were harvested with surrounding tissues with an adequate safety margin for the procedure of homograft implantation. The allografts were stored in University of Wisconsin solution at 4°C with antibiotics (Vancomycin, Lincomycin). The homografts were implanted in place of the removed infected segment of the bifurcated prosthesis within 17–21 h (mean = 19.25) after procurement. The harvested arterial by-pass was dissected atraumatically before implantation. The homograft was sutured in using two end-to-end anastomoses, proximally retroperitoneally to the remaining part of the branch of bifurcated graft above the inguinal ligament, distally to the deep femoral artery (Figs. 1 and 2). Diagnostic monitoring of infection (e.g. duplex sonography, scintigraphy examination) was performed during the follow-up period on the seventh, 21st day and in the first, third, sixth, 12th and 16th month after the surgery. This revealed the remission of infection (Table 1). Duplex ultrasound showed no fluid collections around implanted allograft and the remaining bifurcated graft. White cell scanning showed regression of Technetium 99m-labelled leukocyte migration to the place of the graft replacement. In all of the cases antibiotic therapy was continued for 8 weeks following homograft implantation. In the postoperative follow-up no blood flow disturbances in the lower extremities were observed.

Table 1. Characteristic of patients

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>The reason for the original graft</th>
<th>The interval between the primary operation and graft infection</th>
<th>The interval between the prosthesis infection and bleeding</th>
<th>Risk factors for infection</th>
<th>Time of follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>45</td>
<td>Arteriosclerosis</td>
<td>3 years</td>
<td>3 months</td>
<td>Diabetes</td>
<td>16 months</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>Arteriosclerosis</td>
<td>7 years</td>
<td>6 months</td>
<td>Necrosis of toes</td>
<td>16 months</td>
</tr>
<tr>
<td>3</td>
<td>58</td>
<td>Arteriosclerosis</td>
<td>2 years</td>
<td>4 months</td>
<td>Necrosis of toes</td>
<td>12 months</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>Aneurysm</td>
<td>3 years</td>
<td>6 months</td>
<td>-</td>
<td>16 months</td>
</tr>
</tbody>
</table>

Discussion

Vascular graft infection frequently leads to significant morbidity and mortality. The management of infection using locally applied antibiotic solutions is rarely a satisfactory solution. Eventually graft infection causes the rupture of anastomoses which frequently leads to death. The patients mentioned above were treated initially with long-term irrigation and locally applied antibiotics with no success. The infection caused the rupture of anastomoses that resulted in haemorrhage. Imaging (duplex ultrasound and scintigraphy) and bacteriology confirmed the infection. Scintigraphy localises the infection. The whole prosthesis is usually involved in the infection process. The complete removal of the synthetic graft followed by extraanatomic by-pass and the replacement of the infected graft with an antibiotic-bonded or silver-coated vascular prosthesis or with autologous or homologous grafts are most often used as therapeutic methods. The biological materials which are the most frequently used are patient’s own veins or arteries harvested from brain-dead organ donors stored by deep freezing or cold ischemia. The in situ replacement of an infected vascular prosthesis with arterial homograft material

Fig. 1. Infected branch of bifurcated prosthesis.
can lead to eradication of the infection. Additionally, only biological material is able to heal well in the presence of infection.\textsuperscript{3–6,12,13} Homografts harvested during multiple organ procurement and stored as above were implanted in both cases.\textsuperscript{3–5,13} The employment of this method is only possible after excluding cross-reaction between donor and recipient.\textsuperscript{3,5} Imaging, especially using scintigraphy with Technetium 99m-labelled leukocytes, revealed the local infection of bifurcated graft limited to the distal part of one of its branches.\textsuperscript{8} In this situation we decided to replace only the infected segment of the prosthesis with fresh arterial homograft. We have found no similar cases in the surgical literature. Limited surgery as opposed to replacement of the whole aorto-bifemoral prosthesis with an allograft, reduced the probability of severe postoperative complications. Scintigraphy allowed us to monitor the regression of the infection.\textsuperscript{11} Duplex ultrasound revealed no allograft pathology during the follow-up period. The most frequently described complications are graft aneurysm and homograft thrombosis.\textsuperscript{3,9}

**Conclusion**

The use of arterial homograft can be limited to the replacement of infected segment of prosthesis with arterial homograft, but this therapeutic method requires further investigations and scrupulous observations.

**References**


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