

Dehiscence of an Infected Composite Ascending Graft with Systolic Extrinsic Compression



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INTRODUCTION

Uncommon complications following the Bentall procedure include endocarditis. We present here the rare finding of composite root dehiscence from endocarditis in a 71-year-old man.

CASE PRESENTATION

The patient was a 71-year-old man with hypertension who underwent emergent composite aortic root replacement with a Carbomedics valved conduit in 2007 for an ascending aortic dissection. He did well for 13 years until fevers and chills developed following dental work about 5 weeks before admission. Coronavirus disease 2019 was ruled out, but blood cultures grew *Streptococcus mitis*. Transesophageal echocardiography suggested a root infection with vegetations. Computed tomography showed residual type B aortic dissection and a bilobed pseudoaneurysm arising from the superior aspect of the aortic composite graft. Coronary computed tomography suggested significant mid left anterior descending coronary artery stenosis.

The patient was taken for redo root replacement with a homograft and a single-vessel coronary artery bypass graft. Intraoperative transesophageal echocardiography showed a mobile aortic prosthetic valve, systolic compression of the ascending graft, and diastolic expansion of the aortic graft (Figures 1 and 2, Videos 1-4). There was also disruption of the mitral-aortic intervalvular fibrosa region secondary to the perivalvular extension of endocarditis and development of a pseudoaneurysm (Figures 1 and 2). The blind pouch through which the perigraft region was filling the mitral-aortic intervalvular fibrosa pseudoaneurysm in systole causing compression of the graft is shown.

Arterial cannulation was through the right subclavian artery. Once on bypass with the distal ascending aorta cross-clamped, the distal felt-reinforced anastomosis was taken down and found to be intact. The old distal anastomosis, done at the time of dissection 13 years before, was to the compressed true and false lumen. The false lumen, which extended onward to the descending aorta, was chronically thrombosed. Exploration toward the root revealed the ascending graft surrounded by a loosened chronic capsule of scar. This capsule of scar and the free graft within were incised down to the coronary buttons, and once both buttons were free, the composite graft was removed

VIDEO HIGHLIGHTS

Video 1: Transesophageal echocardiographic short-axis and long-axis views of endocarditis of composite aortic root replacement.

Video 2: Color Doppler in short-axis and long-axis views shows flow around the composite aortic root replacement.

Video 3: Three-dimensional imaging of the long-axis aortic valve view showing systolic compression and diastolic expansion of the ascending graft.

Video 4: Three-dimensional multiplanar reconstructed view of the dehisced Bentall graft.

Video 5: Color Doppler short-axis aortic valve (AV, left) and long-axis AV (right) view following homograft replacement.

Video 6: Deep transgastric view of the aortic valve homograft replacement avoiding the shadowing seen in the midesophageal view.

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without incising a single valve stitch: the valve conduit was free-floating, completely dehisced, and held in place only by the coronary buttons and distal anastomosis. There was loose, infected material on the underside of the dehisced valve, which was debrided.

Reconstruction involved placing a homograft with interrupted sutures to the basal ring and then reimplanting the coronary buttons. Distally, the native, chronically dissected aorta did not appear to be infected. Old clot was removed from the false lumen, and the original operation was essentially replicated: on the lesser curve, the homograft was sewn to the full-thickness normal aorta; on the greater curve, it was sewn to a sandwiched aorta composed of thick chronic septum and declotted false lumen, thus again closing off the false lumen. The patient made an uneventful recovery (Figure 3, Videos 5 and 6).

DISCUSSION

The need for reoperation following the Bentall procedure is usually related to the development of endocarditis, aneurysmal formation, or repeat dissection.¹ More than 30 years ago, Josephson *et al.*² proposed that systolic expansion of a space at the aortic root (or conversely systolic compression of the composite ascending valve conduit) demonstrated by echocardiography is a unique diagnostic finding suggestive of composite graft dehiscence.

The somewhat puzzling initial transesophageal echocardiographic findings of dramatic compression and expansion are explained by the operative findings (Figures 1 and 2): in systole, paravalvular blood

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Keywords: Bentall, Aortic valve, Endocarditis, 2D and 3D transesophageal echocardiography

Conflicts of interest: The authors reported no actual or potential conflicts of interest relative to this document.

