

Case Report

Healed perivalvular abscess: Incidental finding on transthoracic echocardiography

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ABSTRACT

A 36-year-old male patient presented with the complaints of palpitations and breathlessness. Preoperative transthoracic echocardiography (TTE) revealed a bicuspid aortic valve; severe aortic regurgitation with dilated left ventricle (LV) and mild LV systolic dysfunction (ejection fraction 50%). He was scheduled to undergo aortic valve replacement. History was not suggestive of infective endocarditis (IE). Preoperative TTE did not demonstrate any aortic perivalvular abscess. Intraoperative transesophageal echocardiography (TEE) examination using the mid-esophageal (ME) long-axis view, showed an abscess cavity affecting the aortic valve, which initially was assumed to be a dissection flap, but later confirmed to be an abscess cavity by color Doppler examination. The ME aortic valve short-axis view showed two abscesses; one was at the junction of the non-coronary and left coronary commissure and the other one above the right coronary cusp. Intraoperatively, these findings were confirmed by the surgeons. The case report demonstrates the superiority of TEE over TTE in diagnosing perivalvular abscesses.

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INTRODUCTION

Perivalvular abscesses may complicate infective endocarditis (IE) in up to 30% patients and is associated with a higher mortality due to congestive heart failure and sepsis.^[1] Perivalvular abscesses occur more frequently when endocarditis affects the aortic valve or prosthetic valve and are associated with an increased rate of complications with valve replacement.^[1-3] However, there is no non-invasive technique to diagnose them with a high degree of sensitivity and specificity. Two-dimensional (2D) echocardiography has previously been shown to be useful in the diagnosis of IE.^[1] Although, all patients undergo transthoracic echocardiography (TTE) as an initial assessment; multiple studies have shown that transesophageal echocardiography (TEE) is a far superior imaging modality due to its proximity to the aortic valve and higher signal to noise ratio.^[4,5]

CASE REPORT

A 36-year-old male patient presented with palpitations and breathlessness for last 7-8 months and was scheduled to undergo aortic valve replacement. The clinical features and the history were not suggestive of IE. His heart rate was 92 beats/min, blood pressure was 140/40 mmHg and an early diastolic murmur was present. Biochemical and hematological parameters were normal; the markers of endocarditis - total leucocyte count and erythrocyte sedimentation rate was not raised. Electrocardiography and chest X-ray were suggestive of left ventricular (LV) hypertrophy. Preoperative TTE showed a bicuspid aortic valve, severe aortic regurgitation (AR), dilated LV (LVID d/s-60/36 mm) and mild LV systolic dysfunction (ejection fraction 50%). Other valves were normal. The aortic annulus measured 2.47 cm, ascending aorta (AA) 3.2 cm and intersinus distance 4.1 cm. The

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three-dimensional (3D) echocardiography is not available at our institution. The patient underwent aortic valve replacement with standard anesthesia technique. TEE examination in the mid-esophageal (ME) short-axis aortic view after anesthesia induction showed that the aortic valve (AV) is trileaflet which was diagnosed as bicuspid by TTE and there was severe AR. The AA was dilated (4.8 cm). In the ME long-axis view a dissection flap like structure was noted in the root of the aorta. However, there was no flow across the flap on color Doppler examination. The surgical team was alerted for the same. Further examination revealed that it was an abscess cavity [Figure 1]. On AV short axis view, two abscesses were noted. One was at the non-coronary and left coronary commissure and the other above the right coronary cusp [Figure 2]. Intraoperatively, these findings were confirmed by the surgeons [Figure 3]. Patient had AV (Sorin Bicarbon 25 mm) and AA (26 mm Dacron graft) replacement under standard CPB technique. The patient was weaned off bypass uneventfully with the use of adrenaline (0.05 µg/kg/min), dobutamine (5 µg/kg/min) and nitroglycerine (1 µg/kg/min). Rest of the course in the intensive care unit was uneventful.

