
Enlargement of the Aortic Annulus by Resecting the Commissure Between the Left and Noncoronary Cusps

Luis Nuñez, M.D., M. Gil Aguado, M.D.,
A. G. Pinto, M.D., and J. L. Larrea, M.D.

ALTHOUGH several methods of annulus enlargement have been described in the literature,¹⁻⁴ replacing the aortic valve in patients with a small aortic annulus remains a difficult surgical problem. Surgeons have been reluctant to use the procedures advocated because of technical difficulties such as injury to various cardiac structures or poor circumferential enlargement. We propose a new method of enlarging the aortic annulus that avoids most of these limitations.

Operative Technique

A transverse aortotomy is made in the anterior wall of the ascending aorta and is extended inferiorly and to the right towards the posterior commissure (between the left and the noncoronary cusps). After resection of the aortic cusps, and if the decision is made to enlarge the annulus, the adventitia of the aorta is separated from the middle layer by blunt dissection and is dissected distally beyond the posterior commissure. This easily performed maneuver separates the left atrial wall from the posterior aortic annulus, avoiding entrance into the left atrial roof. The posterior commissure is then resected (Fig. 1). Lateral spontaneous retraction of the edges is seen when the commissure is removed. A wide separation of 15 to 22 mm

is obtained between the incised ends of the left coronary and the noncoronary parts of the annulus, with the base of the gap formed by the fibrous origin of the ante-

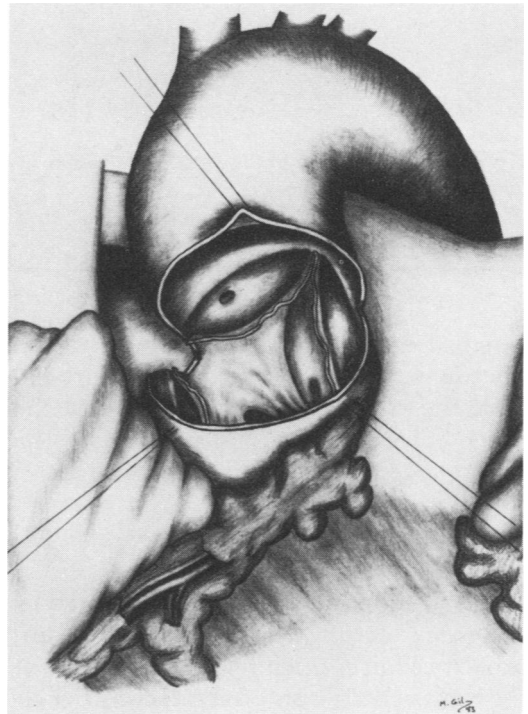


Fig. 1 The left atrial wall is separated from the posterior aortic annulus, avoiding entrance into the left atrial roof, and the posterior commissure is then resected.

From the Cardiac Surgery Department, Hospital Clinico San Carlos, Universidad Complutense, Madrid, Spain.

Address for reprints: Luis Nuñez, Otero y Delage 58, Madrid 35, Spain.

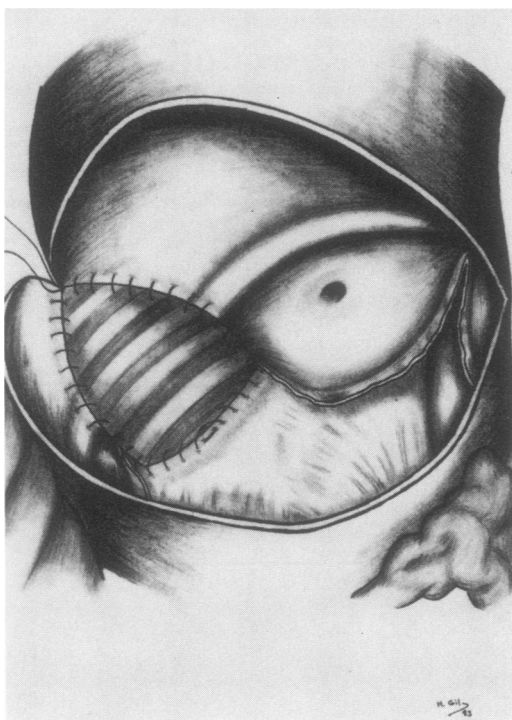


Fig. 2 A woven Dacron patch with a wide base is sutured to close the created defect.

rior leaflet of the mitral valve. A woven Dacron patch with a wide base is sutured to close the created defect (Fig. 2), and the aortic valve prosthesis is attached to the Dacron patch with interrupted sutures.

