HEART VIEWS

PERSPECTIVE

VALVE CONSERVATION IN TYPE A AORTIC DISSECTION : IS IT JUSTIFIED?

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Aortic valve insufficiency resulting from leaflet prolapse or tearing of the annulus or leaflet is a well-recognized complication of type A aortic dissection and correlates with increased morbidity and mortality if not treated. In the 1960s, Groves and colleagues reported the first successful treatment of commissural disruption and leaflet prolapse (1). Since then, two surgical options have emerged: replacement or conservation of the native aortic valve. The first option includes both separate replacement of the valve and ascending aorta with a supracoronary tubular graft and replacement of the aortic root with a composite tubular graft using the technique introduced by Bentall and DeBono (2). The second option consists of preserving the native valve utilizingvarioustypesofvalve-sparing techniques, which have been popularized in recent years. Aortic valve-sparing is not a new concept but rather reflects the advanced surgical and biomechanical innovation of modern cardiac surgery.

The anatomy of the aortic root has fascinated anatomist and surgeons for centuries, among them Leonardo da Vinci in the 1500s (3), and this has produced various opinions and methods for its evaluation. The term "aortic root" is not addressed in some anatomy texts, but we consider it as a region bounded proximally by the aortic annulus and containing the aortic valve leaflets, aortic wall, sinuses of Valsalva and coronary ostia. The aortic root terminates distally to these structures at the sinutubular junction, after which the ascending aorta originates. The definition of which part of the left ventricular outflow tract constitutes the "aortic annulus" is one of the current anatomical controversies.In fact some surgeons and anatomists believe that the annulus does not exist. However, we consider that any reconstruction involving the origin of the aorta traditionally called "annulus" is defined and described as a "circular orifice" (4). The "aortic valve-sparing project", including all aortic root reconstruction, is based on this anatomic description.

The major indication for aortic valve sparing and aortic root reconstruction is in patients affected by the so-called "annuloectasia" as seen in Marfan syndrome. The surgical approaches utilize the so-called "David's operations" (5,6) and the technique proposed by Yacoub (7). In David's operation (inclusion or reimplantation), successively modified with cutting of the tube to replace one, two or three individual sinuses (6) the valve is resuspended in a tubular conduit (5). However, Mr.Yacoub proposed a more intriguing operation, which involves remodelling of the aortic root utilizing a conduit tailored in a supravalvular position (7).

The scenario in acute aortic dissection is completely different, where the technical challenge is valve resuspension that requires obliteration of the false lumen and appropriate reconfiguration of the commissures. Moreover, the sinus of Valsalva must be recreated along with resuspension of one, two or three of the aortic cusps with appropriate orientation. The role of the sinuses has been demonstrated by in vitro studies showing evidence of increased vortices which facilitate valve closure, reduction of leaflet stress, and a washing effect, thus reducing thrombosis.

Our personal approach in type A aortic dissection is based upon the morphology of the aortic valve and our tendency is to repair the valve whenever feasible, rather than to replace it. In a consecutive series of 56 patients with acute type A dissections observed from January 1994 to December 2002, 34 (60.7%) presented with aortic valve insufficiency (Table I). The diagnosis was made by transthoracic or transesophageal echocardiography together with contrast-enhanced computed tomography in all subjects with stable hemodynamics. All

patients underwent emergency surgery via a median sternotomy and femoral-right atrium (45/56;80.3%) or axillary artery-right atrium (11/56;19.7%)
cardiopulmonary bypass with moderate general hypothermia (28°C) in 17 patients (30.3%) and deep hypothermic circulatory arrest in 39 patients (69.7%).

