Use of Antibiotic-bonded Grafts in Vascular Graft Infection

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Introduction

Because the morbidity and mortality after treatment of an established vascular infection is prohibitively high, prevention of local infection should be the primary aim, especially if a prosthetic graft has to be used. Once the infection has occurred, the infected graft must usually be removed. Extra-anatomic bypass or autograft replacement with arterial or venous conduits are frequently used for revascularisation of non-viable organs or extremities. Recently in situ implantation of allografts or prosthetic grafts has been considered as a possible alternative in high risk patients or in patients with poor run-off if complex secondary revascularisation was not feasible.1-5 Many methods have been described to create an infection-resistant graft, binding various antibacterial substances to the vascular prostheses.6-11 This paper documents our clinical experience with the rifampicin-bonded graft.

Materials and Methods

Between May 1991 and December 1995, 12 patients with vascular infection were treated using in situ implantation of rifampicin-soaked grafts at our institution. Eight patients had previous vascular reconstruction performed at our department and three were previously operated elsewhere. One patient on haemodialysis for end-stage renal disease developed a mycotic thoracic aneurysm of the descending aorta. The mean age of the nine men and three women was 70 years. The aortic or iliac graft were implanted for occlusive disease in 10 cases. The proximal anastomosis of the infected graft was end-to-end at the aorta and end-to-side at the iliac and femoral artery.

Eight patients were operated on as an emergency. Seven patients had total graft replacement and four partial replacement of the graft for infection limited to the groin (Fig. 1).

The treatment consisted of parenteral antibiotic treatment with oxacillin, accurate skin preparation, graft removal, generous wound debridement and local antisepctic treatment with betadine. After gloves and instruments had been changed a new gelatine-coated Dacron prosthesis was soaked with 600 mg rifampicin diluted with 10 ml NaCl 0.9% for 10–15 min before implantation. If residual contamination could not be excluded, continuous irrigation of the wound with betadine for 48–72 h was performed. All patients received postoperative intravenous antibiotics on the basis of the sensitivities. Bacteriological studies of the removed prosthesis showed Staphylococcus aureus in eight cases and Staphylococcus epidermidis in four.

Results

The patient treated for mycotic thoracic aneurysm had to be reoperated for contralateral pyothorax and died because of sepsis 2 months later. There were two late deaths, due to myocardial infarction 10 and 18 months after the procedure. After a mean follow-up of 33 months (range: 6–53 months) only one recurrence was found in a case with late graft infection following aortofemoral bypass graft with septic bleeding. The isolated micro-organism was S. aureus stem resistant to both rifampicin and oxacillin. Eight patients showed no signs of infection on follow-up. The ankle pressure index ranged between 0.5 and 0.9 and no amputations were necessary. The first case treated by this technique for aneurysm of the visceral aorta and described in detail elsewhere5 is still alive and shows no signs of recurrent infection 53 months after the original in situ reconstruction (Fig. 2).

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Antibiotic-bonded Grafts

Discussion

Since graft-related infection is caused by irreversible adherence of the bacteria to the prosthetic surface, the standard management protocol includes complete removal of graft material and revascularisation of viable extremities and organs by extra-anatomical bypass. In some cases this classical regimen is not feasible. Because of possible residual colonisation of the wound, in situ implantation of a new graft has been considered hazardous. Nevertheless, an increasing number of authors report successful revascularisation using allografts and prosthetic grafts implanted in the original wound in cases which are not feasible to be treated by extra-anatomical or autologous reconstruction.

To increase the resistance of grafts to the infection several methods of bonding antibiotics to the vascular...
In a recent report published in this journal, Naylor et al. summarised the various management options in the treatment of major aortic graft infection. The multiplicity of alternative procedures (conservative vs. total graft excision, extra-anatomical vs. anatomical vascular reconstruction) and of different grafts used (artery, vein, allografts, prosthesis with and without antibiotic bonding or gentamycin beads/sponge) shows the great efforts used to manage the difficult problem of vascular graft infection. A retrospective analysis of 99 patients operated at our institution during a 12-year period showed a postoperative mortality rate of 37% 1 year after treatment for prosthetic graft infection. This persistent unfavourable outcome points out the importance of infection prophylaxis in vascular surgery.

Conclusions

The reports of other authors and our own experience with new techniques show that the in situ technique using an antibiotic-bonded graft can be an effective strategy with good mid-term results. The potential problems connected with extra-anatomical reconstructions (prolonged operative time, graft thrombosis, need for anticoagulants, impotence) may result in a more liberal use of this operative strategy in the future but further studies are required.

Fig. 2. Postoperative lateral angiography (a) and follow-up CT scan carried out 2.5 years after implantation of a bifurcation graft between the subdiaphragmatic aorta and both renal arteries for infected aortic stump aneurysm. The coeliac and superior mesenteric artery were reimplanted into the graft. The CT scan (b) shows a complete resorption of the abscess cavity, the good perfusion of both kidneys and the patent axillofemoral bypass graft.

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References

Antibiotic-bonded Grafts

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