

CASE REPORT

## Crucial role of safety guidewire in transcatheter aortic valve implantation: Two cases with vascular complication

### Transkateter aort kapak implantasyonunda güvenlik telinin kritik rolü: Damar komplikasyonu gelişen iki olgu

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**Summary**– Vascular complications increasing the rates of morbidity and mortality are among the most common complications observed during transcatheter aortic valve implantation (TAVI). Endovascular management is often life-saving. However, due to limitations of time in cases of iliac rupture and dissection, precautions taken prior to the procedure and the placement of safety guidewire in the contralateral femoral artery are crucial. Here, an 85-year-old woman and an 84-year-old man who had severe symptomatic aortic stenosis and underwent TAVI were presented. Although the valves were successfully implanted, the procedures were complicated by rupture and dissection of the right iliofemoral artery. With the use of safety guidewire, 2 self-expandable graft stents were inserted at the site of rupture and in the place of dissection in the iliofemoral artery, and the patients could be managed successfully.

**Özet**– Hastaların morbidite ve mortalite oranlarını arttıran damar komplikasyonları transkateter aort kapak implantasyonu (TAKİ) sırasında en sık görülen komplikasyonlar arasındadır. Endovasküler girişimler mümkün olup hayat kurtarıcı olmaktadır. Buna rağmen iliak rüptür ve diseksiyon esnasında zaman kısıtlı olduğundan işlem öncesi karşı femoral arterinden güvenlik kılavuz telinin konulması kritik öneme sahiptir. Burada, ciddi semptomatik aort darlığı olan ve TAKİ yapılan 85 yaşında bir kadın ve 84 yaşında bir erkek hasta sunuldu. Her iki hastaya başarılı olarak kapak yerleştirilebilmesine rağmen işlem sağ iliofemoral arterin rüptür ve diseksiyonu ile komplike oldu. İşlem öncesinde iliofemoral arterlere yerleştirilmiş olan güvenlik kılavuz teli sayesinde, acilen hem rüptüre hem diseksiyona ikişer adet kendiliğinden genişleyen stentler yerleştirilerek işlem başarı ile tedavi edildi.

Vascular complications are among the most common and serious of transfemoral TAVI, and have been associated with significantly increased rates of morbidity and mortality.<sup>[1–3]</sup> In spite of improvements in patient selection and the reduction in size of delivery systems, such complications remain a vulnerable point in this novel procedure. Therefore, proper caution and management are crucial in the prevention of further damage, and can even be life-saving. Presently described are 2 cases of peripheral vascular complications (rup-

**Abbreviations:**

AS Aortic stenosis

TAVI Transcatheter aortic valve implantation

ture and dissection) that occurred during TAVI, which were immediately managed with endovascular stent implantation.

### CASE REPORT

**Case 1** – An 85-year-old woman with severe aortic stenosis (AS) underwent elective transfemoral aortic valve implantation under local anesthesia. Aortic annulus sizing by transesophageal echocardiography was 21 mm. Moderate calcification and tortuosity, and adequate calibration of iliofemoral arteries were observed on multi-slice computed tomography. The procedure was performed by right transfemoral ac-

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cess using 2 percutaneous closure devices (ProGlide Suture-Mediated Closure System; Abbott Vascular Inc., Santa Clara, CA, USA). A 23-mm balloon-expandable Edwards Sapien XT valve (Edwards Lifesciences, Irvine, California, USA) was successfully advanced from 16-F e-sheath (Edwards Lifesciences, Inc., Irvine, CA, USA). After the deployment of the stented valve and the closure of the femoral access site with the ProGlide, acute hemodynamic deterioration occurred. Control iliofemoral angiography revealed massive contrast media extravasation at the level of the closure site (Figure 1a). An occlusive 7.0x60-mm Pyxis-v balloon (Stron Medical, Inc., Winsen, Germany) was quickly implemented via the contralateral femoral artery, over the safety guidewire that had been placed in the ipsilateral femoral artery prior to valve implantation. Active bleeding was limited using the balloon (Figure 1b). The breach was completely clogged with 2 covered 7.0x50-mm and 8.0x100-mm Gore Viabahn endoprosthesis stents (Gore Medical,

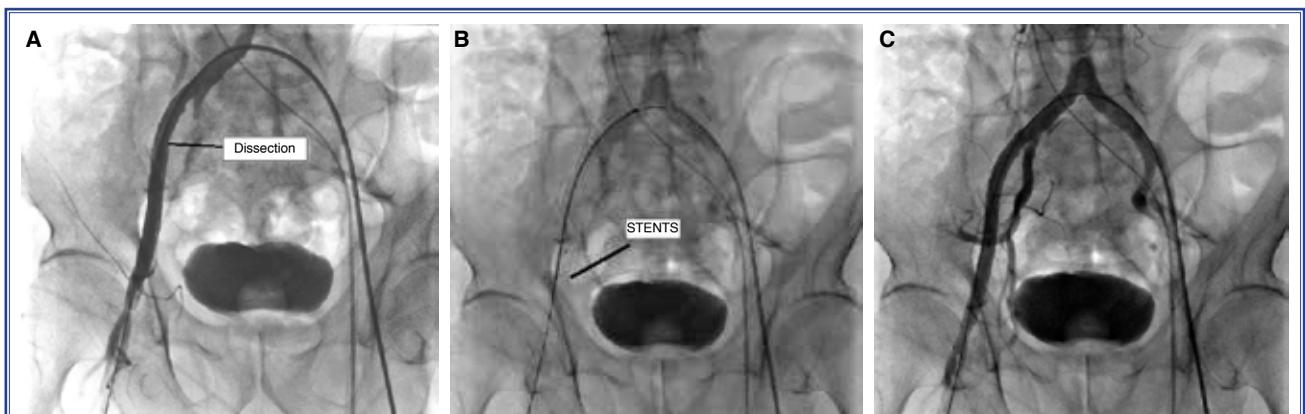
Inc., Flagstaff, AZ, USA) using overlap technique.

