Management of Low-Position Bioprosthetic Aortic Valve Complication with the Snare Technique

Düşük Yerleşimli Bioprotez Aortik Kapak Komplikasyonunun Yakalama Tekniği ile Yönetimi

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Abstract

Transcatheter aortic valve implantation (TAVR) is an alternative technique that is used to treat severe aortic stenosis (AS). Dislocation and paravalvular aortic regurgitation are two of the most common technical complications associated with TAVR, and they must be addressed using endovascular treatment options or surgery. This paper presents a TAVR case report with the complication of valve dislocation that was resolved by pulling the valve back using the snare technique.

Keywords Transcatheter aortic valve replacement; aortic stenosis; aortic regurgitation; heart valve prosthesis

Abstract

Transkateter aortik kapak replasmanı(TAVR) ciddi aort darlığı için alternatif bir tedavi yöntemi olarak bilinmektedir. Dislokasyon ve paravalvüler aortik kaçaklar TAVR işlemi ile ilişkili en önemli iki teknik komplikasyondur ve endovasküler tedavi ya da cerrahi tedavi gerektirirler. Bu olguda kapak dislokasyonu gelişen ve kapağın yakalama yöntemi ile geri çekilerek yerine oturtulduğu bir TAVR olgusu sunulmaktadır.

Anahtar kelimeler *Transkateter aort kapağının değiştirilmesi; aort darlığı; aort yetmezliği; kalp kapak protezleri*

GİRİŞ

Complications associated with transcatheter aortic valve implantation (TAVI) can be classified as cardiac or non-cardiac. Furthermore, some of these complications may be specific to TAVI, such as valve malposition, paravalvular aortic regurgitation (AR), and coronary obstruction, or not specific to TAVI, such as vascular access complications and cardiac perforation/tamponade seen with other endovascular interventions. Normally, the CoreValve prosthesis should be positioned approximately 4–6 mm below the aortic valve annulus. A "too-low" implantation is defined as placing the valve at the distal edge of the valve frame (commonly referred to as the "inflow" aspect) positioned more than 12 mm below the annulus into the left ventricular outflow tract (LVOT). A "too-high" implantation is defined as the inflow aspect positioned above the annulus level. A low implantation is generally associated with moderate (Grade II) to severe (Grade III–IV) degrees of AR on contrast aortography.[1] Transesophageal echocardiography (TEE) can confirm the nature of the regurgitation (i.e., paravalvular vs. central). According to some studies, a paravalvular leakness (PVL) greater than mild grade negatively affects the prognosis after TAVI, increasing both morbidity and mortality.1 In the case of the "too-low" positioning associated with significant AR and hemodynamic instability, the first objective is to manually reposition the valve using a "goose-neck" catheter (i.e., the snare technique).[2] If unsuccessful, the second option is to implant a second valve inside the first one (i.e., the valve-in-valve technique) on the condition of placing it in a slightly higher position. There is limited experience with repositioning the valve manually using a "goose neck" catheter (i.e., the snare technique). Many interventional cardiologists use the second option, the valve-in-valve technique, and they implant a second valve inside the first one. However, the first objective is to manually reposition the valve. In this paper, we present a case study of patient with severe aortic stenosis(AS) due to degenerative aortic disease who was not a candidate for open heart surgery and who experienced a complicated valve malposition during a valve implantation procedure and was finally treated using the snare technique. Informed consent was obtained from the patient.

