An Unusual Cause of Aortic Regurgitation

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A 42-year-old man presented with acute onset of severe dyspnea, fever, and positive blood cultures for *Staphylococcus aureus*. His medical history was relevant for aortic root surgery, including replacement of the aortic root and aortic valve with a homograft 3 years ago. His physical examination revealed sinus tachycardia, a heart rate of 120 bpm, and a blood pressure of 84/45 mm Hg. Bibasilar rales were present, and the jugular veins were distended to the angle of the mandible. Transesophageal echocardiography was performed to examine the underlying reasons for his acute deterioration.

Transesophageal echocardiography revealed the presence of a dehiscence of the homograft, with flow occurring between the left ventricular outflow tract and a pseudoaneurysm in the plane of the intervalvular fibrosa, without vegetations on the aortic valve. Hemodynamically significant aortic regurgitation (AR) was present through the site of the dehiscence, but not the aortic valve itself (Data Supplement Movies I-IV), and pulsed wave Doppler of the descending aorta revealed holodiastolic flow reversal (Figure 1). Continuous wave Doppler signal of the AR jet was consistent with significant AR, showing a short pressure half-time (Figure 2). In addition, echolucent areas with septations were seen surrounding the homograft (Data Supplement Movie I), consistent with multiple abscess cavities. Doppler interrogation showed early closure of the mitral valve and diastolic mitral regurgitation (Figure 3, left). Pulmonary venous flow (Figure 3, right) revealed a reduced systolic velocity to diastolic velocity ratio and a prominent atrial reversal signal. Collectively, these Doppler findings are consistent with a highly elevated left ventricular end-diastolic pressure (atrial reversal >50 cm/s, premature closure of the mitral valve, and diastolic mitral regurgitation), as well as an increased mean left atrial pressure (systolic/diastolic, <1) due to AR.

Aortic graft dehiscence is a rare complication after aortic root surgery, whether with composite grafts or homografts. The hemodynamic consequences depend on the extent of dehiscence and can lead to severe perivalvular regurgitation and acute heart failure, as in this case. Aortography may not visualize a single site dehiscence, nor the mechanism of regurgitation. On the other hand, transesophageal echocardiography has a high accuracy in identifying the location and extent of the dehiscence, the presence of aortic root and aortic valve pathology, and the severity of regurgitation, as seen in this case.

Disclosures

None.
Flow in Descending thoracic aorta

Figure 1. Pulsed wave Doppler recording from the descending thoracic aorta shows forward flow in systole (above the baseline), with holodiastolic flow reversal (below the baseline and delineated by the arrows). This finding is consistent with hemodynamically significant AR.

Mitral Inflow

Figure 2. Continuous wave Doppler of the AR jet. Notice the rather dense signal when compared with forward flow across the aortic valve and the steep deceleration, leading to a very short pressure half-time (95 ms, arrow).

Pulmonary Venous Flow

Figure 3. Left side shows mitral inflow by pulsed wave Doppler. Diastolic flow is abbreviated with premature closure of the mitral valve (arrow above baseline) and diastolic mitral regurgitation (arrow below baseline). Both observations are diagnostic of highly elevated left ventricular end-diastolic pressure. On the right, is a recording from the left pulmonary vein. Forward flow in systole (S) is reduced, whereas forward flow in diastole (D) is increased. This finding indicates increased mean left atrial pressure. In addition, the increased atrial reversal velocity with left atrial contraction confirms the increased left ventricular end-diastolic pressure.
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