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CASE REPORT

Multimodality Imaging of Mitral Perivalvular Abscess with Annular Fistula and Preserved Leaflet Function

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A devastating complication of both native and prosthetic valvular infective endocarditis can involve periannular extension, which is associated with increased perioperative mortality and long-term adverse outcomes. Cardiac imaging, both noninvasive and invasive, is essential to accurately identify the extent and complexity of these infections to perform effective surgical interventional strategies. We present the case of a 62-year-old woman who was found to have a perivalvular mitral valve abscess with an annular fistula without evidence of mitral valve leaflet involvement on histopathology, diagnosed by 3-dimensional transesophageal echocardiography, computed tomography, and left ventriculography. (Echocardiography 2012;0:1-5)

Key words: endocarditis infective, embolism cerebral, color Doppler transesophageal echocardiography, three-dimensional transesophageal echocardiography, mitral valve, myocardial abscess

A 62-year-old woman with a history of hypertension, diabetes mellitus, and hypercholesterolemia presented with a right toe blister, fever, and dysuria for 4 days. Her laboratory testing was notable for a white blood cell count of 18,200 cells/cmm with 64% segmented

neutrophils and 17% bands, and pyuria on urinalysis. Cardiac auscultation was unremarkable for murmurs, rubs, or gallops. A 12-lead

Figure 1. Two-dimensional transesophageal echocardiogram (TEE), mid-esophageal level, five-chamber view at 0°. Initial TEE on first admission showing no vegetations and normal valvular function.

Figure 2. Two- and three-dimensional (3D) transesophageal echocardiogram, mid-esophageal level, two-chamber view, 60°. **A.** 2D visualization of inferoposterior loculated abscess (horizontal arrow) inferior to the posterior mitral leaflet (vertical arrow). **B, C.** 3D visualization of the abscess, which appears to have 3 loculated chambers (horizontal arrow), adjacent to the mitral valve (vertical arrow).

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The patient was readmitted 10 days after discharge for vague chest pain and increasing altered mental status. On physical exam, she was alert and oriented to person and place only. Her jugular venous pulse was elevated to her mandible was noted and inspiratory crackles were heard halfway up her lung fields. No murmurs, rubs, or gallops were heard on exam and no peripheral edema was present. Leukocytosis was noted at 14,700 cells/cmm with 82% neutrophils and no bands. Blood cultures were negative.

Figure 5. Two-dimensional transesophageal echocardiogram with color Doppler, mid-esophageal level, two-chamber view. **A.** 28 Degrees view showing mild to moderate mitral regurgitation (horizontal arrow) with normal valvular morphology with no evidence of vegetations or leaflet dysfunction. **B.** 60 Degrees view showing mild-to-moderate mitral regurgitation (horizontal arrow) with simultaneous regurgitant Doppler flow into the abscess (vertical arrow). No evidence of mitral valve vegetations or valvular dysfunction are seen.

The patient's troponins were noted to be 0.76 ng/mL. Serial ECGs were unchanged from prior. Cardiac catheterization was deferred because of fevers and leukocytosis, and the patient was treated with IV vancomycin and ceftazidime. Brain magnetic resonance imaging (MRI) (GE Medical Systems, GE Healthcare, Waukesha, WI, USA) revealed an acute/subacute infarct in the anterior cerebral artery territory and old infarcts in the left occipital, temporal, and parietal lobes.

The patient's fever and leukocytosis persisted, and a repeat TEE on HD#14 was performed. Imaging revealed a new, complex, loculated perivalvular mitral abscess inferior to the posterior mitral valve leaflet with Doppler flow seen entering the abscess in systole and entering the left ventricle during diastole (Figs. 2–4, movie clips S1–S3). Mild-to-moderate mitral regurgitation was seen without vegetations or evidence of leaflet destruction (Fig. 5). Chest computed tomography with IV contrast also revealed a loculated

abscess on the inferior aspect of the left ventricle (Fig. 6). A biplane left ventriculogram was performed to evaluate the size of the abscess and mitral valve function, which revealed a 4.4×3.6 -cm cavity inferoposterior to the left ventricle which opacified with contrast during systole with a normal EF of 60%. Angiographic + 2 grade mitral regurgitation was also seen. (Fig. 7, movie clip S4).

