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Case Report

A Rare Complication of Transcatheter Aortic Valve Replacement: Delayed Down Migration of a Portico Valve

Transkateter Aort Kapak Replasmanının Nadir Bir Komplikasyonu: Portico Kapağın Aşağıya Gecikmiş Yer Değiştirmesi

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ABSTRACT

There are some complications after transcatheter aortic valve replacement (TAVR), which is an alternative to surgery for the treatment of severe aortic stenosis. Valve migration, an unusual but life-threatening complication of TAVR, usually occurs during or several hours after the procedure and is associated with poor outcome. Therefore, operators must be experienced in rescue treatments. Placement of a second prosthesis as a salvage strategy appears to be a safe method to avoid the need for conversion to surgery.

Keywords: Aortic stenosis, transcatheter aortic valve replacement, valve migration

ÖZ

Ciddi aort darlığının tedavisinde ameliyata alternatif olan transkatater aort kapak replasmanı (TAVR) sonrasında bazı komplikasyonlar yaşanmaktadır. TAVR'nin olağandışı ancak yaşamı tehdit eden bir komplikasyonu olan kapak migrasyonu genellikle işlem sırasında veya işlemden birkaç saat sonra meydana gelir ve kötü sonuçla ilişkilendirilir. Bu nedenle operatörlerin kurtarma tedavileri konusunda deneyimli olmaları gerekmektedir. Kurtarma stratejisi olarak ikinci bir protezin yerleştirilmesi, cerrahiye gidiş ihtiyacını ortadan kaldırmak için güvenli bir yöntem gibi görünmektedir.

Anahtar kelimeler: Aort darlığı, transkateter aort kapak replasmanı, kapak migrasyonu

INTRODUCTION

Transcatheter aortic valve replacement (TAVR) has emerged as a less invasive alternative to surgical intervention for severe aortic stenosis. While TAVR offers significant benefits, it is not without complications. One rare yet potentially life-threatening complication is valve migration, which typically occurs during the procedure or within several hours post-procedure[1].

CASE REPORT

A 74-year-old man with symptomatic, severe aortic stenosis was referred to our clinic for TAVR evaluation. Sixteen years prior, the patient had undergone coronary artery bypass grafting surgery. The risk of operative mortality was 13.8% according to the logistic EuroScore and 6.1% according to the Society of Thoracic Surgeons score. Transthoracic echocardiography (TTE) revealed an ejection fraction of 60%, mild aortic regurgitation (AR) with severe aortic stenosis as measured by an aortic valve area of 0.9 cm^2, a mean gradient of 47 mmHg, and a peak velocity >4 m/s. Coronary angiography revealed graft patency. His condition was assessed with the heart team, and TAVR was scheduled. Pre-procedural computed tomography demonstrated a calcified trileaflet aortic stenosis with a perimeter-derived annular diameter of 25.3 mm and appropriate peripheral vasculature. After predilatation with a 20-mm balloon, a self-expandable 29-mm portico valve (Abbott Vascular, Santa Clara, CA, USA) was implanted. Postdilatation was performed using a 25-mm balloon. Aortography and TTE revealed mild to moderate AR, and his blood pressure was 110/50 mmHg

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(Figure 1A). The patient did well at two days after the procedure, but tachypnea and tachycardia developed abruptly. A chest radiogram showed pleural effusion, and severe AR with two jets was noted on TTE (Figure 1B, C). Diuretic infusion and non-invasive respiratory support were initiated. Transesophageal echocardiography (TEE) revealed migration of the bioprosthetic valve to the left ventricular outflow tract (LVOT) up to 2/3 of the anterior mitral leaflet as well as paravalvular and transvalvular severe AR was noted (pressure half time: 158 ms, effective regurgitant orifice area: 0.32 cm^2, regurgitant volume >60 cc/beat) (Figure 1D). Aortography also confirmed downward migration of the valve and severe AR (Figure 1E). Following consultation with the heart team, a decision was made to proceed with valve-in-valve TAVR because of symptomatic severe AR. A 29-mm portico valve (Abbott Vascular, Santa Clara, CA, USA) was replaced inside the previously implanted valve by aligning the aortic annulus (Figure 1F). After postdilatation with a 25-mm balloon, only mild AR was noted on the final aortography and TEE, and the procedure was completed uneventfully (Figure 1G). The patient's symptoms were noted to resolve at follow-up, and he was discharged 5 days after the procedure.

