

Three-Dimensional Transesophageal Echocardiography in Native Valve Endocarditis: A Case Report and Similarities Between Echocardiography and Surgical Findings

Ecocardiografia Tridimensional na Avaliação de Endocardite de Válvula Nativa: Um Relato de Caso e Semelhança entre Achados Ecocardiográficos e Cirúrgicos

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Abstract

Native valve bacterial endocarditis is an uncommon, complex, and highly morbid disease that requires prolonged clinical treatment and challenging surgical interventions. Transthoracic and transesophageal echocardiography are paramount assessment tools whose findings are included in the diagnostic criteria. Three-dimensional echocardiography shows further realistic imaging details.

Here we present a case demonstrating the role of echocardiography in the diagnosis of endocarditis and the identification of its complications to show how advanced imaging techniques may have a remarkable resemblance with *in vivo* surgical findings.

Introduction

A 60-year-old woman presented to the emergency department with important lumbar pain, malaise, loss of appetite, and nausea. She reported a progressive weight loss of more than 20 kg over the previous couple of months. She was an obese and fully functional woman. The patient had a Guillain-Barré syndrome episode complicated by deep venous thrombosis some years prior with no clinically relevant sequelae. She was undergoing testing for normocytic and normochromic anemia on an ambulatory basis. She had no previous cardiovascular conditions and no specific family history.

Her vital signs were unremarkable. A physical examination showed normal neurologic status with pale and hydrated mucosae. The cardiac findings were a 3/6 rough systolic murmur in the aortic and mitral areas and a 3/6 aspiration diastolic murmur in the aortic area. This finding led to careful

examination of the skin and extremities: her peripheral pulses were of increased amplitude and duration (Corrigan's sign), the fingertips had papular ecchymosis compatible with Janeway's lesions, and the nail beds had a pulsatile "ebb and flow" capillary filling (Quincke's sign). Crackles were detected at the bases of both lungs.

The differential diagnosis implied systemic inflammatory diseases. She presented with insidious symptoms of lumbar pain and malaise. Deep muscle or bone infections should be considered. Inflammatory myopathies, connective tissue diseases, or neoplasm could also explain those findings.

The specific physical examination signs pointed to valvular heart disease. The systolic murmur could be secondary to a benign preexistent condition as simple as mild mitral regurgitation or aortic sclerosis. However, the diastolic murmur should indicate a pathology, especially when it has intense character.

It was unclear if the patient had a previously unknown chronic heart condition that presented as another inflammatory disease or if there was a unique clinical entity responsible for all of the findings.

Considering the peripheral pulse and skin findings, a possible diagnosis was sought and complementary exams were ordered.

Investigations

The blood cell count showed anemia (hemoglobin, 8 g/dL) with normocytic normochromic features, a leftward shift of the white blood count, and an increased serum C reactive protein level. The electrolytes and urinary panel findings were unremarkable.

Abdominal computed tomography (CT) showed inflammation and bone erosion on lumbar vertebral bodies of L2–3 compatible with spondylodiscitis. A bilateral pleural effusion was noted, as were contrast perfusion deficits compatible with renal and spleen infarction.

A transthoracic echocardiogram showed normal LV systolic function. The mitral valve demonstrated a central regurgitation jet compatible with severe mitral insufficiency. There was irregular thickening on both leaflets and nodular vegetation on the atrial face of the anterior leaflet. The aortic valve had thickened cusps and a central regurgitation jet of severe intensity. Transesophageal echocardiography further detailed the aortic and mitral valves, showing a vegetation on the anterior

Keywords

Endocarditis, echocardiography, Echocardiography, Three-Dimensional, Mitral Valve.

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mitral leaflet with a central perforation. The aortic valve leaflets had increased motion and at least two prolongations (8 mm each) were depicted.

Blood cultures drawn at admission tested positive for *Enterococcus faecalis*.

Management

The broad-spectrum antibiotics vancomycin and cefepime were initiated. The therapy was modified to ampicillin plus gentamicin after the bacteria was cultured and the endocarditis diagnosis was made.

The patient remained stable for the next few days despite her malaise being cumbersome and feeling fatigued after trivial efforts such as bathing. Considering the complicated endocarditis (mitral and aortic severe regurgitation), surgery was indicated.

A large vegetation was found on the atrial aspect of the anterior mitral leaflet with a round perforation. The aortic

leaflets were friable, were clad in inflammatory pannus, and had three vegetations.

The transoperative findings (Figure 1) were remarkably similar with the pre-procedure echo images (Figure 2, 3, and 4).

