SHEATHLESS TRANSCATHETER AORTIC VALVE IMPLANTATION WITH A SELF-EXPANDABLE PROSTHESIS

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A 79-year-old male with severe symptomatic aortic stenosis was admitted for pre-TAVR evaluation. He presented with recurrent chest discomfort and dyspnea leading to NYHA Class IV for 3 years, and these symptoms were aggravated half a month ago. He had several comorbidities including Hypertension, type-2 diabetes, chronic kidney disease, chronic obstructive pulmonary disease with a moderate-to-severe mixed ventilation dysfunction and severe reduction of diffusion function on pulmonary function test (FEV1/FVC 61.12%). On physical examination, the patient had a grade 4/6 systolic murmur consistent with aortic stenosis, enlargement of left heart border, and edema of the lower extremities. Echocardiography demonstrated severe aortic stenosis and moderate aortic regurgitation with an AVA of 0.88cm2, V_{max} of 4.08m/s, PG_{max} of 40mmHg, LVEDd of 6.33cm, Left Atrium (LA) of 4.77cm and LVEF of 38.2%. Enhanced Chest CT showed a severe and uneven aortic valve calcification (annulus perimeter 90.3mm, area 629.8mm^2) and coronary lesions (Fig.1A and 1B). Coronary angiography was performed for further evaluation, but the patient developed acute left heart failure during angiography so the procedure was aborted halfway. 2 days later coronary angiography was performed successfully in semi-supine position. His laboratory test revealed normal liver function, normal coagulation function, except a creatinine level of 1.52 mg/dL. His surgical predicted perioperative mortality risk was 13.3% based on the Society of Thoracic Surgeons (STS) risk score. Thus, our heart team decided to perform TAVR instead.

Vascular approach was assessed using computed tomography angiogram (CTA), and trans-aortic, trans-subclavian and trans-apical approaches were found to be ineligible. Trans-femoral approach seemed to be the only choice, albeit with right iliac artery dissection (Fig.1C and 1D) and left iliac artery calcification and stenosis (5.2mm for the narrowest diameter of vascular cavity, Fig.1E and 1F). Our multidisciplinary team recommended sheathless implantation as a reasonable alternative, which was accepted and consented by the patient and her family recognizing and accepting the “off-lable” use for this condition.

With the consideration of patient’s poor condition, the TAVR procedure was performed in semi-supine position with local anesthesia in the catheterization laboratory. We performed a surgical incision of 4cm for femoral access. A 19F Venus A System (Venus Medtech, Hangzhou, China) (Fig.2A) was gently inserted and a 32mm Venus A prosthesis was implanted (Fig.2B and 2C). Then the 16F sheath (Cook Inc., Bloomington, IN, USA) was introduced for post-dilation with a 25mm * 40mm balloon. The procedure was very successful (Fig.2D).

The patient recovered quickly without any vascular complications and bleeding events. Echocardiography confirmed excellent device deployment with trace paravalvular leakage, AVA of 1.93 cm2，V_{max} of 2.12m/s, PG_{mean} of 10mmHg, LVEDd of 5.66cm，LA of 4.42cm and LVEF of 54%. He was discharged in optimal condition 7 days after TAVR.

LEARNING POINTS

The maximum outer diameter for the Venus A System (Venus Medtech, Hangzhou, China) is 19F (6 mm) for the first part (where the prosthesis is loaded), 13F for the middle part, and 15F for the last part, while the outer diameter of a compatible 19F introducer is 22F (7.33cm). Thus, the difference between a sheath and sheathless procedure is 1.2mm, indicating a reduction in access vessel diameter of 13.6%. Patients indicated for TAVR are always high-risk patients and sometimes femoral

access is the only available access for them. Some of these patients have a less-than-6mm femoral access diameter. For them, a sheathless technique remains an alternative.