Table 1: Valve repair in type A aortic dissection

No. of patients with valvular insufficiency in acute aortic dissection (January 1994–December 2002)	34/56 (60.7%)	
Valve abnormality		**Type of valve repair**
Commissural prolapse	27/34 (79.4%) →	Commissural resuspension (see figure 2)
Cusp prolapse	3/34 (8.8%) →	Resuspension
Annular dilatation	4/34 (11.8%) → →	Commissural plicatio (3) Circumclusion (1)

The dissected aorta was completely resected and the cuffs were prepared using biological glue (gelatin-resorcine-formaldehyde) to obliterate the false lumen (Fig.1) and external strips of Teflon felt to reinforce the wall, and sutured to a vascular graft. The aortic valve was preserved as follows: 27/34 (79.4%) commissural resuspension (Fig.2) for commissural prolapse, 3/34 (8.8%) resuspensions due to cusp prolapse, 3/34 (8.8%) commissural plication and 1/34 (3.0%) circumclusion for annular dilatation. The prolapse of the commissures due to aortic dissection destroyed the sinotubular region and the commissures were resuspended with 4-0 polipropilene pledgeted sutures that also occluded the dissected space. In the case of cusp prolapse, we performed a resuspension of the free edge near the commissure using pledgeted suture, and finally when annular dilatation was present we utilized plication of the aortic wall at each commissure and in 1 case an encircling suture of the whole aortic circumference (circumclusion). This latter technique has subsequently been considered obsolete, because of the tendency to distort the sinuses.

All these techniques have been previously described by Carlos Duran (8), and we believe that the anatomical aspects of the valve are respected by these repair principles (except the circumclusion), as confirmed by our results. The overall hospital mortality was 17.8% (10/56); the mortality in the group with aortic insufficiency was 23.5% (8/34) in patients with preoperative hemodynamic instability.

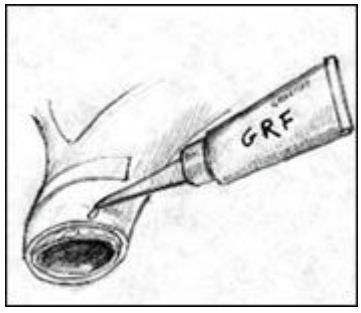

Fig.1: Preparation of the distal cuff of the dissected aorta using biological glue

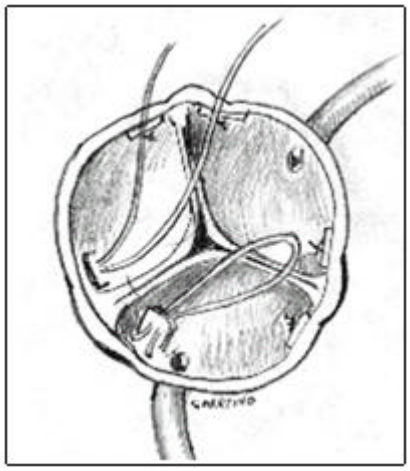

Fig. 2: Repair of commissural prolapse by resuspension (Duran technique)

One patient presented with a type B dissection with subtotal obstruction of the true lumen at one month after repair of the proximal aorta and died after reoperation. The remaining 25 patients were followed by echocardiography and computed tomography for 3 to 108 months with 2 sudden late deaths at 42 and 22 months respectively. There was no aortic regurgitation in 19 cases, while moderate insufficiency (2+) was observed in 4, without new symptoms or radiological evidence of redissection or peripheral vascular compromise.

The preservation of the aortic valve in type A aortic dissection is an excellent alternative to the mechanical valve replacement that requires consequent anticoagulation, and which may interfere with thrombosis of the residual false lumen. Recently, the operation suggested by David (5,6) has been proposed in the treatment of acute dissection with valve incompetence, but long-term results are needed to confirm that this is an optimal choice rather than separate valve preservation and graft replacement of the ascending aorta or composite valve graft implantation (2). In our series of patients, the procedure of valve preservation and replacement of the ascending aorta with a tubular graft was selected when the dimension of the aortic root, was less than 40 mm. It is obvious that a larger number of patients and long-term follow-up are needed to support and justify this procedure.

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