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IMAGES IN INTERVENTION

Aortic Root Injury Following TAVR

When Plugging the Hole Can Save the Day and the Patient

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Aortic root injury is a rare but potentially fatal complication of transcatheter aortic valve replacement (TAVR) with limited options for percutaneous treatment. We describe a case of root injury with aorto-right ventricular fistula causing hemodynamic collapse that was closed percutaneously.

An 86-year-old woman was referred for TAVR because of severe bicuspid aortic stenosis. Preprocedural cardiac computed tomography revealed an annular area of 575 mm^2 and a calcified raphe (Figure 1A). After implantation of a 29-mm SAPIEN 3 (Edwards Lifesciences) without predilation, rapid diastolic hypotension (38 mm Hg) was noticed, and root injection revealed potential aortic injury. Transesophageal echography confirmed aortic root injury with a large shunt toward the right ventricular outflow tract (RVOT) causing hemodynamic instability (Figures 1B and 1C).

Given the patient's age and comorbidities, salvage surgery was deemed unfeasible. Percutaneous closure was attempted by accessing the fistula through the open top cell of the SAPIEN 3, and a 12-mm Amplatzer ventricular septal defect (VSD) occluder was deployed through the right sinus of Valsalva and the RVOT. Transesophageal echocardiography confirmed shunt resolution without occluder-leaflet interaction. However, rapid catheter manipulations during device deployment caused right ventricular perforation, leading to pericardial effusion. After percutaneous drainage, sternotomy with right ventricle suture without cardiopulmonary bypass was performed. The patient was discharged on postoperative day 30. At the 6-month follow-up, the patient was stable, and a transthoracic echocardiogram confirmed the absence of a residual fistula.

Treatment of root injury is generally hindered by rapid clinical deterioration, leaving very limited time and options. Coiling and tissue glue embolization have been reported in limited instances.[1] When root injury results in a fistula with the RVOT, a few cases of VSD occluder deployment have been described yet always in a delayed and stable setting. In the present case, the VSD device was used in an acute context with hemodynamic instability caused by a large fistula. The choice of this nitinol device was made based on its good deliverability, shape matching the circular appearance of the defect, and its relatively flat conformation once deployed, thus hoping to limit interactions with the SAPIEN leaflets. Interventionalists should be familiar with the different techniques and tools available to treat this kind of rare complication and be aware of their location in the catheterization laboratory.

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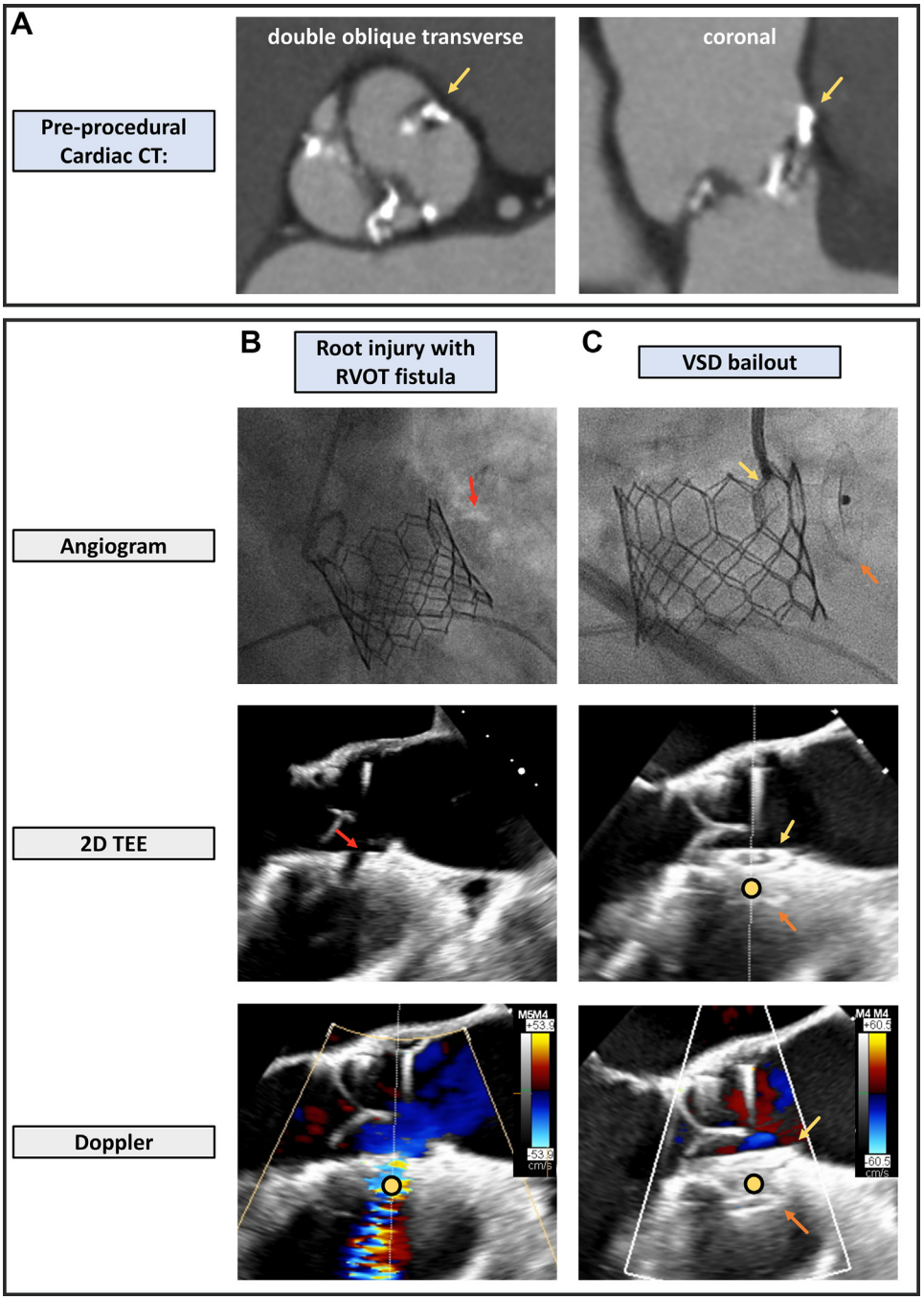
FIGURE 1 **Root Injury: From Risk Assessment to Percutaneous Closure**



(A) Double oblique transverse and coronal preprocedural cardiac computed tomography (CT) views with a calcified raphe extending to the sinotubular junction (yellow arrow). (B) Aortic root injury with contrast extravasation (red arrow) and fistula as shown by transesophageal echocardiography (TEE). (C) Percutaneous closure with a ventricular septal defect (VSD) occluder (yellow arrow: disc inside the SAPIEN stent frame, orange arrow: disc in the right ventricular outflow tract [RVOT]). 2D = 2-dimensional.

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