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# Type B Aortic Dissection in a Young Patient with Methamphetamine Use: A Case Report

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**Abstract: We report an uncommon case of Stanford type B aortic dissection in a young woman with recent methamphetamine use and no comorbidities. This case illustrates an atypical presentation of a high-mortality condition and highlights an under-recognized association in the literature. The patient presented to the emergency department with sudden-onset chest pain radiating to the back, associated with dyspnea following methamphetamine use. Physical examination revealed bradycardia and hypoxemia without additional abnormalities. Dyspnea of possible thromboembolic origin was evaluated with chest CT angiography, which incidentally demonstrated a Stanford type B dissection without significant aortic dilation. This case underscores the need to maintain a high index of suspicion for aortic dissection in young patients using sympathomimetic drugs, even in the absence of aortic dilation. Methamphetamine may induce vascular changes that predispose to aortic dissection at smaller-than-expected diameters, challenging traditional diagnostic paradigms.**

***Keywords:*** *Aortic Dissection; Methamphetamine; Aorta, Thoracic; Emergency Service, Hospital; Cardiovascular Diseases.*

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## I. INTRODUCTION

Type B aortic dissection is a life-threatening emergency. Traditionally linked to aortic dilation (>5.5 cm), recent evidence has documented dissections in non-dilated aortas, challenging these fixed thresholds 1. Methamphetamine use has emerged as a significant risk factor—particularly in younger populations—prompting clinicians to maintain a high index of suspicion and to employ appropriate clinical and imaging diagnostic approaches for the proper management of these patients in the emergency department.

## II. CLINICAL PRESENTATION

A 29-year-old Caucasian woman with no known comorbidities presented with sudden-onset, pressure-like chest pain radiating to the back and 5 hours of dyspnea following accidental amphetamine use. On arrival, blood pressure and heart rate were normal, but oxygen saturation was 82% on room air. Physical examination was otherwise unremarkable (Table 1). The electrocardiogram demonstrated sinus bradycardia (Figure 1).

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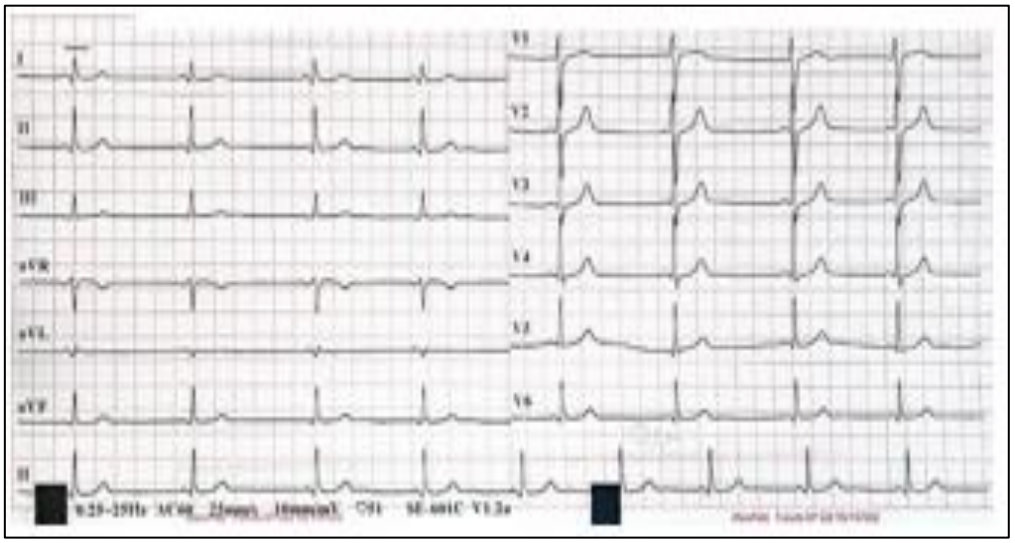

Fig 1 Admission Electrocardiogram Showing a Heart Rate of Approximately 49 Beats per Minute.
Source: Authors' Archive.

