

How-to-do-it

A technique to reposition sinotubular junction in aortic valve reimplantation procedures with the De Paulis Valsalva graft

Daniele Maselli^{*}, Gaetano Minzioni

Department of Cardiac Surgery, Azienda Ospedaliera Universitaria Pisana, Via Paradisa n° 2, 56124 Pisa, Italy

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Abstract

Sinotubular junction reconstruction in reimplantation type of valve-sparing aortic procedure can present some problem when a Valsalva graft is used. Since in the Valsalva graft the sinotubular junction height is predetermined, correct matching with native commissures height can be difficult. We propose a method by which it is possible to create a new sinotubular junction in Valsalva graft without altering its original configuration.

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1. Introduction

The aortic valve-sparing reimplantation technique described by David and Feindel [1] is an established method for surgical treatment of aortic regurgitation due to aortic root dilatation with preserved aortic leaflets.

Evolution of the technique has shed light on the importance of a physiologic reconstruction of the aortic root including neo-sinuses of Valsalva [2] which play a key role in driving a correct function and durability of aortic cusps [3,4].

The De Paulis Valsalva graft (Gelweave Valsalva; Sulzer Vascutek, Renfrewshire, Scotland) is a tubular graft incorporating a self-expandable region, obtained by 90° rotation of the Dacron fabric corrugations, which has been demonstrated to produce neo-sinuses of Valsalva and physiologic aortic leaflets movement [5]. Since Valsalva graft's sinotubular junction height above aortic annulus plane equals graft collar diameter, relative proportions of the prosthetic components are fixed. Height of the native commissures, however, can be inadequate to reach the sinotubular junction of the graft and the surgeon has to adapt prosthesis to suit the patient.

As an alternative grafts of two different diameters can be used to create pseudosinuses of Valsalva and a neo-sinotubular junction, as described by the Stanford group [6].

We propose a simple method by which commissures can be repositioned at an ideal height in the Valsalva graft; even in the skirt of the graft and graft sinotubular junction can be repositioned.

2. Technique

Native sinuses are resected leaving the coronaries on buttons and commissural pillars with a sewing margin of 5 mm on pillars and sinuses remnants. A Valsalva graft is selected and its collar is shortened to a minimum. The graft is implanted in the left ventricular outflow tract and its distal portion is cut 3 cm above the skirt and stored.

The commissures are fixed in the graft at the ideal height by horizontal mattress sutures. Sutures are passed from inside to outside and are not tied. The distance between the lowest commissure and the Valsalva graft sinotubular junction is measured and a 10-mm longer ring is cut away from the resected portion of the graft itself.

After completing sub-coronary sutures, the ring is inserted around the body of the graft and lowered to the level of the lowest commissure. Horizontal sutures used to position the commissures are passed from inside to outside into the ring at its lower margin and then tied. Two additional mattress sutures are placed at the lower margin of the ring above each coronary button in order to prevent eventual ring sliding and coronary compression. Preventing expansion of the skirt, the ring realizes a new sinotubular junction at the appropriate level of the Valsalva graft (Fig. 1).

3. Case report

A 59-year-old man underwent aortic valve reimplantation procedure with a Valsalva graft for an ascending aortic aneurysm with tricuspid aortic valve and moderate aortic

^{*} Corresponding author. Tel.: +39 0 5099 5261; fax: +39 0 5099 5271.
E-mail address: dmaselli@tiscali.it (D. Maselli).

