INVITED COMMENTARY

Cryoveinorta — Another Option for Supra-inguinal Primary Aortic and Arterial Graft Infections?

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Aortic infection remains a morbid problem as shown by actuarial one year outcomes. Antibiotics alone are usually fatal. *Ex situ* bypass with aortic stump ligation is complicated by 73% survival, 25% limb loss, frequent graft failure, prosthetic re-infection, and 13% aortic stump blowout. Excision with *in situ* replacement using antibiotic or silver impregnated grafts has a better outcome, but not if the organism is virulent. Excision with autogenous femoral vein(s) reconstruction also offers better one year outcomes; 90% survival, 7% limb loss, and 100% primary patency. This lengthy procedure is complicated by paresis, venous thrombosis, compartment syndrome, and chronic oedema.[1] Patients with aortic infections are often too frail to survive this intervention.

Aortic replacement began with allografts but they were abandoned due to thrombosis, dilation, and rupture. Fresh homografts and methods for preparing allografts (including cryopreservation) became important research interests. Kieffer's sequenced series combined results of 111 fresh arterial allografts with 68 cryopreserved arterial allografts for aortic infections. Grafts were obtained from the Tissue Bank of Paris Hospitals. Survival was 73% with 0.5% limb loss at one year.[2] Fresh allografts contributed most of the adverse outcomes, stimulating wider acceptance of the cryopreserved arterial allograft. Allografts were particularly vulnerable to aorto-enteric fistulas.[2,3]

Cryopreservation has transitioned from academic research to a mature commercial venture with durable five year outcomes. A multicentre database reported 220 aortic infections repaired with commercially available cryopreserved aorto-iliac allografts; one year survival was 75%, freedom from limb loss 98%, and primary patency 98%.[4]

Although cryopreserved venous allografts are commonly employed for extremity arterial replacement, supra-inguinal or *ex situ* application are rare. Different conduits were compared in an analysis of 119 femorofemoral grafts. Cryopreserved femoral veins (12) and autogenous femoral veins (18) placed primarily for infectious indications had an 82% survival, 10% limb loss, and 100% primary patency.[5]

In situ reconstruction with cryopreserved arterial allografts has emerged as a reasonable alternative for the management of aortic graft and arterial infections. Although expensive, multiple configurations of cryopreserved arteries and veins are now readily available from multiple vendors. Access to a local tissue bank may not be required.

Heinola *et al.* describe a mixed series of 23 supra-inguinal arterial infections, primary aortic (five), aortic graft (12), pseudoaneurysm (two), and extra-anatomic infections (three) treated with cryopreserved femoral vein and/or vena cava.[6] Allografts were obtained from the Helsinki University Homograft Bank. Negative experience with cryopreserved arterial allografts (Supplementary material) prompted their use of cryopreserved femoral vein allografts. Survival was 76% with no amputations. The results are encouraging but remain burdened by the complications of rupture (one), aneurysmal dilation of the cryopreserved vein (two), and re-infection (one).

The larger cryopreserved femoral and caval venous conduits are a better size match for large diameter native arteries, similar to commercial cryopreserved arterial allografts. A cryopreserved vein appears to be more flexible and less likely to "crack" than artery. The "valve problem" is related to the decreased wall thickness at valve pockets, and the stiffness of the valve cusps; this was addressed by excision.

Will cryopreserved femoral vein and vena cava allografts sustain the promise of this investigation and offer a better alternative to cryopreserved arterial allografts? Durability with long term freedom from thrombosis, dilation, and rupture is yet to be determined. The early results reported here are encouraging and sustain consideration for further pursuit of this option.

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