

## A rare case of quadruple valve infective endocarditis of normal native valves - the advantage of TEE

### Dört doğal kalp kapağını birden tutan nadir bir enfektif endokardit olgusu - TÖE'nin avantajı

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**Summary**– Quadruple valve infective endocarditis of apparently normal native valves is a relatively uncommon condition, reported particularly in the setting of intravenous drug use, structural heart disease and immunocompromised state, but its occurrence outside these settings is rare. Multiple valve endocarditis is caused by *Staphylococcus aureus* in the majority of cases. Although *Enterococcus faecalis* is a common cause of bacterial infective endocarditis overall, it is rarely reported to cause multiple valve involvement. The present case is one such rare report of a patient who had quadruple valve endocarditis of normal native valves, caused by *E. faecalis*. Compared to single valve endocarditis, multiple valve disease is associated more frequently with heart failure, perivalvular complications and need for heart surgery; hence, early recognition of the extent of disease and number of valves involved is crucial, as this in turn influences the management, risk of complications and outcomes. Transthoracic echocardiography is a widely used first-line tool in the imaging of infective endocarditis, but transesophageal echocardiography, which is more sensitive, should be used more frequently to assess the extent of involvement. Extensive valvular involvement alone does not preclude medical management, and surgical management should be considered only in those who do not respond to antimicrobials or in the case of hemodynamic compromise or mechanical complications.

**Özet**– Görünürde normal doğal kalp kapaklarının dördünü birden tutan enfektif endokardit göreceli olarak sık görülen özellikle intravenöz ilaç kullanımı, yapısal kalp hastalığı ve bağışıklık sisteminin risk altında olduğu durumlarda bildirilen, ancak bu ortamlar dışında nadiren oluşan bir patolojidir. Olguların çoğunda *Staphylococcus aureus* birden fazla kalp kapağını tutan endokardite neden olmaktadır. Genellikle bakteriyel enfektif endokarditin sık görülen etkeni *Enterococcus faecalis* olmakla birlikte nadiren birden fazla kalp kapağının etkilenmesine neden olduğu bildirilmiştir. Burada *E. faecalis*'in normal doğal kalp kapaklarının dördünde endokardite neden olduğu bir hastaya ait seyrek görülen bir olgu raporu sunuldu. Tek kalp kapağını tutan endokardite karşılaştırıldığında çoklu kalp kapağı hastalığının daha büyük bir sıklıkla kalp yetersizliği, perivalvüler komplikasyonlar ve kalp cerrahisi gereksinmesiyle ilişkili olması ve sonuçta tedavi, komplikasyon riski ve sonuçları etkilemesi nedeniyle hastalıklı kapakçıkların sayısı ve endokarditin yaygınlık derecesinin erkenden bilinmesi kritik önem taşımaktadır. Enfektif endokarditin görüntülenmesinde transtorasik ekokardiyografi yaygın biçimde kullanılan ilk tercih olmasına rağmen transözofajiyal ekokardiyografi daha duyarlı bir yöntem olup tutulumun yaygınlık derecesini değerlendirmede daha sık kullanılmalıdır. Yaygın valvüler tutulum tek başına tıbbi tedavinin uygulanmasına mani olmamakla birlikte, antibiyotiklere yanıt vermeyen, hemodinamik risk altında ve mekanik (kapak) komplikasyonları olan hastalar için cerrahi tedavi düşünülmelidir.

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Quadruple valve infective endocarditis of apparently normal native valves by itself is a relatively uncommon condition, reported mainly in the setting of intravenous drug use<sup>[1]</sup> and immunocompromised state,<sup>[2]</sup> but its occurrence outside these settings is rare. The causative microorganism reported in the overwhelming majority of native multiple valve endocarditis cases is *Staphylococcus aureus*.<sup>[3,4]</sup> Although *Enterococcus faecalis* is the third most common cause of bacterial endocarditis overall, it is rarely known to cause multiple valve endocarditis.<sup>[3]</sup>