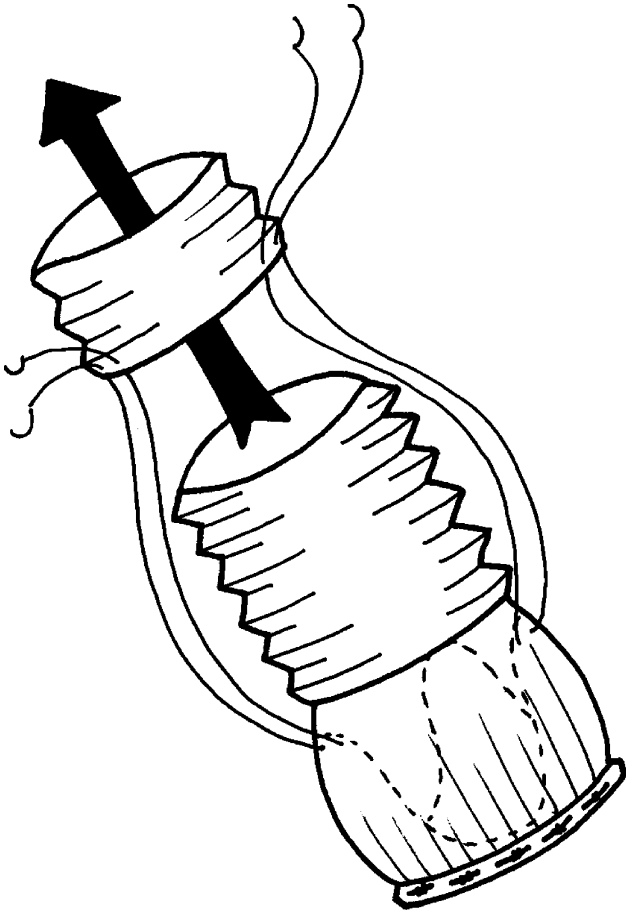


Fig. 1. Technique description. Commissures are re-suspended at the ideal height in the skirt of the graft. The new sinotubular junction is realized by suturing at the level of commissures, a ring obtained from the body of the graft itself. To enhance clarity, only two of the three commissural sutures are illustrated. See text for details.

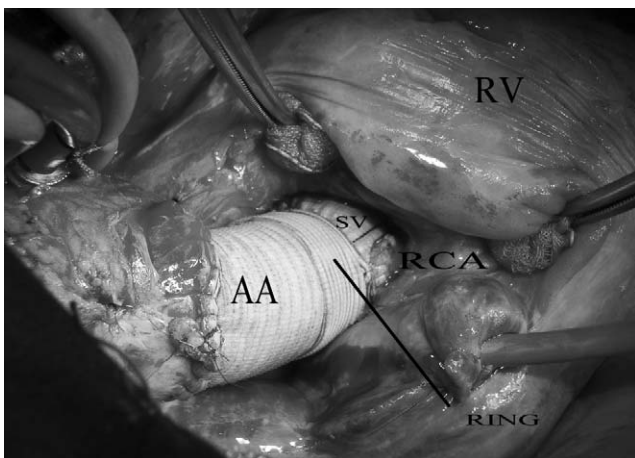


Fig. 2. Final anatomic appearance of the neo-aortic root. Sinuses of Valsalva and a neo-sinotubular junction can be appreciated. AA: ascending aorta; RCA: right coronary artery; RING: graft ring used to realize a new sinotubular junction; RV: right ventricle; SV: neo-sinuses of Valsalva.

regurgitation. At operation the right to left, left to non coronary, non coronary to right commissures were found to be at 18 mm, 20 mm and 22 mm, respectively, above aortic annulus plane. A 28-mm Valsalva graft was implanted following our technique. A 20-mm long ring was used to relocate the sinotubular junction. Final anatomic appearance of the aortic root is illustrated in Fig. 2.

4. Discussion

Sinotubular junction height in the Valsalva graft is fixed and increases with graft size. Some sort of adaptation has often to be made in order to adjust native commissures height to graft sinotubular junction height. De Paulis proposes to cut the skirt of the graft at the desired length after measuring commissures height and to reimplant the aortic annulus directly in the skirt. By using this method, however, since aortic annulus size is by definition always smaller than selected prosthesis, once annular sutures are tied, the curvature radius of the skirt, and consequently the volume of neo-sinuses, is significantly reduced. A bigger graft has to be selected to achieve the planned final sinuses size. Selecting a bigger graft, however, results in a bigger sinotubular junction and in a sinotubular junction to aortic annulus ratio that can be much higher than normal.

Recently, Mazzola et al. [7] proposed to pass the stitches used to fix the commissures in the skirt and then at the top of the graft to lower the sinotubular junction at the appropriate level. This technique determines a sandwich of graft wall and can produce an excess of tissue bulging inside the graft.

Our technique is easy to realize and requires minimal modification of the graft limited to the reduction of the collar height. It preserves the annular portion of the graft allowing an effective aortic annulus stabilization and respects the smooth internal contour of the neo-sinotubular junction. Since the ring has the same size of the tubular portion of the graft, it simply lowers sinotubular junction of the graft with a minimal reduction of the curvature radius of the skirt. By reducing the diameter of the ring used to reposition the sinotubular junction, it is possible to realize a "custom size" neo-sinotubular junction.

Our technique can be proposed for frequent situation in which a correct matching between native sinuses and neo-sinuses is difficult to achieve.

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