Aortic valve replacement with a rapid deployment Edwards Intuity bioprosthesis using a completely video-guided approach

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Submitted Mar 02, 2015. Accepted for publication Mar 04, 2015.
doi: 10.3978/j.issn.2225-319X.2015.03.03
View this article at: http://dx.doi.org/10.3978/j.issn.2225-319X.2015.03.03

Clinical vignette

We describe the case of a 54-year-old female with severe aortic stenosis and a background of severe comorbidities including prior radiotherapy for Hodgkin's lymphoma, splenectomy, severe chronic obstructive pulmonary disease, scleroderma with laryngeal and esophageal involvement, and systemic and pulmonary hypertension. The patient underwent totally video-guided aortic valve replacement through a minimally invasive right anterior thoracotomy (*Video 1*).

Surgical technique

Preparation

The operative room setup, patient position and draping was performed according to standardized protocols at our institution. The patient was positioned supine with a 30° elevation of the right shoulder in order to extend the intercostal spaces. Single-lumen endotracheal intubation is achieved, and a four-lumen central right jugular vein catheter is placed. External plaques for direct current (DC) shock are always applied.

Exposition

Cardiopulmonary bypass (CPB) in our minimally invasive operation is performed through peripheral cannulation with surgical exposure of the femoral artery via a small skin incision and counter-lateral percutaneous femoral venous drainage. A minimally invasive right-sided thoracotomy in the 2nd or 3rd intercostal space is made with soft-tissue retractor placement; two additional 5 mm ports are made to place the 30° thoracoscope with CO_2 insufflation and the left ventricle venting line. A 3rd port is made using a Chitwood clamp instead of the Cygnet clamp.

Operation

After aortic cross clamp, the initial shot of antegrade crystalloid cardioplegia was given directly into the aortic root. Following transverse aortotomy, successive doses were given selectively into the coronary ostia. Under video-thoracoscopic view, accurate excision of native aortic leaflets and annular decalcification was made to achieve a smooth and regular surface in order to reduce the risk of paravalvular leaks. An accurate aortic box sizing was made; subsequently three 2/0 Ethibond sutures without pledgets were placed using a "U" annular passage at the nadir of Valsalva's sinuses. A 21-mm Edwards Intuity Elite bioprosthesis was then implanted as indicated and the three Ethibond stitches were tightened.

Completion

The valve was visually inspected for paravalvular leakage. The aortotomy was then closed as usual with two 4/0 Prolene running sutures. Once the patient was been weaned from CPB, transesophageal echocardiography was used to assess the prosthesis in order to exclude paravalvular leaks or other abnormalities. The two ports for thoracoscope and venting line were used for 24 Fr chest tubes drainages positioning and the minithoracotomy was closed.

Comments

Clinical results

The patient was extubated after 4 hours, the postoperative course was uneventful except for new onset of paroxysmal atrial fibrillation and a right pleural effusion requiring delayed drainage removal and patient discharge.

Advantages

Minimally invasive aortic surgery is an excellent choice for debilitated and fragile patients (1,2). Reducing surgical trauma and sternal sparing translates into a faster recovery after surgery, a reduced need for transfusions and fewer perioperative complications (3-5). The surgery performed under video-guided assistance allows the surgeon to avoid a specific preoperative assessment such as computed tomography (CT) imaging to assess the position of the aortic valve respect to the sternum. It also reduces the thoracotomy incision size with less pain, patient discomfort and better aesthetic results.

Caveats

Video-guided minimally invasive cardiac surgery requires a long learning curve; in order to perform it in a safe and reproducible way, the center must have extensive experience in minimally invasive thoracoscopic surgery (i.e., mitral valve surgery).

Technically in small aortic roots, is difficult to place the stitch for the right coronary sinus. The relative tourniquet, that must firmly fix the bioprosthesis to the native annulus, sometimes lifts the valve from the annulus as result of the impingement with the prosthesis holder itself. As safeguard, we suggest to perform a lateral right extended aortotomy in order to easily reach the left region. Once the aorta has been closed, the de-clamped the portion of the aortotomy next to the pulmonary artery is very difficult to handle with a right-sided thoracoscopic access, and thus bleeding in that zone may be difficult to control.

Cite this article as: Hinna Danesi T, Cresce GD, Favaro A, Bilotta M, Salvador L. Aortic valve replacement with a rapid deployment Edwards Intuity bioprosthesis using a completely video-guided approach. Ann Cardiothorac Surg 2015;4(2):210-211. doi: 10.3978/j.issn.2225-319X.2015.03.03

Acknowledgements

Disclosure: The authors declare no conflict of interest.

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