

Delayed Aortic Dissection After Transcatheter Aortic Valve Implantation

Transkateter Aort Kapak İmplantasyonu Sonrası Geç Gelişen Aort Diseksiyonu

ABSTRACT

In high-risk patients with aortic stenosis, transcatheter aortic valve implantation (TAVI) provides functional improvement. Vascular complications after TAVI are known to occur frequently. Aortic dissection is a rare but life-threatening vascular complication of TAVI. Here, we present a case of delayed aortic dissection following a successful TAVI procedure.

Keywords: Aortic dissection, aortic stenosis, transcatheter aortic valve implantation

ÖZET

Aort darlığı olan yüksek riskli hastalarda transkateter aort kapağı implantasyonu (TAVİ) fonksiyonel iyileşme sağlamaktadır. TAVİ sonrası vasküler komplikasyonların meydana geldiği sıklıkla ifade edilmiştir. Aort diseksiyonu, TAVİ'nin nadir fakat hayatı tehdit eden vasküler komplikasyonlarından biridir. Burada, başarılı TAVİ işlemi sonrası gecikmiş aort diseksiyonu olgusunu sunuyoruz.

Anahtar Kelimeler: Aort diseksiyonu, aort stenozu, transkateter aort kapağı implantasyonu

The development of aortic dissection as a result of transcatheter aortic valve implantation (TAVI) is rare, yet it represents one of the most devastating vascular complications associated with this procedure. The incidence of iatrogenic aortic dissection in TAVI ranges from 0.2% to 0.3%.¹ While there are case reports of delayed aortic dissection following TAVI, this complication typically occurs during the TAVI procedure itself.² The available clinical data on pathogenesis remain limited. In this report, we present a case of delayed aortic dissection that occurred after a successful TAVI procedure.

Case Report

A 73-year-old male patient with a six-month history of New York Heart Association Class III dyspnea was referred to our institution for treatment of severe aortic stenosis. His medical history included hypertension, coronary artery bypass graft surgery (CABG), and chronic obstructive pulmonary disease. Transthoracic echocardiography revealed an aortic valve area of 0.70 cm² with a mean gradient of 40 mmHg and preserved left ventricular systolic function. Given that the logistic European System for Cardiac Operative Risk Evaluation (EuroSCORE) and Society of Thoracic Surgeons (STS) scores were 8.14 % and 5.94%, respectively, a TAVI procedure was planned following evaluation by our heart team. Before the procedure, the aortic valve was assessed using coronary computed tomography (CT) (Figure 1). A self-expanding 27 mm ACURATE NEO prosthesis (Symetis, a Boston Scientific company, Ecublens, Switzerland) was successfully implanted in our patient. Predilatation was performed before the implantation. Post-dilatation was also performed, as the annular contact part of the valve did not open circularly (Video 1). Postprocedural aortography showed no aortic regurgitation (Video 2). Hemostasis was achieved with percutaneous vascular closure. An echocardiogram two days post-TAVI showed good function of the prosthesis with a peak gradient of 9 mmHg, a mean gradient of 4 mmHg, and no signs of aortic dissection. The asymptomatic patient was discharged on the third day. One week later, the patient presented to our emergency department with vague back and chest pain that had started two days prior. The troponin values were

