

# BRIEF EXPERIENCE IN AORTIC ROOT OCCLUSION ON A VALVED TUBE IN AORTIC ROOT ANEURYSM

## ABSTRACT

Since 1968, when Bentall and De Bono introduced a novel technique to treat aortic root disease —be it as a result of dissection or aneurysm— surgical mortality improved so much that it became possible to establish this technique as the gold standard for surgical treatment of aortic root disease. Several modifications have been made of the original technique until the present surgery with remodeling or conservation of the aortic valve was developed. In this paper we present our experience with a slight variation of the Bentall technique applied in four patients with aortic root aneurysm that has allowed a reduction of the surgical time and bleeding, fast recovery and easy reproducibility.

**Keywords:** *Aneurysm, Bentall, dissection, aortic root*

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## INTRODUCTION

In 1968, Bentall and De Bono reported the technique that would become the standard for the treatment of combined ascending aorta and aortic valve disease<sup>(1)</sup>, marking a before and after in the post-surgical evolution of these patients. Later, in 1981, Kouchoukos et al. modified the anastomosis of the coronary ostia to the Dacron tube with the button technique<sup>(2,3)</sup>, providing greater mobility and more tension on the ostial anastomosis with reduction of bleeding and preventing coronary twisting. In 1986, Cabrol published another modification to reduce bleeding resulting from tension of the coronary anastomosis with the interposition of a fine 8 mm Dacron tube between both ostia, and in turn, the latter anastomosed to a valved tube<sup>(4,5)</sup>.

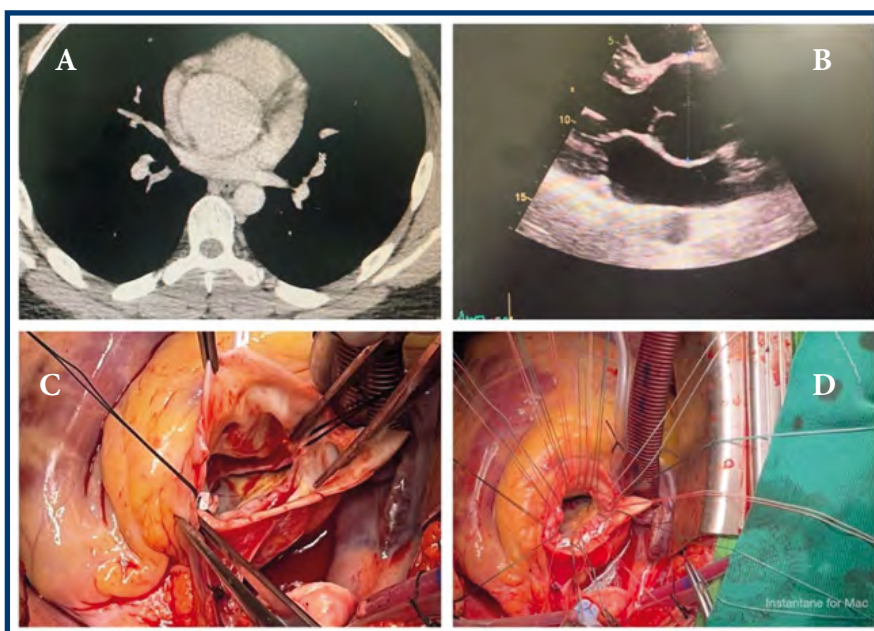
In 1999, Doty DB et al. reported the implant of the FreeStyle bioprosthesis, both in subcoronary position as well as with inclusion in the aortic root with good results<sup>(6)</sup>. In 1992, David TE et al. published their experience in aortic root remodeling with promising results<sup>(7)</sup>.

