Operative Techniques in
Thoracic and
Cardiovascular Surgery

Aortic Valve Reimplantation According to the David Type I Technique

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Anatomy determines the close vicinity of the sinuses of Valsalva and the aortic valve leaflets. Therefore, the aortic valve has to be involved in any planning of surgery on the critically dilated aortic root. This is particularly true in patients with little or no structural changes of the valvular leaflets, because these valves can be considered potentially retainable regardless if they are tricuspid, bicuspid, competent, or regurgitant. The surgical challenge therefore resides in the need for a procedure that enables resection and replacement of diseased sinuses while preserving and/or restoring both function and anatomy of the aortic valve.

In 1993, we adopted a method for aortic valve reimplantation, which was described by T. David 1 year earlier. Meanwhile, we have used this technique in more than 300 patients with retainable aortic valves for 3 reasons:

1. It appears to provide long-term stability of the aortic annulus.
2. The procedure is relatively hemostatic.
3. The procedure is teachable to many surgeons with some interest in surgery on the aortic root.

With ongoing experience, we have expanded its use from patients with aneurysms of the aortic root to patients with aortic dissection too. The latter indication is still a matter of reasonable debate given the fact that aortic valve reimplantation takes somewhat more time compared with the implantation of a valved conduit or supracoronary replacement of the ascending aorta. On the other hand, this operation is probably the best treatment of the dissected aortic root, because most of the diseased vessel wall may be resected and replaced by a vascular graft while at the same time retaining the valve.

Likewise, many surgeons regard aortic valve reimplantation as the first choice for aortic root aneurysm in patients with Marfan syndrome who do not present with pronounced leaflet prolapse or extensive fenestrations in the valvular commissures. Whether this opinion will withstand the test of time is currently challenged by a prospective, multicenter clinical trial initiated by members of the National Marfan Foundation.

Using the original so called T. David type I procedure, we have remained resistant to the evolution, which this procedure has undergone in the meantime. However, our follow-up data well justify this attitude, because the incidence of reoperation for late valve failure has remained acceptable.

Operative Technique of the David Type I Procedure

The technique of aortic valve reimplantation can be used in many cases of aortic root aneurysm whenever the aortic valve is not stenotic and/or calcified. Central mild-to-moderate regurgitation can be corrected very often, whereas eccentric regurgitation may be more difficult to treat by this technique alone.

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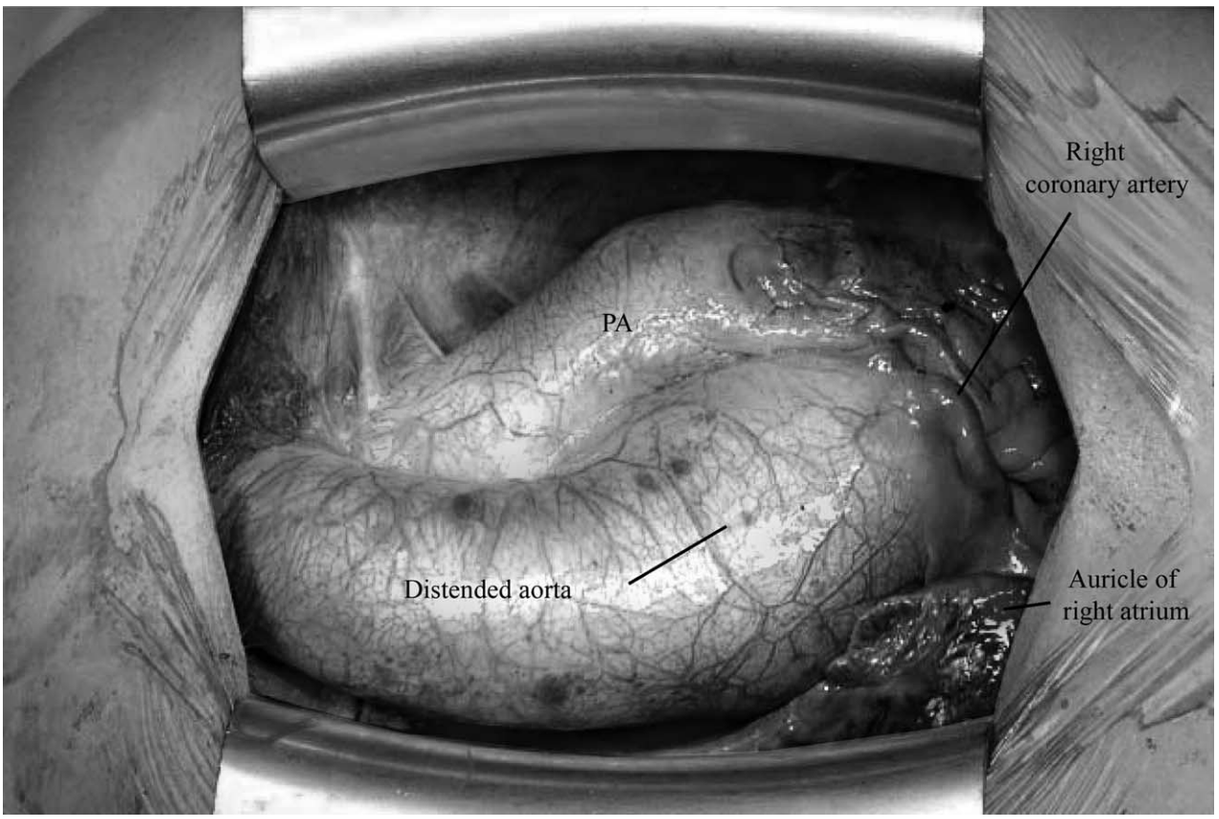

Figure 1 The surgeon's view of the ascending aorta of a 26-year-old female patient with Marfan syndrome with a typical aortic root aneurysm 5 cm in diameter. The preoperative echocardiography revealed only mild aortic regurgitation. The onion-shaped aneurysmatic dilation is confined to the proximal ascending aorta, while its distal segment is not dilated. As with many ascending aortic aneurysms, the heart is rotated posterolaterally, which sometimes hides the right atrial appendage. The ascending aorta may now be cannulated. Venous drainage is accomplished by a 2-stage cannula, unless there is evidence of a shunt on the atrial level, which requires for bicaval cannulation to prevent from aspiration of air into the heart-lung machine once the aorta is opened. On full extracorporeal circulation, the heart is fibrillated before a vent catheter is introduced into the left ventricle through the right upper pulmonary vein to prevent from instant left ventricular over distension, which may develop due to aortic regurgitation. In addition, the vent catheter is very helpful to clear the operative field from residual blood flowing through the pulmonary veins. Then, the distal ascending aorta is cross clamped carefully before the aorta is opened and completely transected. Because of the distal progression of aortic root dilation, the sinotubular junction may sometimes have disappeared. In this condition, the aorta should be incised 3 to 5 mm distal to the estimated level of the former sinotubular junction to prevent from injury to both the right coronary ostium and aortic valve commissure between the right and the noncoronary sinus. This is particularly important in patients with Marfan syndrome, in whom both structures may have drifted surprisingly far downstream within the aortic root.