

CASE REPORT

Direct aortic transcatheter aortic valve implantation

Doğrudan aortik yaklaşımla transkateter aort kapak implantasyonu

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Summary– Transcatheter aortic valve implantation (TAVI) is a safe and effective alternative to surgical valve replacement in intermediate and even in low-risk patient cohorts. Direct aortic (DAo) route may be used in patients with severe peripheral vascular disease. Here, we present an 88-year old patient hospitalized with cardiogenic shock. Echocardiography revealed severe aortic valve stenosis with aortic valve area 0.5 cm², mean gradient of 55 mmHg, and peak gradient 92 mmHg. TAVI was considered by the Institutional Heart Team. Multislice computed tomography (MSCT) revealed severe peripheral vascular disease, decreased calibration of abdominal aorta, and multiple large vulnerable atherosclerotic plaques. The patient was scheduled for a DAo TAVI. A 26-mm Medtronic CoreValve Evolut R valve was implanted after predilatation with median sternotomy. The patient was discharged after 96 hours. Although transfemoral (TF) access is used as the default approach for TAVI, it was contraindicated in our patient owing to severe peripheral vascular disease and decreased calibration of the abdominal aorta at its narrowest point (4.5 mm) with multiple large vulnerable atherosclerotic plaques. Careful preprocedural MSCT evaluation is essential and directly affects the success of the procedure. MSCT is also mandatory to confirm the best cannulation zone that must be met for a successful DAo TAVI.

Özet– Transkateter aort kapak implantasyonu (TAVI), orta ve hatta düşük riskli hastalarda cerrahi kapak replasmanına güvenli ve etkili bir alternatiftir. Doğrudan aortik (DAo) yol, şiddetli periferik vasküler hastalığı olan hastalarda kullanılabilir. Biz, 88 yaşında kardiyojenik şok ile hastanemize başvuran bir hastayı sunuyoruz. Ekokardiyografide aort kapak alanı 0.5 cm², ortalama gradiyent 55 mmHg ve pik gradiyent 92 mmHg olan ciddi aort kapak stenozu görüldü. Kurumumuz Kalp Ekibi tarafından TAVI önerildi. Çok kesitli Bilgisayarlı tomografide (ÇKBT) şiddetli periferik vasküler hastalık, abdominal aortanın kalibrasyonunda azalma ve çok sayıda hassas aterosklerotik plaklar görüldü. Hastaya Dao ile TAVI planlandı. Median sternotomi yapıldı. Önce predilatasyon yapıp sonra 26 mm Medtronic CoreValve Evolut R kapak implante edildi. Hasta 96 saat sonra taburcu edildi. TAVI için varsayılan yaklaşım olarak transfemoral (TF) yaklaşım kullanılsa da, hastamızda şiddetli periferik vasküler hastalık, çok sayıda hassas aterosklerotik plaklar, abdominal aortun kalibrasyonunun azalması ve en dar noktada 4,5 mm olması nedeniyle hastamızda kontrendikedir. Prosedür öncesi dikkatli ÇKBT değerlendirmesi önemlidir ve prosedürün başarısını doğrudan etkiler. ÇKBT, başarılı DAo TAVI için mutlaka olması gereken en iyi kanülasyon bölgesini doğrulamak için de zorunludur.

Trascatheter aortic valve implantation (TAVI) is a safe and effective alternative to surgical valve replacement in intermediate and even in low-risk patient cohorts.^[1,2] Direct aortic (DAo) route may be used in patients with severe peripheral vascular disease. In this report, we present a patient with severe aortic stenosis who was treated with DAo TAVI.

CASE REPORT

An 88-year old patient was hospitalized with cardiogenic shock. Echocardiography revealed severe AS

with an aortic valve area of 0.5 cm², mean gradient of 55 mmHg, peak gradient 92 mmHg, and reduced left ventricular ejection fraction (LVEF) of 35%. An urgent coronary angiography showed patent bypass grafts of the left internal mammary artery to left anterior descending (LAD) artery, the right internal mammary artery to right coronary artery, and saphenous graft to circumflex artery. Intra-aortic balloon pump was placed because of ongoing cardiogenic shock. TAVI was considered by the institutional heart team. Multislice computed tomography (MSCT) revealed

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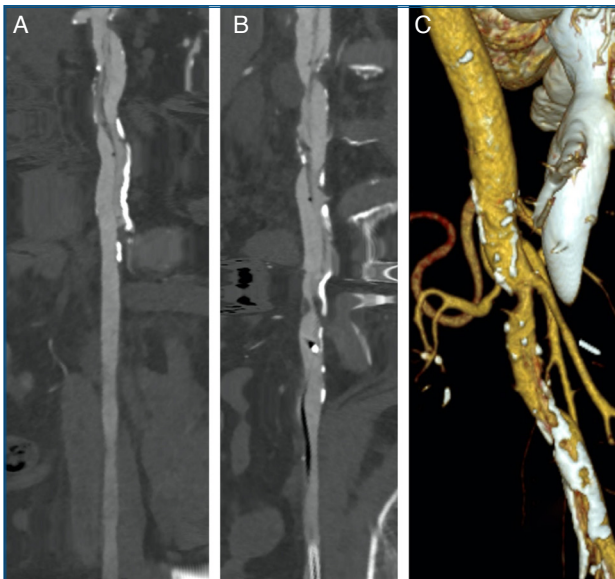


Figure 1. Tomographic image of (A) right and (B) left femoral arteries and (C) three-dimensional reconstruction of abdominal aorta, demonstrating multiple large vulnerable atherosclerotic plaques and stenosis.

