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Case Report

Percutaneous Transfemoral TAVR With Direct Puncture and Successful Closure of Aortobifemoral Bypass Graft

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ABSTRACT

Two successful cases of percutaneous transfemoral transcatheter aortic valve replacement (TAVR) in patients with previous aortobifemoral bypass graft surgery are presented. Both cases demonstrate feasibility of this strategy after careful preprocedural planning and suggest transfemoral TAVR can also be considered for patients when alternative access and/or general anaesthesia is excluded.

RÉSUMÉ

Les auteurs présentent deux cas de remplacement valvulaire aortique par cathéter (RVAC) réalisé par voie transfémorale percutanée chez des patients ayant déjà subi un pontage aorto-bifémoral. Ces deux cas montrent la faisabilité d'une telle intervention après une planification minutieuse et portent à croire qu'un RVAC transfémoral pourrait aussi être envisagé lorsqu'il n'y a pas d'autre accès possible et/ou qu'une anesthésie générale est contre-indiquée.

Transcatheter aortic valve replacement (TAVR) has become a standard therapy for patients with severe symptomatic aortic valve stenosis and is preferably performed by transfemoral route.[1] In patients with inadequate iliofemoral access, alternative approaches—such as transapical, direct aortic, transaxillary, subclavian, transcarotid, and transcaval—can be considered.[2] However, the presence of severe comorbidities can prevent the choice for TAVR by alternative access. This article reports on 2 percutaneous transfemoral TAVR cases performed in patients with previous aortobifemoral bypass graft surgery and comorbidities that precluded use of alternative access.

Case 1

A 79-year-old woman with previous aortobifemoral bypass graft surgery, coronary artery bypass graft (CABG), and surgical aortic bioprosthesis (Trifecta 19 mm, St Jude Medical, Abbott, Abbott Park, IL) presented with symptoms of heart failure. Echocardiography and computed tomography (CT) revealed a severe aortic valve stenosis (mean gradient 42 mm Hg, AVA 0.7 cm^2), potentially caused by a fractured stent-post of the valve frame (Fig. 1, A-C). Clinical valve thrombosis was excluded. As the patient was disqualified from general anaesthesia because of severe obstructive lung disease, valve-in-valve TAVR under local anaesthesia by transfemoral approach was preferred (Fig. 1, D-F). The left superficial femoral artery was punctured distal to the anastomotic site, and a 5Fr sheath was inserted. The left femoral bypass graft was punctured directly under ipsilateral angiographic guidance (Fig. 2A) and 2 Proglides (Abbott Vascular, Abbott Park, IL) were deployed. The puncture site was further dilated with a 12Fr sheath, and a 18Fr Ultimum sheath (Abbott Vascular) was finally introduced over a stiff guidewire. A Portico 23 mm (Abbott Vascular) transcatheter heart valve was implanted in the failed surgical bioprosthesis and postdilated with a 18-mm True Dilatation balloon (Bard, Liberator Medical, Stuart, FL). There was no paravalvular leak visible on the control aortography (Fig. 2E), and the invasively measured transvalvular mean gradient was 6 mm Hg. After removal of the 18Fr introducer sheath, successful closure of the vascular graft was obtained by means of 2 Proglides and 1 additional 6Fr Angioseal (Terumo, Shibuya, Tokyo, Japan). The more distal 5Fr sheath was removed, and this distal puncture site was compressed manually after obtaining a final angiography of the large-bore access site, showing good hemostasis, normal flow, and no dissection. The patient reported immediate symptom improvement the day after the procedure. Transthoracic echocardiography (TTE) showed a well-functioning valve with a mean gradient of 14 mm Hg and no paravalvular leak. The patient was discharged the day after TAVR.

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Ethics Statement: The research reported in this paper adhered to the CONSORT guidelines.