We report the case of a patient who had quadruple valve infective endocarditis caused by *E. faecalis*, on apparently normal native valves. Although transthoracic echocardiography (TTE) is a quintessential tool in the diagnosis of infective endocarditis, transesophageal echocardiography (TEE) increases the sensitivity. In our case, identification of vegetations on the mitral valve was possible only with the help of TEE, thus emphasizing the role of TEE in

studying the extent of disease. Early recognition of the extent and number of valves involved is crucial, as this in turn influences the management, risk of complications and outcomes.<sup>[4]</sup>

## CASE REPORT

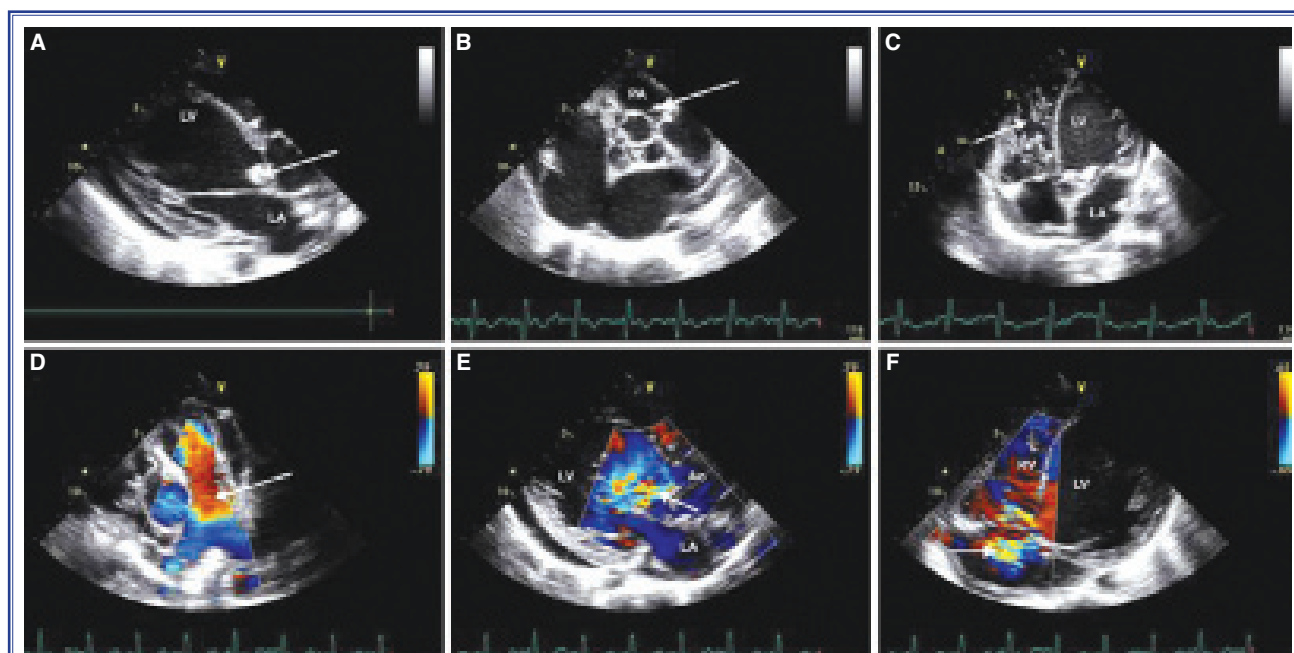
A 16-year-old girl presented with a history of intermittent fever of six months' duration associated with anorexia and significant weight loss. She was apparently healthy prior to this six-month period, with an unremarkable medical history. On examination she was febrile (39.4 °C), with a pulse rate of 115 beats per minute regular and blood pressure of 118/60 mmHg. Jugular venous pulse was normal in height with prominent 'v' wave. On cardiovascular examination, there was grade II/III early diastolic murmur at the base and grade III/VI pansystolic murmur at the lower left parasternal area. Respiratory, abdominal and nervous system examinations were unremarkable. On admission, her blood test reports were as follows: hemoglobin, 9.8 g/dl; total leukocyte count,  $18.2 \times 10^9/L$ ; neutrophils,  $15.5 \times 10^9/L$ ;