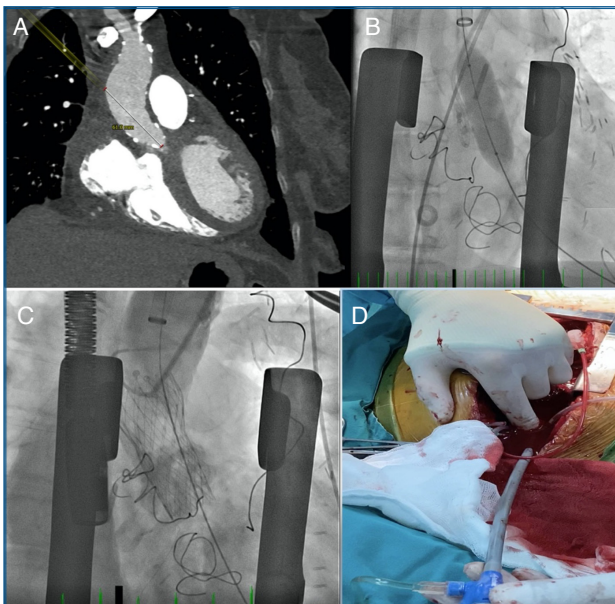


Figure 2. (A) Distance from access site to the aortic valve was measured 6.1 cm. (B) Pre deployment ballooning and (C) post-deployment aortography with no evidence of paravalvular leak. (D) During the procedure, the surgeon was holding the 18 Fr sheath to prevent excessive movements and dislodgment.

bilateral calcification with 3 mm luminal diameter in the left common iliac artery. The luminal area of the right iliac artery measured 5 mm; however, there were multiple large vulnerable atherosclerotic plaques at the narrowest point of the aorta (Figure 1). The

common carotid arteries were calcified with 60% right internal carotid stenosis. The patient was scheduled for a DAo TAVI. Median sternotomy was

performed. The double purse string sutures and an 18 F sheath was placed with the Seldinger technique in a suitable non-calcified posterior area of the ascending aorta. A 26-mm Medtronic CoreValve Evolut R valve was implanted after predilatation with a Medtronic 23 mm balloon (Figure 2). The patient was discharged after 96 hours. The first-month post-procedure echocardiography revealed normal prosthetic valve functions, and LVEF had recovered to 57%.

Abbreviations:

DAo	Direct aortic
LAD	Left anterior descending
LVEF	Left ventricular ejection fraction
MSCT	Multislice computed tomography
TAVI	Transcatheter aortic valve implantation
TF	Transfemoral

DISCUSSION

Although transfemoral access is used as the default approach for TAVI, it was contraindicated in our patient owing to severe peripheral vascular disease and the decreased calibration of abdominal aorta at its narrowest point (4.5 mm) with multiple large vulnerable atherosclerotic plaques (Figure 1). These unfavorable anatomic features are believed to be potential sources of embolization or causes of vascular rupture/dissection when catheters are inserted during procedure. Transaxillar or subclavian routes are contraindicated in patients with patent internal mammary grafts, especially in the setting of proximal occlusion of LAD as in our patient.^[3] Transcaval approach is also an emerging strategy, but we did not have enough experience for this route. Transcarotid approach is a non-inferior alternative to TF TAVI but contraindicated in our patient owing to carotid stenosis and small vessel size.^[4] Careful pre-procedural MSCT evaluation is essential and directly affects the success of the procedure. It is very important to evaluate the relation between the ascending aorta and sternum to decide whether to perform the procedure with mini J sternotomy or mini right thoracotomy. Right anterior mini-thoracotomy is generally preferred for DAo TAVI; however, our patient was not a good candidate as the aorta was not right-sided, and there was a patent RIMA graft which could be injured during the procedure. Mini J sternotomy could be a less invasive approach, but median sternotomy was preferred as we believed that it would provide faster interventional options for possi-

ble fatal complications, such as bleeding or ventricular perforation and also more convenient and precise access to the non-calcified area located in the posterolateral part of the aorta. MSCT is also mandatory to confirm three major criteria for the best cannulation zone that must be met for successful DAo TAVI. First, the site of the purse strings must be placed in an area free of calcification.⁵ Ascending aorta was severely calcified in our case. There was only a small area located at the posterolateral part of aorta, and we cannulated aorta from this part. Second, the DAo cannulation zone is preferred along the upper outer quadrant, anterolateral part of aorta which may allow direct line perpendicular access to the aortic valve.^[5] Although we performed the cannulation from posterolateral part of aorta, it allowed us to direct the sheath in a straight line to deploy the device. Finally, the site of the purse string must leave enough distance to allow the delivery system for implantation. The minimum required distance must be 6 cm.^[6] It measured 6.1 cm in our patient.

In conclusion, in patients undergoing non-TF TAVI, the choice of aortic access must be made according to the vascular anatomy, local facilities at the center, and experience of the operator. Careful evaluation of preprocedural MSCT affects the success of the procedure.

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Anahtar Kelimeler: Transkateter aort kapak replasmanı; aort kapak stenozu; periferik vasküler hastalık; çok kesitli bilgisayarlı tomografi