

IMAGING VIGNETTE

INTERMEDIATE

CLINICAL VIGNETTE

3-Dimensional Images of Mitral Annulus Perforation



An Alien's Mouth

Kumral Cagli, MD,^a Havva Tugba GURSOY, MD,^b Funda Basyigit, MD,^b Etga Koprucu, MD,^b Zehra Golbasi, MD^c

ABSTRACT

In this clinical vignette, we describe a case of a patient with windsock-like posterior mitral annulus perforation at the site of annular calcification caused by infective endocarditis. Three-dimensional transesophageal images of the perforation resembling an "alien's mouth" are very striking for how 3-dimensional imaging can improve visualization of anatomy of the heart. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2022;4:101681) © 2022 Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

An 80-year-old woman was admitted due to pain and swelling in the right ankle developed after a fall during assisted mobilization at home. She has had traumatic paraplegia and a permanent urinary catheter since 2018. Her past medical history is remarkable for hypertension, diabetes mellitus, coronary artery disease, severe osteoporosis, and multiple urinary tract infections requiring hospitalizations. At admission, her blood pressure was 116/68 mm Hg, heart rate 96 beats/min, and respiratory rate 18/min. A fragmented fracture at the right distal tibia and fibula was detected and an urgent operation was performed. On the postoperative second day, she experienced dyspnea and hypoxemia. Pulmonary embolism was ruled out with computed tomography angiography and cardiology was consulted due to large pleural effusion and interstitial edema in both lungs on computed tomography. A bedside echocardiography was performed and reported as "severe eccentric mitral regurgitation (MR)." In the meantime, the patient's high sensitive C-reactive protein and procalcitonin levels increased. Urine culture was found to be positive for *Escherichia coli* but blood cultures were negative. Transesophageal echocardiography (TEE) revealed severe posterior mitral annular calcification and a highly mobile, windsock-like structure at the atrial side of the annulus (**Figures 1A and 1B, Videos 1 and 2**). A severe regurgitation jet between the left ventricle and the left atrium through a perforated posterior mitral annulus aneurysm was detected on Doppler examination (**Figures 1C and 1D, Video 3**). Three-dimensional (3D) images showed that this is almost a real windsock filled with blood and makes an impression of an "alien's mouth" on motion images (**Figures 1E and 1F, Videos 4 and 5**). Intravenous meropenem was initiated for urinary tract infection and "possible infective endocarditis" according to the modified Duke criteria. The patient's dyspnea resolved within 3 days with intravenous furosemide and nitroglycerine infusion and acute phase

From the ^aUniversity of Health Sciences, Gulhane Faculty of Medicine, Ankara City Hospital, Department of Cardiology, Ankara, Turkey; ^bAnkara City Hospital, Department of Cardiology, Ankara, Turkey; and the ^cYildirim Beyazit University, Faculty of Medicine, Ankara City Hospital, Department of Cardiology, Ankara, Turkey.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

