

Transcatheter valve implantation into descending aorta due to the insufficient guide wire support

Yetersiz kılavuz tel desteğine bağlı inen aorta transkateter kapak implantasyonu

Serkan Aslan, Derya Öztürk, Mehmet Gül, Ömer Çelik, Nevzat Uslu

Department of Cardiovascular Surgery, İstanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery
Training and Research Hospital, İstanbul, Turkey

ABSTRACT

Transcatheter aortic valve implantation (TAVI) is an alternative therapy to surgical aortic valve replacement in inoperable patients with severe aortic stenosis. Despite the increasing use of TAVI currently, the potential risk for life-threatening complications is still regarded to be high. An 86-year-old female patient was admitted to our clinic with angina. On echocardiography, the mean transaortic gradient was 55 mmHg with a calculated aortic valve area of 0.8 cm². Due to high surgical risk scores (Logistic EuroSCORE= 31.21%), the patient was scheduled for TAVI via transfemoral route. An Amplatz Super Stiff PTFE-coated Guide wire (7 cm Bentson-Type) was positioned correctly into the left ventricle. Predilatation was made into the aortic root by balloon. A 23 mm Edwards SAPIEN XT valve was advanced to the aorta, however, the valve was unable to be placed at the aortic valve level due to the retraction of the guide wire from the left ventricle. The transcatheter aortic valve was withdrawn and implanted to the descending aorta. Subsequently, another transcatheter aortic valve (23 mm Edwards SAPIEN XT) was implanted at the aortic valve level successfully.

Keywords: Aort stenosis; complication of transcatheter aortic valve implantation; transcatheter aortic valve implantation.

Transcatheter aortic valve implantation (TAVI) is an alternative therapy to surgical aortic valve replacement in inoperable patients with severe aortic stenosis. Despite the increased use of TAVI, the potential risk for life-threatening complications is still high.^[1]

ÖZ

Transkateter aort kapak implantasyonu (TAVI) ciddi aort kapak darlığı olup ameliyat edilemeyen hastalarda cerrahiye alternatif bir tedavi seçeneğidir. Günümüzde TAVI kullanımını giderek artsa dahi işlemin komplikasyon riski halen yüksektir. Seksen altı yaşında ciddi aort darlığı olan bir kadın hasta kliniğimize anjina yakınması ile başvurdu. Ekokardiyografide hesaplanan aort kapak alanı 0.8 cm² ile birlikte ortalama transaortik gradyan 55 mmHg idi. Cerrahi risk skorları yüksek olduğu için (Logistic EuroSCORE= %31.21), hastaya transfemoral yol ile TAVI planlandı. Amplatz Super Stiff PTFE kaplı kılavuz tel (7 cm Bentson-Tip) sol ventriküle yerleştirildi. Aort köküne balon ile predilatasyon yapıldı. 23 mm Edwards SAPIEN XT kapak aorta ilerletildi; ancak kılavuz telin sol ventrikülden geri gelmesi nedeniyle, kapak aort kapak seviyesine yerleştirilemedi. Transkateter aort kapak çekilerek inen aorta yerleştirildi. Sonrasında başka bir transkateter aort kapak (23 mm Edwards SAPIEN XT) aort kapak seviyesine başarılı bir şekilde yerleştirildi.

Anahtar sözcükler: Aort darlığı; transkateter aort kapak implantasyonu komplikasyonları; transkateter aort kapak implantasyonu.

CASE REPORT

An 86-year-old female patient with a history of hypertension, diabetes mellitus type 2, chronic obstructive pulmonary disease, and coronary artery disease who presented with New York Heart Association (NYHA) class III functional capacity did



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Correspondence: Derya Öztürk, M.D. İstanbul Mehmet Akif Ersoy Göğüs Kalp ve Damar Cerrahisi Eğitim ve Araştırma Hastanesi Kalp ve Damar Cerrahisi Kliniği, 34303 Küçükçekmece, İstanbul, Turkey.

Tel: +90 505 - 914 24 82 e-mail: dr.deryaerbas@hotmail.com

not respond to medical treatment and was admitted to our facility. Her physical examination revealed a systolic ejection murmur over the aortic area, and transthoracic echocardiography showed normal left ventricular dysfunction (70%) and severe aortic stenosis with a mean transaortic gradient of 55 mmHg corresponding to a calculated aortic valve area of 0.8 cm². The branches of the aortic arch were classified as type 1, and there was no elongation.^[2] Due to the patient's very high surgical risk [logistic European System for Cardiac Operative Risk Evaluation (EuroSCORE): 31.21%], the heart team in conjunction with various cardiologists, interventional cardiologists, and cardiac surgeons decided to perform TAVI via a transfemoral approach. The procedure was done under general anesthesia. An Amplatz Super Stiff™ Guidewire (3 mm J-tip, 6 cm flexible, 260 cm x 0.035 in) (Boston Scientific, Marlborough, MA, USA) was inserted correctly into the left ventricle (LV), and predilatation was performed at the aortic root using a balloon. A 23 mm Edwards SAPIEN XT transcatheter heart valve (Edwards Lifesciences Corp., Irvine, California, USA) was then advanced over the valve system to the aorta. However, because of the retraction of the guidewire from the LV, the valve could not be placed at the aortic valve level (Figure 1). Fluoroscopy showed that the guidewire had become displaced in the LV during the advancement of the valve. The transcatheter

aortic valve was then withdrawn to the descending aorta at least 5 cm below the subclavian artery and implanted successfully during rapid ventricular pacing. Afterward, another transcatheter aortic valve (23 mm Edwards SAPIEN XT) was implanted at the aortic valve level while rapid ventricular pacing was taking place. Control imaging then showed a normally functioning aortic stent-valve without any complications (Figure 2), but an aortogram revealed mild aortic regurgitation. Post-procedural echocardiographic findings demonstrated a well-functioning prosthesis with a 1.9 cm² surface area, a mean gradient of 6 mmHg, and mild paravalvular leakage. The postoperative course did not include any major cardiac, vascular, or cerebral events, and the functional capacity was NYHA class I at the six-month follow-up.

