Proposal for bail-out procedures - Vascular thoracic
Management of re-coarctation due to prosthetic graft pseudo-intimal dissection

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Abstract
Re-coarctation is a recognised late complication of surgical coarctation repair. Re-operation in these patients is difficult and the role of surgery has been partly subsumed by balloon angioplasty and endovascular stenting. We describe a patient who twice developed re-coarctation, the second time because of a raised pseudo-intimal flap within an interposition graft. It was managed successfully with an ascending-descending aorta extra-anatomic graft.

Keywords: Arteries; Coarctation; Prosthesis

1. Introduction
Despite the overall satisfactory outcome of the surgical repair of coarctation, there remains 5–30% incidence of re-coarctation requiring re-intervention [1]. Although endovascular management is used increasingly [2], open intervention remains necessary in some cases. The surgical technique for re-operation depends on the type of initial repair, length of aortic narrowing, the proximity to the aortic arch, the patient’s age and concomitant cardiac disease. Various anatomical and extra-anatomical bypass techniques using prosthetic grafts have been described [3,4].

Non-anastomotic narrowing of the prosthetic graft is uncommon. We describe a case that twice developed re-coarctation due to occlusion of prosthetic grafts.

2. Case details
A 58-year-old female presented with pulmonary oedema. On examination, she had upper–lower limb systolic pressure gradient of 90 mmHg. At the age of eight, she had undergone her first coarctation repair using an interposition Orlon graft (Orlon, an additional polymer of acrylonitrile, was the first prosthetic graft manufactured as seamless tube). At age 33, she was re-investigated for hypertension and re-coarctation was confirmed on aortography. At the second procedure, the Orlon graft was found to be calcified and an extra-anatomic 14 mm dacron graft was interposed between the left subclavian artery and mid-descending thoracic aorta. During the current admission, invasive imaging confirmed a gradient of 70 mmHg and a CT scan demonstrated partial occlusion of the extra-anatomic bypass graft at the junction of proximal and mid third, extending for 4 cm distally. This appeared to be due to a dissecting flap of a pseudointima in the graft. The ascending aorta, arch and distal descending aorta were of normal calibre. The original Orlon graft was completely occluded and partly calcified. The distal descending thoracic aorta was, however, patent. The MRI angiogram confirmed these findings (Fig. 1).

Percutaneous intervention was felt inadvisable in view of the occluded first graft and a raised flap in the second. Therefore, an extra-anatomic ascending–descending aorta conduit, using a 20-mm gelweave gelatine-impregnated polyester graft (Vascutek, Renfrewshire, UK) was constructed via a median sternotomy utilising cardiopulmonary bypass. Access to posterior pericardium and descending aorta was difficult, due to severe left ventricular hypertrophy and therefore, the descending aorta anastomosis was performed during a period of cardioplegic arrest and left atrial venting. The conduit was routed posterior to the inferior vena cava and anastomosed to the ascending aorta using a partial occlusion clamp. The patient made an uneventful postoperative recovery with no upper:lower limb pressure gradient remaining. An MRI examination at three months demonstrated satisfactory graft location (Fig. 2).

3. Discussion
This case is of interest due to the repeated presentations of re-coarctation as a result of obstruction within prosthetic grafts. In the first instance it presumably was the result of the calcific degeneration of relatively small prosthetic graft. On the second occasion, the obstruction was due to spontaneous dissection of a pseudointima within a dacron graft. There are very few reported cases of this phenome-
descending aorta as used in this patient for the first re-
dissected and obstructed at autopsy
patient with congenital heart disease has been found to be
the main pulmonary artery and descending aorta in a
further view.

An interposition graft between left subclavian artery and
descending aorta as used in this patient for the first re-
coaarctation operation has been described with good long-
term results [4]. This technique avoids extensive dissection
and total cross clamping of the aorta. However, if this or
similar methods fail, the extra-anatomic ascending–de-
sending aortic conduit would appear to be the technique
of choice [3,7]. The use of extra-anatomic graft interposi-
tion was first described in 1980 [8]. The advantages include
access to the descending thoracic aorta above the dia-
aphragm in a segment with less collateral circulation, avoids
manipulation of a coarctation segment in which the aortic
wall has structural alterations and extensive collateral
circulation, especially in adults. The use of an ascending–
descending aortic conduit avoids possible complications of
repeat thoracotomy including extensive dissection, bleed-
ing, parenchymal lung injury, recurrent laryngeal or phrenic
nerve injury, chylothorax and spinal cord ischaemia [3]. It
also avoids hypothermic circulatory arrest in the repair of
aortic arch coarctation and other cardiac pathologies can be
repaired simultaneously through sternotomy. On occasion,
this technique can also be performed without cardiopulmonary bypass
[9].

4. Conclusion
This report describes an unusual case of prosthetic graft
obstruction resulting in recurrent coarctation and its suc-
cessful management. No single surgical or endovascular
procedure is applicable in all the re-coarctation cases and
a multi-disciplinary decision-making process is advisable in
the management of such patients.

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Combined surgical management through median sternotomy: a new