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Novel Teaching Points

- Percutaneous transfemoral TAVR in patients with previous aortobifemoral bypass grafting can be considered in case of severe comorbidities preventing general anesthesia and/or TAVR by alternative access.
- Percutaneous access and closure of a femoral vascular endograft to perform TAVR in patients with previous aortobifemoral bypass grafting is feasible; thorough preprocedural planning with CT angiography is recommended.

Case 2

A 75-year-old man with medical history of ischemic cardiomyopathy (left-ventricular ejection fraction 30%), CABG, peripheral vascular disease, and kidney transplant presented with worsening symptoms of dyspnea caused by severe aortic valve stenosis. In addition, this patient had an aortobifemoral bypass graft with a side branch on the right femoral graft to supply the transplant kidney. Because of the worsening general condition of the patient and his severe cardiovascular comorbidities, TAVR by transfemoral approach was the preferred strategy after Heart Team discussion. The left-sided aortobifemoral graft was punctured directly at the mid-level of the femur head. Next, 2 Proglides were deployed, the puncture side was further dilated with 3-mm to 6-mm balloons, and finally an Ultimum 19Fr sheath could be introduced smoothly. The transcatheter heart valve (Portico 29 mm) was deployed uneventfully with good angiographic and hemodynamic results. The left femoral graft was closed with the 2 Proglides and 1 additional Angioseal, with good hemostasis, as confirmed at final angiogram. No further problems occurred regarding the vascular access, with good clinical recovery, and the patient left the hospital 5 days after TAVR.

Discussion

In this case report, 2 successful TAVR cases with direct puncture and percutaneous closure of a femoral vascular endograft are described. Few other TAVR cases in patients with previous aortobifemoral bypass grafting have been described; however, in these cases, the arteriotomy was either localized below the endograft/native vessel anastomosis or obtained by surgical cut-down to the endograft using general anesthesia.[3–6]

In general, careful pre-TAVR planning based on CT-angiography helps to identify the most optimal access route

