



Ultra fast-track trans-axillary mini-aortic valve replacement

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Introduction

Despite minimally-invasive aortic valve replacement (MI-AVR) having gained interest within the cardiac surgeons' community, patient requests for interventions associated with minimized trauma and faster recovery often remains unfulfilled (1). In our center, we believe that a MI-AVR program (2) may benefit from a multidisciplinary approach that combines reduced incisions with an increasing use of rapid deployment valves (RD), minimal invasive extracorporeal circulation system (MiECC) (3) and fast-track anesthetic (UFT) management. Our experience with the MI trans-axillary direct approach in mitral valve surgery (MVS) (4) led us to consider that the aortic valve could be nicely exposed from the same approach. As a result, we recently initiated the use of trans-axillary incisions for MI-AVR in selected patients. In this setting, RD valves may help with reducing technical complexity and operative times. The aim of this video is to share our approach in a step-by-step fashion.

Clinical vignette

The patient was an 80-year-old-male presenting with NYHA-III symptoms due to his severe aortic valve stenosis. Transthoracic echocardiogram showed a max/med trans-valvular gradient of 99/66 mmHg; where the left ventricular function was preserved. Coronary angiography ruled out any significant coronary disease. The EuroSCORE II was 1.6%. A patient-informed consent form for treatment, data collection and analysis for scientific purposes were collected.

Surgical technique

On the operating table, the right posterior chest wall

was elevated with a roll. After induction of anesthesia with fentanyl and propofol, a short-acting volatile agent (sevoflurane) was used to maintain anesthesia before and after extra-corporeal circulation (ECC). A transesophageal echocardiography (TEE) probe was placed and a thorough echocardiographic evaluation was performed. The groin vessels were exposed through a 2 cm longitudinal incision. After heparinization, with the Seldinger technique and TEE guidance, a 25-French venous cannula (Livanova, London, UK) was inserted with the tip well-placed in the superior vena cava. The femoral artery was cannulated with a 19-French arterial cannula (Biomedicus, Medtronic, Minneapolis). A 6 cm incision was performed on the right anterior axillary line. The 3rd intercostal space (ICS) was entered. A soft tissue retractor and an intercostal rib spreader provided additional exposure. The pericardium was opened over the aorta and extended down towards the inferior vena cava. After ECC institution, a minimally-invasive clamp (Cygnet®Flexible Clamps, Vitalitec, USA) was applied across the distal ascending aorta, and warm blood cardioplegia was given through the aortic root. A "hockey-stick" aortotomy crossing the sinotubular junction was performed and the aortic valve exposed. The aortic cusps were removed and the annulus decalcified. The aortic annulus was measured and a 23 mm Intuity Elite™ RD valve was implanted in the usual fashion. The aortotomy was closed and before releasing the aortic clamp, two pacing wire electrodes were applied to the right ventricle. The left ventricle was de-aired and the aortic clamp released. Total ECC and cross-clamp times were 60 and 42 minutes, respectively. Once hemostasis was satisfactory, the ribs were approximated with two single non-absorbable stitches. A few minutes before surgery completion, the inhalational

agent was stopped. Local anesthetic infiltration of suture and drain sites were used for immediate postoperative pain relief. Tube extubation was performed once usual extubation criteria were fulfilled. After extubation, the patient was transferred to the intensive care unit where mobilization and respiratory therapy were started 3–4 hours after surgery. The morning after, the drains were removed and the patient was transferred to the ward.

Comment

In this video-article we sought to share our RD trans-axillary MI-AVR program. At the Lancisi Cardiovascular Center, we currently use three surgical minimally-invasive approaches to expose and replace the aortic valve: the ministernotomy, the anterior right minithoracotomy, and the trans-axillary approach. The latter was introduced based on our growing experience with direct access trans-axillary mini-MVS and highlighted how valid the alignment with the aortic valve could be from a more lateral approach (4). In fact, compared to other available incisions for MI-AVR, the trans-axillary is associated with the following advantages:

- (I) The ICS is wider compared to more anterior positions with less need for rib spreading or cutting. Moreover, the right internal thoracic artery can always be preserved;
- (II) A superior cosmetic result; in fact, this is the only surgical MI-AVR approach that results in invisible scars from an anterior view. The patient has to lift up the right arm to make the incision visible;
- (III) A very favorable 90-degree alignment with the aortic valve and nice exposition of all three aortic sinuses.

As we do with other MI-AVR interventions (5), the trans-axillary approach can be implemented with the use of RD-valves and UFT-anesthesia. In fact, the former is effective in minimizing: (I) complexity of valve implantation, (II) operative times, and (III) trans-valvular gradients; while the latter allows: (I) aggressive rehabilitation programs in the early hours, and (II) immediate patient-family contact with improved comfort and better perception and satisfaction of the received MI procedure. In our opinion, UFT RD trans-axillary MI-AVR represents an interesting additional option for patients requiring AVR. We are well aware that we are in the early phase of our learning curve and that more solid data are necessary to confirm our initial encouraging hunch.

Acknowledgments

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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