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Surgical retrieval of a degenerated Sapien 3 valve after 29 months

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Abstract

A 70-year-old man developed heart failure due to severe mixed disease of a degenerated transcatheter aortic valve prosthesis. The patient underwent retrieval of the transcatheter aortic valve and implantation of a 25-mm bioprosthesis through a redo sternotomy.

Keywords: Heart valve • Aortic valve • Transcatheter aortic valve implantation

CASE

A 70-year-old man with a complex medical history was admitted to our hospital with heart failure due to early degeneration of a Sapien 3 aortic valve. In 2000, he underwent coronary artery bypass grafting operation (left internal mammary artery to left anterior descending artery and sequential saphenous vein graft to left circumflex/posterolateral (PL) and right coronary artery/

posterior descending artery) and developed new angina shortly thereafter requiring multiple percutaneous procedures, percutaneous coronary intervention on ramus intermedius in 2007 and proximal left anterior descending artery in 2011. After 3 years, he started to complain about dyspnoea and chest pain on exertion. A transthoracic echocardiography (TTE) revealed severe aortic valve stenosis (peak/mean gradients 88/56 mmHg) and a new angiogram showed occlusion of the saphenous vein graft. The

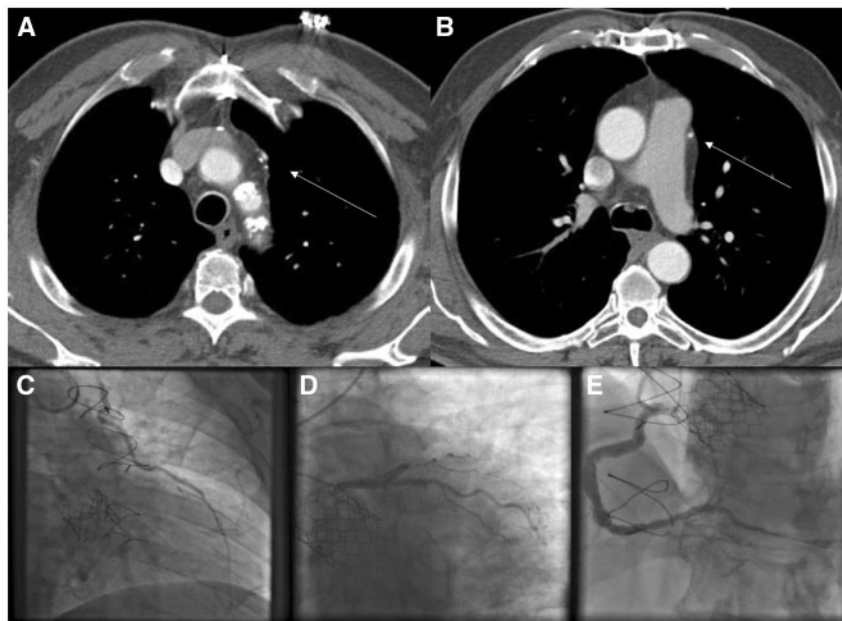
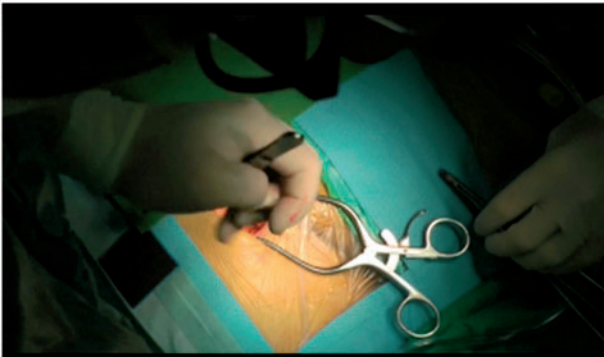


Figure 1: Preoperative workup: computed tomography scan shows the spatial arrangement of the mediastinal structures [left innominate vein (A); ascending aorta and main pulmonary artery (B) and the LIMA graft (white arrow)]. Angiogram shows patency of the LIMA graft to LAD and the absence of coronary arteries obstruction: LIMA-LAD (C); left circumflex (D), RCA (E). LIMA: left internal mammary artery; LAD: left anterior descending artery; RCA: right coronary artery.

patient ultimately underwent percutaneous coronary intervention of the venous graft followed by transcatheter implantation of a 29-mm Sapien 3 valve through a femoral approach. Pre-discharge TTE showed normal positioned and fully competent aortic prosthesis.

