

Medtronic 3f Enable implantation through right anterior thoracotomy

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Clinical vignette

We describe the case of an 80-year-old female with high grade symptomatic aortic stenosis, slightly impaired left ventricular function, chronic obstructive pulmonary disease (COPD), arterial hypertension, atrial fibrillation and a past medical history of left-sided breast cancer that was treated by surgery and radiotherapy two years ago (*Video 1*). The patient was symptomatic for dyspnea (class NYHA III). The logistic Euroscore was 7.94 and the logistic Euroscore II was 1.65%. After cardiac catheterization, which excluded significant coronary artery disease, a minimally invasive sutureless aortic valve replacement (AVR) using a Medtronic 3f Enable valve was planned.

Surgical techniques

Preparation

In a standard operating room, general anesthesia and intubation were performed. External defibrillation pads were placed and a transesophageal echo probe was inserted.

Exposure

A right anterior thoracotomy at the level of the 3rd interspace was chosen as the access site. Cannulation for cardiopulmonary bypass (CPB) was carried out after exposure of the right groin vessels.

Operation

The skin incision is started at the right sternal border at

the 3rd interspace ranging to the mid-clavicular line. After transection of the subcutaneous tissue and muscles the right pleural cavity is entered during a phase of apnea. We do not routinely use double lumen tubes for this kind of surgery. After systemic heparinization, the groin vessels are cannulated and the patient placed on CPB. We used a 21 French cannula (Medtronic) for arterial and a 23 French cannula (Estech) for venous drainage in this case. The pericardium is opened after resection of the fatty tissue and multiple stay sutures are tacked to the lateral aspect of the thoracotomy, helping to further expose the aorta. A vent catheter is brought in place through the right superior pulmonary vein (RSPV) and a cardioplegia catheter into the ascending aorta. The aorta is cross-clamped with a transthoracic clamp through a separate skin incision and cold blood cardioplegia is administered. After cardiac arrest a standard aortotomy is carried out approximately one centimeter distal to the sino-tubular junction. The calcified stenotic valve is excised and the aortic annulus carefully debrided. After placing several stay sutures the aortic annulus is further exposed and inspected. The Medtronic 3f Enable valve sizer is inserted and the corresponding valve size chosen. A 4/0 prolene guiding stitch is placed at the level of the nadir of the non-coronary cusp. The stentframe of the valve is now folded in one sinus and the cross action forceps applied to hold the valve. The guiding stitch is placed at the corresponding valve site and the valve slid down into the annulus. Once in the correct plane, the cross action forceps is released and the superior aspect of the folded stentpost unfolded towards the commissure between the left and right coronary cusp. If the position is correct, the lower part of the valve is unfolded. Repeat this

maneuver until the valve is correctly seated at the level of all three nadirs. One can fold and unfold the prosthesis until the correct position is achieved. Warm saline is now used to bring the valve to its optimal dimension. The aortotomy is closed with a running prolene suture and the heart deaired according to institutional protocol. Epicardial pacing wires are placed before releasing the crossclamp.

Completion

After weaning from CPB, two drainages are placed: one into the pericardium and the other into the right pleural cavity. The wound is closed in a standard fashion. Cross clamp time was 41 min and CPB time was 73 min in this case. The patient was transferred to the intensive care unit (ICU) for post-operative monitoring and was extubated within six hours. Drainage loss within the first 24 hours was 320 mL.

Clinical results

The authors' experience with this nitinol stent-based sutureless valve have been published in detail this year (1). Mean aortic cross clamp times in this initial series were 37 ± 11 min and CPB times 62 ± 18 min in patients with isolated AVRs. The 30 day mortality was 1.4% in stand-alone procedures. During a mean follow-up of 313 days, three more deaths occurred. The reoperation rate was 4.2%. Mean and peak transvalvular pressure gradients were 9 mmHg (range, 4-13 mmHg) and 14 mmHg (range, 8-22 mmHg) at discharge respectively. In eight patients

(6.7%), permanent pacemaker implantation was necessary. No thromboembolic events or bleedings related to the bioprosthesis were observed.

Advantages

This sutureless technology significantly reduces cross clamp as well as CPB times when the right anterior thoracotomy approach is used (2).

Caveats

Exact placement of the prosthesis at the annular level is crucial. Do not hesitate to reposition the valve if there is any doubt. This is easily achieved by folding the stentpost inwards with two forceps.

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