In 1993 Copeland created the miniskirt technique: after the tandem suture in an intra-annular U, a continuous suture of the aortic wall remnant is performed 1 cm above the prosthesis skirt in the valved tube with the aim of reducing bleeding of the proximal anastomosis<sup>(8)</sup>. By 1995, Khana et al. reported that a tobacco-pouch suture, reinforced with Teflon patches through the aortic wall, above the proximal suture line may prevent bleeding<sup>(9)</sup>. Later, in 2010, Mohite *et al.*<sup>(10)</sup> reported their experience with the use of everted mattress sutures, interrupted

in the proximal anastomosis, passing them through the tube suture sleeve with a valve, and then through an autologous pericardial strip. Chen et al. used a prosthesis that was modified with a Dacron miniskirt joined to the suture sleeve, which was sutured to the remaining proximal aortic tissue, thus creating a perianostomotic space that was later filled with fibrin glue<sup>(11)</sup>. Finally, in 2012, Alessandro Della Corte performed an intra-annular imbricated U suture in proximal anastomosis, obtaining a marked bleeding reduction and good surgical results<sup>(12)</sup>.

## TECHNIQUE

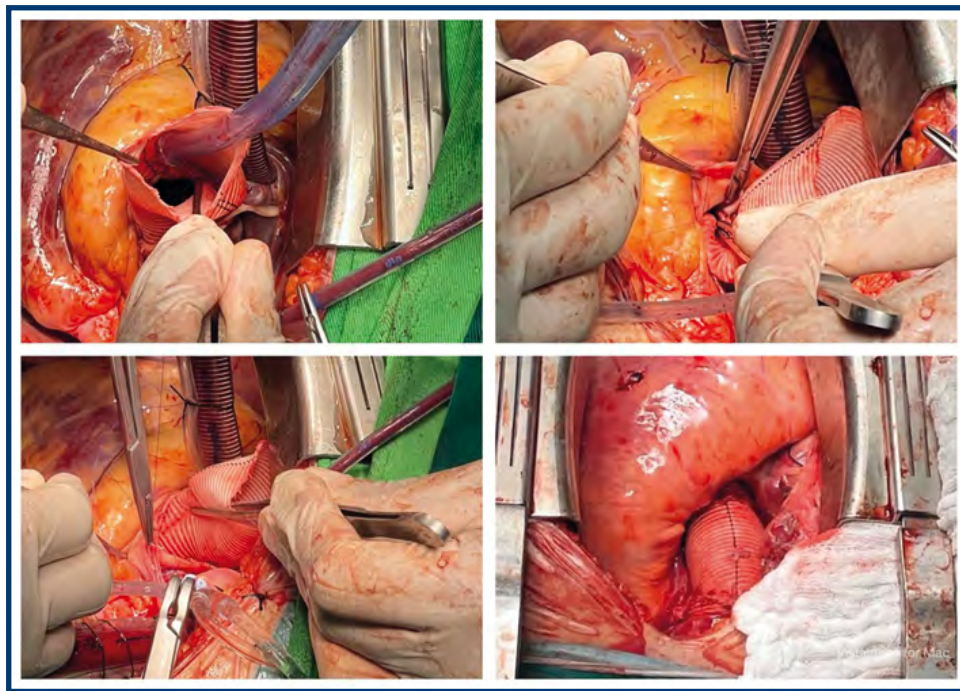
The technique consists in performing a transversal aortotomy at the level of the sinotubular junction. We fix the commissures with multifilament 2.0, resect the veils, decalcify if required, place the braided multifilament suture on Teflon with an intra-annular technique (Figure 1), pass these sutures through the Dacron tube prosthesis skirt and knot one by one. We fill the prosthesis with saline solution plus a Valsalva maneuver, stop venting, and then mark the coronary ostium site with demographic pencil. We create an ovoid opening with the cautery device in the Dacron tube on the mark, resect a margin of at least 5 mm outside the left ostium and suture with polypropylene 6.0 from inside the tube with a 0.5 cm margin of coronary ostium towards the aortic wall and Dacron tube with a three-loop parachute technique. Then we proceed with a continuous suture until completing the circumference. We recommend to start and finish at 3:00 o'clock position and move forward clockwise as the anastomosis accommodates.