DISCUSSION

In the present patient, the cavity at the non-coronary and left coronary commissure looked like a small intimal tear of the aorta. The diagnosis of aortic dissection is confirmed when two lumina separated by an intimal flap can be visualized within the aorta. A tear is defined as a disruption of the intimal continuity with the fluttering of the ruptured intimal borders. Smaller intimal tears are detected by color Doppler, showing jets traversing the dissection membrane.^[6] In the present case, small intimal tear was suspected but no flow was detected by color Doppler and the diagnosis of dissection was not considered. Epicardial echocardiography also would have clearly delineated the underlying pathology. Availability of 3D echocardiography would have made the diagnosis easier as it provides additional information to 2D-TEE in aortic dissection assessment, particularly in tear size quantification.^[7]

Further TEE evaluation showed two small periaortic valve abscess cavities, presumably, a complication of IE. Most of these patients present with severe valvular dysfunction and conduction disturbances. New onset atrio-ventricular block or bundle branch block is highly suggestive of ring abscess.^[8] Our patient had symptoms due to severe AR, but did not have any conduction abnormalities; the features of

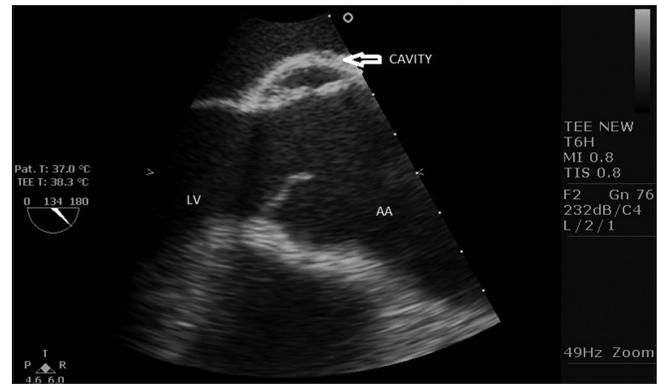


Figure 1: Mid-esophageal long-axis view showing the abscess cavity (arrow) appearing like a dissection flap. LV: Left ventricle, AA: Ascending aorta

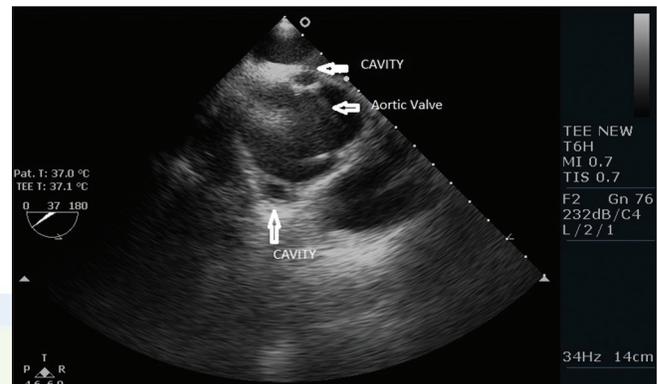


Figure 2: Aortic valve short axis view showing one cavity at the non-coronary and left coronary commissure and one at the right coronary cusp

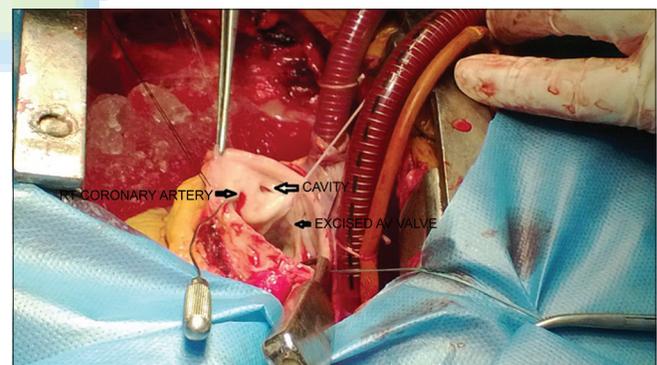


Figure 3: Abscess cavity present beside the right coronary artery. Probe placed at the right coronary artery. Aortic annulus with excised aortic valve also seen

active IE were also absent as the abscess cavity was healed. The three main echocardiographic features of endocarditis according to the Duke's criteria are: (a) Oscillating intracardiac mass on the valve or supporting structures in the path of regurgitant jets or on implanted material in the absence of an alternative anatomical explanation, (b) abscess, (c) new partial dehiscence of a prosthetic valve.^[9] The presence of one or more of the following features on 2D echocardiography suggest the presence of perivalvular abscess in the setting of

