



# Reimplantation Technique for Bicuspid Aortic Valve and Aortic Aneurysm in a Patient with Right Sided Aortic Arch

Calogera Pisano<sup>1\*</sup>, Riccardo Bentivegna<sup>2</sup>, Salvatore Territo<sup>3</sup> and Vincenzo Argano<sup>3</sup>

<sup>1</sup>Department of Cardiac Surgery Unit, Tor Vergata University Hospital, Rome, Italy

<sup>2</sup>Department of Cardiology, University Hospital "P. Giaccone", Italy

<sup>3</sup>Department of Surgery and Oncology, University Hospital "P. Giaccone", Italy

## Abstract

Bicuspid aortic valve repair is still a debated argument in cardiac surgery according complexity of the technique and the lack of long term results. We reported a challenging case of David reimplantation technique for bicuspid aortic valve and ascending thoracic aneurysm in a patient with right-side aortic arch.

**Keywords:** Bicuspid aortic valve; Right-side aortic arch; TEE

## Introduction

The Bicuspid Aortic Valve (BAV) is the most common congenital cardiovascular abnormality, with a prevalence of 0.9% to 2.5% in the general population. The proximal aorta is prone to dilatation and 50% to 60% of patients with BAV will be affected [1]. In recent years, repair techniques for BAV have received increasing attention. Innovations in operative techniques, an improved understanding of the functional anatomy of the aortic valve and root as well as an increased awareness of the mechanisms leading to aortic regurgitation have undoubtedly contributed to this renewed interest [2]. We reported a challenging case of David reimplantation technique for BAV and Thoracic Ascending Aneurysm (TAA) in a patient with Right-side Aortic Arch (RAA), a rare congenital defect of the aorta presented in 0.05% to 0.1% of radiology series. The Edwards classification describes three types of RAA: type I with aberrant left subclavian artery, type II with mirror image branching and type III with isolation of the left subclavian artery [3].

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### \*Correspondence:

Calogera Pisano, Department of Cardiac Surgery Unit, Tor Vergata University Hospital, Rome, Italy, Tel: 0039-3283297692;

E-mail: [bacalpi@libero.it](mailto:bacalpi@libero.it)

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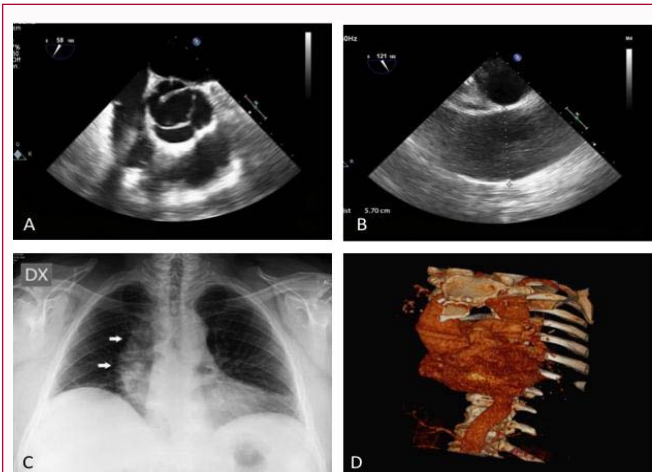
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## Case Presentation

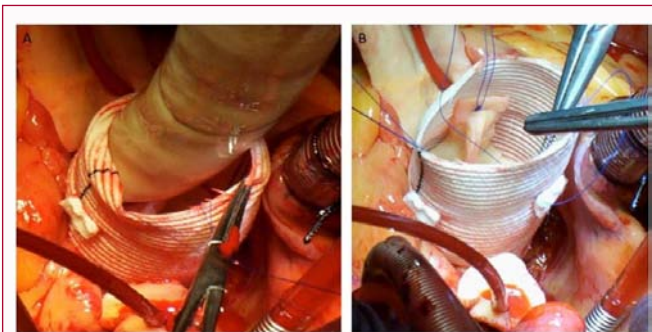
A 50-year-old severely obese man was admitted to our Unit for BAV associated with TAA required surgical management. On admission, Transesophageal Echocardiography (TEE) showed a type 2 BAV with right and left cusp fusion, an enlarged aortic root (44 mm) and sino-tubular junction (41 mm), a TAA (57 mm), slight aortic insufficiency with eccentric jet directed towards the anterior mitral leaflet (Figures 1A and 1B). Chest X-ray, unexpectedly, uncovered a RAA (Figure 1C), and therefore a CT scan was performed. The CT scan showed: a fusiform TAA (57 mm × 52 mm) with a longitudinal extension of about 8 cm associated with a type I RAA, left subclavian artery with the emergency from the third proximal of descendent aorta, common left carotid artery with anterior course in its proximal and middle tract, separate origin of right subclavian artery and right common carotid artery (Figures 1D). The leaking BAV and TAA were repaired with a David reimplantation technique (Figure 2A and 2B) using a 30 mm Dacron graft (MAQUET Intervascular<sup>®</sup>). A good result was achieved with resolution of aortic regurgitation as shown by the post-operative TEE.

## Discussion

In patients with BAV aortic regurgitation related to dilatation of the ascending aorta reimplantation technique seems to be a good solution even in more complex cases associated with RAA. This surgical technique must be adapted to take into account the preexisting symmetry or asymmetry of the native BAV [4]. The first step when using this graft is to fix the height of the native commissures at the appropriate level. This step is followed by trimming the bottom of the graft to match the patient's anatomy. After that we have to scallop the graft in the commissure between the coronary cusp and the right to deal with the external limitations to dissection. Great care should thus be taken in evaluating the relationship between these structures immediately after reimplantation. As a general rule, the level at which the aortic leaflets should come together must be at half the height



**Figure 1:** TEE images showed type 2 BAV (A) and TAA (B). Chest x-Ray (C) and CT scan (D) showed type I RAA.



**Figure 2:** Intraoperative images of David reimplantation techniques in BAV patients (A-B).

of the corresponding sinuses, even when a gentle downward force is applied with a forceps as to simulate high diastolic pressures [5]. Our approach is based on the principle that BAV repair needs to address

the cusps, functional aortic annulus and the ascending aorta as one functional unit. Root replacement in this setting is performed not only to prevent the potentially fatal complications of aortic dissection and rupture but also to stabilize the repair procedure. In our opinion aortic valve reimplantation techniques is safe and reproducible in BAV patient with dilated aortic root and normal cusp. It is a very complex procedure that can be performed by expert surgeons. Anyway, it can be realized also in challenging and rare cases, such us in BAV patients with TAA and RAA.

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