Given this presentation, chest pain of possible coronary (Non-ST Elevation Acute Coronary Syndrome, Pericarditis) or pulmonary etiology (Pulmonary Embolism) was considered; point-of-care ultrasound (POCUS), was performed at the patient's bedside, which revealed an image suggestive of acute aortic syndrome (Figure 2 and 3), additional laboratory tests were obtained (Table 1), which supported the suspicion of pulmonary embolism. Contrast-enhanced CT pulmonary angiography ruled out pulmonary thromboembolism; however, an incidental Stanford type B aortic dissection was identified, extending from the origin of the left subclavian artery, with a descending aortic diameter of approximately 3.5 cm at its maximal measurement at the level of the renal artery origins (Figures 2-5).

Table 1 Vital Signs on Arrival at Emergency Service and Main Laboratory Results of your Stay in the Emergency Department.
Source: Authors' Archive.

| **Clinical and Paraclinical Variables** | | | |
|---|---|---|---|
| **Vital Signs** | | **Relevant Laboratory findings** | |
| Blood preassure | 124/85 mmHg | Blood count | Leukocytes 18.75 × 10^9/L<br>Hemoglobin 15.96 g/dL |
| Heart rate | 56 bpm | Troponin I | <10 pg/mL |
| Oxygen saturation | 82% on room air | D-dimer | 1177 |

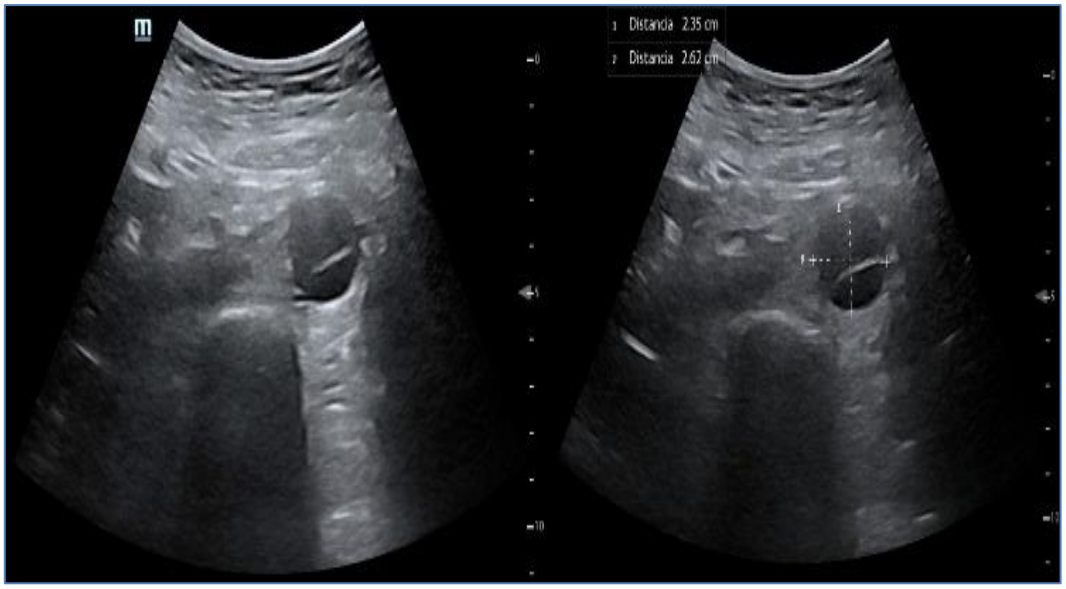


Fig 2 Point-of-Care Ultrasound (Pocus) Showing a Transverse (Axial) View of the Descending Aorta with an Intraluminal Intimal Flap; Maximal Diameter 2.6 Cm.
Source: Authors' Archive.