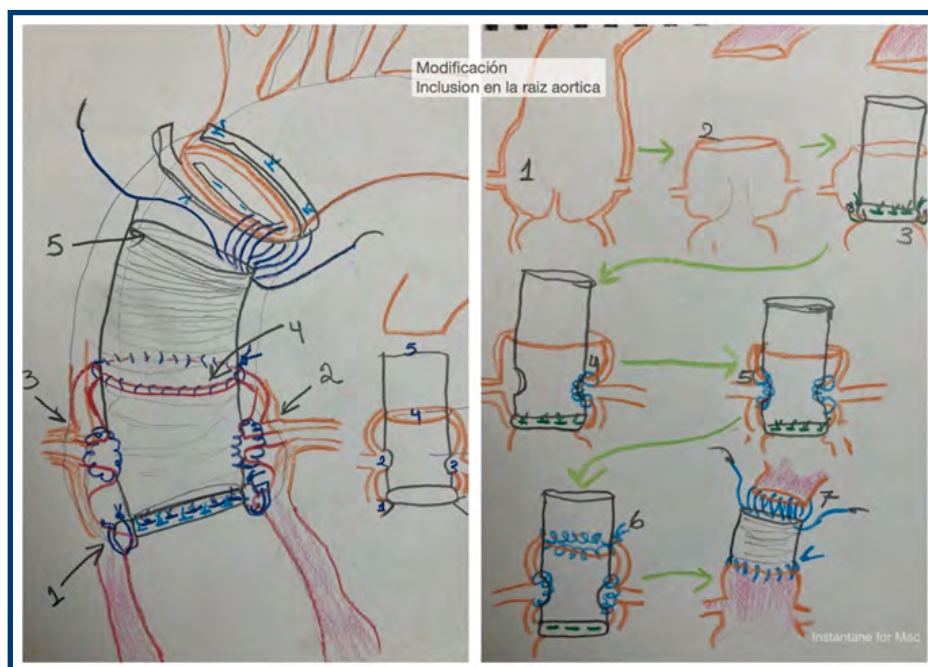
**FIGURE 1.** A. Chest CT showing aneurysm of the aortic root. B. Echocardiography showing bicuspid valve with aortic-root dilation. C. Transverse aortotomy in a sinotubular junction. D. Intra-annular valved tube implant.

It is not necessary to reinforce the ostium wall (starting from inside and taking aortic wall reinforces the suture against the Dacron tube). We inspect the ostium integrity and make sure that it does not bend when released. We proceed to fill the Dacron tube and mark with demographic pencil the site where the right coronary ostium will lie. We perform the prosthesis foramen with the cautery device in an ovoid shape with a similar technique as that of the left ostium. We cut

the valved tube to the height of the distal anastomosis, first performing a continuous raphy of the remaining aortic wall with polypropylene 5.0 in the sinotubular junction against the Dacron tube contour. We use biological glue in this raphy (not indispensable) and perform the distal anastomosis with polypropylene 4.0 lying on Teflon, Dacron or pericardium with a sandwich technique with Dacron or felt (Figure 2). In Figure 3 we sketch the surgical steps.



**FIGURE 2.** A. Intra-aortic root mechanical valved tube. B. Endoaortic raphy of the right ostium. C. Continuous raphy of the supracoronary crown against Dacron tube. D. Anastomosis performed, minimum bleeding.



**FIGURE 3.** A. Drawing of the applied technique. B. Modification steps of the Bentall technique.

## CASES

Mean age: 48 years; one woman and three men. Mean extracorporeal circulation time: 112 minutes; average clamping time: 95 minutes; 24-hour bleeding in three patients, the mean was 658 ml. One of the four patients bled 1420 ml in the context of coagulopathy that soon reverted. Three of the four patients remained less than 48 hours in intensive care units, one of them prolonged the stay to four days and the mediastinal drainage tubes were removed on day three. No deaths were reported.

## DISCUSSION

Our initial experience has been very encouraging. Results have been very good, both in terms of shorter aortic clamping, extracorporeal circulation and total surgery time as well as less post-surgical bleeding and fast recovery. We present for your consideration this short experience of a minimum modification of the original technique that, in our understanding, might benefit a significant group of patients.

### Conflicts of interest

The authors have no disclosures to declare.

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