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IMAGES IN CARDIOVASCULAR INTERVENTION

Balloon-assisted sheath insertion technique for transfemoral aortic valve replacement through an aortoiliac endograft

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Case

An 86-year-old woman with a history of diabetes and effort angina was admitted to our hospital for symptomatic severe aortic valve stenosis. She underwent bilateral aortoiliac grafting (Y graft; 16 and 9 mm in the body and limb, respectively) for the rupture of an infected abdominal aortic aneurysm 7 years prior. Echocardiographic examination revealed: mean gradient, 53 mmHg; valve area, 0.48 cm^2; left ventricular ejection fraction, 70%. Computed tomography showed: annulus area, 482 mm^2; area-derived diameter, 23.0 mm. Although there was no significant stenosis or bending of the transfemoral access route (Fig. 1a), the proximal anastomosis site of the Y graft was partially narrowed with an 8.7 × 10.6 mm lumen diameter (Fig. 1b, c). We performed transcatheter aortic valve replacement (TAVR), using a SAPIEN3® valve (Edwards Lifesciences, Irvine, USA), via the right femoral approach. A 14-F expandable sheath (eSheath®, Edwards Lifesciences) was advanced through the graft; however, the tip of the sheath could not pass the graft's proximal anastomosis site due to the gap between the introducer and the expandable sheath (Fig. 1d). In addition, the bump of the anastomosis site seemed to be another cause of resistance to advancing the sheath. Exchanging with the more supportive wire, i.e., Lunderquist® wire (Cook Medical, Bloomington, USA) was ineffective. In addition, the parallel wire technique using a Lunderquist® wire via the left femoral artery was not helpful. To change the site at which the sheath tip contacts the graft wall, we inflated a 10 mm balloon via the left femoral artery, and subsequently advanced the sheath just after the balloon was deflated (balloon-assisted sheath insertion technique). Thereafter, the sheath could pass through the anastomosis site with no resistance (Fig. 1e). Subsequently, a 26 mm SAPIEN3® valve was successfully implanted. Postoperative aortography showed no access route injury.

Discussion

Transfemoral TAVR through an artificial graft has rarely been reported and remains challenging despite the reduced size of the delivery systems [1–3]. Major concerns include possible difficulty in advancing the delivery sheath through the graft, particularly in patients with stenosis or bends [2]. Several strategies for sheath advancement should be considered in such situations. The balloon anchoring method, in which the balloon is inflated and the sheath is advanced just after balloon deflation, has a potential risk of expanding the tip of the eSheath®. If the balloon anchoring technique failed and the tip of the eSheath® expanded, the advancement of the sheath would be more challenging. Whereas the pull-through method, in which the wire is pulled through from the femoral to the brachial artery, requires an additional puncture, sheath insertion, and use of a snare. It would make the procedure more complicated and time consuming.

The balloon-assisted sheath insertion technique enables us to change the site at which the sheath tip contacts the graft wall, and thus, helps to smoothen the passage of the sheath through the graft. This technique does not require an invasive or complicated procedure, and therefore, seems to be a safe, simple, and reasonable strategy. Moreover, we

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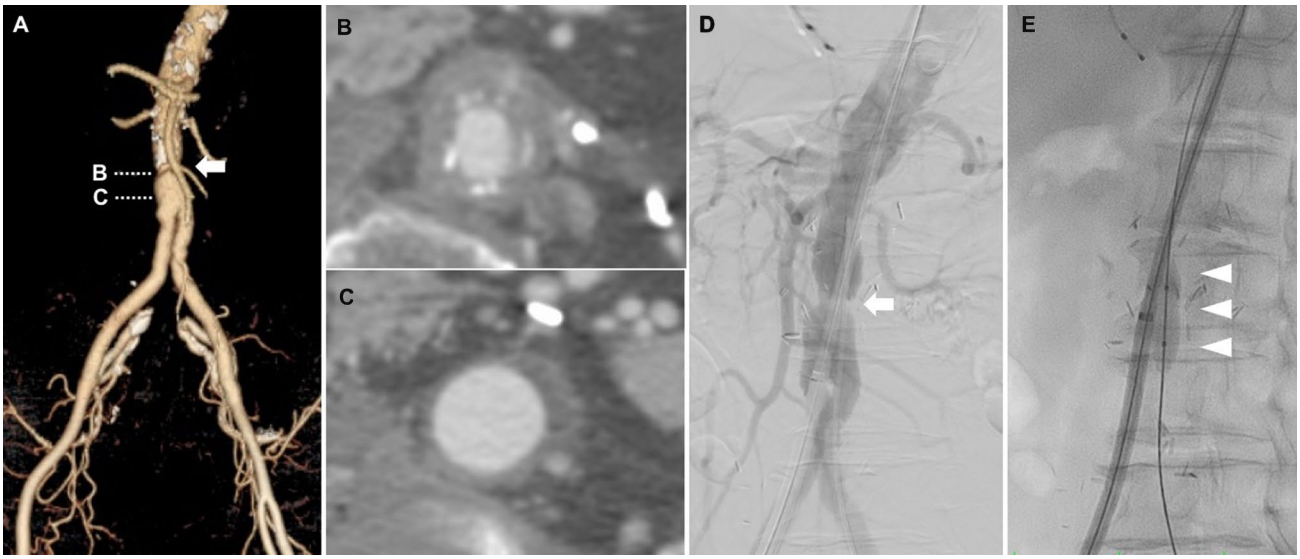

Fig. 1 **a** Computed tomography showing transfemoral access route. (arrow: proximal anastomosis site narrowing). **b** The axial view of computed tomography at the proximal anastomosis site. **c** The axial view of computed tomography at just below the proximal anastomosis site. **d** The tip of the sheath could not pass the graft's proximal anastomosis site (arrow: proximal anastomosis site narrowing). **e** Balloon-assisted sheath insertion technique (arrowheads: a 10-mm-sized balloon)

believe that it may be widely adapted for difficult situations involving sheath insertion during various transfemoral interventions.

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