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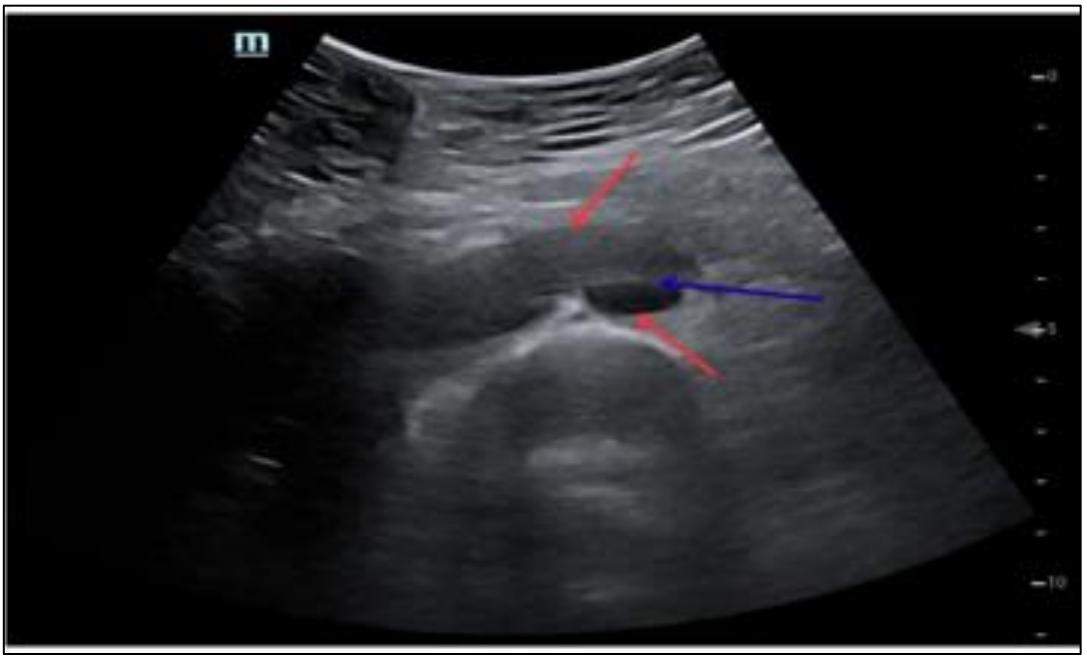

Fig 3 Point-of-Care Ultrasound (POCUS) Showing A Longitudinal View of the Abdominal Aorta. the Origin of the Left Renal Artery Lies in Close Relation to An Intimal Flap, Suggestive of Renal Malperfusion. Red Arrow: Aortic Contours. Blue Arrow: Intimal Flap.
Source: Authors' Archive.

Fig 4 Contrast-Enhanced Chest CT with an Aortic Protocol. Lack of Intraluminal Contrast Opacification is seen from the Aortic Arch to the Abdominal Aorta, Delineating an Intimal Flap Consistent with a Stanford Type B Aortic Dissection.
Source: Authors' Archive.

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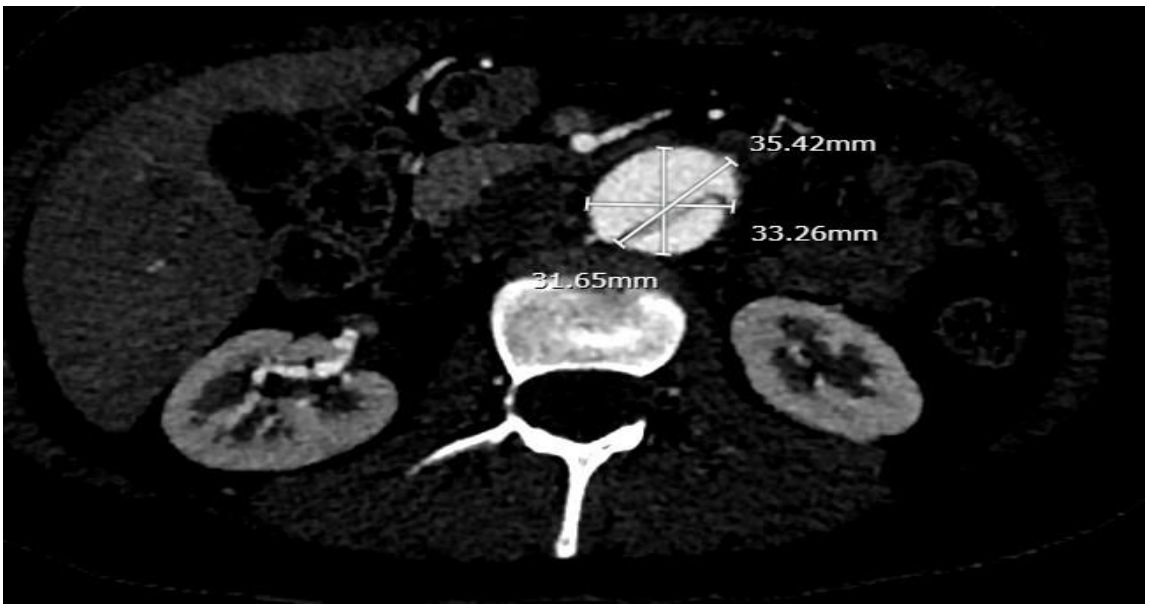


