Minimally invasive David reimplantation of bicuspid aortic valve

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Introduction

The technical details of aortic valve reimplantation as a treatment for aortic root aneurism with or without aortic valve insufficiency has been previously described in several studies (1,2). Variations in the aortic valve reimplantation operation have been developed, with the common goal of achieving not only perfect intraoperative results, but also long-term stability. The Valsalva® graft (Vascutek, Inchinnan, Scotland, UK) aims to preserve the long-term performance of the aortic valve (3). It is well known that the occurrence of aortic insufficiency during follow up is dependent on leaflet morphology, satisfactory coaptation length and height and stability of the aorto-ventricular junction (AVJ). In our case presentation (*Video 1*), we emphasize that perfect reimplantation of the bicuspid aortic valve can be achieved by reimplantation of both main commissures into the new sinotubular junction and 180° orientation of the valve.

Clinical vignette

We present the case of a 50-year-old male, with a congenital bicuspid valve with moderate aortic regurgitation (*Video 1*). The patient had an aortic root aneurysm 4.9 cm in size, with a slight progressive enlargement of the left ventricle.

Surgical technique

The partial upper "J" sternotomy in the 4th intercostal space was performed. Four pericardial traction sutures were placed and the ascending aorta was anteriorized. The venous cannula was passed through the left femoral vein in the right atrium using transesophageal echocardiographic (TEE) guidance. The ascending aorta was cannulated directly using straight cannula and cardiopulmonary bypass was established. For decompression of the heart, the right upper pulmonary vein was cannulated and vent was placed in the left ventricle. After aortic cross-clamping, root cardioplegia followed by selective cardioplegia in both coronary ostia was delivered.

Three commissural traction sutures are placed and aortic valve is carefully examined to exclude the structure defects of both leaflets. Both coronary ostia were isolated and aortic root was dissected. The appropriate prosthesis is now chosen using newly designed sizers (Asanus Medizintechnik, Germany). The inner diameter of the sizer corresponds with size of Valsalva prosthesis. Three lines in upper margin divide the sizer circle on thirds, which facilitate orientation of commissures. Traction sutures are passed through the sizing ring and the native orientation together with straightness of both main commissures is checked. In this particular case the 30 mm Valsalva graft was chosen.

The subannular 2/0 Teflon buttressed polypropylene sutures were placed. The orientation of pledgets underneath the commissures was vertical to avoid the interference with leaflet tissue; all other pledgets were placed horizontal. The height of commissures is measured using a novel centimeter caliper method developed by El Khoury's group (2), and the Valsalva prosthesis is marked by pencil to create 180° orientation of reimplanted valve. The 3/0 purse string suture is placed on the bottom of the prosthesis (future aorto-ventricular junction) to allow postoperative adjustment of this area using TEE guidance.

Subannular sutures were passed through the prosthesis (above the purse string suture), the commissures were everted in outflow tract, the prosthesis was parachuted down and sutures were tied. In the conjoint cusp, the sutures were tied firmly to compress the annulus and facilitate

180° orientation of the valve without tension. The major commissures were fixed on opposite sides of neo-sinotubular junction, the rudimentary commissure in between. The valve was than reimplanted using 4/0 Prolene sutures.

The both leaflets were than trimmed using 6/0 central plication sutures to achieve the same length of free margins and coaptation above the annulus. The valve is then tested with cold saline. The coronary ostia are reimplanted in the usual manner, the length of the prosthesis is trimmed and sutured with the remainder of the aorta using 4/0 Prolene suture. Intraoperative TEE was performed to assess the quality of reconstruction. The possible rest aortic regurgitation and the length and height of coaptation were examined and carefully documented for future follow-up.

Comments

We present a successful case of the minimally invasive reimplantation of bicuspid aortic valve. A perfect result for minimally invasive aortic valve reimplantation can be achieved by ensuring symmetrical heights of both commissures in 180° orientation, coaptation above the annulus, and adequate length of coaptation.

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