



Evaluation of aortic valve in valve sparing root replacement: Reimplantation versus noncoronary sinus replacement

Khaled S. Karara^a, Said A. Badr^b, Basem A. Ramadan^a, Ahmed A. Saad^{a,*}

^a Department of Cardiothoracic Surgery, Faculty of Medicine, Alexandria University, Egypt

^b Department of Cardiothoracic Surgery, Faculty of Medicine, Cairo University, Egypt

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Abstract

Background: Valve sparing aortic root replacement (VSRR) had been popularized in the last decades because preservation of the native valve allows for better hemodynamics, better left ventricular performance, lesser risk of endocarditis and avoidance of lifelong anticoagulation. Two basic types of VSRR techniques are used: reimplantation of the aortic valve (Tirone David) and remodeling of the aortic root (Yacoub). We compared the David reimplantation technique versus one or two sinus replacement in repair of aortic root aneurysm or dissection associated with aortic regurgite.

Patients & Methods: Fifty patients were divided into two groups: Group I (25 patients) undergone David reimplantation technique, Group II (25 patients) undergone supracoronary with one or two sinus replacement.

Results: There were two deaths (8%) within 30 days in each group. Postoperative significant regurgite in Group I occurred in 1 case (4.3%) and in 2 cases (8.6%) in Group II with no significant difference. Cross clamp time was significantly shorter in Group II; 137 ± 37.0 min versus 177 ± 33.0 min in Group I. Significant bleeding occurred in 7 cases (28%) in Group I which was significantly higher than Group II; 1 case (4%).

Conclusion: Replacement of one or two sinuses is not inferior to reimplantation technique regarding early survival and correction of aortic regurgite. Noncoronary sinus replacement provided better results than reimplantation technique regarding postoperative bleeding and cross clamp time.

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Keywords: Aorta; Aortic regurgite; Valve sparing root replacement; David reimplantation

1. Introduction

Cystic medial necrosis (degenerative etiology) is the most common etiology of ascending thoracic aortic aneurysm disease. Smoking has been associated with increased concentrations of elastolytic enzymes [1].

* Corresponding author. Tel.: +20 1227392193.

E-mail address: ahmed.anwar2127@gmail.com (A.A. Saad).

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Genetic causes for aneurysm/dissection include Marfan syndrome, Ehlers-Danlos syndrome and Non-syndromic familial thoracic aortic aneurysms and dissection (nsTAAD) [2].

Bicuspid aortic valve (BAV) is the most common congenital cardiac defect, with prevalence at birth of 1–2%. Males are more often affected than females. In addition to early onset aortic root dilation, BAV is an independent risk factor for dissection and rupture [3].

Multislice Contrast-enhanced computed tomography (MSCT) is a gold standard in diagnosis due to short acquisition time, 3D reconstruction, and its widespread availability. In addition, it extends the scan field-of-view to the upper thoracic branches and the iliac and femoral arteries so assisting in planning surgical or endovascular repair procedures [4].

Transthoracic (TTE) and transesophageal (TEE) echocardiography should be used in a complementary manner. Important data can be obtained by TTE; the TEE exam may be focused only to confirm and assess the extent of dissection along with the morphological features of dissection that impact management [5].

1.1. Surgical management

To manage aortic regurg together with aortic root replacement; two main groups of surgical strategies can be used: valve replacement (modified Bentall) and valve sparing which includes reimplantation technique and remodeling technique with its modifications.

Modified Bentall procedure: Composite graft and mechanical valve replacement of the aortic root and ascending aorta with coronary reimplantation which became the gold standard for treatment of aortic aneurysm and aortic dissection.

Cabrol and colleagues used an 8- to 10-mm Dacron graft anastomosed to coronary ostia during root replacement which is useful in redo cases and hugely dilated root [6].

Aortic reimplantation technique: Tirone David-I (TD I): Reimplantation of the aortic valve within a Dacron tube graft [6].

Yacoub aortic root remodeling technique: Utilizing a tripartite crown-shaped Dacron tube graft. It required coronary reimplantation but did not provide stabilization of the aortic base or specific narrowing of the sino-tubular junction [7].

Another technique was described in Japan in 2008 and published as ‘Modified partial aortic root remodeling in acute type A aortic dissection’ in which the sinus is left (if one or two Valsalva sinuses are affected) but a U-shaped Dacron patch sutured to the inside of the sinus to reinforce the dissected weakened wall. They proposed its usefulness regarding bleeding, and shorter clamp time [8].

1.2. Results of surgical repair

For valve sparing procedures, over two-thirds of patients remain free of re-development of significant aortic regurg at 8–10 years following surgery [9]. However, the opening and closing behavior of the aortic valve preserved with the remodeling procedure appeared to be more physiologic when compared with the reimplantation technique [9].

Perioperative mortality has varied between 0 and 6% with a 7-year survival of $72-78 \pm 8\%$, these results are comparable to composite valve-graft techniques, in which the operative mortality approximates 3.3–4% [10].

2. Aim of the work

This study was carried out to compare the results of David reimplantation technique versus noncoronary sinus replacement in repair of aortic root aneurysm/dissection associated with aortic regurg.

3. Patients

The study was a prospective study done in Cardiothoracic Surgery Departments of Cairo University Hospital and Alexandria Main University Hospital in the period from March 2012 till July 2015. Fifty patients having aortic root aneurysm/dissection and significant aortic regurg were divided into two groups:

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