Case Study

An 82-year-old woman with a history of coronary artery disease presented with dyspnea (The Canadian Cardiovascular Society Functional Class IV) and chest pain. This woman, with severe AS but high surgical risk, was referred to our institution for transcatheter aortic valve replacement (TAVR). Based on consensus from the heart team and preprocedural computed tomographic analysis, TAVR was planned via the left transfemoral route. The electrocardiogram (ECG) showed normal sinus rhythm, hypertrophic findings, a heart rate of 82 beats/min, ST segment depression, and T wave inversion in leads V1–V6. The echocardiography revealed severe AS, moderate thickening and calcification, and trivial aortic insufficiency, a peak pressure gradient of 95 mmHg, and a mean pressure gradient of 57 mmHg. The aortic annular diameter and aortic valve area were 2.3 cm and 0.6 cm2, respectively. On multidetector computed tomography (MDCT), the calculated aortic annular area was 4.07 cm2. The patient's risk of operative death was 20.1% according to the logistic EuroScore and 11.7% according to the Society of Thoracic Surgeons score. Moreover there was mild left ventricular (LV) hypertrophy, diastolic LV dysfunction, good LV size and systolic function, and good right ventricular size and function. The patient underwent TAVR, which was performed under general anesthesia via a transfemoral approach and with fluoroscopic guidance. We used aortography to confirm the dimensions of the annulus from the perpendicular view. Briefly, after positioning a 0.035" Safari guidewire (Boston Scientific, Natick, MA, USA) and predilating with a 22–40 mm VACS II balloon under rapid pacing (180 beats/min) (Osypka, Rheinfelden-Herten, Germany), we implanted a 26-mm Portico valve. Immediately after valve implantation, the patient became hypotensive. We then performed the aortography. Migration of the prosthesis into the LV and serious PVL were seen (Figure 1). The Portico device

can be snared using a standard goose neck snare (Figure 2). The prosthesis was withdrawn up to the right position and successfully repositioned using the snare technique (Figure 3) and hemodynamic stability was achieved. After the prosthesis was repositioned, the aortography was performed and a mild valvular leakage was seen (Figure 4). The postoperative echocardiography showed a well-functioning prosthesis with a mild valvular leakage and a mean gradient of 11 mm Hg. The patient was discharged, and was determined to be well at the 60-day follow-up visit.

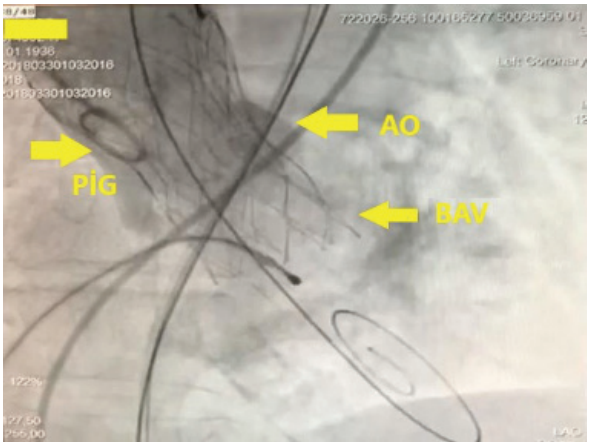

Figure 1: Angiographic view shows severe degree PVL and low TAVI implantation. AO: Aortic annulus, BAV: Bioprosthetic Aortic Valve

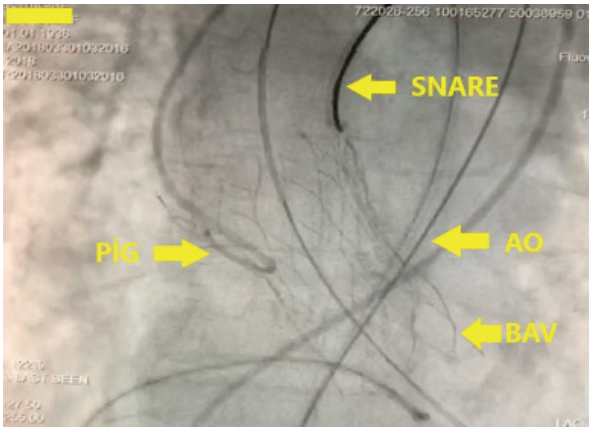

Figure 2: Portico device can be snared with a standard goose neck snare. AO: Aortic annulus, BAV: Bioprosthetic Aortic Valve, Pig: Pigtail catheter