CASE REPORT OLGU SUNUMU

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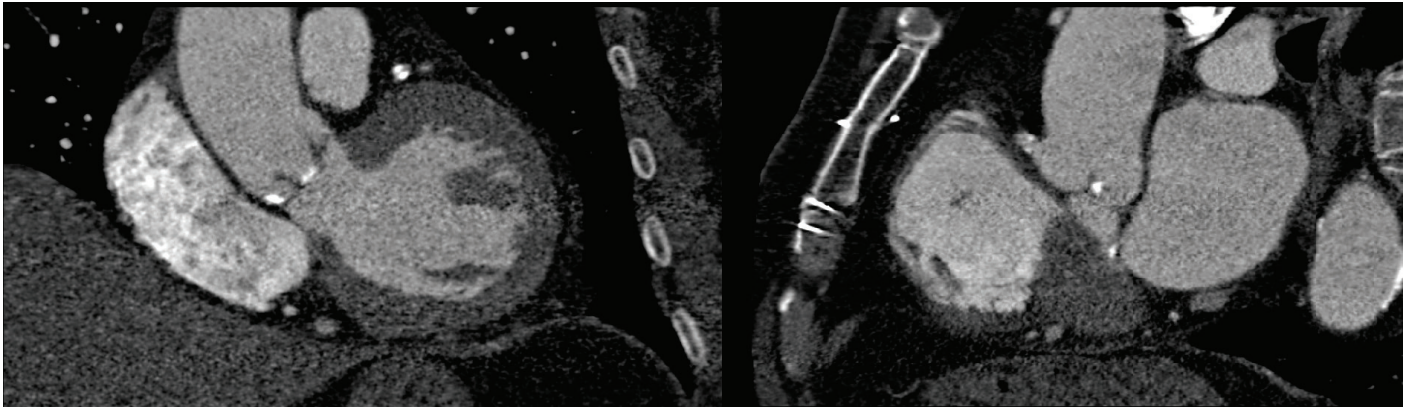


Figure 1. Images of the aortic valve in coronal and sagittal views from a computed tomography scan taken before the procedure.

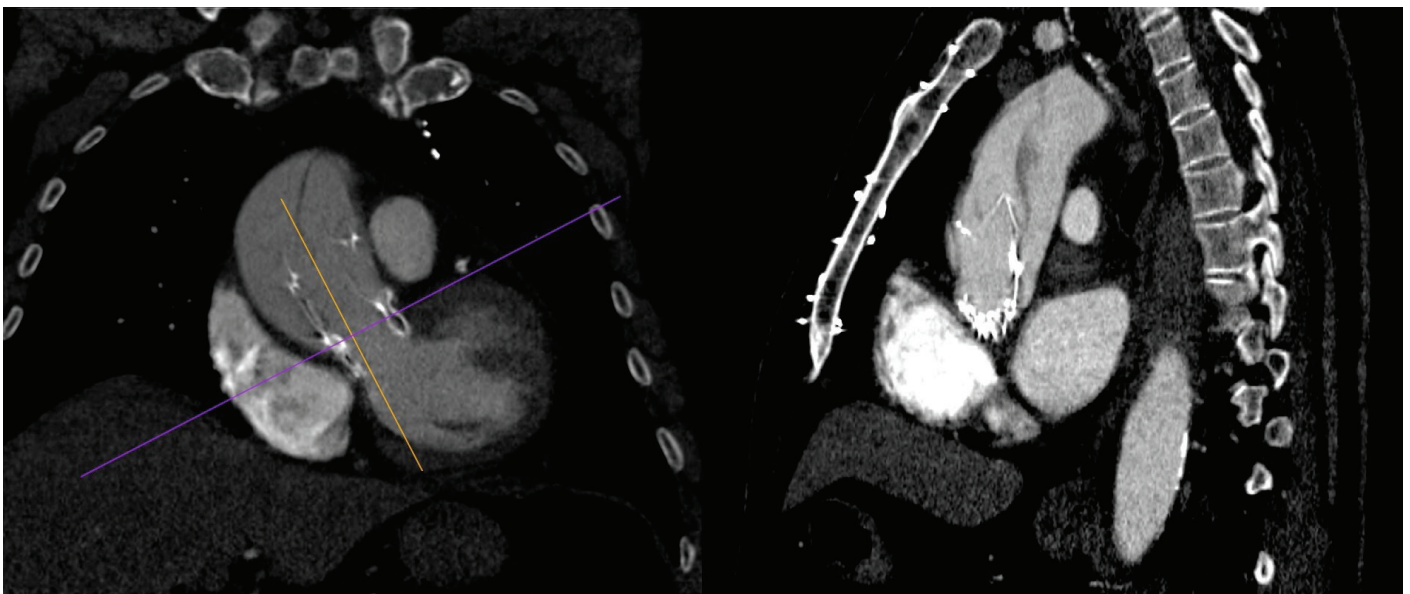


Figure 2. Depiction of the aortic dissection in sagittal and coronal views from a computed tomography scan.