### Abbreviations:

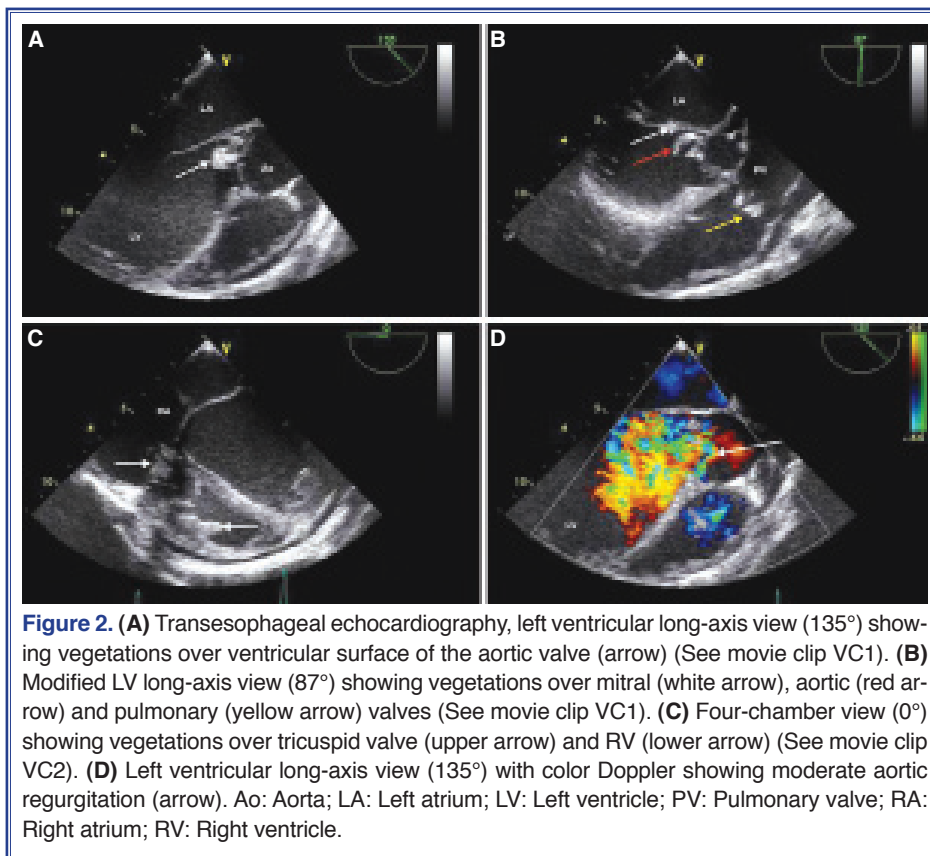
TEE Transesophageal echocardiography

TTE Transthoracic echocardiography

only with the help of TEE, thus emphasizing the role of TEE in



**Figure 1.** (A) Transthoracic echocardiography parasternal long-axis view showing vegetation over the aortic valve (arrow). The mitral valve is apparently not involved (See movie clip MC1). (B) Parasternal short-axis view at the aortic valve level showing vegetations over the pulmonary valve (arrow) and aortic and tricuspid valves (See movie clip MC2). (C) Apical four-chamber view showing vegetations on tricuspid and aortic valves and mural endocardium of the RV (arrow). (D) Color Doppler in parasternal short-axis view showing pulmonary regurgitation (arrow) (See movie clip MC3). (E) Color Doppler in parasternal long-axis view showing moderate aortic insufficiency (arrow). (F) Color Doppler in apical four-chamber view showing moderate tricuspid regurgitation (arrow). Ao: Aorta; LA: Left atrium; LV: Left ventricle; PA: Pulmonary artery; RV: Right ventricle.



