A 88-year-old woman with a permanent VDD pacemaker and severe aortic stenosis underwent elective transcatheter aortic valve replacement because of high surgical risk (logistic Euroscore of 35.3%). Aortic valve area was 0.5 cm², mean gradient was 86 mm Hg, and left ventricular ejection fraction was 64% on transthoracic echocardiography. Aortic annulus sizing was 23.5 and 23.7 mm by transesophageal echocardiography and computed tomography, respectively. Femoral and iliac arteries evaluated by angiography and computed tomography were straight with mild calcification and had adequate internal diameters. Great tortuosity of the aorta was also observed in computed tomography, with the presence of a double angle in the descending thoracic aorta and a very pronounced curve in the distal part of the aortic arch (Figure 1). The procedure took place via right transfemoral access with the use of a percutaneous closure device. A self-expandable 29-mm Core Valve prosthesis (Medtronic, Inc., Minneapolis, MN) was advanced, encountering a high resistance at the level of the proximal angle of the aortic arch that precluded the progress. When advancement of the prosthesis was attempted, the delivery system was bent at the level of the first ascending in the descending aorta, worsening the angle (Figure 2 and Movie I in the online-only Data Supplement). Shortly after, acute hemodynamic collapse ensued. Aortography was subsequently performed, revealing extravasation of contrast medium from the descending thoracic aorta at the level of the external edge of the proximal angle in the descending aorta seen in computed tomography where the delivery system was bent (Figure 3 and Movie II in the online-only Data Supplement). Transesophageal echocardiography also showed the descending aortic rupture (Figure 4 and Movies III–V in the online-only Data Supplement). An occlusive 250-mm aortic valvuloplasty balloon was quickly inflated distal to the left subclavian take-off to limit active bleeding by the same femoral access. Subsequently, a 31×15 mm stent graft (Gore TAG, WL Gore, Newark, DE) was deployed to cover the leak site. The stent graft position was verified by angiography, and no endoleak was detected. Hemodynamic status improved after stent deployment. Subsequently, a 26-mm balloon-expandable Edwards-Sapien-3 valve (Edwards Lifesciences LLC, Irvine, CA) was successfully implanted without complications. Repeated aortic injection after the procedure demonstrated no leakage of contrast material outside the aorta (Figure 5 and Movie VI in the online-only Data Supplement). A large bilateral hemothorax was detected by transesophageal echocardiography. Blood transfusion was started, and a chest drainage tube was placed to enable complete evacuation. However, despite aggressive fluid replacement and intravenous injection of high doses of inotropic agents and vasoconstrictors, the patient’s hemodynamic status worsened gradually, and she died of refractory hypovolemic shock 2 hours later. Necropsy revealed a large tear of the aortic wall at the level of the proximal angle in the descending aorta covered by the stent graft (Figure 6) and a large hemothorax.

Transcatheter aortic valve replacement has become an established treatment for patients with symptomatic aortic valve disease deemed inoperable or at high risk for conventional surgical aortic valve replacement. Although it is a less invasive catheter-based procedure, it is associated with some potentially fatal complications. Acute rupture of the descending aorta is unusual and almost invariably has a lethal outcome. This complication should be suspected in the case of unexplained hypotension during catheter advancement. In our case, we hypothesize that the aortic rupture at the time the delivery system was advanced was attributable to the presence of an acute angle in the aortic arch that transmitted resistance to the delivery system and kinked the descending aorta in the proximal angle. This case gives further evidence that careful evaluation, selection of the patient candidates, and the approach for transcatheter aortic valve replacement are
crucial, and must be discussed on a case-by-case basis, considering the benefit–risk ratio.

**Disclosures**

None.

**References**


**Figure 1.** Pre-TAVR chest computed tomography. A. Coronal contrast-enhanced CT image showing the great tortuosity with a double angle in the descending thoracic (arrows). B. 3D reconstruction showing kinking of the aorta and a very pronounced curve in the distal part of the aortic arch (arrow). CT indicates computed tomography; 3D, 3-dimensional; and TAVR, transcatheter aortic valve replacement.

**Figure 2.** Fluoroscopy during the advancement of the prosthesis. A high resistance was found at the level of the distal part of the aortic arch (A), and the delivery system was bent at the level of the first angle in the descending aorta, worsening the angle (B).
Figure 3. Aortography showing extravasation of contrast medium (arrow) from the descending thoracic aorta at the level where the delivery system was bent.

Figure 4. Transesophageal echocardiography. A, Two-dimensional transesophageal echocardiography image showing the rupture of the anterior aortic wall (arrow). B, Color Doppler image showing systolic flow across the site of rupture (arrow). C, Three-dimensional transesophageal echocardiography image showing the tear of the aortic wall (arrow).

Figure 5. Fluoroscopy (A) and aortography (B) after stent graft deployment and TAVR, showing no leakage of contrast material outside the aorta. TAVR indicates transcatheter aortic valve replacement.
Figure 6. Necropsy demonstrated a large tear (arrows) of the aortic wall at the level of the external edge of the proximal angle in the descending aorta covered by the stent graft.
Descending Aorta Rupture During Transcatheter Aortic Valve Replacement
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