slightly above the norm but clinically insignificant. On physical examination, pulses in the arms and legs were equal, and there was no difference in blood pressure between the right and left arm. However, we decided to perform a computed tomography (CT) scan on the patient to exclude aortic dissection. The CT scan demonstrated a dissection flap starting from the level of the aortic annulus and continuing along the ascending aorta and aortic arch. However, the continuity of the dissection did not extend to the level of the abdominal aorta. The ascending aorta

at the level of the pulmonary artery was aneurysmatic, with an anteroposterior (AP) diameter of approximately 55 mm (Figure 2, Video 3). The patient was consulted with the surgical team. Due to the history of bypass surgery and the recent bioprosthetic valve procedure, the surgeons deemed the patient to be at high risk for surgical intervention. The patient declined the operation, and the decision-making process favored medical treatment. Unfortunately, the patient suddenly died while on the ward five days later.

Discussion

This case underscores that aortic dissection, which may occur after TAVI, could result in death within days, challenging the current perception that it is strictly a periprocedural complication. Aortic dissection is an infrequent event during the TAVI procedure, potentially triggered by manipulations of the delivery system, valve repositioning, retrieval, or retraction.

Delayed aortic dissection is a rare occurrence but has been documented previously. Jacobzon et al.³ reported on a 78-year-old patient who experienced a delayed aortic dissection one

ABBREVIATIONS

AP	Anteroposterior
BPD	Balloon post-dilation
CABG	Coronary artery bypass graft surgery
CT	Computed tomography
EuroSCORE	European System for Cardiac Operative Risk Evaluation
PVL	Paravalvular leakage
STS	Society of Thoracic Surgeons
TAVI	Transcatheter aortic valve implantation

month following a TAVI procedure. This individual required emergency surgery; however, the postoperative course was smooth, resulting in a discharge on the 13th postoperative day. In this particular case, the dissection was attributed to a malalignment of the valve with the longitudinal axis of the aorta, identified during surgery to have started at the level of the sino-tubular junction, with the valve cage deeply embedded in the aortic wall. Gerber et al.⁴ described two cases where postmortem examinations confirmed aortic dissection as the cause of death, occurring at 6 and 22 days after TAVI. Additionally, Losmanova et al.⁵ reported a case identified through autopsy, revealing a tear in the ascending aorta, adjacent to the upper edge of the valve.

In our case, the tear initiated from the upper crown part of the valve, progressing through the ascending aorta and aortic arch. The primary function of the upper crown part of the valve is to secure the native valve and facilitate supra-annular anchoring. The upper crown may have caused dissection as a result of increased mechanical stress on the aortic wall after post-dilation. Balloon post-dilation (BPD) has both advantages and disadvantages. BPD is not routinely recommended except to reduce paravalvular leakage (PVL), correct any frame underexpansion, and optimize transvalvular gradients. Studies have identified BPD as a cause of aortic annular rupture or aortic damage.^{6,7} In an analysis of patients who underwent post-dilatation with the CoreValve system, Harrison et al.⁸ found no differences in major vascular complications between patients requiring and not requiring BPD. In this case, our aim was to correct frame underexpansion and decrease patient-prosthesis mismatch. No pathological conditions were observed in the post-procedure angiography image and echo control. However, it was difficult to determine when the dissection occurred. This dissection may have become clinically significant after the initiation of dual or single antiplatelet therapy because antiplatelet therapy might prevent the healing of the intimal tear.

Conclusion

Aortic dissection developing during or after TAVI is an emergency with a high mortality rate. Patients may present to emergency services with atypical or milder complaints rather than the classic symptoms of aortic dissection. Because of this, diagnosis can be difficult or delayed. A detailed treatment protocol is not yet available in this regard. Open surgery for iatrogenic type A dissection has not been described, given the high mortality rate in patients with underlying frailty. In the literature, there were patients who underwent open surgery or were treated percutaneously and survived.

Informed Consent: Informed consent was obtained from the patient's family for the publication of this case report and any accompanying images.

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Video 1. Post-dilatation of the bioprosthetic aortic valve.

Video 2. Post-procedure aortography following valve implantation.

Video 3. View of aortic dissection by coronal computed tomography scan.

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