Fig 5 Axial CT Image of the Abdominal Aorta at the Level of the Renal Artery Origins, Demonstrating a Maximal Diameter of 3.5 Cm. The Right Renal Artery Arises From The Dissected Segment Of The Abdominal Aorta (False Lumen). Source: Authors' archive.

The patient was admitted to the intensive care unit because of a high risk of rupture and underwent goal-directed management, including blood pressure and heart-rate control and analgesia. Transthoracic echocardiography showed no valvular involvement but revealed a minimal pericardial effusion (Figure 6). A multidisciplinary team recommended endovascular stent-graft repair at a high-complexity referral center, to which the patient was transferred for definitive management.

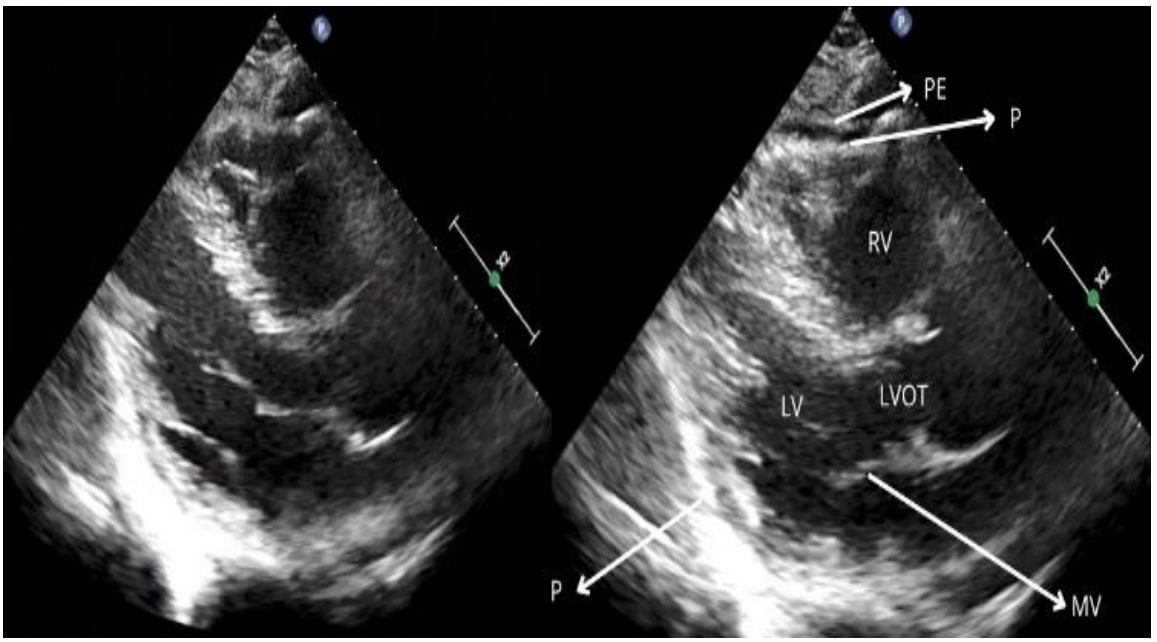


Fig 6 Transthoracic Echocardiography in the Parasternal Long-Axis View Demonstrating a Minimal Pericardial Effusion. RV: Right Ventricle; LV: Left Ventricle; LVOT: Left Ventricular Outflow Tract; P: Pericardium; MV: Mitral Valve; PE: Pericardial Effusion. Source: Authors' Archive.

## III. DISCUSIÓN

This case underscores two critical clinical concepts: the link between amphetamine-type stimulant use and aortic dissection, and the so-called “aortic size paradox.”

Methamphetamine use is a nontraditional but increasingly recognized risk factor for aortic dissection in young patients without underlying cardiovascular disease. It triggers catecholamine surges, systemic vasoconstriction, transient hypertension, and direct endothelial injury. Chronic

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use can promote vascular remodeling, medial inflammation, and extracellular matrix degradation—key contributors to dissection pathogenesis [1,2].

Westover et al. showed that young adults with amphetamine abuse history had a significantly increased risk of aortic dissection (OR 3.33; 95% CI: 2.37–4.69) [1]. Wako et al., in 2007, warned of an "emerging epidemic" of methamphetamine-induced aortic dissections in tertiary centers, accounting for up to 20% of dissections in individuals under 50 years [2].

Luo et al. demonstrated that methamphetamine upregulates pro-inflammatory mediators like C/EBPβ and MMP-2/9, promoting

matrix degradation, aortic wall weakening, and smooth muscle apoptosis [5], even in the absence of aneurysmal dilation.

