Transapical aortic valve replacement through a chronic apical aneurysm

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Abstract

Transapical aortic valve replacement through an apical aneurysm is traditionally contraindicated because of the risk of severe systemic embolization when thrombi are present. However, a chronic fibrotic aneurysm without apical thrombi carries a low risk of distal embolization and can be safely employed for a transapical transcatheter aortic valve replacement in case of absence of an alternative access site (severe vascular disease, small vascular sizes and diseased calcified aorta). We illustrate our experience with a 73-year-old patient suffering from symptomatic aortic valve stenosis, coronary artery disease with occluded left anterior descending artery, left ventricular apical aneurysm and severe peripheral vascular disease, who successfully underwent a transapical 26 mm Sapien™ XT stent-valve implantation through the fibrotic thin akinetic apical wall.

Keywords: Aortic valve replacement • Transcatheter aortic valve implantation • Apical aneurysm

INTRODUCTION

Transcatheter aortic valve replacement is an emerging technique for patients with severe symptomatic aortic valve stenosis and surgical high-risk profile [1], and the procedural access depends on the clinical status: a vascular disease contraindicates a femoral access, a porcelain aorta contraindicates a trans-aortic access, and a small size can constrain a trans-subclavian access [2]. The transapical procedure has also limitations such as an acute myocardial infarction, an impaired left ventricular function or an apical thrombus resulting from an ancient myocardial infarction (akinetic region).

However, even when apical thrombi are absent, it is still unclear whether transapical stent-valve procedures through a chronic apical aneurysm are feasible or not, because of an increased risk of tissue frailty and severe apical bleeding [3]. Nevertheless, this approach can be relevant when alternative access sites are unavailable and, to the best of our knowledge, this clinical case represents the first reported case focusing on this topic.

CLINICAL CASE

A 73-year-old lady with severe symptomatic aortic valve stenosis was screened for a transcatheter procedure. Despite the age, the patient carried several comorbidities such as severe obstructive respiratory disease, peripheral vascular disease with small and calcified femoral vessels, and a coronary artery disease. The preoperative transthoracic echocardiogram showed a degenerated calcified aortic valve with trans-valvular gradient of 83 mmHg, surface area of 0.4 cm²/m², left ventricular ejection fraction of 40%, moderate pulmonary hypertension and presence of an apical aneurysm without intra-luminal thrombi (Fig. 1a, b). The coronary angiogram (Fig. 1c) confirmed the presence of a severe apical akinesia with mild aneurysmatic evolution, and the chronic occlusion of the left anterior descending (LAD) coronary artery. A computed tomography (CT) scan (Fig. 2a) was performed to calculate the aortic annulus diameter (23 mm) and to confirm the absence of thrombi into the aneurysm, whereas the magnetic resonance confirmed the presence of a fibrotic, organized, aneurysmatic apical wall with absence of myocardial viability in the region of the distal LAD that contraindicated a revascularization (Fig. 2b). The trans-subclavian approach was not taken into consideration because of the inadequate vascular size. The patient accepted a transapical procedure through the aneurysm with an estimated risk of 35% by logistic Euroscore.

The transapical procedure was performed under general anesthesia and in the operating room. From a surgical point of view, the apex was preoperatively identified by transthoracic echocographic ultrasound beneath the sixth intercostal space. There were soft adhesions (as in redo surgery) not limiting the apical access and the two Prolene 3-0 pledgeted sutures were successfully performed around the aneurysm, where the viable myocardium becomes fibrotic. Following the standard technique, a 26 mm Sapien™ XT stent-valve (Edwards Lifesciences Inc., Irvine, CA, USA) was successfully implanted with absence of leaks and a trans-valvular gradient of 10 mmHg. The entire procedure required 75 min and we did not experience apical complications. Apical sutures were tided under rapid pacing to
decrease the intra-ventricular pressure. A postoperative scan confirmed the stent-valve placement with a left ejection fraction increased to 55% (Fig. 2c). The postoperative recovery was uneventful and the patient was discharged 10 days later.

DISCUSSION

An apical aneurysm traditionally contraindicates a transapical procedure because the presence of an apical thrombus is a risk of severe systemic embolization. However, if alternative access sites are unavailable, if the apical thrombus is absent and if the aneurysmatic surface area is moderate, the transapical valve replacement is feasible and represents a valid alternative.

With regards to the tissue quality, the fibrotic wall can accept standard manipulations and safe purse string sutures can be performed, but caution is requested during the preparation: the pledgeted 2-0 or 3-0 purse string sutures should be placed near the viable myocardium surrounding the aneurysmatic region. Using this stratagem, part of the aneurysm can also be excluded when sutures are tied. Adhesions with the pericardium do not represent an issue and, in our experience, were comparable with those present in redo cases (the pericardium can also be used as a natural pledget).

Preoperatively, when an apical aneurysm is detected, a specific cardiac imaging is required to collect data: the coronary angiogram and the CT scan for the anatomy, and the magnetic resonance for the myocardial viability. However, despite the fact that during transapical aortic valve replacement the LAD can also be revascularized through the same access [4], an aneurysmatic wall is the consequence of a myocardial infarction and the revascularization is often unnecessary (no viability). With regards to the postoperative management, we did not change the

Figure 1: Preoperative imaging: transoesophageal echocardiographic images showing the apical aneurysm in diastole (a) and systole (b); (c) coronary angiogram showing the occlusion of the LAD coronary artery (arrow).

Figure 2: (a) Computed tomography scan showing the apical aneurysm; (b) magnetic resonance showing the apical aneurysm; (c) postoperative CT scan showing the stent-valve and the ventricular apex.
standard protocol but we performed a CT scan to visualize the resulting apical anatomy.

In conclusion (i) the presence of an apical thrombus contraindicates transapical valve procedures; (ii) a giant aneurysm is a cardiac disease itself and requires a surgical treatment under cardiopulmonary bypass (consider standard valve surgery plus ventricular re-shaping or inoperability) [5–7]; (iii) a mild apical aneurysm without thrombi does not contraindicate transapical procedures when alternative access sites are unavailable.

Conflict of interest: none declared.

REFERENCES