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2468-6441

<https://doi.org/10.1016/j.case.2020.08.004>

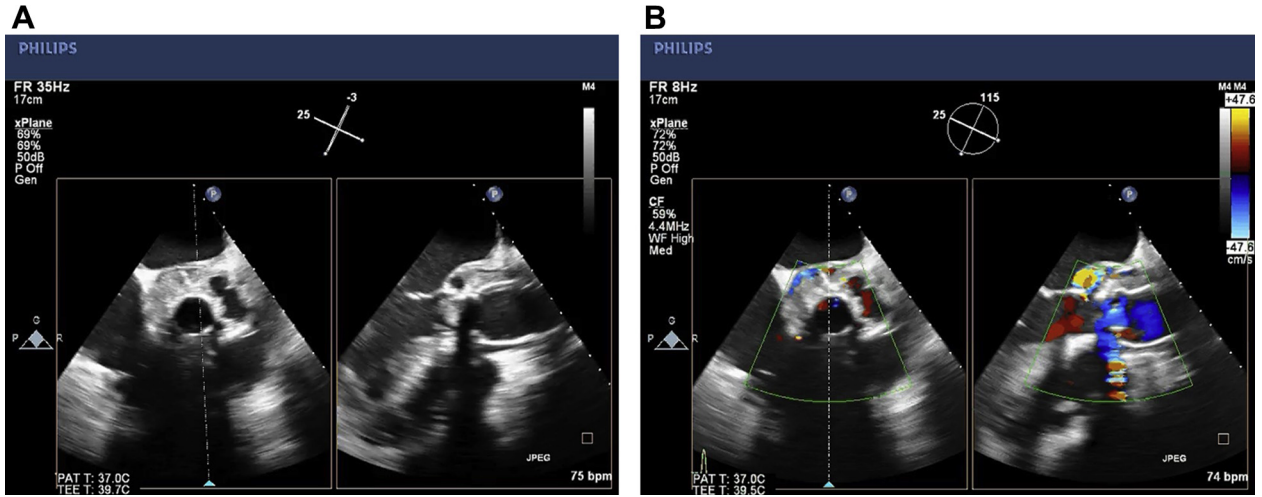


Figure 1 (A) Transesophageal echocardiographic short-axis (SAX) and long-axis (LAX) views of endocarditis of composite aortic root replacement. (B) Color Doppler in SAX and LAX views shows flow around the composite aortic root replacement.

swirled inside the now loosened scar capsule, outside the graft but meeting a dead end at the intact distal anastomosis. The central jet, going through the valve and out the conduit, fed the entire body

and hence had much higher flow and lower pressure (Venturi effect), and thus the graft was dynamically compressed in systole. In diastole, the paragraft blood flowed back in the left ventricle on the basis of