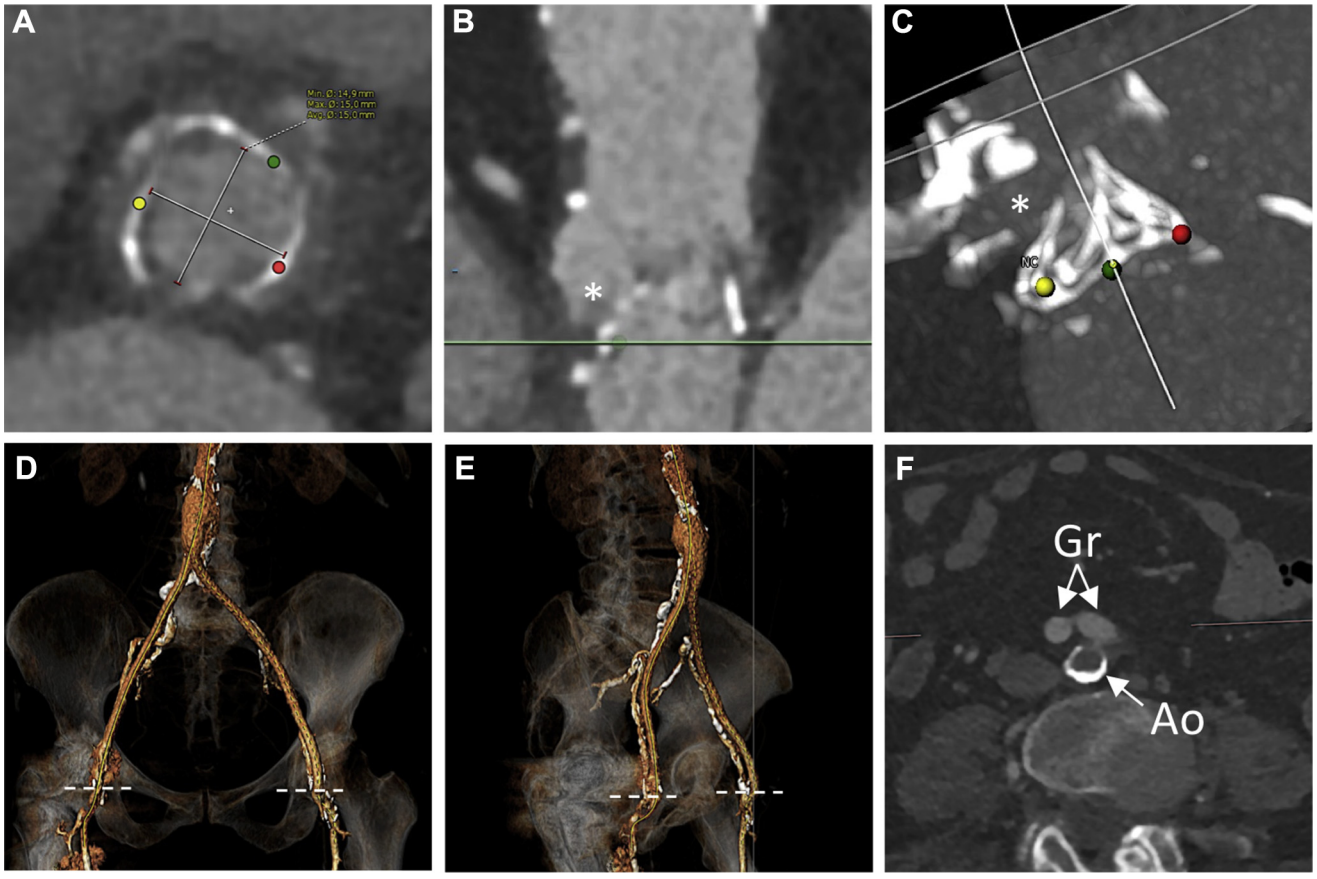

Figure 1. Preprocedural multidetector computed tomography (MDCT). (**A-C**) MDCT images showing the distorted Trifecta 19 mm (St Jude Medical, Abbott, Abbott Park, IL) surgical aortic biopsrothesis (true ID 16 mm) with the impression of a bended or fractured stent post, indicated by an asterisk. (**D-F**) Angiography showing the occluded distal abdominal aorta (without contrast, **white arrow-Ao**) and patent aortobifemoral bypass grafts (filled with contrast, **white arrow-Gr**) anastomosed to the distal end of the common femoral arteries (**white dashed lines**).