The occurrence of dissections in normal-caliber aortas—the “aortic size paradox”—has been highlighted by the International Registry of Acute Aortic Dissection (IRAD). Evangelista et al. reported that over 60% of Stanford type B dissections occurred in aortas <5.5 cm, and 40% in aortas <5.0 cm in diameter [6]. Pape et al. found that the 5.5 cm threshold for elective surgical repair does not reliably predict dissection risk, as many patients dissect below this size [7]. Coady et al. also showed that dissections may occur early in aneurysmal evolution, especially in hypertensive individuals [8].

Anthropometric variables like height, sex, and body surface area have been proposed as more accurate risk predictors. Zafar et al. suggested the use of z-scores adjusted for height, demonstrating that shorter individuals and females dissect at smaller aortic diameters [9]. Pacini et al. emphasized that clinical factors (e.g., migratory chest pain, severe hypertension, drug use) may better guide decision-making than diameter alone [10].

This case illustrates that a young female without connective tissue disease or aneurysm history can develop a Stanford type B dissection with a normal aortic diameter (3.4 cm) in the context of methamphetamine use, prompting a reevaluation of current screening and prevention criteria. Chest pain in young patients—particularly those with sympathomimetic drug use—should prompt early imaging with high-sensitivity tools such as CT angiography. Absence of dilation should not delay diagnosis or rule out aortic dissection.

In emergency settings lacking immediate cardiothoracic surgery capabilities, timely recognition and referral are crucial. This case highlights access gaps in urgent surgical care and supports the development of regional referral protocols

## ETHICAL CONSIDERATIONS

This case report was conducted in accordance with the core ethical principles of clinical research and medical practice, ensuring patient autonomy, confidentiality, dignity, and rights, in alignment with the Declaration of Helsinki and Colombian Ministry of Health Resolution 8430 of 1993, and was approved by the Ethics Committee of Hospital Universitario Clínica San Rafael, under the protocol number CEI-091-2025No interventions outside standard care were performed. This report seeks to contribute to scientific knowledge without compromising ethical standards or human integrity.

## INFORMED CONSENT

Informed consent was obtained from the patient for anonymous publication of clinical data, in compliance with institutional and ethical guidelines.

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