urea, 17.9 mmol/L; creatinine, 166 mmol/L; sodium, 137 mEq/L; potassium, 4.7 mEq/L; erythrocyte sedimentation rate (ESR), 48 mm in the first hour; and C-reactive protein, 250 mg/L. TTE revealed vegetations on ventricular surfaces of aortic, pulmonary, and tricuspid valves and on the mural endocardium of the right ventricular inflow tract with an apparently unaffected mitral valve. Mild pericardial effusion was also observed (Fig. 1a-c; see corresponding videos MC1 - MC3\*). Color Doppler study revealed moderate aortic insufficiency, moderate tricuspid regurgitation and pulmonary regurgitation (Fig. 1d-f; see corresponding videos MC1 - MC3\*). Blood cultures were taken, and she was started on empiric antimicrobials with intravenous benzyl penicillin and gentamicin at appropriate doses. TEE was performed to further delineate the extent of disease. It confirmed the TTE findings (Fig. 2a-d; see corresponding videos VC1 and VC2\*), and in addition, revealed vegetations on the ventricular surface of the anterior mitral leaflet (Fig. 2b; see corresponding video VC1\*). Three out of four blood cultures reported growth of *E. faecalis*, which was sensitive to imipenem and linezolid. Empiric anti-

microbials were switched to imipenem with linezolid at appropriate doses and were continued for six weeks. She responded to the treatment and remained afebrile from the fourth day onwards. As she remained afebrile, without any hemodynamic compromise, she was managed conservatively and then discharged. On evaluation during follow-up visits at one month and four months of discharge, she was asymptomatic.

## DISCUSSION

Most cases of echocardiographically demonstrated infective endocarditis are single valve diseases; the involvement of two valves occurs less frequently, and triple or quadruple valve involvement occurs even less frequently.<sup>[5]</sup> Some series have reported *E. faecalis* as the causative organism in multiple valve endocarditis, particularly in the postoperative period,<sup>[5,6]</sup> but to our knowledge, such extensive involvement by *E. faecalis* in normal native valves has not been reported. Compared to single valve endocarditis, multiple valve disease is more frequently associated with heart failure, perivalvular complications and need for

heart surgery. Despite this, in-hospital mortality rates in single valve endocarditis and multiple valve disease are similar.<sup>[4]</sup> Even though obvious vegetations are easily demonstrated on TTE, a more sensitive tool like TEE should be used more frequently in patients with infective endocarditis to define the extent of involvement. Our report also emphasizes that multiple valve involvement alone does not imply the need for surgical management; response to medical management and hemodynamic status are still the factors guiding therapy.

**Conflict-of-interest issues regarding the authorship or article: None declared.**

**\*Supplementary video file associated with this article can be found in the online version of the journal.**

## REFERENCES

1. Piran S, Rampersad P, Kagal D, Errett L, Leong-Poi H. Extensive fulminant multivalvular infective endocarditis. *JACC Cardiovasc Imaging* 2009;2:787-9. [CrossRef](#)
2. Groesdonk HV, Seeburger J, Krohmer E, Anwar N, Doll N, Fassl J, et al. 4 valve endocarditis confirmed by intraoperative transesophageal echocardiography leads to successful quadruple valve replacement. *Applied Cardiopulmonary Pathophysiology* 2009;13:134-7.
3. Krake PR, Zaman F, Tandon N. Native quadruple-valve endocarditis caused by *Enterococcus faecalis*. *Tex Heart Inst J* 2004;31:90-2.
4. López J, Revilla A, Vilacosta I, Sevilla T, García H, Gómez I, et al. Multiple-valve infective endocarditis: clinical, microbiologic, echocardiographic, and prognostic profile. *Medicine (Baltimore)* 2011;90:231-6. [CrossRef](#)
5. Kim N, Lazar JM, Cunha BA, Liao W, Minnaganti V. Multivalvular endocarditis. *Clin Microbiol Infect* 2000;6:207-12.
6. Hricak V Jr, Kovacik J, Marx P, Fischer V, Krcmery V Jr. Endocarditis due to *enterococcus faecalis*: risk factors and outcome in twenty-one cases from a five year national survey. *Scand J Infect Dis* 1998;30:540-1. [CrossRef](#)

**Key words:** Echocardiography, transesophageal; endocarditis, bacterial; *Enterococcus faecalis*/isolation & purification; heart valve diseases/etiology/microbiology; heart valves.

**Anahtar sözcükler:** Ekokardiyografi, transözofajiyal; endokardit, bakteriyel; *Enterococcus faecalis*/izolasyon ve saflaştırma; kalp kapak hastalıkları/etioloji/mikrobiyoloji; kalp kapakları.