Written informed consent was obtained from the patient.

DISCUSSION

TAVR has revolutionized the treatment of severe aortic stenosis, offering a minimally invasive alternative to surgical intervention for high-risk patients. However, as with any medical procedure, TAVR is not without its complications, and this case underscores the importance of vigilance, prompt diagnosis, and an experienced heart team in managing such complications.

Valve migration in TAVR, as observed in the present case, is a rare but potentially life-threatening event. It has been reported that the valve migration rate is approximately 1% in the literature. It can manifest suddenly, leading to acute hemodynamic instability and severe AR. The etiology of valve migration can be multifactorial, including suboptimal valve sizing, inadequate anchoring due to a lack of sufficient annular calcification, deep implantation of the valve, or anatomical variations in the aortic root. The use of first-generation valves and the presence of a bicuspid valve are considered independent risk factors[2]. In our

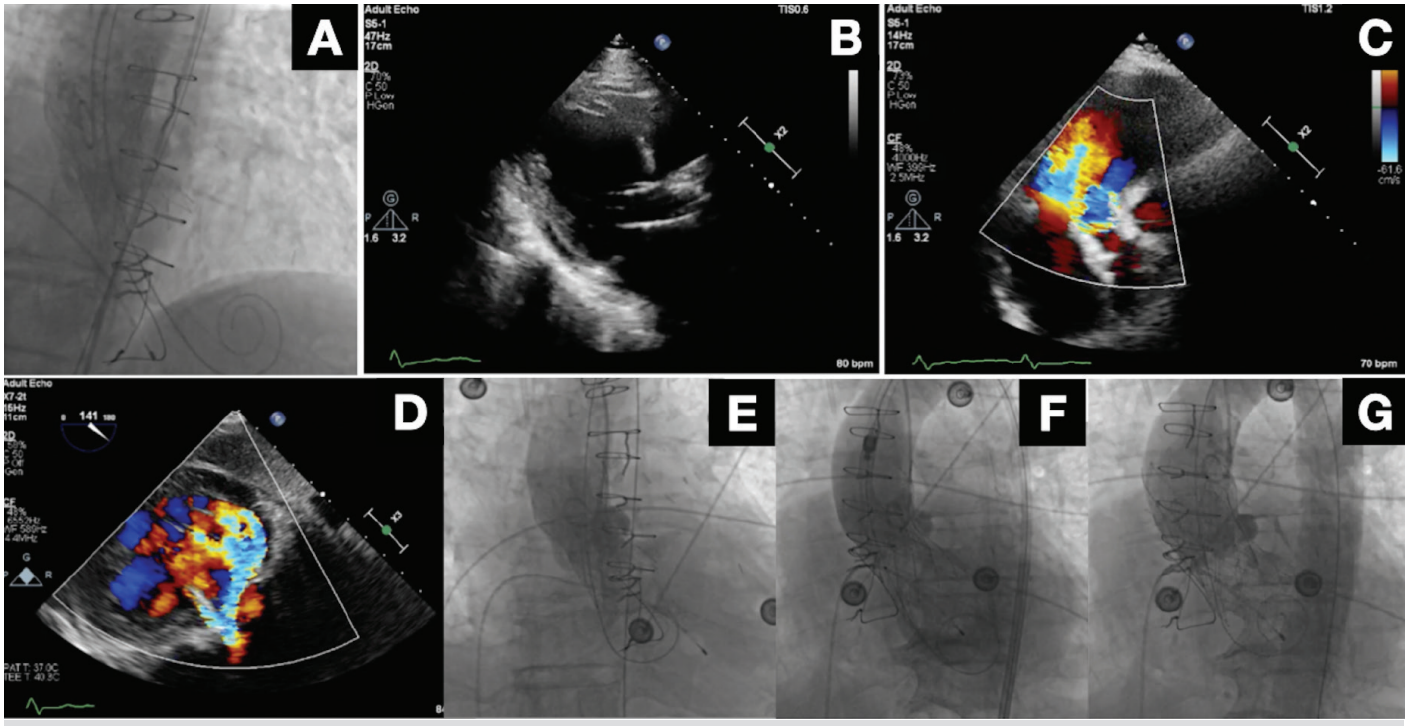

Figure 1. A. Aortography revealed mild to moderate aortic regurgitation (AR) after the valve implantation. B. Transthoracic echocardiography (TTE) showed migration of the bioprosthetic valve to the left ventricular outflow tract. C. Severe AR with two jets was noted on the TTE. D. Severe AR with two jets was noted on the TEE. E. The aortography revealed downward migration of the valve and severe AR. F. A 29 mm Portico valve (Abbott Vascular, Santa Clara, CA, USA) was replaced inside the previously implanted valve by aligning the aortic annulus. G. On the final aortography, only mild AR was noted.

case, meticulous attention was paid to the selection of an appropriate size valve and careful placement without excessive depth. In addition, there was sufficient annular calcification for secure anchoring. Despite these considerations, the observed migration phenomenon prompts an examination of the inherent characteristics of the portico valve itself. During the expansion of the nitinol frame upon valve deployment, the limited radial force of the portico valve may contribute to its descent into the ventricle. This suggests that the observed migration may be attributed to the specific mechanical properties of the portico valve.

The early diagnosis of valve migration is paramount. In this case, the patient's abrupt onset of tachypnea and tachycardia prompted further evaluation, revealing pleural effusion and severe AR. TEE played a pivotal role in confirming valve migration into the LVOT and assessing the extent of AR.

