

Direct Aortic Portico Trans-Catheter Aortic Valve Implantation via Right Anterior Thoracotomy

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Abstract

Transcatheter Aortic Valves Implantation (TAVI) is a valid treatment for elderly patients with symptomatic severe aortic stenosis considered high- or intermediate risk surgical candidates. Retrograde trans-femoral approach should be considered the less invasive approach; however, TAVI patients are often affected also by severe iliac-femoral arteriopathy, rendering the trans-femoral approach either unemployable or deemed to carry a high risk of vascular complications.

We describe a case of Portico™ TAVI system (St Jude Medical, St Paul, MN, USA) implantation made through a right anterior mini-thoracotomy in an 83 year-old patient affected by severe aortic stenosis and severe peripheral vasculopathy.

Introduction

Transcatheter aortic valves implantation has revolutionized the management of patient affected by severe Aortic Stenosis (AS) who is at high risk or ineligible for surgical aortic valve replacement due to major comorbidities. Transcatheter treatment has become the treatment of choice for elderly patients with symptomatic severe AS considered high- or intermediate risk surgical candidates [1,2].

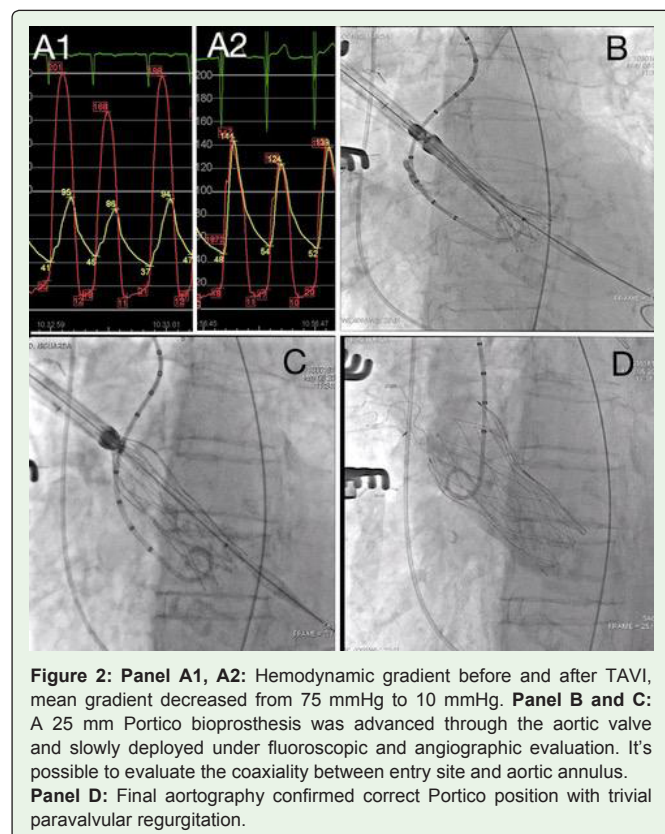
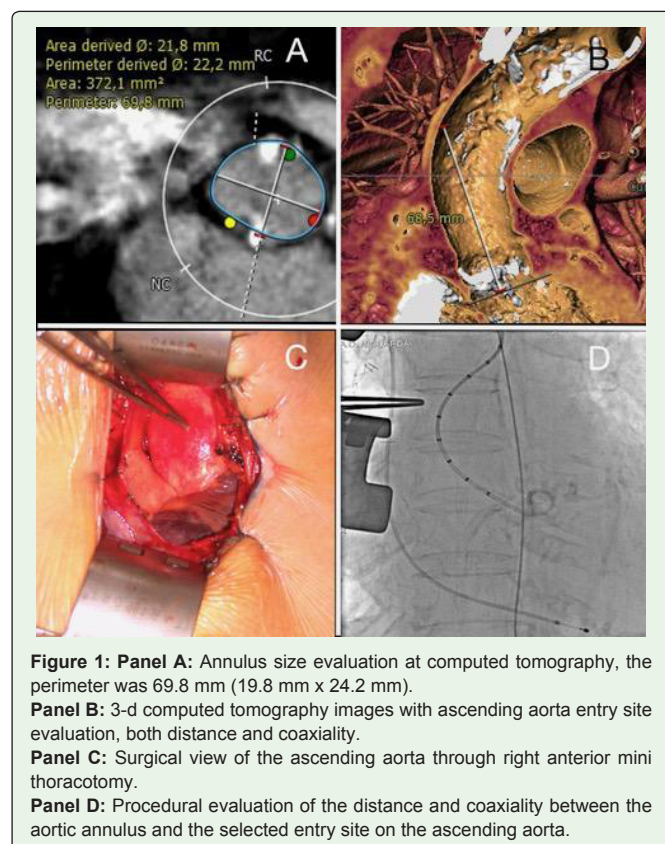
Retrograde trans-femoral approach should be considered the less invasive approach for TAVI; however, patients are often affected also by severe iliac-femoral arteriopathy, rendering the trans-femoral approach either unemployable or deemed to carry a high risk of vascular complications. Therefore, alternative access site for TAVI delivery have been developed, including the trans-apical access, the subclavian and the direct-aortic access [3,4,5].

