Transcatheter Aortic Valve Implantation in a Patient With Severe Bicuspid Aortic Valve Stenosis and Ascending Aortic Aneurysm

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A 78-year-old woman with chest discomfort and progressive exertional dyspnea was admitted to our center. Transthoracic echocardiography (TTE) suggested severe aortic stenosis (AS) (mean pressure gradient 70 mm Hg; peak jet velocity 5.4 m/s) and moderate aortic regurgitation (AR). Left ventricular

![Figure 1. CTA and Fluoroscopic Images Before and After CoreValve Deployment](image)

(A) Cardiac computed tomographic angiography (CTA) showing the congenital bicuspid aortic valve in systole. (B) Cardiac CTA showing aneurysmal dilation of the ascending aorta (53 mm in diameter). (C) Intraprocedural fluoroscopy (left anterior oblique 19°, caudal 12°) showing the deployed CoreValve. (D) Horizontal sectional cardiac CTA image showing circular expansion of the deployed CoreValve at the level of the native valve. (E and F) CTA showing the relative location of the CoreValve outflow portion within the dilated proximal ascending aorta on coronal (E) and horizontal (F) sectional view.

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ejection fraction was 64%. Bicuspidy of the aortic valve and aneurysmal dilation of the ascending aorta (56 mm in diameter) were noted on TTE. She was declined for surgery on account of high operative risk (logistic EuroSCORE 31.67%) after consultations by the heart team, thus she was evaluated for transcatheter aortic valve implantation (TAVI). Coronary angiogram showed the absence of significant coronary lesions. Three-dimensional computed tomographic angiography (CTA) confirmed the bicuspidy (Fig. 1A) and measured the diameter of the ascending aorta at 53 mm (Fig. 1B); the annulus was elliptical with a long-axis diameter of 25.6 mm and a short-axis diameter of 19.5 mm. TAVI was conducted in a hybrid operating room, with the patient under general anesthesia. After aortic valvuloplasty with a 22-mm balloon, a 29-mm self-expandable Medtronic CoreValve (Medtronic, Minneapolis, Minnesota) was successfully deployed via the right transfemoral approach (Fig. 1C). The immediate post-deployment aortography and transesophageal echocardiography showed moderate periprosthetic regurgitation. Hence, post-dilation was performed with a 26-mm balloon; thereafter, only mild regurgitation was noted. Post-TAVI mean gradient decreased strikingly to 9 mm Hg, and peak velocity to 2.1 m/s. Post-operative recovery was uneventful, and she was discharged with a well-functioning prosthetic aortic valve and in good general condition 2 weeks after TAVI. Pre-discharge CTA is shown in Figures 1D to 1F.

A bicuspid aortic valve (BAV) is frequently associated with dilation of the proximal aorta, especially in the presence of AR and/or AS (1). Although TAVI has shown its feasibility and safety in selected high-risk patients with BAV stenosis (2), the coexistence of an ascending aortic aneurysm would render surgery mandatory in order to be able to address both lesions simultaneously and to avoid catastrophic stent-related complications (e.g., prosthesis dislodgment and aneurysm rupture). In fact, a previous attempt of transapical TAVI in a patient with concomitant BAV stenosis and ascending aortic aneurysm resulted in progressive prosthesis dislocation requiring open-heart surgery (3). Despite the achieved success in the present case, it is a serious concern as to the fate of the untreated aneurysm, which is exposed to the radial force of the stent frame. Therefore, TAVI for such patients should only be considered on the premise of contraindication to surgery or excessive operative risk that outweighs the anticipated benefits.

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