Unexpected complication during transcatheter aortic valve replacement: Balloon that cannot inflate!

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Introduction

In the treatment of severe aortic stenosis, transcatheter aortic valve replacement (TAVR) procedure is increasingly being used. In this report, we present a case of balloon rupture during TAVR operation, followed by successful valve implantation, with appropriate management of complication.

Case Report

An 88-year-old male was admitted to our clinic with complaint of effort dyspnea. Transthoracic echocardiography revealed severe aortic stenosis. The Society of Thoracic Surgery (STS) risk score was calculated to determine the risk of surgery, and then the patient with 6 STS point had decided to undergo TAVR operation by the heart team. In the preoperative preparation phase, valvular annulus and aortic–iliac vessels could not be evaluated using computed tomography (CT) due to high creatinine levels. Therefore, the diameter of the aortic annulus measured using transesophageal echocardiography (TEE) was found to be 26 mm. The Edwards Sapien S3 valve (Edwards Lifesciences Inc., Irvine California, USA) was selected for implantation, because the main femoral arteries were observed to be 6 mm in diameter and calcified by iliac digital subtraction angiography. Additionally, aortic root angiography was performed prior to the procedure; the ascending aorta was found to be horizontal, whereas the descending aorta was distinctly tortuous and locally calcified. With the standard TAVR procedure, a Safari-2 guidewire was placed in the left ventricle. Predilatation was performed with a 25×40 mm balloon by the Safari-2 guidewire. Then, the 29 mm valve was loaded into the delivery system, and the valve started to move from the right femoral artery. The valve was difficult to load into the vessel due to the lack of complete coaxiality after the sheath was removed. After seeing that the valve was brought to the proper position (Video 1), the balloon with valve was tried to inflate for implantation but we could not, so the valve could not be opened, at that moment some blood came out from the system when negative pressure was applied. After this, we thought that the balloon exploded, and the valve

Figure 1. The balloon burst when the delivery system was withdrawn

was taken back into the delivery system. The Safari-2 guidewire was just left in the ventricle, but the entire system was pulled back together with the sheath. The valve that was pulled back with the other system was checked; no structural or functional problem was found (Fig. 1). Then the same valve was loaded into a new delivery system from the same femoral artery but at another puncture place. Fortunately, the valve system was successfully implanted (Video 2). Paravalvular insufficiency was not observed during the control aortography (Video 3).

Discussion

To the best of our knowledge, this is the first study to report such a complication; during the process, the balloon burst without being inflated. The rupture may have been caused by the fact that the valve–balloon axis was different during the loading of the valve into the balloon.

In literature, the number of cases reporting balloon rupture during TAVR operation is limited (1-3). Cases of balloon rupture associated with aortic valve have been reported mostly during aortic balloon valvuloplasty in the preoperative period. In these reports, balloon rupture development has been associated with the presence of a bicuspid aortic valve, sudden high-pressure inflation of the balloon, or intense calcification in the ascending aorta (4, 5). In literature, we could not find any case in which the balloon was ruptured without being inflated during the TAVR operation, similar to our case.

The preoperative preparations are extremely important to foresee the complications that may occur during the TAVR operation. At this stage, evaluation of the calcification and tortuosity of the ascending and descending aorta as well as the detailed evaluation of the valve with TEE and CT is extremely important. In the presence of advanced aortic tortuosity, a harder wire may be helpful in solving the problem. Alternatively, subclavian or aortic pathway may be preferred.

There are some prosthetic valves that can be retrievable or not during the TAVR operation. The Edwards Sapien S3 valve is not repositionable or retrievable, making precise deployment critical. However, it can be reused when it is withdrawn before inflation. In our patient, the balloon never inflated, thus the valve never opened.

Conclusion

Although TAVR opens new horizons in the treatment of patients with severe aortic stenosis, it has brought new complications too. However, in these cases, successful implantation of the same valve is possible with timely detection and correct management of complications.

