

Transcatheter (Transapical and Percutaneous) Aortic Valve Implantation in the Elderly Population

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Introduction:

Transcatheter Aortic valve implantation is a new, emerging technique that has been performed in elderly high-risk patients suffering with severe symptomatic aortic stenosis (1). As with the increasing life expectancy more elderly patients are diagnosed with aortic stenosis. Both these methods has the potential advantage of avoiding sternotomy, usage of extra corporeal circulation (ECC) thereby avoiding cardiac arrest, and implantation of the prostheses on a beating heart (2).

The Transapical Aortic Valve Implantation:

As the name suggests, the approach is through the apex of the heart. The valve is deployed through an anterolateral minithoracotomy, through the 5th intercostal space. After insertion of the safety net (guidewires for emergency use of extracorporeal circulation) an aortic root pigtail catheter is placed for angiographic visualisation. The apex of the heart is prepared with purse string sutures, and bipolar epicardial pacing wires are inserted for rapid ventricular pacing (RVP). The puncture of the apex is performed and soft guidewire is placed and later replaced with a super stiff (Amplatz super stiff, 260cm Boston Scientific) guidewire. The wire is replaced with apical sheath and balloon valvuloplasty catheter. After valvuloplasty was performed with RVP the apical sheath is withdrawn and valve delivery system is inserted through the apex. A second episode of RVP facilitates valve implantation, after the correct positioning is confirmed through TEE and fluroscopy. After implantation of the valve, apex is sutured and femoral access to ECC is withdrawn (3).

The Transfemoral Approach:

Instead of an antegrade approach for implantation of the Aortic Valve (transapical approach), a retrograde route is utilised for deployment of the valve. The percutaneous balloon expandable aortic valve is considered in patients when the anatomy of the iliac vessels is favourable for the application of the delivery system. Femoral access is achieved using the contralateral approach followed by the 6French sheath is introduced. A pigtail catheter is placed in the abdominal aorta for continuous arterial monitoring and angiographic facilitation of the anatomy of ileofemoral vessels. Temporal pacing lead may be inserted via the internal jugular vein or the femoral vein. After guidewire insertion a 14French sheath is introduced. Insertion of J tip guidewire is directed to cross the valve and then replaced with an Amplatz superstiff 260cm length guidewire. Balloon valvuloplasty is then performed under rapid ventricular pacing. In the event of suboptimal dilatation, the procedure may be repeated. After the progressive dilatation of the femoral artery the introducer sheath is fixed with a stay suture. The Retroflex delivery system (COREVALVE) along with the crimped valve is directed towards the annulus of the native valve using fluroscopic guidance (4). After satisfactory positioning using central and coaxial orientation, valve deployment is performed. If the Edwards-Cribier prosthesis is used a second episode of rapid ventricular pacing is required. Correct positioning is performed using full root angiographic

control. After satisfactory implantation of the valve, delivery system along with the guidewire is withdrawn and the femoral access is closed and pressure bandage is applied.

Anaesthetic Implications:

General anaesthesia is usually the anaesthesia of choice for transapical aortic valve implantation, unless otherwise indicated. Our aim is to transfer these patients to our post anaesthesia care unit (PACU) and fast-track them, with a mean extubation time of 80 minutes (5). We have done 9 cases of “awake” transapical aortic valve implantation with thoracic epidural anaesthesia. All these patients had a clear indication for epidural anaesthesia, poor pulmonary function being a common factor among them. There is extensive demand from the surgeon as far as echocardiographic skills of the anaesthetist is concerned, as echo guided imaging plays a major role in such hybrid procedures. Post valvuloplasty and implantation may require some additional inotropic support for which the anaesthetist should be well equipped. Hemodynamic maintenance throughout the procedure can be an extremely challenging task, and it is a fine mix of volume substitution and inotropes, which can prove to be life-saving for these high-risk patients.

Conclusion:

Although conventional aortic valve replacement still remains the gold standard, transcatheter aortic valve implantation has a promising future. The concept of “over-sizing” has partially solved the problem of paravalvular leak of these sutureless devices, but this still remains a potential drawback of this approach. Good imaging in a hybrid suite minimises the risk of coronary occlusion and also is beneficial for positioning and implantation of the valve. Long term outcome of these implanted valves is the likely landmark for the success of these transcatheter procedures.

Reference:

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