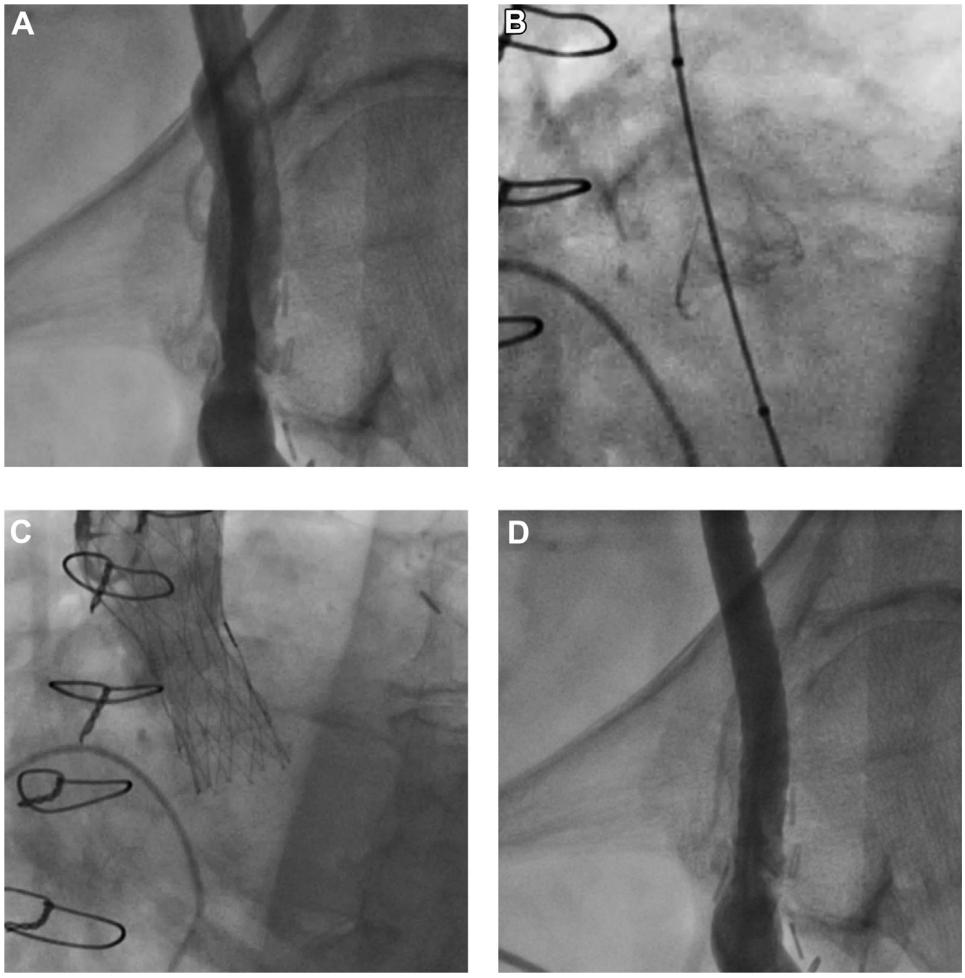

Figure 2. Transcatheter aortic valve replacement (TAVR) procedural images. (**A**) Visualization of the bypass graft and the distal end of the diseased left femoral artery by contrast injection through a distal 5Fr sheath. (**B**) Fluoroscopic image showing the abnormally protruding stent post at the noncoronary cusp side. (**C**) Successful implantation of the Portico valve system with no paravalvular or transvalvular leakage. (**D**) Uncomplicated percutaneous closure of the 18Fr hole in the vascular graft by use of 2 Proglides and 1 additional Angioseal.

and puncture site based on tortuosity, vessel dimensions, and calcifications of the iliofemoral arteries. In cases of previous aortobifemoral bypass grafts, defining the most optimal strategy—as well as bail-out options—for access and closure of the large-bore arteriotomy is an absolute necessity. In Case 1, ipsilateral puncture of the native femoral artery, distal of the anastomosis, with introduction of a small 5Fr sheath was performed, as crossing over from the contralateral side was not possible. In this way, the operator could make use of angio-guidance for direct puncture of the vascular endograft, and a safety wire could be used in case of vascular closure failure. In Case 2, the optimal puncture site was defined based on the preprocedural CT images, and anatomic fluoroscopic landmarks guided this direct puncture.

In both cases, the minimal graft dimension was not a limiting factor for delivery of the large-bore introductory sheaths (> 7.0 mm). The Portico TAVR system used in both cases has one of the lowest profiles of all TAVR systems currently available (18Fr outer diameter) and can also be delivered sheathless. Still, both operators considered it a safer approach to use the delivery sheath for crossing the transcatheter heart valve through the vascular endograft. The puncture site at the endograft needed to be gradually uptitrated, with escalating sheath size, and even use of 3-mm to 6-mm balloons in the second case. Finally, percutaneous closure of the vascular endograft was successful in both cases with the combination of suture- and plug-based closure devices, which is a similar technique used for closure of native femoral arteries post-TAVR.

Conclusions

These 2 case reports demonstrate that—after careful preprocedural imaging, assessment, and planning—transfemoral TAVR with direct puncture and percutaneous closure of a vascular endograft is feasible. As a result, it seems reasonable to expand the transfemoral TAVR approach to those patients with previous aortobifemoral bypass graft surgery and severe comorbidities preventing TAVR by general anaesthesia and/or alternative access route. However, larger case series are needed before being able to appoint this the preferred first approach.

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Disclosures

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