Early during 2016, a new TTE revealed significant degeneration of the aortic prosthesis with severe aortic regurgitation and increased gradients (peak/mean 51/32 mmHg). A valve-in-valve transcatheter procedure was planned; re-occlusion of the venous graft and in-stent restenosis of RI were treated with percutaneous coronary intervention in preparation for the percutaneous procedure. Despite medical therapy, the patient sustained acute heart decompensation requiring hospital admission and intravenous diuretics. He came finally to our attention and we could not agree with the proposal for a new transcatheter procedure. The patient was relatively young, he experienced a rapid deterioration of the previously implanted valve, he sustained during previous months fever for more than 2 weeks although there was no definitive evidence of endocarditis. Furthermore, he



Video 1: 00.00–00.40: insertion of pulmonary artery vent (EndoVent Pulmonary Catheter, Edwards Lifesciences, Irvine, CA, USA) and coronary sinus cannula (ProPlege Peripheral Retrograde Cardioplegia Device, Edwards Lifesciences); 00.41–0.44: regurgitation across the aortic prosthesis; 00.45–01.40: exposure of the femoral vessels, resternotomy, cannulation of the ascending aorta and the right atrium followed by cardiopulmonary bypass institution; 01.41–01.52: during retrograde cardioplegia the occluded saphenous vein graft was divided and the aortotomy performed; 01.53–03.50: dissection and troublesome retrieval of the Sapien 3 valve from the native annulus; 03.51–04.05: calcification of the prosthesis leaflets and neo-endothelialization of the left ventricular surface of the prosthesis; 04.06–04.45: excision of the native valve, decalcification of the aortic annulus and valve implantation; 04.46–04.59: cardiopulmonary bypass weaning and intraoperative transoesophageal echocardiography result.

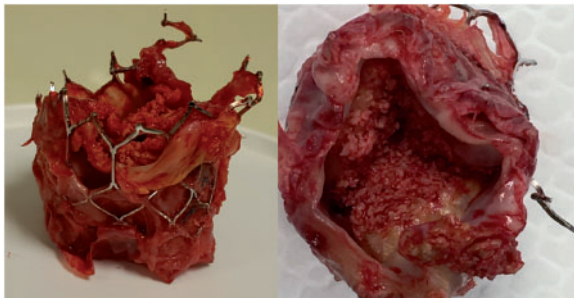


Figure 2: Degeneration of the Sapien 3 valve. Diffuse degeneration of the leaflets and neo-endothelialization of the left ventricular surface.

had no associated comorbidities and there was no significant technical issue in performing a resternotomy. A preoperative transoesophageal echocardiography showed also the presence of a mild paravalvular regurgitation. Left internal mammary artery graft was clearly visualized lateral to the midline, the mediastinal structures were not adherent to the posterior aspect of the sternum and the angiogram showed satisfactory revascularization of the coronary arteries (Fig. 1). A conventional surgical operation was then proposed and accepted by the patient who ultimately underwent successful aortic valve replacement with a 25-mm bioprosthesis (Video 1).

DISCUSSION

Our strategy provided: (i) a complete resternotomy; (ii) neck lines for retrograde cardioplegia delivery and pulmonary artery vent [1]; and (iii) avoidance of left internal mammary artery isolation associated with moderate hypothermia.

This setting provided a safe myocardial protection and a satisfactory surgical exposure, as we were prepared for a full root replacement. A clear surgical description of Sapien valve explant after more than 2 years was not available in literature [2, 3], and we were concerned about the incorporation of the prosthesis in the aortic wall. We found the frame separated from the aortic wall; however, we faced serious difficulties in the dissection and mobilization of the prosthesis from the native calcified aortic valve. There was partial neo-endothelialization mostly at the ventricular side of the prosthesis; the leaflets were thick and affected by diffuse calcification (Fig. 2, Video 1). Histology study of the leaflets tissue showed typical features of prosthesis degeneration with hyaline areas and bone fragments [4, 5]. We cannot completely rule out the occurrence of valve endocarditis in promoting a rapid degeneration of the prosthesis. On the other side, the macroscopic appearance may point in the direction of heart valve thrombosis.

Open-heart procedures after transcatheter aortic valve implantation may become common in the near future. These operations can pose technical challenges and involve patients with complex medical history. A proper surgical strategy can ease a redo procedure and allow a satisfactory result.

Conflict of interest: none declared.

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