Discussion

The aortic annulus has been enlarged by different techniques. The anterior approach requires opening and repairing of the right ventricle and the interventricular septum³; however, injury to the conducting system and the septal coronary branches has been reported.⁵ The posterior approach, as described by Nicks and colleagues¹ and by Blank and associates,² is less traumatic but allows for only a few millimeters of enlargement and risks tearing the roof of the left atrium once the heart starts beating again. The posterior approach of Manouguian and colleagues⁴

widens the aortic annulus very efficiently but may cause disruption of the patch used to close the anterior mitral leaflet. No long-term reports of mitral function with the use of Manouguian's technique have been published.

The new technique reported here is advantageous because it does not cause injury to any important structure. The left atrial wall is dissected away with the aortic adventitial layer; the conducting system remains anteriorly distant; the left coronary ostium is several millimeters to the left; and incision of the mitral valve is not required. Another advantage is that the Dacron patch sutures are attached to firm structures—the fibrous base of the anterior mitral leaflet and the aortic wall. Finally, the new aortic ring remains above the mitral valve. Enlargement of the aortic ring is achieved by spontaneously separating the cut edges of the annulus and by flattening and extending the space between the aortic ring and the mitral annulus (Fig. 3, A and B). By using this technique, we have been able to insert prostheses from 4 to 6 mm larger than would have been possible originally.

We have used this technique in seven patients. In two children with inactive bacterial endocarditis and cusp perforations, the diameter of the aortic annulus was enlarged from 17 to 21 mm in one, and from 17 to 23 mm in the other. A St. Jude medical valve prosthesis was inserted in both cases. In five adults ranging in age from 47 to 62 years, the aortic annulus was enlarged from 17 to 21 mm in two patients and from 17 to 23 mm in three patients. Two St. Jude Medical and three Ionescu-Shiley valves were inserted. Thus far, all patients have remained well between 3 months and 2 years postoperatively.

References

1. Nicks R, Cartmill T, Bernstein L. Hypoplasia of the aortic root. *Thorax* 1970; 25:339.
2. Blank RH, Pupello DF, Bessone LN, Harrison EE, Sbar S. Method of managing the small aortic annulus during valve replacement. *Ann Thorac Surg* 1976; 22:356.

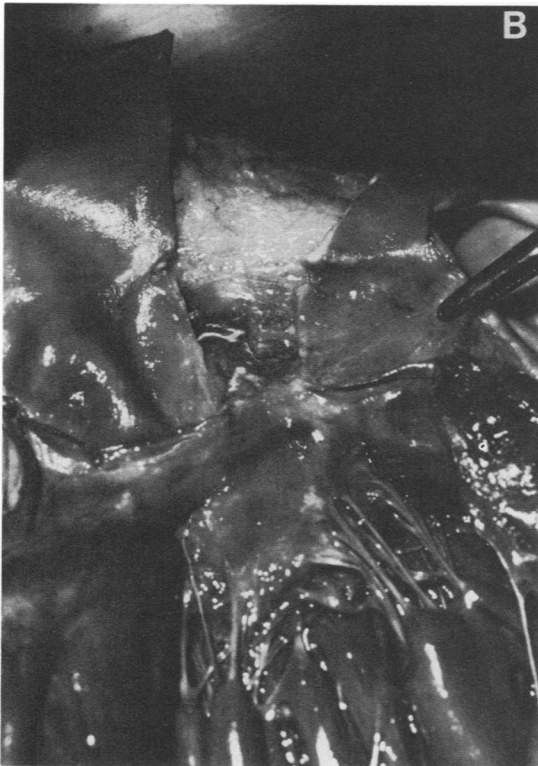


Fig. 3 (A) The space between the aortic commissure and the mitral ring allows for a wide separation of the cut edges of the aortic ring. (B) This enlargement in cases involving a small aortic annulus is more prominent than in this picture, taken from a cadaver with a normal aortic valve.

3. Konno S, Imai Y, Nakajima M, Fida Y. A new method for prosthetic valve replacement in congenital aortic stenosis associated with hypoplasia of the aortic valve ring. *J Thorac Cardiovasc Surg* 1975; 70:909.
4. Manouguian S, Seybold-Epting W. Patch enlargement of the aortic valve ring extending the aortic incision into the anterior mitral leaflet. New operative technique. *J Thorac Cardiovasc Surg* 1979; 78:402.
5. Rastan H, Abu-Aishah N, Rastan D. Results of aortoventriculoplasty in twenty-one consecutive patients with left ventricular outflow tract obstruction. *J Thorac Cardiovasc Surg* 1978; 75:659.