A 76-year-old woman with a history of aortic valve replacement was referred for echocardiography for routine postoperative evaluation. Transthoracic echocardiogram revealed evidence of an intracardiac shunt between the left ventricle (LV) and the right atrium (RA) (Figure 1A).

A transesophageal echocardiogram confirmed the presence of an LV to RA shunt consistent with a Gerbode defect (Figure 1B and 1C). To further define shunt anatomy and to quantify the shunt ratio, cardiac MRI was performed. The cardiac MRI demonstrated abnormal flow from the LV to the RA (Figure 2A and 2B) as well as normal right ventricular size and function. By phase contrast imaging technique, the shunt volume was determined to be 28.4 cc/cardiac cycle corresponding to 2 L/min (Figure 2C). In addition, the pulmonary-to-systemic flow ratio was calculated as 1.7/1.0, consistent with a small to moderate left to right shunt.

In keeping with the current American College of Cardiology/American Heart Association guidelines for ventricular septal defect closure, given her normal right and left ventricular size and function as well as the lack of pulmonary hypertension or history of infective endocarditis, it was elected to manage the patient conservatively (with plan to monitor her in the future with serial noninvasive imaging) instead of any operative repair.

The Gerbode defect is a type of communication between the LV and the RA. The congenital form of the LV-RA shunt is uncommon and was first classified by Gerbode in 1958. Acquired causes secondary to trauma, infective endocarditis and aortic or mitral valve surgery, have been described. The magnitude of the shunt is the main predictor of the long-term outcome. Phase-contrast MRI can accurately locate and quantify the severity of the eccentric flow across this septal defect.

This case demonstrates the complementary value of contemporary imaging techniques such as 3-dimensional transesophageal echocardiogram and cardiac MRI to noninvasively assess the anatomy and hemodynamics of intracardiac shunts. The high resolution of transesophageal echocardiogram confirmed the diagnosis and location of the defect. On the other hand, in addition to anatomic visualization, CMR was used to evaluate the shunt volume and fraction as well as the associated impact on right-sided heart function. Importantly, the data provided by these tests had a direct impact on

Figure 1. Illustration of LV-RA shunt by (A) 2-dimensional transthoracic echocardiography, (B) 2-dimensional transesophageal echocardiography, and (C) 3-dimensional transesophageal echocardiography. LV indicates left ventricle; RA, right atrium; RV, right ventricle; LA, left atrium; TV, tricuspid valve.
clinical decision making as it was used to defer any surgical or catheter-based intervention.

Disclosures
None.

References

**KEY WORDS:** magnetic resonance spectroscopy  ■ transesophageal echocardiography

![Figure 2. Cardiac MRI demonstration of the Gerbode defect. ECG-triggered breath-hold steady-state free procession showing the intracardiac shunt (arrow) in (A) short-axis view and (B) 4-chamber view. Through-plane phase contrast imaging of the Gerbode shunt (red circle) (C). LV indicates left ventricle; RA, right atrium; RV, right ventricle; LA, left atrium.](image_url)
Multimodality Imaging of a Gerbode Defect
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