Adequate fluid was provided with serum physiologic and erythrocyte suspension to ensure hemodynamic stability, and the iliac rupture was simultaneously attended to. During the procedure, a prophylactic safety Treasure guidewire (Asahi Intecc Co., Ltd. Nagoya, Japan) from the contralateral femoral artery was transferred to the ipsilateral femoral artery, in order to manage an acute complication such as vascular rupture. Because this precaution had been taken, it was possible to insert 2 self-expandable graft stents over the safety guidewire, reaching the rupture in the femoral artery. The bleeding was stopped (Figure 1c). In total, 6 units of erythrocyte suspension were administered during and after the procedure, and the patient was discharged.

**Case 2** – An 84 year-old-man with severe AS underwent transfemoral aortic valve implantation under local anesthesia. Aortic annulus sizing on trans-



**Figure 1.** Peripheral angiography images. (A) Rupture of the iliac artery and contrast media extravasation. (B) Balloon inflation to stop hemorrhage. (C) Stent implantation and final angiography showing no rupture.



**Figure 2.** Peripheral angiography images. (A) Ilio-femoral dissection. (B) Stent implantation. (C) Final angiography showing no dissection.

esophageal echocardiography was 25 mm. Mild calcification and tortuosity, and adequate calibration of iliofemoral arteries were observed on multi-slice computed tomography. The procedure was performed by right transfemoral access using a percutaneous closure device (ProStar XL Percutaneous Vascular Surgical System; Abbott Vascular Inc., Santa Clara, CA, USA). A 29-mm balloon-expandable Edwards Sapien XT valve (Edwards Lifesciences, Inc., Irvine, CA, USA) was successfully advanced from a 20-F sheath (Edwards Lifesciences, Inc., Irvine, CA, USA). After deployment of the valve, the femoral access site was percutaneously closed with the ProStar device.

Control iliofemoral angiography was performed, revealing a dissection in the right iliofemoral artery (Figure 2a). A Bern catheter (Boston Scientific, Natick, MA, USA) was advanced over the Treasure guidewire (Asahi Intecc Co., Ltd. Nagoya, Japan) from the contralateral femoral artery and it was exchanged for a Supra Core guidewire (Abbott Vascular Inc., Santa Clara, CA, USA). Two self-expandable 8.0x60-mm and 8.0x100-mm Maris Plus stents (Medtronic Inc., Minneapolis, MN, USA) were then implanted successfully using overlap technique (Figure 2b). Control iliofemoral angiography revealed no dissection (Figure 2c). At follow-up, the patient was discharged.

## DISCUSSION

Presently described was the successful endovascular management of 2 major vascular complications that occurred during TAVI procedures. TAVI is a promising treatment of high-risk patients with severe AS. Vascular access site injury is among the most serious complications that can occur during transfemoral TAVI, often resulting in post-procedural mortality. According to the definitions of major and minor vascular complications outlined by the Valve Academic Research Consortium (VARC),<sup>[4]</sup> vascular rupture and subsequent requirements of blood transfusion, which occurred in the first case, and vascular dissection impeding peripheral circulation, which occurred in the second case, were both classified as major vascular complications. As demonstrated in the Placement of Aortic Transcatheter Valve (PARTNER) trial, major and minor vascular complications that occurred during TAVI were correlated with decreased survival, and were risk factors of late mortality.<sup>[5]</sup> With im-

provements in interventional techniques (e.g., the use of smaller sheaths and delivery systems) and the implementation of thorough preprocedural screening, incidence of major vascular complications has been significantly reduced within a relatively short time.<sup>[6]</sup> However, these complications can still result in catastrophic events, even death. Though management strategies include conservative measures, endovascular interventions with stents, or even surgical repair are required in a majority of cases, in order to maintain adequate limb perfusion (in the event of dissection) or to save the patient's life (in the event of rupture).

Ilio-femoral rupture occurred in the first case presented, and iliofemoral dissection developed in the second case. Endovascular intervention was performed in both cases, with the use of stents. Ilio-femoral rupture was managed with implantation of 2 graft stents, terminating hemodynamic deterioration. Ilio-femoral dissection impeding peripheral circulation was also managed with implantation of 2 stents, and peripheral circulation was achieved. The most significant factor in the present cases was timely management, owing entirely to the placement of the safety guidewire in the ipsilateral iliofemoral artery before complications occurred, facilitating intervention and successful management.

## Conclusions

The importance of timely endovascular management and the potential for complications such as those presently described must be taken into consideration during TAVI procedures. The authors wish to emphasize the significance of the transfer of the safety guidewire from the contralateral femoral artery prior to the implantation of aortic bioprosthesis, which facilitated immediate intervention. Implementation of a safety guidewire may save valuable time in such acute situations, thus potentially saving lives. The role of the safety guidewire, which can be simply inserted into the contralateral femoral artery, was crucial in the present cases, and its routine use in all TAVI procedures is strongly recommended.

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- Keywords:** Endovascular management; transcatheter aortic valve implantation; safety guide-wire; vascular complications.
- Anahtar sözcükler:** Endovasküler yönetim; güvenlik kılavuz teli; transkateter aort kapak implantasyonu; vasküler komplikasyonlar.