

IMAGING VIGNETTE

INTERMEDIATE

CLINICAL VIGNETTE

Acute Post-Traumatic Aortic Regurgitation



Daniel de Castro, MD,^a Alejandro Rasines-Rodríguez, MD,^b Ana Usano, MD,^b Susana Mingo, MD, PhD^a

ABSTRACT

A 16-year-old girl with a history of blunt chest trauma was admitted because of heart failure symptoms. Transthoracic echocardiography showed severe eccentric aortic regurgitation. Cardiac computed tomography revealed a pseudoaneurysm of the right sinus of Valsalva. We present a rare clinical presentation of a life-threatening condition. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2022;4:1432-1434) © 2022 The Authors. 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/>).

CASE DESCRIPTION

A 16-year-old girl was admitted to the cardiology pediatric outpatient clinic because of heart failure symptoms. Physical examination revealed a diastolic murmur (II/VI) in aortic foci. Six months earlier, the patient has been admitted to the hospital after a fall from the second floor of a building.

Current transthoracic echocardiography (TTE) showed a severely dilated left ventricle with global left ventricular dysfunction and severe eccentric aortic regurgitation (0.6 cm of vena contracta width holodiastolic flow reversal in the descending aorta), resulting from rupture of the right coronary cusp (RCC) (**Figures 1A and 1B, Video 1**). The parasternal short-axis view also displayed a left-to-right shunt from the aortic root to the right ventricle (**Figure 1C, Video 1**). Mild pericardial effusion was detected. Right ventricular size and function were preserved. Transesophageal echocardiography was performed (**Video 2**), and it supported the TTE findings.

Cardiac computed tomography was performed. The study showed a nondilated thoracic aorta without evidence of dissection and with normal coronary arteries. Below the right coronary ostium, a pseudoaneurysm of the right sinus of Valsalva was shown circulating through the right coronary sulcus, under the right coronary artery (**Figure 1F, Video 3**). Iodinated contrast material was detected in the right ventricle during the arterial phase as a result of the rupture of the pseudoaneurysm to the right ventricle (**Figures 1D and 1E, arrows**). Neither ventricular nor atrial septal defects were detected. The pulmonary arteries and right-sided valves were not affected. Cardiac surgery was performed. The aortic valve was tricuspid, and the RCC was remarkably torn and could not be repaired; therefore, a mechanical Bentall procedure was chosen.

One year after surgery and with guideline-directed medical therapy, the patient was in New York Heart Association functional class I, and the echocardiogram showed complete restoration of the left ventricular ejection fraction (57%) (**Video 4**).

From the ^aDepartment of Cardiology, Puerta de Hierro Majadahonda University Hospital, Madrid, Spain; and the ^bDepartment of Pediatric Cardiology, Puerta de Hierro Majadahonda University Hospital, Madrid, Spain.

