Paravalvar aortic regurgitation (AR) is frequently observed after transcatheter aortic valve implantation (TAVI) for aortic stenosis.1–3 In case of malapposition or underexpansion, AR is usually corrected by balloon dilatation of the frame. We describe a perforation of the membranous interventricular septum (IVS) after TAVI with the CoreValve ReValving System after dilation with a larger balloon.

An 89-year-old man (weight, 66 kg; height, 171 cm) was referred for TAVI because of symptoms of dyspnea on effort due to severe aortic stenosis. A transthoracic echocardiography revealed a heavily calcified stenotic aortic valve and a hypertrophic left ventricle with preserved systolic function (Table). His logistic EuroScore was 15%. A multidetector computed tomography (MDCT) revealed a thick muscular IVS (20 mm) with a large membranous IVS, extending up to 13 mm below the aortic annulus (Figure 1).

A 29-mm inflow CoreValve ReValving System was chosen, which was mainly based on the aortic root measurements by the MDCT, next to the angiography and echocardiography readings (Table). The aortic valve was dilated with a 23-mm balloon (percutaneous aortic balloon valvuloplasty) using rapid right ventricular pacing (220 bpm). The transesophageal echocardiography (TEE) revealed absence of complications. A 29-mm inflow CoreValve ReValving System was then implanted at a depth of 6 to 8 mm below the base of the annulus (Figure 2). Contrast angiography immediately after the TAVI, however, revealed a grade 3 to 4 AR. The TEE confirmed the presence of a moderate to severe paravalvar AR, with 3 different regurgitant jets around the prosthesis (short-axis view). Given the correct position of the CoreValve ReValving System in the aortic root, it was hypothesized that the AR was caused by incomplete apposition of the frame. Therefore, dilatation with a 25-mm balloon was performed (manual inflation without pressure control via an indeflator), which resulted in an improvement of AR on TEE. At this moment, a ventricular septal defect was noted (Figure 3). Hemodynamic assessment indicated a small, restrictive ventricular septal defect (Table). The procedure was therefore ended, and the patient was discharged on day 12.

We report a patient who suffered from a ventricular septal defect after additional balloon dilatation, after valve implantation. To our knowledge, this is the first report describing this complication. It was detected by TEE and, therefore, highlights the role and value of TEE during these novel and complex procedures. The question is why this complication did occur and how it can be prevented.4 We believe that it was caused by a combination of mechanical trauma to the thin membranous IVS by the further extension of the frame during balloon dilatation and the unusually large extent of the membranous IVS. Of note, the median length of the IVS in our series of patients, who are referred for TAVI (excluding this patient) and underwent an MDCT, is 3.2 mm (interquartile range, 2.5 to 9.5 mm; n = 73). The perforation may not...
have occurred in the presence of a shorter membranous IVS, because the ventricular portion of the frame would have touched the muscular IVS. However, we do not believe that patients with an unexceptional long membranous IVS—which is easily detectable by an MDCT—should be excluded from treatment. We rather propose to control the balloon dilatation of the frame and avoid balloon overexpansion by using an indeflator.

Careful inflation may be important given the design of the frame and the flaring of the ventricular end in particular. Intuitively, less flaring may be desirable to minimize tissue injury. It is too speculative to promote a change in the design on the basis of a single observation. We have performed postimplantation balloon dilatation in 19 of 94 patients (20%). This was not associated with IVS perforation in any patient, except the one described herein.

So far, there is no report of membranous IVS perforation after TAVI. The unusually large extent of the membranous IVS in combination with manually controlled postdilatation of the prosthesis with a larger balloon may have caused this complication. It was detected by intraprocedural TEE, emphasizing the role of TEE in the assessment of complications during TAVI. Preprocedural MDCT allows a detailed evaluation of the cardiac anatomy, which may help treatment planning and execution.

Disclosures
None.

References
Perforation of the Membranous Interventricular Septum After Transcatheter Aortic Valve Implantation
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