Prosthesis migration typically manifests during or within several hours following the procedural intervention and is often associated with adverse outcomes. Given the temporal pattern of migration, it is important to emphasize the critical role of echocardiographic and hemodynamic monitoring, particularly in the initial post-procedural hour. Although migration is an expected complication in the early period, it is not easy to predict late migration. In the case we reported, valve migration was observed two days after the intervention. This deviation from the expected timeline underscores the necessity for heightened vigilance during postoperative follow-up. Any sudden deterioration, such as dyspnea, hypotension, and tachycardia, in the patient's clinical condition warrants consideration of valve migration. In such instances, prompt diagnostic measures, including urgent echocardiographic or fluoroscopic examinations, are essential to determine the precise etiology and facilitate timely intervention.

In previous studies, downward migration to the LVOT after balloon-expandable transcatheter aortic valves has been reported, and some patients have been treated with the valve-in-valve procedure[3,4]. However, downward displacement of the self-expanding valve is considered less likely. The low radial force and complex opening techniques of self-expanding valves can result in valve mispositioning.

The decision to perform a valve-in-valve TAVR procedure was made after careful consideration by the heart team. The implantation of a new valve within the previously placed bioprosthetic valve successfully treated severe AR. Placement of a second prosthesis as a salvage strategy appears to be a safe method to avoid the need for conversion to surgery.

Post-procedural outcomes were favorable, with the patient's symptoms resolving, and he was discharged within a reasonable timeframe. However, long-term follow-up remains crucial for monitoring valve function and potential complications.

This case highlights the importance of vigilance and ongoing monitoring in patients who have undergone TAVR procedures, particularly when using self-expandable valves. Valve migration, although rare, remains a potential complication that can lead to severe AR and other clinical consequences. Prompt recognition of such complications and a multidisciplinary approach, as seen in the present case, can lead to successful rescue interventions and favorable outcomes for the patient. Regular post-procedural surveillance is crucial to promptly detect and manage complications, thereby ensuring the long-term success of TAVR as a treatment option for severe aortic stenosis.

Ethics

Informed Consent: Written informed consent was obtained from the patient.

Author Contributions

Concept: B.G.S., C.Y., R.Z., Design: B.G.S., C.Y., R.Z., Data Collection and/or Processing: B.G.S., Analysis and/or Interpretation: B.G.S., C.Y., Literature Search: B.G.S., R.Z., Writing: B.G.S., C.Y., R.Z.

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