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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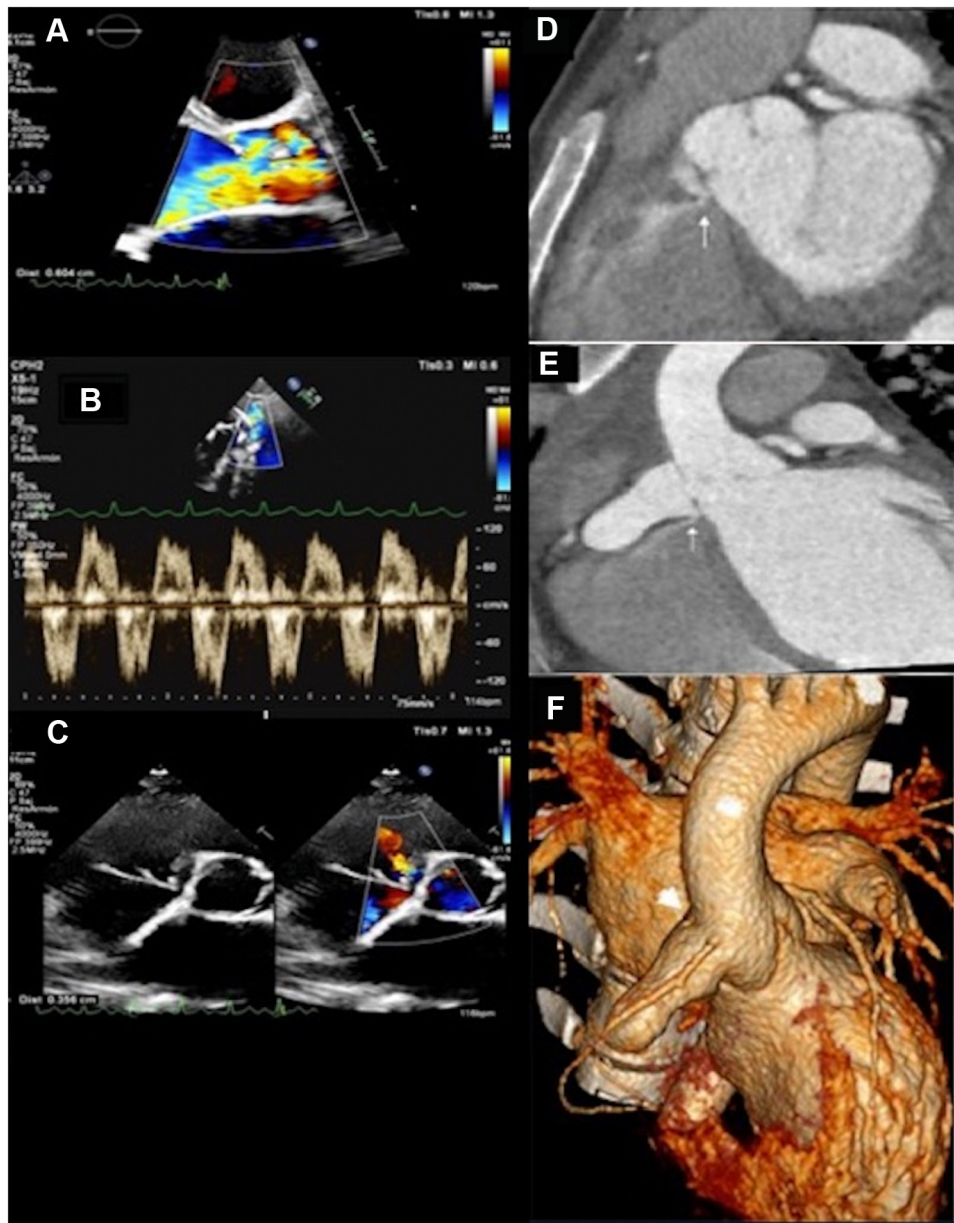
DISCUSSION

Aortic valve rupture is a rare complication of blunt chest trauma.¹ The mechanism causing aortic valve lesions is considered to be a sudden increase in intracardiac pressure during a vulnerable phase of the cardiac cycle, especially

ABBREVIATIONS AND ACRONYMS

RCC = right coronary cusp
TTE = transthoracic echocardiography

FIGURE 1 Imaging of Acute Post-Traumatic Aortic Regurgitation



(A) Echocardiographic parasternal long-axis view displaying severe eccentric aortic regurgitation through the right aortic cusp (vena contracta width, 0.6 cm). (B) Pulsed-wave Doppler imaging in the descending aorta showing severe diastolic flow reversal. (C) Echocardiographic parasternal short-axis view exhibiting a left-to-right shunt from the aortic root to the right ventricle. (D) Iodinated contrast material in the right ventricle during the arterial phase in the sagittal oblique short-axis view on cardiac computed tomography (white arrow). (E) Iodinated contrast material in the right ventricle during the arterial phase in the coronary oblique view on cardiac computed tomography (white arrow). (F) Superior and lateral view of the sinus of Valsalva pseudoaneurysm (white arrowhead) on 3-dimensional volume-rendered cardiac computed tomography.

during early diastole, when the transaortic gradient is maximal but the pressure in the empty left ventricle is low.¹ The aortic valve is the most commonly involved valve.^{1,2}

Sinus of Valsalva pseudoaneurysms are the result of blood collecting within a false lumen after an intimal tear of the aorta, and even the smallest of these pseudoaneurysms may have an insidious course. Very few remain stable over time, and expansion and rupture are common.³ They may also lead to thrombotic embolization, fistulization to adjacent organs, or the compression of nearby structures.³

Surgical intervention at the moment of diagnosis is the standard treatment approach³ because delay of repair can lead to death, cardiogenic shock, or, less frequently, subacute heart failure symptoms, as shown in our case report.

This case highlights the importance of thorough clinical surveillance and a careful initial imaging evaluation of the thoracic aorta in patients with recent blunt chest trauma.

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ADDRESS FOR CORRESPONDENCE: Dr Daniel de Castro, University Hospital Puerta de Hierro Majadahonda, 28220 Manuel de Falla Street, 1 Madrid, Spain. E-mail: danidcc93@gmail.com.

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KEY WORDS aorta, aortic valve, chronic heart failure, computed tomography, echocardiography

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