IE: (1) Prosthetic valve rocking, (2) sinus of Valsalva aneurysm, (3) anterior or posterior aortic root wall thickness ≥ 10 mm and (4) perivalvular density in a septum ≥ 14 mm.^[1] Periaortic valve abscess formation is a dynamic process; it starts with aortic wall thickening and may extend to form a pseudoaneurysm or a fistula.^[10] The echocardiographic features varies with the presenting pathology. On echocardiography abscess is defined as a thickened, non-homogenous perivalvular echodense area due to suppuration in active IE or echolucent appearance on echocardiography.^[11,12] It typically appears as a perivalvular zone of reduced echodensity, without color flow detected inside. The diagnosis may be difficult in case of small abscesses, at an early stage of the disease when only a thickening of aortic root is observed, in the immediate postoperative period and in the presence of severe valvular and perivalvular calcification.^[11,13] Aguado, *et al.*, reported that peri AV abscesses are more frequently observed in IE (80%) and usually involve the mitral-aortic intervalvular fibrosa (10-40%) in native valve and very frequently in prosthetic valve (56-100%).^[8,14] The present patient also had echolucent cavities in the periaortic area [Figure 2]. TTE is rapid, non-invasive and has excellent specificity for vegetations (98%).^[15] However, the sensitivity of TTE for diagnosis of abscess is $< 50\%$ and specificity is $> 90\%$.^[16] Vegetations greater than 2 mm in size, especially on right sided valves are readily detected by TTE.^[17] However, TTE is inadequate in up to 20% of adult patients with obesity, COPD or chest wall deformities. TTE alone cannot exclude several important aspects of IE such as infection of prosthetic valves, periannular abscess, leaflet perforation and fistula formation.^[18] In contrast, TEE has a substantially higher sensitivity (76-100%) and specificity (94%) for perivalvular extension of infection because the transducer is in close proximity to the aortic root and basal septum where most of the complications occur.^[16,18] Hence, TEE needs to be performed in all cases of AV IE and as soon as an abscess is suspected so that these patients can be operated early after detection of perivalvular abscess to avoid cardiac morbidity and mortality.^[12] In addition, TEE also enhances visualization of prosthetic valve vegetations and regurgitation.^[16,18] The sensitivity of TEE can be further improved by imaging in ≥ 2 planes to decrease the number of false negatives and improve the definition of vegetation extent and mobility.^[19] Therefore, TEE is the method of choice to diagnose IE in patients who are difficult to image, possible prosthetic valve IE, intermediate or high clinical suspicion for IE

and patients who are at high risk for complications of IE.^[18] The algorithm proposed by European Society of Cardiology, The Task Force on the Prevention, Diagnosis and Treatment of IE recommends TEE in patients with high clinical suspicion of IE and a normal TTE. TEE is recommended even in cases of positive TTE due to its better image quality and better sensitivity particularly for perivalvular involvement. With good quality negative TTE and low clinical suspicion of IE, only TTE may be considered sufficient. Intraoperative TEE is recommended in all patients of IE undergoing cardiac surgery.^[11,12]

The present case scenario is rare as IE was not suspected. The detection of the perivalvular abscess cavity was an incidental finding on routine TEE, which was performed to verify the preoperative diagnosis and monitor the success of cardiac surgical repair. TEE also helped in making the correct diagnosis, which led to change in the surgical management. The patient was to undergo only AV replacement but had aortic root replaced as well due to the presence of cavities and dilated aorta. Our experience reconfirms that TEE has higher sensitivity and specificity in defining periannular extension of IE. However, small anterior abscesses are sometimes difficult to diagnose by TEE and may be better evaluated by TTE. Consequently, both TTE and TEE are useful in suspected perivalvular involvement.

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