

A technique for complete replacement of the ascending aorta

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A technique for complete replacement of the aortic valve and ascending aorta in cases of aneurysm of the ascending aorta with aortic valve ectasia is described. The proximal aortic root was too attenuated to afford anchorage to the aortic prosthesis, so this was sutured to the ring of a Starr valve and the prostheses were inserted *en bloc*. The ostia of the coronary arteries were anastomosed to the side of the aortic prosthesis.

Aneurysmal dilatation of the ascending aorta is often associated with ectasia of the aortic valve ring and presents clinically as aortic incompetence. In Marfan's syndrome or cystic medial necrosis this may develop with dramatic suddenness in an ostensibly healthy individual.

The dilatation of the valve ring makes repair or replacement with other than a prosthetic valve difficult. The aneurysm, which is either a true dilatation or dissection, is best treated by excision and replacement with a tubular prosthesis, as the wall is invariably attenuated. This is not difficult provided that the aorta distal to the aneurysm and proximal to the arch is suitable for anastomosis.

Proximally, in most cases, the aortic prosthesis can be sutured to a rim of aorta, leaving the coronary ostia undisturbed, while a valve prosthesis is placed in the usual sub-coronary position (Cooley, Bloodwell, Beall, Hallman, and De Bakey, 1966).

However, it sometimes happens that the root of the aorta is so involved in the disease process that the wall is too attenuated to be sutured to the proximal end of the aortic prosthesis. In this situation the management of the coronaries is the main concern of the surgeon.

CASE REPORT

A man aged 33 years had been in excellent health until a few months before admission, when his wife had noticed a loud cardiac murmur and he developed signs and symptoms of gross aortic regurgitation. Angiocardiography showed a large aneurysmal dilatation of the ascending aorta, not involving the vessels of the arch but associated with free aortic regurgita-

tion. He was in incipient cardiac failure with an effective cardiac output of 1.8 l./min./m.²

OPERATION A mid-sternal thoracotomy revealed a large globular dilatation of the ascending aorta. Its bulging inelastic wall was so thin that blood could be seen eddying within. Figure 1 gives an idea of the attenuation of the wall.

Total cardiopulmonary bypass was established, and, after cross-clamping the aorta distal to the aneurysm, the aorta was opened, and the coronaries were cannulated and perfused in the usual way. The aortic valve ring was much dilated and the wall was extremely thinned down to the ring.

It was clear that it would not be possible to join the aortic wall above the coronaries to an aortic prosthesis. It was therefore decided to suture the tube prosthesis directly to the ring of a Starr valve. A No. 13 Starr valve was sutured to one end of a crimped Teflon aortic prosthesis, as shown in Figure 2. The aortic cusps having been excised, sutures were placed in the aortic ring and through the Starr valve ring. These were tied, fixing the Starr valve and the attached Teflon tube.

At this stage the coronary cannulae were outside the lumen of the aortic replacement. Holes were cut in the aortic prosthesis at the site of the coronary ostia, which were then re-cannulated, this time through the lumen of the tube (Fig. 3). The aortic wall was sutured to the perimeter of the holes in the Teflon tube, thus reincorporating the coronary ostia within the new aorta.

The distal anastomosis was then completed, leaving a vertical slit (Fig. 3 (5)) through which the coronary cannulae were removed and air was evacuated. This was then closed with a clamp while the aortic clamp was released and retrograde coronary perfusion was started again without any delay. The wall of the aneurysm was closed over the prosthesis.

The patient made an uneventful recovery and remains well after nine months.

