Technical Challenge of Transfemoral Aortic Valve Implantation in a Patient With Severe Aortic Regurgitation

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Transfemoral aortic valve implantation (TAVI) has become an important interventional technique for patients with severe aortic stenosis (AS) and very high surgical risks. Several studies have demonstrated the feasibility and clinical success of TAVI procedures.\(^1\)\(^2\) Indications of transfemoral implantations of aortic valves are clearly defined, and TAVI should only be performed in patients with symptomatic severe aortic stenosis, high surgical risks (EuroScore ≥20%, or other severe concomitant disease that would prohibit surgery), aortic annulus diameter and peripheral vessel diameters within the required dimensions for Edwards Sapien\(^{\text{XT}}\) or Medtronic CoreValve devices and sheaths. However, several off-label applications have been described in recent years that could broaden the range of TAVI interventions, such as valve-in-valve implantations in degenerated aortic bioprostheses.\(^3\) One of the contraindications for TAVI is severe aortic regurgitation (AR). In severe AR, several technical aspects prohibit TAVI. Aortic annulus shows larger diameters in AR compared with AS. In addition, aortic valve calcification is less pronounced. These two factors make transfemoral aortic valve placement very difficult, with high risks of valve dislocation.

In this case report, we present a patient with severe symptomatic aortic regurgitation who underwent transfemoral CoreValve implantation. The patient was an 87-year-old woman with severe AR who suffered from dyspnea on mild exertion (New York Heart Association III). The patient had concomitant coronary artery disease, moderate pulmonary disease, peripheral arteriopathy, and renal failure. Her calculated logistic EuroScore was 46%, and her Society of Thoracic Surgeons score was 22%. Thus, aortic valve replacement was refused both by the patient and the referring physician. Cardiac computed tomography (256-slice) revealed an annulus diameter of 25 mm and mild valve calcification. The annulus diameter was thus still in the range of a 29-mm CoreValve prosthesis (upper range, 27 mm). After careful consideration and the patient had been informed about risks, alternatives, and the off-label application, a 29-mm CoreValve prosthesis was implanted under local anesthesia from the right femoral artery, without valvuloplasty. As expected, CoreValve implantation was challenging. During the first attempt, the partially unfolded CoreValve prosthesis dislocated into the ascending aorta (Figure 1; online-only Data Supplement video 1). The prosthesis was successfully retrieved and reloaded. In the second attempt, the implantation was aimed at a deeper position within the left ventricular outflow tract, and rapid pacing was applied during CoreValve deployment, leading to a successful implantation. After implantation, angiography showed only a trace of paravalvular regurgitation (Figure 2; online-only Data Supplement video 2). The patient recovered quickly and was discharged home after a few days. A control after 6 weeks showed stable position of the CoreValve prosthesis, again with just a trace of paravalvular regurgitation (Figure 2). More importantly, the patient had significantly improved
to New York Heart Association II. This case report shows two important aspects of TAVI in patients with severe aortic regurgitation. Despite an annulus diameter that was still within the range for CoreValve implantations, the prosthesis dislocated into the aorta during the first attempt. This happened even though the implanter hardly pulled on the device. However, we still achieved successful implantation after deliberately aiming at a lower position and applying rapid pacing to reduce ventricular contractions. An interesting question is whether a self-expanding or balloon-expandable valve would be more favorable in AR. With this case, the ability to retrieve a dislocated CoreValve was advantageous. In contrast, a dislocated balloon-expandable valve would be more disastrous clinically. The aortic portion of a CoreValve may further help stabilize the prosthesis. In conclusion, TAVI in aortic regurgitation remains an off-label application that needs further study. However, in very select cases with high surgical risks, TAVI can be attempted if the annulus is not at the upper limit for a specific device.

Disclosures
None

References
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Supplemental Material

Movie 1. Aortography after dislocation of the partially unfolded CoreValve prosthesis. The CoreVale prosthesis is located above the annulus. The severe aortic regurgitation into the left ventricle is apparent with contrast injection.

Movie 2. Aortography after successful CoreValve implantation. A deeply implanted CoreValve can be seen with only a trace of paravalvular regurgitation.