References

1. Kubo S, Fuku Y, Shimamoto T, Kuwayama A, Ohya M, Amano H, et al. Vascular injury caused by retrieval of ruptured and detached balloon valvuloplasty catheter during transcatheter aortic valve replacement. JACC Cardiovasc Interv 2017; 10: 1593-5.
2. Mustafa A, Farooq V, Manoly I, Hassan R, Fraser DG. Recurrent balloon rupture during transcatheter aortic valve replacement (TAVR)-Implication for access site choice. Heart Lung Circ 2015; 24: e193-4.
3. Kasapkara HA, Aslan AN, Durmaz T, Bozkurt E. Bulging sign: A precursor of annular rupture observed before aortic balloon rupture during valvuloplasty in transcatheter aortic valve implantation. Turk Kardiyol Dern Ars 2016; 44: 154-7.
4. [No authors listed]. Percutaneous balloon aortic valvuloplasty. Acute and 30-day follow-up results in 674 patients from the NHLBI Balloon Valvuloplasty Registry. Circulation 1991; 84: 2383-97.
5. Blanke P, Reinöhl J, Schlensak C, Siepe M, Pache G, Euringer W, et al. Prosthesis oversizing in balloon-expandable transcatheter aortic valve implantation is associated with contained rupture of the aortic root. Circ Cardiovasc Interv 2012; 5: 540-8.

Video 1. After the bioprosthesis valve was adjusted to the proper position, the balloon was tried to inflate with opaque saline injection; however, it did not inflate.

Video 2. The re-installed valve was successfully implanted.

Video 3. There were no paravalvular insufficiencies in control aortography after the valve implantation.

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Extremely late stent thrombosis after more than 7 years (2691 days) of sirolimus-eluting stent implantation

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Introduction

Stent thrombosis (ST) is a rare but potentially fatal complication of percutaneous treatment of coronary artery disease.

According to the Academic Research Consortium criteria and classification, ST can occur either acutely (within 24 h), subacutely (within 1-30 days), late (within 1-12 months), or very late (beyond 1 year) after stent implantation (1). The use of a new term "extremely late stent thrombosis " was suggested for cases of stent thrombosis that occur ≥5 years after stent implantation (2). Very late stent thrombosis (VLST) occurs more frequently with first-generation DES than with BMS, and the majority of VLST occur within 1-4 years of stent implantation. VLST is extremely rare after 5 years of stent implantation, with the first case being reported in 2009 (3). Few cases have been reported since 2009 until now. The longest reported intervening period between stent implantation and acute coronary event secondary to stent thrombosis is 11 years (4). The underlying pathophysiology of VLST is not completely understood and because duration of dual antiplatelet therapy is undetermined. Here we report the first case of an extremely late stent thrombosis presenting as a non-ST-elevation myocardial infarction (NSTEMI) from Turkey, which occurred 2691 days after implantation of a first-generation DES and 3 months after discontinuation of clopidogrel therapy.

Case Report

A 63-year-old male patient presented to our hospital with NSTEMI in August 2017. In March 2010, he underwent coronary

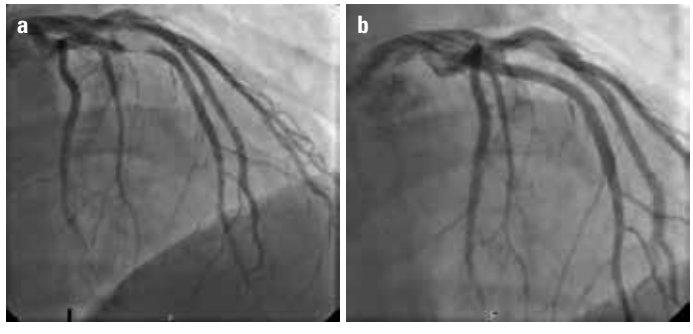

Figure 1. (a) Coronary angiography showing thrombotic occlusion in left coronary artery. (b) A drug-eluting stent (CYPHER) was deployed on the left coronary artery