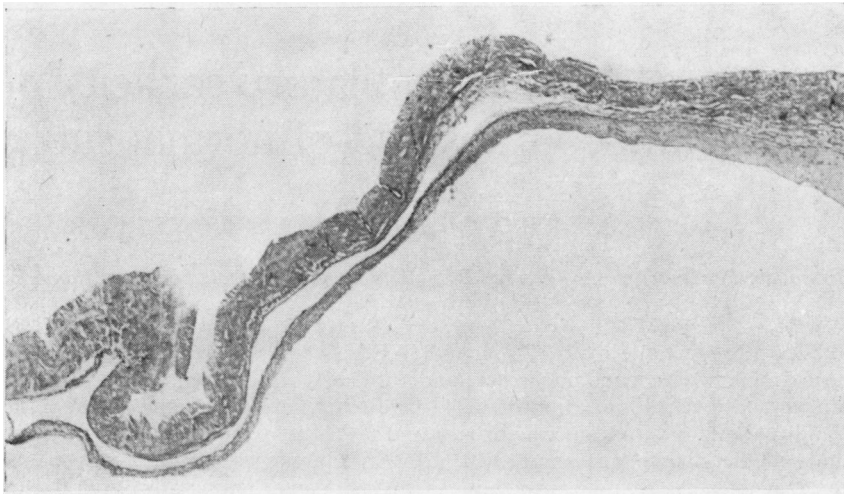


FIG. 1. Section of aortic aneurysm just above aortic valve, showing extreme thinning. Wall about one-tenth normal thickness. (L.E.H.V.G. $\times 40$.)

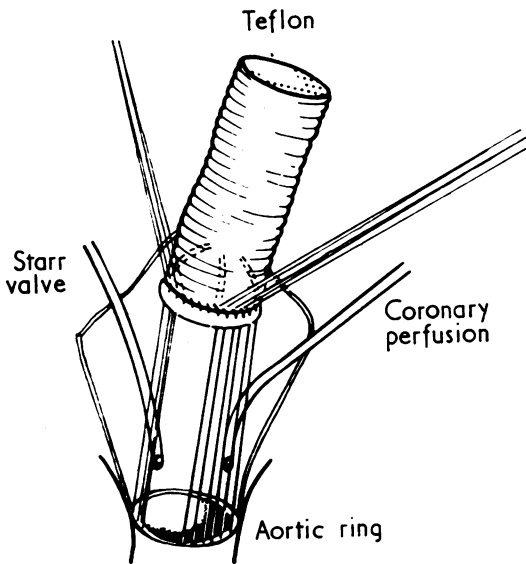


FIG. 2. Starr valve has been sutured to aortic prosthesis: sutures have been placed in aortic ring before fixing the combined prostheses.

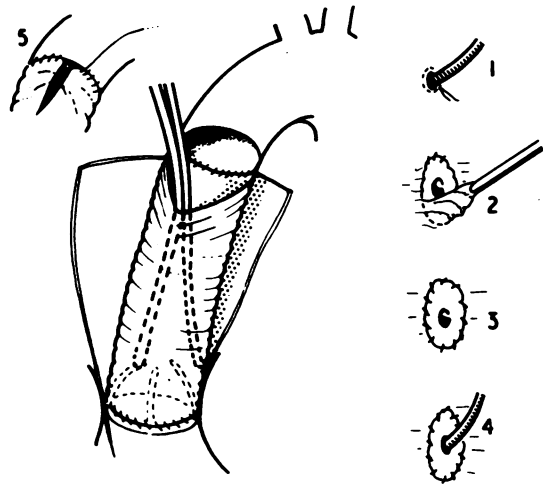


FIG. 3. Combined prostheses in situ. Insets 1 to 4 show details of holes fashioned in the side wall of the Teflon tube to reincorporate the coronary ostia within the lumen of the new ascending aorta. Inset 5 shows the vertical slit in the prosthesis.

The technique used is reported as it offers an alternative method of dealing with this type of aortic disease when the whole of the ascending aorta has to be replaced.

REFERENCE

Cooley, D. A., Bloodwell, R. D., Beall, A. C., Hallman, G. L., and De Bakey, M. E. (1966). Surgical management of aneurysms of the ascending aorta. *Surg. Clin. N. Amer.*, 46, 1033.