DISCUSSION

Complications with TAVI commonly arise from both the complexity of the procedure and the morbidity of the patients being treated. In a meta-analysis by Génereux et al.^[3] that involved 3,519 patients, the 30-day mortality rate was 7.8%, the 30-day stroke rate was 3.2%, and the 30-day major vascular event rate was 11.9%. In addition, the major bleeding rate was 22.3% with a life-threatening bleeding rate of 15.6%. Furthermore, the prosthetic-related

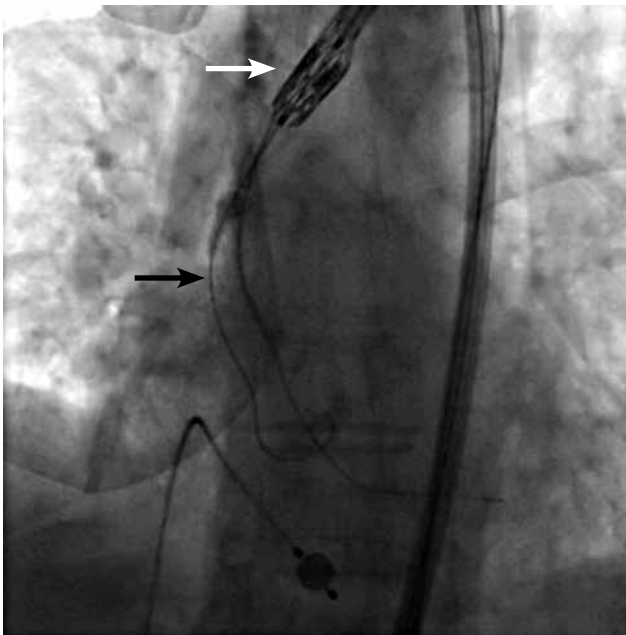


Figure 1. Fluoroscopic image showing the removal of the Amplatz Super Stiff™ Guidewire (black arrow) while advancing the Edwards Sapien XT valve (white arrow).

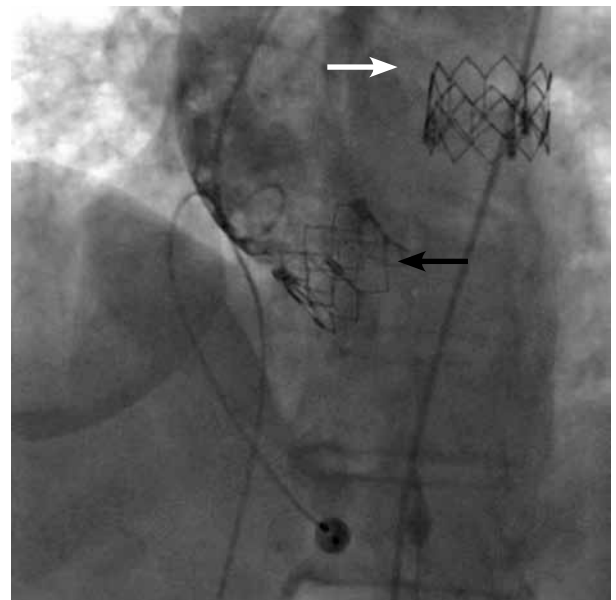


Figure 2. Fluoroscopic image showing the final angiogram after the deployment of the Edwards Sapien XT valves in the aortic root of the ascending aorta (black arrow) and the descending thoracic aorta (white arrow).

complications were as follows: failure to deliver or implant the valve in the correct position (3.5%), multiple valve implantation (1.8%), valve embolization (1.7%), valve in valve (2.3%), moderate-to-severe aortic regurgitation (7.4%), and conversion to open surgery (1.3%). In our case, we were unable to advance the transcatheter aortic into a suitable position from the ascending aorta to the aortic root because the guidewire was positioned too high relative to the valve; therefore, it failed to give adequate support to advance the valve system. We then withdrew the transcatheter aortic valve at least 5 cm below the subclavian artery to avoid occluding the aortic branches. To the best of our knowledge, no other successful method for overcoming this situation has been reported in the literature. The guidewire that we used had a 6 cm flexible tip; hence, it is possible that one with a shorter flexible tip might have provided better support. Furthermore, we might have used the guidewires which are pre-shaped for the TAVI procedure, because they provides enhanced rail support and are designed to facilitate stable, atraumatic placement with curved shape. In addition, they also have greater retention.^[4] In patients undergoing TAVI, after crossing the aortic valve via standard interventional techniques, the guidewire exchange must be performed with redundant curving of the wire in the LV cavity to prevent the loss of position. Moreover, care must be taken to avoid damage to the LV, which could result in perforation. To avoid possible problems, the position of the guidewire should be checked by fluoroscopy when the prosthetic valve is advanced into the valve system.

Conclusion

Despite being less invasive than open-chest aortic valve replacement, TAVI continues to be associated with the potential for serious complications. As operators become more experienced with TAVI, the outcomes will improve, which hopefully will lead to the wider application of this therapy.

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