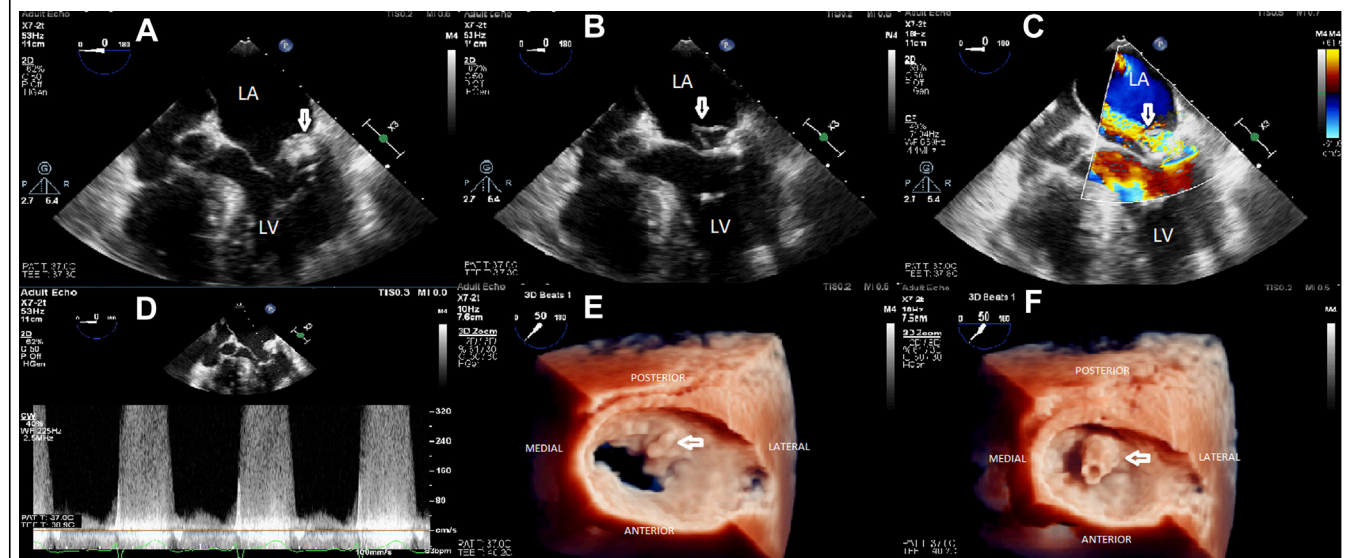
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**ABBREVIATIONS
AND ACRONYMS****3D** = 3-dimensional**MR** = mitral regurgitation**TEE** = transesophageal
echocardiography

reactants were gradually improved. Because the patient refused to undergo open heart surgery, she was discharged after completion of antibiotic therapy of 4 weeks. She was reported to be stable at 4-months' follow-up.

Mitral annulus perforation is a rare cause of MR. It is usually seen as a complication of infective endocarditis and diagnosed by echocardiography.¹ On transthoracic echocardiography, eccentric MR jet is the first clue for mitral valve perforation and TEE is generally needed for confirmation. Two-dimensional TEE with color Doppler examination provides detailed visualization of the entire mitral apparatus, but 3D imaging with en face atrial and ventricular views is a useful adjunct to understand the detailed anatomy of the mitral valve, as in our case. In the case of infective endocarditis, 3D echocardiography can also be useful for assessing vegetation size and its exact location, in the evaluation of prosthetic dehiscence, and in preoperative planning.²

Mitral annular calcification is a predisposing factor for infective endocarditis.³ Although our patient met only "possible infective endocarditis" criteria, we suppose that isolated annulus perforation at the site of mitral annular calcification in a patient with a history of recurrent urinary tract infections and multiple comorbidities but without a history of trauma or connective tissue diseases should be interpreted as a complication of infective endocarditis.

FIGURE 1 Transesophageal Echocardiography of the Mitral Annulus Perforation

(A) Midesophageal 5-chamber view showing prominent posterior mitral annulus calcification (**arrow**). **(B)** Systolic still frame of midesophageal 5-chamber view reveals a windsock-like structure on the atrial side of the posterior mitral annulus (**arrow**). **(C)** Color Doppler examination shows an eccentric systolic jet from the left ventricle (LV) to the left atrium (LA) through the posterior annulus. The jet itself has an exit point at the top of the windsock-like structure (**arrow**). **(D)** Continuous-wave Doppler confirms the presence of mitral regurgitation jet through the annulus. **(E)** TrueVue 3-dimensional (3D) zoom view of the mitral valve from the atrial perspective at diastole revealing an irregular bump (**arrow**) on the posterior annulus. **(F)** Systolic still frame of the lifelike 3D zoom view from the atrial perspective clearly shows a windsock-like perforated annulus aneurysm (**arrow**).

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ADDRESS FOR CORRESPONDENCE: Dr Kumral Cagli, Ankara City Hospital, Üniversiteler Mahallesi, 1604. Cadde No: 9, Çankaya/Ankara, Turkey. E-mail: kumralcagli@yahoo.com.

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KEY WORDS echocardiography, endocarditis, mitral valve, three-dimensional imaging

 **APPENDIX** For supplemental videos, please see the online version of this paper.