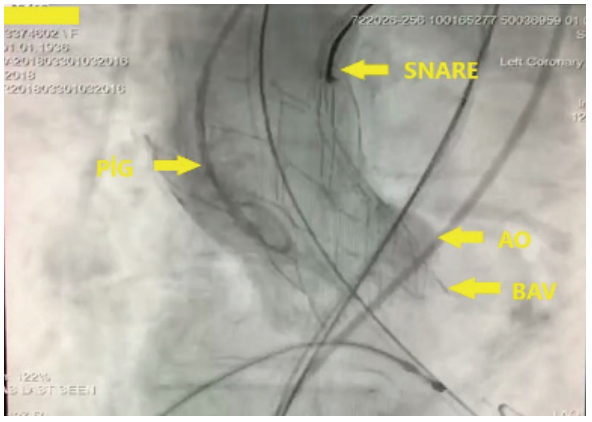

Figure 3: Aortic valve prosthesis was withdrawn up to right position and repositioned successfully by using snare. AO: Aortic annulus, BAV: Bioprosthetic Aortic Valve, Pig: Pigtail catheter

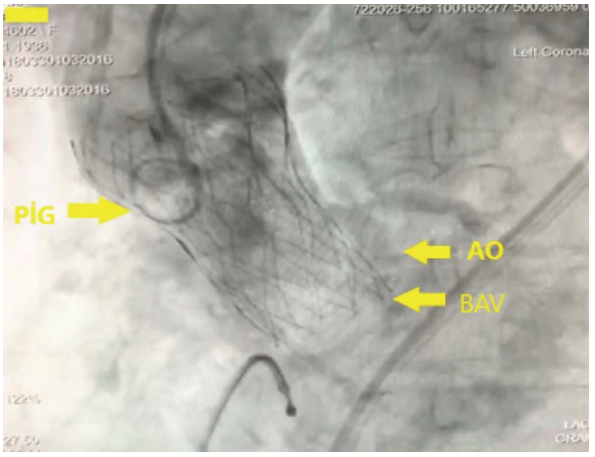

Figure 4: Final Aortography showing mild degree valvular leak. AO: Aortic annulus, BAV: Bioprosthetic Aortic Valve, Pig: Pigtail catheter

DISCUSSION

Malposition and migration of a prosthesis are the main reasons for using the snare technique, and these complications are associated with poor procedural and clinical outcomes. Thus, it is essential for interventional cardiologists to develop strategies to cope with these complications in the catheterization laboratory to avoid the need for cardiac surgery. Repeat balloon valvuloplasty, valve-in-valve, and surgical aortic valve replacement are important inter-

ventional options that are used to manage device malposition. There are also the cases in which the valve-in-valve technique has been used for Portico valves.[3] The rate of a valve-in-valve implantation due to malposition of a first prosthesis ranges between 3–6%.2 In our patient, transcatheter heart valve (THV) migration might have been related to several factors. We implanted a 26-mm Portico valve because the patient's annular area, calculated with MDCT, was 3.82 cm2. However, the size of the annular area on the MDCT appeared to be slightly smaller than the actual annular area. In fact, the size of the annulus might have been larger (annulus-THV mismatch). In addition to the annulus–THV mismatch, other mechanisms related to THV failure are high and low implants with significant PVL due to an insufficient annular seal or overhanging native leaflets causing "frozen leaflets" of the bioprosthesis. One study reported a case in which only the snare technique was used to reposition the core valve self-expanding bioprosthesis.[4] To the best of our knowledge, there are very few cases in the literature like this case.[5] The case presented in this paper is one of them to only use a snare to reposition the Portico self-expanding bioprosthesis. In our case, we only used the snare technique to pull back the malpositioned prosthesis without using the balloon pull technique and without implantation of the second valve.[6,7] We successfully managed this with the use of the snare techniques, finally achieving a significant reduction in the severity of aortic regurgitation.

CONCLUSION

Lowermost deployment of an Portico device can be complicated by PVL. Using of the snare techniques can be beneficial and substantially improve paravalvular leak. In some cases, a cheaper method such as using a snare kit can be equally effective and is worth at least a try. Awareness of this complication and the possible use of these technique may increase the safety and efficacy of TAVR with this and other new devices

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