Severe bleeding occurred during the operation that required major volumes of blood products. Although the replacement of both affected valves was technically successful, the patient developed progressive multiorgan failure and died of refractory shock within a few days despite intensive medical support.

Discussion

Native valve infective endocarditis is currently an uncommon disease. Its clinical presentation varies from a very severe onset of sepsis to an insidious and progressing condition diagnosed weeks later.

The possibility of this indolent course implies the need for a high grade of suspicion and adequate workup before

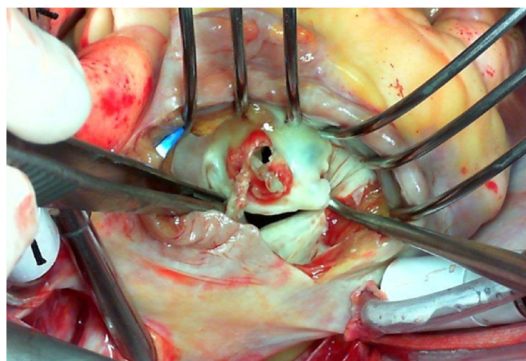
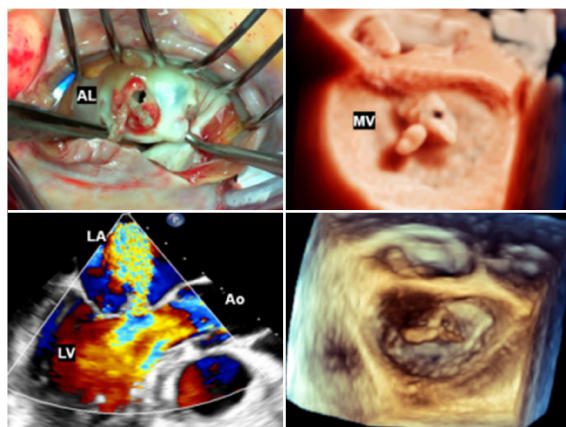


Figure 1 – Mitral valve with anterior leaflet perforation and vegetations (transoperative view).



Ao, aorta; LA, left atrium; LV, left ventricle.

Figure 2 – Top left: Surgeon's view perspective of a central vegetation and perforation on mitral valve anterior leaflet (AL). Top right: Three-dimensional transesophageal echocardiogram (3D-TEE) showing the same view on True-View filter. Bottom left: Central regurgitation through the perforated leaflet and severe mitral insufficiency. Bottom right: 3D-TEE on a traditional filter.

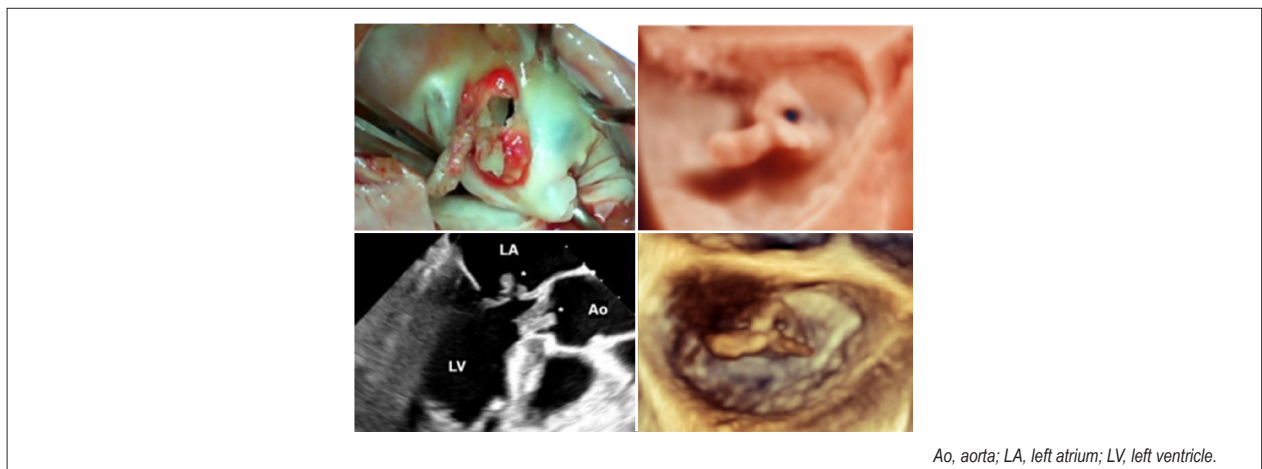


Figure 3 – Top left: Zoomed-in view of the structure and prolongations array of the mitral valve anterior leaflet vegetation. Top right: three-dimensional transesophageal echocardiogram (3D-TEE) True-View image showing remarkable similarity with the surgical findings. Bottom left: Vegetations (*) on both sides of the anterior mitral leaflet and aortic cusps. Bottom right: Traditional 3D-TEE of the vegetation and mitral valve.

