

Transcatheter management of an aorto-right ventricular fistula: a minimally invasive solution to a rare defect

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A 64-year-old woman who presented with progressive exertional dyspnea (NYHA class IIb) over the previous month, unresponsive to adjustments in diuretic therapy. She denied chest pain or palpitations. On physical examination, bilateral lower extremity edema and a right parasternal systolic murmur were noted. Electrocardiography showed sinus rhythm with first-degree atrioventricular block and complete right bundle branch block.

Her medical history was significant for surgical aortic valve replacement in November 2008 with a 21 mm Carpentier-Edwards bioprosthesis, followed by a redo operation in April 2024 for structural valve degeneration, during which a 23 mm Magna Ease prosthesis was implanted. In November 2024, she was admitted with infective endocarditis due to *Staphylococcus epidermidis* and *Enterococcus faecalis*, which resulted in moderate-to-severe mitral regurgitation, dehiscence of the aortic prosthesis with severe regurgitation, and multiple large vegetations with high embolic risk. A re-redo operation was performed, with replacement of both the aortic valve using a 23 mm Inspiris Resilia and the mitral valve with a 29 mm Epic bioprosthesis. She completed a six-week course of intravenous antibiotics following surgery.

Three months later, transoesophageal echocardiography revealed a 5 mm aorto-right ventricular fistula (ARVF) with evidence of left-to-right shunting on color Doppler (Figure 1). Additional findings included severe tricuspid regurgitation, preserved left ventricular systolic function, mild pulmonary hypertension with a pulmonary artery systolic pressure of 30 mmHg, and borderline

systolic function of a non-dilated right ventricle. Computed tomography angiography confirmed the presence and location of the ARVF and provided crucial measurements for procedural planning, including device selection and fluoroscopic projection angles that facilitated safe access and closure. Blood screening was negative for hemolysis, and inflammatory markers did not suggest active endocarditis.

Due to the high surgical risk associated with a fourth open-heart procedure, a percutaneous approach was selected following multidisciplinary heart team discussion. The intervention was performed under general anesthesia with fluoroscopic and transesophageal echocardiographic guidance (Figure 2). A 6-Fr right femoral arterial access was used for a retrograde approach, and a 7-Fr left femoral venous access was established in case arteriovenous looping or an antegrade approach became necessary. A 6-Fr multipurpose catheter was used to cross the defect retrogradely with a Storq guidewire (Cordis, Cardinal Health, USA), which was advanced into the right ventricle. Initially, a 6 mm Amplatzer Vascular Plug II (Abbott, Chicago, IL, USA) was deployed; however, it failed to completely occlude the fistula. The device was removed and replaced with an 8 mm Amplatzer Vascular Plug II (Abbott, Chicago, IL, USA), which resulted in a significant reduction of the shunt. Final deployment was secure, and transesophageal echocardiography confirmed effective closure. Femoral hemostasis was achieved using a single Perclose ProGlide device (Abbott Vascular, Santa Clara, CA, USA).

Postprocedural echocardiography demonstrated complete resolution of the shunt, improved right heart function, and reduction in tricuspid regurgitation. The patient

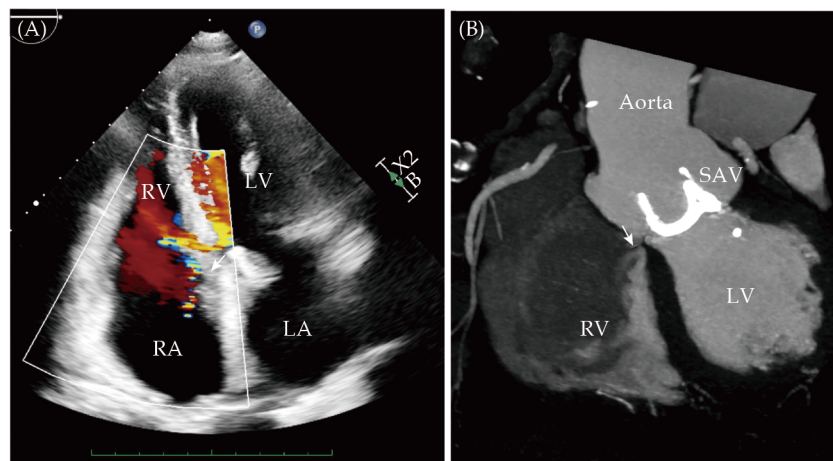


Figure 1 Echocardiographic and computed tomography pre-planning. (A) Echocardiographic four chamber view with color Doppler flow (white arrow) across the septum into the RV; and (B) computed tomography coronal view showing the location of the fistula (white arrow) in relationship to the adjacent structures. LA: left atrium; LV: left ventricle; RA: right atrium; RV: right ventricle; SAV: surgical aortic valve.

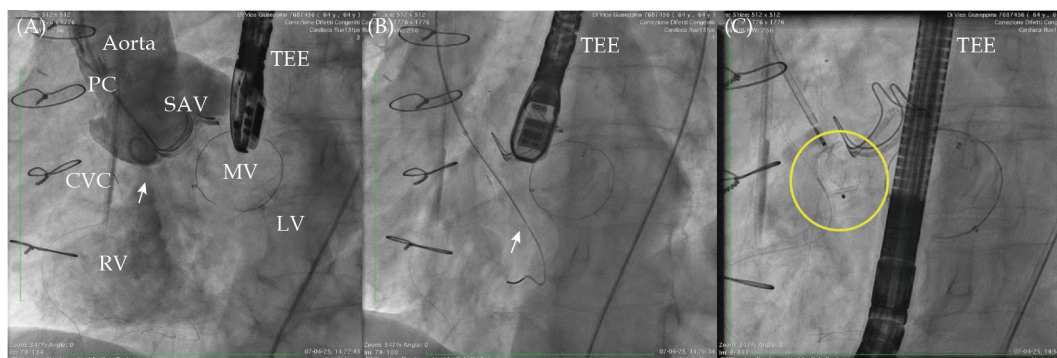


Figure 2 Fluoroscopic images of the procedure. (A) PC positioned at the level of the SAV to perform an aortography which depicts the fistula (white arrow) with passage of contrast media from the aorta to the RV; (B) retrograde crossing with a multipurpose catheter and a Stortz guidewire (white arrow); and (C) an Amplatzer Vascular Plug II device was deployed to ensure adequate sealing. CVC: central venous catheter; LV: left ventricle; MV: mitral valve ring; PC: pigtail catheter; RV: right ventricle; SAV: surgical aortic valve; TEE: transesophageal echocardiography.

remained hemodynamically stable, with no pericardial effusion or conduction disturbances, and was discharged 24 h later on optimized diuretic therapy. She is currently under follow-up with favorable clinical evolution.

ARVFs are rare but potentially life-threatening complications of cardiac surgery, transcatheter interventions,^[1] traumatic injuries,^[2] or infective endocarditis. In certain cases, delayed presentation may be explained by progressive necrosis, tissue degeneration, or fibrosis leading to gradual enlargement of the fistulous tract.^[3] While surgical repair remains the standard approach, percutaneous closure is increasingly considered a feasible and less invasive alternative, particularly in high-risk surgical candidates. No formal recommendations exist regarding device selection, and reported cases have described the use of vascular plugs or atrial septal defect occluders, highlighting the

importance of a patient-specific approach based on anatomical and clinical features.

This case underscores the role of advanced multimodality imaging, individualized planning, and multidisciplinary decision-making in the management of complex structural complications following multiple cardiac surgeries. The successful percutaneous closure of the ARVF, along with improvements in hemodynamics and valvular function, supports the efficacy of this strategy in selected high-risk patients.

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