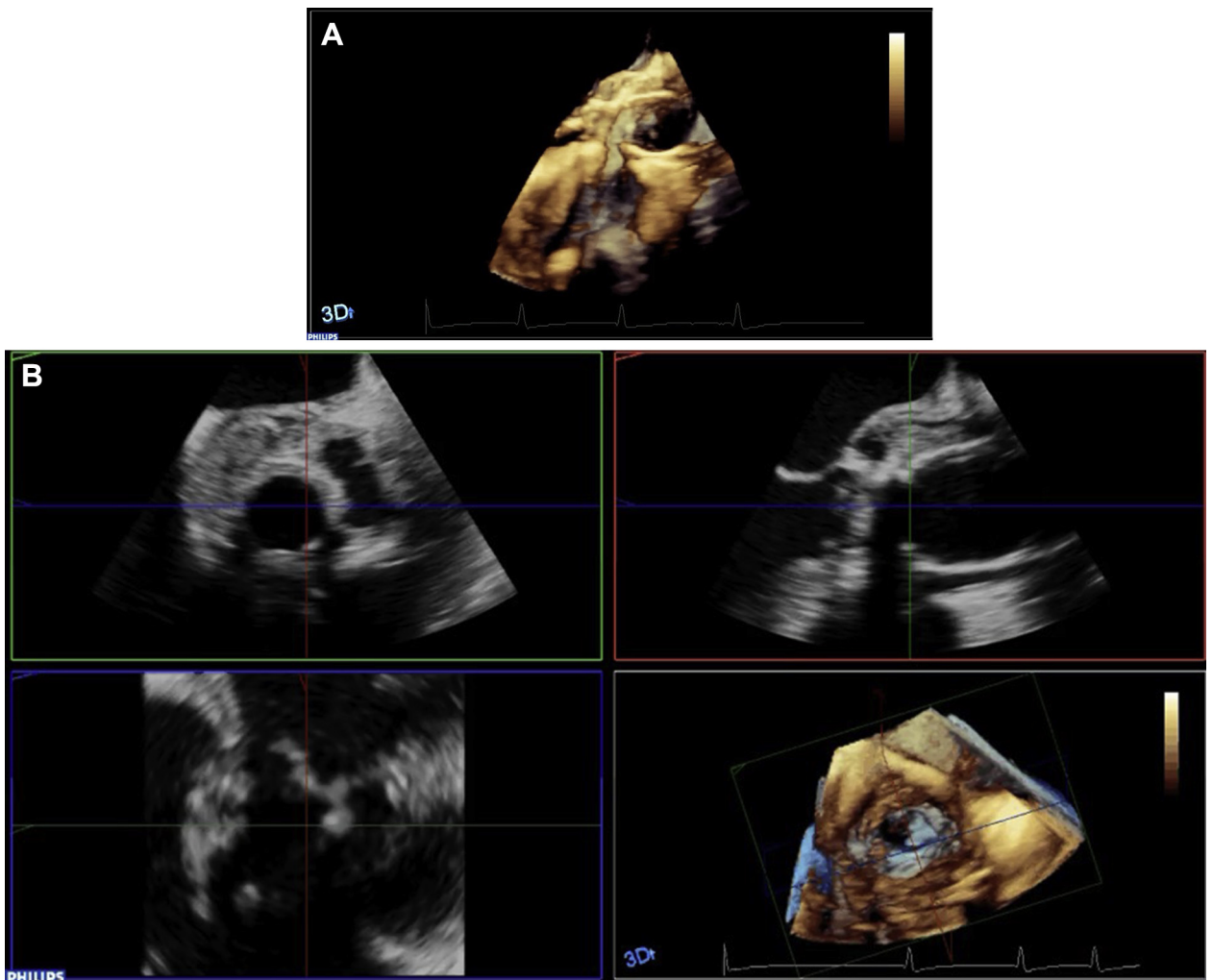


Figure 2 (A) Three-dimensional image of the long-axis aortic valve view showing systolic compression and diastolic expansion of the ascending graft. (B) Three-dimensional multiplanar reconstructed view of the dehiscent Bentall graft.

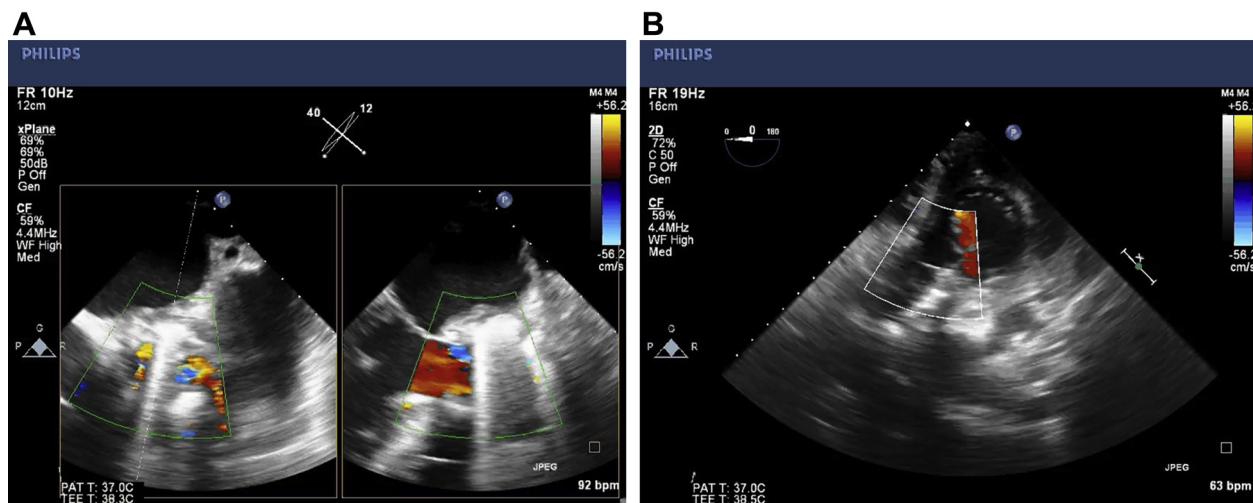


Figure 3 (A) Color Doppler short-axis aortic valve (AV, left) and long-axis AV (right) view following homograft replacement. (B) Deep transgastric view of the AV homograft replacement avoiding the shadowing seen in the midesophageal view (A).

falling left ventricular end-diastolic pressure; however, the blood within the graft maintained a higher diastolic pressure against the closed valve, expanding the graft.

We postulate that the patient's unusual anatomy (chronic scar around graft, intact distal anastomosis, free-floating valve) led to this unusual echocardiographic finding and demonstrates an interesting Venturi effect.

This case is different from earlier cases in that our patient was much older (71 vs 21–63 years of age),^{2–8} he did not have Marfan syndrome,² there was no traumatic event,³ he survived the redo surgery,^{3,4,6–8} and he initially underwent the Bentall procedure because of nontraumatic aortic dissection.⁵

CONCLUSION

Two-dimensional and three-dimensional echocardiography easily demonstrated systolic compression of a composite ascending valve conduit as a result of endocarditis.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.case.2020.08.004>.

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