Case Report

Infraannular dislocation and its successful management: A rare complication following TAVI

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A R T I C L E   I N F O

Article history:
Received 8 October 2013
Received in revised form 14 November 2013
Accepted 17 December 2013

Keywords:
Aortic stenosis
Transcatheter aortic valve implantation
Dislocation

A B S T R A C T

Transcatheter aortic valve implantation has been increasingly used in symptomatic patients with severe aortic stenosis who are inoperable or at high risk. However it remains associated with the potential for serious complications. We report a case in which an Edwards Sapien (Edwards, Irvine, CA, USA) valve prosthesis dislocated to the left ventricular outflow tract with hemodynamic collapse 6 h following implantation.

<Learning objective: Transcatheter aortic valve implantation (TAVI) is an alternative method to surgical aortic valve replacement in patients with severe aortic stenosis and high surgical risk. Despite continuous improvements in operators’ expertise and device technology, it remains associated with the potential for serious complications such as valve dislocation. Dislocation after TAVI is a life-threatening complication that requires immediate diagnosis and treatment.>

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Introduction

Transcatheter aortic valve implantation (TAVI) is now considered to be a therapeutic option for patients with severe aortic stenosis (AS) who are inoperable or at high risk for conventional aortic valve surgery [1]. It was first described in 2002 by Cribier et al. [2]. Although the procedure has a >95% success rate, it remains associated with life-threatening complications different from conventional aortic valve surgery and different from other catheter procedures such as dislocation, valve embolization, stroke, perforation of the aorta, and the obstruction of coronary ostia. These complications are also difficult to control in contrast to conventional surgery [3,4].

Case report

A 79-year-old man presented with exertional dyspnea and known severe AS that was refused for surgery in the past. His past medical history included coronary artery bypass grafting [left internal mammary artery (LIMA) to the left anterior descending artery (LAD)] and saphenous vein grafts to diagonal and right coronary arteries], hypertension, and diabetes mellitus type 2. Over the preceding 3 months he had been complaining of worsening dyspnea and dizziness and was becoming increasingly functionally incapacitated. His New York Heart Association (NYHA) functional class was 3. Transthoracic echocardiography (TTE) demonstrated a severe calcified AS with a valve area 0.6 cm², mean gradient 45 mmHg, and left ventricular ejection fraction (LVEF) 30%. The aortic annulus was 23 mm. On transesophageal echocardiogram (TEE), the aortic valve leaflets appeared thickened and calcified with mild aortic regurgitation. Society of Thoracic Surgeons (STS) and logistic EuroSCORE were calculated and found to be, respectively, 12 and 35%. The risk of conventional surgery was deemed too high and in accordance with the cardiac surgeon, a transfemoral approach TAVI with the implantation of a 26 mm Edwards Sapien (ES) (Edwards Lifesciences, Irvine, CA, USA) valve prosthesis was planned.

At coronary angiography, all bypass grafts were patent. After informed consent was obtained and all preventive measures were taken, the TAVI procedure was performed in the hybrid operating room under general anesthesia. After the balloon valvuloplasty was carried out under rapid pacing (Fig. 1, Video 1) a 26 mm ES aortic valve was successfully implanted percutaneously through the left femoral artery. Completion aortic root angiogram showed mild paravalvular leak and fine seating of the valve (Fig. 2, Video 2). The patient became severely hypotensive 6 h after the procedure and developed ventricular fibrillation. Cardiopulmonary resuscitation was performed. TTE and aortography demonstrated a dislocated aortic prosthesis into the LVOT (Fig. 3, Videos 3 and 4). The patient was urgently operated and the prosthesis valve was removed through the native aortic valve (Fig. 4). The native aortic valve was mildly calcified and thickened with commissural fusion. After the complete resection of the native aortic valve, the
aortic annulus was measured as 21 mm. Surgery was successfully completed with the implantation of a metallic prosthetic valve and the patient was discharged from the hospital on the seventh day.

**Discussion**

Although rare, dislocation occurring after TAVI is a serious complication and operators must be prepared for it during TAVI procedures. Dislocation may emerge in any implantation approach, including transfemoral, subclavian, and transapical [4]. It can be seen as 3 different types: infra-annularly (intraventricular), supra-annularly, and supra-sinutubular junction (dislocation into the ascending aorta) [5]. A completely implanted dislocated ES prosthesis can be retracted into the ascending or descending aorta with a gooseneck catheter, and a second valve can be implanted in the annular position. As in our case and some others, retrieval of the prosthesis is impossible. This complication may only be treated surgically [3,4]. Dislocation is usually caused by initial positioning error and utilizing an undersized valve [6]. Therefore, precise annulus measurements by echocardiography and if necessary computed tomography (CT) are essential [4]. Our measurements were mainly based on echocardiography. However, the values of the aortic annulus diameter vary significantly in different CT and TEE assessments and this matter can be associated with valve dislocation. Indeed, it has been well recognized that TTE routinely underestimates the true annulus diameter compared to TEE or CT [7]. In this case we experienced a rare but possible complication of TAVI, although the recommended procedural managements were applied. In our case, inadequate calcification to allow the valve to adhere properly might be responsible for valve dislocation. Recently, there have been two case reports that described second valve implantation for the treatment of core valve dislocation [5]. Because it does not work, when the ES valve prosthesis is embolized into LVOT or ventricle, especially in hemodynamically compromised patients an attempt to pull the prosthesis for implantation of a second prosthesis is sometimes impossible. Therefore, the patient was taken directly to the operating room.

The ES prosthetic valve is usually malpositioned supra-annularly, while embolization, coronary obstruction, and sub-annular positioning are uncommon [4,6]. For prevention of this complication, appropriate imaging of the aortic root with angiography, TEE, and CT should be performed, with particular attention to the size and shape of the annulus, as well as the location and distribution of any calcification [8]. Other factors that may contribute to malposition such as suboptimal visualization, lack of burst pacing, poor timing of balloon inflation, lack of predilatation, and interference from cardiac structures should also be eliminated [6]. As the ES prosthesis system is balloon expandable and not repositionable once expanded, the exact location of deployment must be resolved and performed in an accurate and careful manner.

Management of infra-annular dislocation depends mainly on the degree of dislocation and hemodynamic compromise. Deployment of a second overlapping prosthesis may be effective although correct positioning may be difficult. If the prosthesis is low in the left ventricular outflow tract, it may not be possible to manage it with a second overlapping prosthesis and conversion to conventional surgery may be the only option [6].
Conclusion

TAVI is an alternative or promising treatment option with specific procedure- and patient-related complications. Although dislocation of ESV prosthesis can be managed interventionally in most cases, surgical intervention is inevitable in some cases. The procedure must be performed in experienced centers with meticulous diagnostic evaluation to prevent life-threatening complications.

Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jccase.2013.12.007.

References


Fig. 3. Aortography showing the dislocated valve into the left ventricular outflow tract.

Fig. 4. The extracted valve.