We describe a case of Portico™ TAVI system implantation made through a right anterior mini-thoracotomy in an 83 year-old patient.

Case Report

An 83 year-old female affected by severe aortic stenosis was admitted to our hospital from the emergency department for angina and dyspnea. The patient was affected by severe renal failure with a creatinine clearance of 41 ml/min, peripheral vascular disease and severe osteoporosis with multiple vertebral compressions. Echocardiographic evaluation evidenced a severe aortic stenosis with a mean gradient of 83 mmHg, aortic valve area of 0.3 cm²/m² Left Ventricle (LV) Ejection Fraction (EF) 50% and pulmonary artery pressure of 40 mmHg. Coronary angiography showed a severe stenosis of the proximal right coronary artery. An ECG-gated Computed Tomography (CT) was performed and evidenced peripheral vascular disease with small size, calcified, femoral vessels; small size bilateral subclavian arteries, with severe stenosis of the left subclavian. The aortic valve was tri-leaflet, severely calcified; the annulus perimeter was 69.8 mm (19.8 mm x 24.2 mm) (Figure 1A).

After Heart Team evaluation taking in consideration patient's age and comorbidities (Euroscore II: 15.7%; STS score Mortality: 9.2%) a trans-catheter aortic valve implantation was preferred. Due to calcified and small size femoral and subclavian arteries a direct aortic access was chosen. Based on 3-d CT scan images entry site on the ascending aorta was selected and right anterior thoracotomy was preferred (Figure 1B). Three days before TAVI procedure the patient underwent a Percutaneous Coronary Intervention (PCI) with everolimus drug eluting stent implantation on the right coronary artery. The TAVI procedure was performed, under general anesthesia, in a hybrid OR by a team composed of "hybrid" cardiac surgeon, interventional cardiologist and cardiac anesthesiologist. A temporary pacing lead was advanced in the right ventricle through the right jugular vein. Right anterior thoracotomy was performed in the 3rd intercostal space as evaluated by CT scan, pericardium was opened and ascending aorta exposed, as previously described [5]. A basal aortography was



performed to measure the distance between the aortic annulus and the selected entry site and to evaluate the best coaxial trajectory between the entry site on the aorta and the aortic annulus (Figure 1C and 1D). Direct aortic cannulation was performed with the Seldinger technique through double purse-string sutures. A 9-Fr sheath was then inserted and a 0.035 straight guidewire was advanced in the left ventricle, a pig-tail was advanced and pressure gradient through the aortic valve were measured, mean hemodynamic gradient was 75 mmHg (Figure 2 A1). Then a pre-shaper super stiff guidewire was inserted in the left ventricle and a 20-Fr sheath was advanced over it. Pre-TAVI balloon aortic valvuloplasty was performed under rapid pacing using a 20 mm True Dilatation balloon (Bard - Tempe, AZ 85281 USA). A 25 mm Portico bioprosthesis was advanced through the aortic valve and slowly deployed under fluoroscopic and angiographic evaluation (Figure 2B). The delivery system was then removed. Final aortography revealed normal valve function with mild para-valvular regurgitation, hemodynamic evaluation revealed a mean gradient of 2 mmHg (Figure 2 A2).

Purse string sutures on the aorta were knotted, a 26-Fr round fluted chest spiral drain was positioned and mini-thoracotomy incision was closed in standard fashion.

Patient had an uneventful post-operative hospital course and discharged on 7th post-operative day. Pre-discharged echocardiography showed slight LV function improvement with ejection fraction of 55%, normal aortic valve function with mean gradient of 10 mmHg and trivial para-valvular regurgitation. At 6-month follow up the patient was asymptomatic, in NYHA functional class I and echocardiographic evaluation evidenced normal Portico valve function with mean gradient of 9 mmHg (Figure 2C and 2D).

Discussion

The direct aortic approach is currently CE mark approved as an alternative to the trans-femoral for the CoreValve and Edwards TAVI [6,7]. One of the major advantages of the direct aortic approach is the control of the delivery system that is dramatically enhanced, because any force is directly transmitted one-to-one without any loose of pushability and trakability compare to a trans-femoral approach. A co-axial trajectory to aortic valve plane allows a perfect alignment of the TAVI device in the aortic annulus, this is extremely important also in a recapturable valve like the Portico. This undoubtedly facilitates more accurate valve deployment, which might be particularly useful in patients with complex anatomical or pathophysiological situations (horizontal ascending aorta, large annular sizes, primary aortic regurgitation, and presence of mechanical mitral prosthesis).

In our case the patient underwent coronary PCI before TAVI, so we choose the Portico valve also because of larger stent cell size of the frame that allow an easier coronary access in case further coronary angiography would be needed.

Our experience characterized by a heart team approach and multidisciplinary patient care demonstrated the safety and feasibility of direct aortic approach with the Portico valve.

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