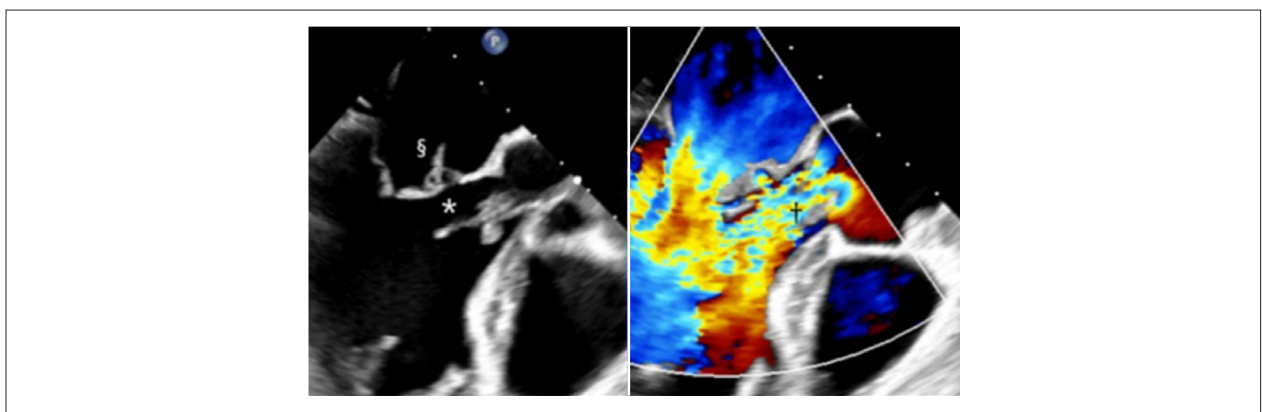


Figure 4 – Left: Longitudinal transesophageal echocardiogram (TEE) view in end systole. Irregular thickening of the aortic cuspid and an elongated vegetation (*) are evident. The anterior mitral leaflet with the reported vegetation. Right: Longitudinal TEE view in diastole and color Doppler. An aortic regurgitation jet is occupying almost the entire outflow tract (†).

complications ensue.¹ The most important risk associated factors are implanted prosthetic heart valves or devices, hemodialysis, indwelling catheters, immunosuppression, and the use of injectable recreational drugs.² Emboligenic complications can seed virtually any vascularized tissue, culminating in visceral and neurologic sequelae, sepsis, and death.

This patient presented with lumbar pain and was diagnosed with spondylodiscitis, a serious infection of the deep bone tissue of possible emboligenic origin. Thus, the diagnosis of endocarditis was made due to the embolization seen in multiple territories (renal and spleen infarctions). The patient had plenty auscultatory findings; however, these are not always present and a normal cardiac examination alone does not rule out the diagnosis, especially in cases with an earlier clinical presentation.

In addition to a careful history-taking and physical examination, echocardiography is the first-choice exam when suspicion of endocarditis occurs.^{3,4} The transthoracic examination is the initial

evaluation exam, with sensitivity as high as 80% in more recent clinical series. As it cannot rule out the diagnosis, transesophageal echocardiography can accurately detail the valves, with a sensitivity of 90–100% and a specificity of 90%.^{1,2} One must also exclude complications such as perforation, annular abscess, and fistula. The testing should be repeated within the treatment course if the initial imaging exams are negative and clinical suspicion persists, as it increases the sensitivity to near 98%.⁵

The three-dimensional transesophageal echocardiography is becoming more familiar to cardiologists. It has a realistic approximation and can show additional morphological details of lesion mechanisms and refine surgical planning. This modality requires newer ultrasonography machines and software, although it is not cumbersome to learn and perform.⁶

Conclusion

Native valve infective endocarditis is a serious disease whose clinical presentation ranges from subtle to dramatic. It requires

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detailed imaging attention with transthoracic and transesophageal studies. Its three-dimensional echocardiographic findings show notable resemblance to operative findings.

Authors' contributions

Manuscript writing: Schmitz GB, Bertuol Filho AA; 2D and

3D image acquisition: Berger SV; surgery and imaging: Saadi RP, Albrecht A; review and general guidance: Santos ABS.

Conflict of interest

The authors have declared that they have no conflict of interest.

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