Amplatzer Device Deployment for Saccular Aortic Arch Aneurysm
A Note of Caution

Stephen Westaby, MS, PhD, FRCS, FACC, FESC, FECTS, FICA;
Suvitesh Luthra, MCh(CTVS), FRCS(CTh); Suzie Anthony, MD; Oliver Ormerod, MD; Neil Wilson, MD

Amplatzer septal occluder devices (AGA Medical Corporation, Plymouth, MN) have been used in the treatment of saccular and aortic false aneurysms. We have reservations about the long-term reliability of this approach.

A 62-year-old man, who was a heavy smoker and had arteriopathy, was under regular surveillance for chronic obstructive airways disease and bullous emphysema. He had previously undergone abdominal aortic aneurysm resection (1997) with prolonged postoperative respiratory support. Subsequently, a huge circumflex coronary aneurysm (5.9×5.0 cm, Figure 1A) caused lateral myocardial infarction (2005) and an enlarging saccular arch aneurysm (3.5 cm, Figure 1B). CT scan in transverse section showing a large circumflex coronary aneurysm (arrow) following covered stent closure of the entry. Diffuse coronary disease is apparent in the LAD branch. CT reconstruction demonstrating the nonthrombosed part of a 6.5-cm saccular arch aneurysm compressing the pulmonary bifurcation (double arrow). Lateral view showing the partially thrombosed arch aneurysm. CT reconstruction with the Amplatzer occluder device closing the mouth of the aneurysm. Lateral view (1 year later) showing that the neck of the aneurysm has increased in size. The device has prolapsed into the sac with further pulmonary artery compression. CT reconstruction showing the repaired ascending aorta (arrow) and arch together with the thrombosed circumflex coronary aneurysm (arrow). CT indicates computed tomography; LAD, left anterior descending artery; and An, aneurysm.

From the Departments of Cardiothoracic Surgery (S.W., S.L.), Cardiology (O.O., N.W.), and Radiology (S.A.), John Radcliffe Hospital, Oxford, United Kingdom.

Correspondence to Suvitesh Luthra, FRCS(CTh), Department of Cardiothoracic Surgery, John Radcliffe Hospital, Headley Way, Oxford, OX3 9DU, United Kingdom. E-mail suviteshluthra@yahoo.com

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Figures 1B and 1C, 2 and 3) compressed the pulmonary arterial bifurcation with worsening dyspnea (New York Heart Association class 4). In addition, the coronary angiogram showed severe midvessel left anterior descending stenosis and moderate disease of right coronary artery.

When both aneurysms exceeded 6 cm diameter, multiple surgical opinions were sought. Given severely impaired respiratory function and embolic stroke risk, advice ranged from “unfit for any procedure with anesthetic” (United Kingdom) to “concomitant aortic arch replacement and coronary bypass surgery” (USA).

We initially decided on an interventional approach for both aneurysms. First, in 2009, a covered coronary stent was deployed to occlude entry to the circumflex aneurysm (Figure 1A). This successfully thrombosed the sac. A bare metal stent was deployed in the left anterior descending coronary for relief of angina. Six weeks later, an Amplatzer septal occluder was introduced from the right brachial artery to close the mouth of the saccular arch aneurysm (Figure 1D). Initially, this provided symptomatic improvement. A computed tomography scan 6 months later showed that the device remained in place. The patient continued to smoke. Subsequently, breathlessness worsened again and a further scan showed that the occluder device had fallen into the expanding aneurysm (8.5 cm) (Figure 1E). We proceeded to surgical replacement of the ascending aorta and proximal arch by use of hypothermic circulatory arrest (2010) (Figure 1F). The aneurysm sac was decompressed by removing thrombus.

The postoperative period was complicated by transient left-sided weakness and the anticipated respiratory problems required tracheostomy. He was discharged 6 weeks after surgery with no residual neurological symptoms, and he has stopped smoking. One year later, he is symptomatically greatly improved (New York Heart Association class 2) and subject to detailed medical management of hypertension and lipid profile. The remaining aorta is kept under surveillance (Figure 4), but any further aortic intervention will be limited to endovascular techniques.

Comment
Coronary artery and aneurysmal disease are progressive, in particular, in active smokers with hypertension and an adverse lipid profile. In our patient, repeated imaging showed that the mouth of the saccular aneurysm increased from 2.3 cm diameter at the time of the Amplatzer occluder deployment to 2.8 cm diameter after device prolapse. Although radiologically satisfactory, occluder deployment failed to thrombose the sac. Prolapse of the device allowed the aneurysm to expand with compression of pulmonary artery bifurcation. In contrast, the excluded coronary aneurysm did thrombose and decreased in size (Figure 1F). Aortic surgery was undertaken anticipating respiratory and embolic complications. Duration of cardiopulmonary bypass and hypothermic circulatory arrest were kept to a minimum, and we avoided cannulation of severely atheromatous brachiocephalic vessels.

Endovascular techniques, including coil embolization and endoluminal stent grafts, have been used successfully for the
treatment of pseudoaneurysms of the ascending or descending aorta. 3–5 Use of the septal occluder is a novel technique that requires a discrete neck for deployment. Intravascular ultrasound is a useful tool to define the precise diameter of the aneurysm neck in selection of the appropriate size. Although the mouth of a postsurgical false aneurysm may not enlarge with time, we have shown that entry to a true saccular aneurysm may increase in size and predispose to failure. Although the occluder is a useful, less invasive technique for poor surgical candidates, continued surveillance is needed because of this failure mode.

Disclosures
None.

References

Figure 4. CT reconstruction of a recent follow-up scan showing the whole aorta including the aortobifemoral graft with occlusion of 1 limb. There is no significant compression of pulmonary artery and no flow into the excluded saccular aneurysm. CT indicates computed tomography.
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