Surgical management was initially delayed due to the patient's cerebrovascular issues; however, given the significant nature of the abscess and its propensity to cause further embolic sequelae, the decision was made to undergo abscess debridement and mitral valve replacement on HD#37. In the operating room, the abscess cavity was seen in the inferior portion of the heart, and communication was present between the cavity and the base of the heart in the posteromedial aspect of the annulus of the mitral valve. The cavity was debrided and closed with Prolene sutures. The mitral valve was then replaced with a 29-mm St. Jude bileaflet mechanical valve (St. Jude Medical, Minneapolis, MN, USA). There were no intraoperative complications. Cultures obtained from the abscess cavity were negative. Histopathologic analysis of the mitral valve leaflets showed myxoid degeneration with no evidence of endocarditis.

On HD#39, the patient exhibited deteriorating mental status, and serial head computed tomography (CT) (Siemens Somatom, Siemens, Malvern, PA, USA) imaging showed increasing edema in the left cerebral hemisphere with mass effect associated with the patient's left middle and anterior cerebral artery infarction. The patient's family eventually decided on comfort measures, and the patient expired on HD#41 following bradycardic pulseless electrical activity. The family declined autopsy.

Periannular extension of infective endocarditis (IE) is known to involve 10–40% of native valve IE and 56–100% of prosthetic valve IE. For native valve IE, the aortic valve is more frequently involved than the mitral or tricuspid valves. Because detection with TTE has a very low sensitivity (18–63%), TEE imaging significantly improves accuracy of detection with both a high sensitivity (76–100%) and specificity (95%) and holds a Class I indication for the initial assessment of a patient suspected of having periannular extension.¹ Independent risk factors for increased mortality in IE patients include *S. aureus* IE, severe heart failure, septic shock, perivalvular extension, neurologic manifestations, and acute renal failure.²

A 64-multislice cardiac CT has also been shown to be a potentially valuable tool in evalu-

Figure 6. A 64-slice computed tomography of the chest with intravenous contrast showing the loculated abscess (arrows) in the inferior portion of the heart. Loculations are seen dividing the abscess into 3 chambers. Bilateral pleural effusions are also noted. **A.** Sagittal view. **B.** Coronal view. **C.** Axial view.

Figure 7. Left ventriculography, right anterior oblique view. In systole, there is contrast filling of a 4.4 × 3.6-cm abscess inferoposterior to the left ventricle. Angiographic + 2 grade mitral regurgitation was also present with an ejection fraction of approximately 60%. LA = left atrium; LV = left ventricle; Ab = abscess.

ating for IE and has been shown to have more accurate anatomic information in assessing the extent of perivalvular involvement than TEE,

although it can miss small leaflet perforations (≤ 2 mm) and vegetations (≤ 4 mm). In addition, coronary anatomy can also be accurately assessed in preparation for surgery if concurrent coronary artery bypass is indicated.³

Surgical treatment for patients with perivalvular extension usually involves valve replacement and a customized approach towards the abscess depending on its extent, including drainage, removal of necrotic tissue, and closing accompanying fistulas. However, the presence of perivalvular abscess and preoperative shock have been associated with elevated operative mortality. Long-term survival has been adversely affected by age and recurrent IE.⁴

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Movie clip S1. 2D TEE with color Doppler, mid-esophageal level, biplane views at 115 and 0°, two-chamber view. Color Doppler flow is seen entering the abscess in systole and entering the left ventricle in diastole at the annular level of the posterior mitral valve leaflet.

Movie clip S2. 3D TEE, mid-esophageal level, 0°, showing the loculated perivalvular abscess inferoposterior to the mitral valve apparatus.

Movie clip S3. 3D TEE, multiplanar views of the loculated perivalvular abscess, showing 3 loculated chambers within the abscess.

Movie clip S4. Left ventriculography, right anterior oblique (RAO) view. In systole, there is contrast filling of a 4.4 × 3.6-cm abscess inferoposterior to the left ventricle. Angiographic + 2 grade mitral regurgitation was also present with an ejection fraction of approximately 60%.

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