Aortic arch stabilization in redo operations for aortic type A dissection
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**Background** In patients undergoing a new surgical procedure after correction of type A dissection, care must be taken to correct as much as possible the residual lesions and to obliterate, if possible, any residual false lumen.

**Methods** From November 2003 to May 2004, four patients who previously underwent ascending aortic replacement for acute type A aortic dissection underwent a second procedure because of severe aortic root dilatation. The residual false lumen was limited to the arch in two cases, but extended to the whole thoracic aorta in the other two, going down to the abdominal aorta in one of them. A composite valve conduit was inserted, and then a stent was placed in the dissected aortic arch.

**Results** All patients had a regular postoperative outcome and were discharged 9–11 days after surgery. The computed tomography angiography scan, performed early and after 6 months, showed no evidence of false lumen in the aortic arch.

**Conclusions** The placement of a stent in the aortic arch in redo cases can be performed with satisfying results because it causes the disappearance of the false lumen. Long-term follow-up is required for the confirmation of these initial positive results. J Cardiovasc Med 8:384–386 © 2007 Italian Federation of Cardiology.

Keywords: aortic arch stent, residual false lumen, type A dissection

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**Introduction**
Traditional treatment of type A acute aortic dissection sometimes simply consists of ascending aorta replacement by a prosthetic Dacron conduit. When this procedure is performed, the aortic root is spared. However, in some unfortunate cases, the development of aortic root progressive dilatation leads to aortic valve incompetence and, ultimately, aneurysm of Valsalva’s sinuses. Moreover, persisting dissection with a false lumen often occurs beyond the distal suture.

Our initial experience described here concerns surgical treatment performed in patients presenting with aortic root dilatation following surgery and consists of total ascending aorta replacement and aortic arch stabilization by endovascular stent implantation.

**Materials and methods**
From November 2003 to May 2004, four patients who previously had ascending aortic replacement for acute type A dissection underwent a second procedure following the occurrence of aortic root dilatation.

The aim of this procedure was to replace the aortic root and to stabilize the aortic arch lumen by a vascular stent implantation.

The patients comprised three males and one female. Most patients presented with hypertension and one male had diabetes. The mean age was 65.25 years (range 51–72 years). None had coronary artery disease.

Two males suffered from carotid artery atherosclerosis, but with no occurrence of ischaemic episodes.

All patients had previously undergone isolated ascending aortic replacement as treatment for aortic A type dissection (mean 5.5 years, range 3–7 years). They presented good clinical conditions at discharge after the first operation, with no aortic root dilatation. However, echo measurements, controlled in time, gradually revealed a progressive increase in the aortic diameter of Valsalva’s sinuses of up to 50–54 mm.

Computed tomography (CT) scans performed on all patients confirmed aortic root dilatation.

A variable degree of aortic valve incompetence was found to be moderate in two patients, and severe in the other two.

Moreover, CT scans showed the persistence of a false lumen beyond the previously performed distal anastomosis. The residual false lumen was limited to the arch in two patients, to the whole thoracic aorta in one, and to the entire abdominal aorta in one case.
Operative technique

The chest was entered through a secondary median sternotomy and femoral artery and right atrium cannulation was performed.

After aortic clamping just before innominate artery and cardioplegia, the aortic root wall was removed. In one case, the native aortic valve was spared by performing Tirone David’s reimplantation technique. In the other cases, a Bentall’s operation was performed. Specifically, in two cases, a composite conduit (28 mm) with a mechanical prosthetic valve (23 mm) replaced the whole aortic root; in one case, a biological valved porcine conduit was inserted. In all cases, coronary arteries were reimplanted.

Before proceeding to the distal suture, in conditions of deep hypothermia and circulatory arrest without antegrade or retrograde cerebral protection, the aortic clamp was removed, and a direct inspection of the aortic lumen was possible. A vascular stent (Djumbodis Dissection System, Saint Come Chirurgie, Marseille, France) was then inserted in the concavity of aortic arch and expanded against the vessel wall by an appropriate balloon, which was part of the delivery system. The device consists of an unsheathed stent made of 316L steel, provided in three lengths (4, 9 and 14 cm) and mounted on a compliant balloon. The balloon is inflated to adapt the stent to the shape of the aortic arch and to rejoin aortic layers. The stent was fixed to the aortic wall with the distal suture. A 30°, 5-mm endoscope positioned in the aortic arch allowed control during the correct deployment of the stent.

Subsequently, the cardiopulmonary by-pass was restarted and the distal suture performed. Mean circulatory arrest time was 31 ± 7 min, mean clamping time was 110 ± 13 min and mean extracorporeal circulation time was 143 ± 15 min.

Results

No intraoperative complications were reported. The mean intensive care stay was 4.6 days (range 3–6 days). One patient had postoperative delirium, which resolved after 2 days. Neurological outcome was uneventful for all patients. Three patients required donor blood transfusions. Mean mechanical ventilation time was 19.6 h (range 11–34 h). All patients were treated with inotropic drugs (low-dose dopamine) but none showed cardiac failure. No significant postoperative bleeding was reported. No electrocardiogram modifications were observed. Computed tomography angiography scans were performed before discharge (Fig. 1). They revealed complete thrombosis of the false lumen in patients who were suffering from aortic arch dissection. Moreover, they showed an important reduction of false lumen in those patients whose dissection was extended to the entire thoracic and abdominal aorta. The patient who underwent Tirone David’s reimplantation procedure had a complete restoration of aortic valve competence. Positive outcome was reported also in patients who underwent Bentall’s procedure and biological porcine root replacement. At follow-up, which continued until December 2004, all patients were alive, three of them were in functional NYHA class I and one patient in class II. No patient underwent further hospitalization.

Discussion

Our initial experience concerns four patients, and the validity of this surgical option merits further investigations in a larger number of patients. However, we achieved encouraging results in our patients, as shown by satisfactory surgical results and short-term follow-up. The treatment of acute aortic dissection with surgical replacement of aortic root or ascending aorta combined with arch stabilization was recently performed [1] as a further possibility to manage chronic residual dissection when surgical replacement of proximal aorta is required.

Residual chronic dissection is common in patients who undergo traditional repair after acute aortic dissection. A persistent false lumen can occur in 60–80% of cases [2]. The outcome of these patients depends on the false lumen thrombosis and the true lumen diameter [3]. Certainly, in acute dissection, this goal can be easier to achieve but, in chronic dissection, stent implantation could reduce false lumen, and prevent true lumen reduction and aortic wall rupture [4].

It may be argued that this procedure should be applied in chronic patients as in first-instance operations. However, in cases presenting with other surgical indications, such as aortic valve dysfunction or aortic root dilatation, stent implantation could routinely be performed to achieve...
arch stabilization with complete or partial reduction of false lumen.

Indeed, in our experience, we combined four mandatory repairs for aortic root dilatation (with 50 mm minimum and 54 mm maximum) with stent placement inside the aortic arch. This procedure is interesting and could emerge as a new treatment providing excellent results related to its high efficacy, its low complication rate and a simple surgical technique that requires a relatively short time of circulatory arrest [5].

In conclusion, the preliminary results and short-term follow-up, suggest that a combined surgical and endovascular approach not only in acute type A aortic dissection, but also in chronic cases, could favour complete, or at least partial, false lumen thrombosis, reducing complications such as progressive dilatation, false lumen rupture and compression followed by impaired distal perfusion.

Long-term follow-up is required for confirmation of these initial positive results.

References