

# The mortal cause of sudden ECG changes in patients with chronic aortic insufficiency: Aortic dissection

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**Abstract:** The symptoms of aortic dissection (AD) may be highly variable and may mimic other much common conditions. Thus, a high index of suspicion should be maintained, especially when the risk factors for AD are present or signs and symptoms suggest this possibility. However, sometimes AD may be asymptomatic or progression may be subclinical. Various electrocardiographical (ECG) changes may be seen in AD patients such as ST segment elevation in aVR as well as ST segment depression and T-wave inversion. In this case report, we reported a patient with acute AD whose ECG revealed ST segment elevation in aVR lead in addition to diffuse ST segment depression in other leads.

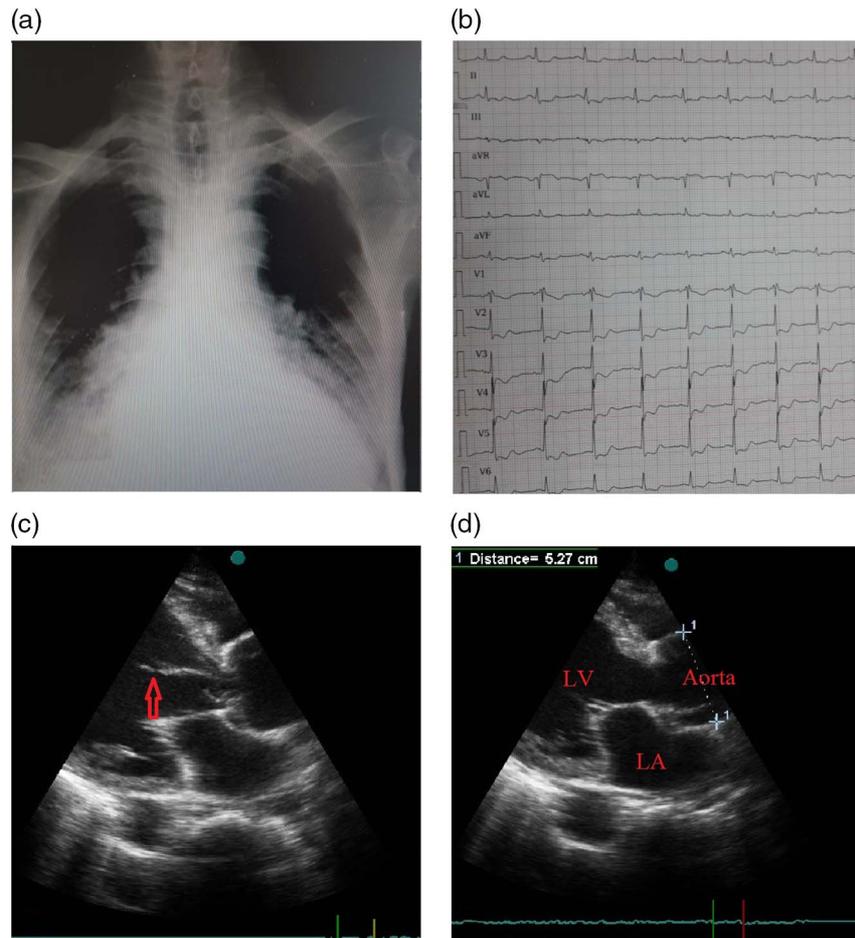
**Keywords:** aorta, aortic dissection, electrocardiography, transthoracic echocardiography, ST segment elevation

## Case Presentation

A 68-year-old man who had a history of aortic insufficiency and ascending aort dilatation for 5 years was admitted to our emergency department with exertional dyspnea and coughing. He had no history of hypertension or diabetes mellitus. The physical examination revealed a blood pressure of 100/50 mmHg and a heart rate of 80 beats/min. His body temperature was normal. Blood pressure values were similar between the right and left arms. Femoral, tibialis posterior, and dorsalis pedis pulses were palpable and similar between the right and left limbs. A 3/6 diastolic decrescendo murmur was heard along the left sternal border. Electrocardiography (ECG) showed normal sinus rhythm without any ST segment or T-wave changes. Increased cardiothoracic

index and prominent aortic arch were observed on chest X-ray examination (*Fig. 1a*). While awaiting the results of laboratory tests, patient described severe chest pain. A repeated ECG showed ST segment elevation in aVR lead and diffuse ST segment depressions in all other derivations (*Fig. 1b*). His blood pressure was 90/50 mmHg and heart rate was 100 beats/min. Transthoracic echocardiography revealed severe aortic regurgitation, dilated ascending aorta with a diameter of 5.27 cm, and intimal dissection flap that was prolapsing into the left ventricle during diastole (*Fig. 1c and 1d*). Left ventricular ejection fraction was found within the normal limits. Immediate surgery was suggested for the patient just before a sudden cardiopulmonary arrest. Cardiopulmonary resuscitation was performed; however, patient passed away.

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**Fig. 1.** Chest X-ray examination showed an increased cardiothoracic index and prominent aortic arch (a). A repeated electrocardiography showed ST segment elevation in aVR lead and diffuse ST segment depressions in all other derivations (b). Transthoracic echocardiography revealed an intimal dissection flap that prolapsed into the left ventricle during diastole (c) and a dilated ascending aorta with a diameter of 5.27 cm (d)

## Discussion

The vast majority of patients with acute AD commonly have sudden and severe chest, back, or abdominal pain, which is usually maximal at its onset. Although most patients with type-B AD are hypertensive, several patients with type-A AD are normotensive or hypotensive on admission [1]. The present patient was normotensive on admission; however, his hemodynamic status was deteriorated in a short time period.

The ECG changes in AD are usually non-specific; however, approximately 1%–2% of the patients have acute ST segment elevation [2]. In a study conducted by Hirata et al. [3], ECG changes were investigated in patients with acute AD. They reported that the most common ECG changes in patients with acute AD were ST segment depression or T-wave changes. They also reported more common cardiogenic shock and cardiac tamponade in patients with ST depression or T-wave

changes. The prevalence of ST segment elevation was reported to be 8.2% in patients with acute type-A AD [3]. Although ST segment elevation in aVR lead is not a common ECG sign in patients with acute AD, diffuse ST segment depression with ST segment elevation in aVR lead was appeared just after the beginning of severe chest pain in the present patient. In such patients, ST segment elevation in aVR lead may reflect the occlusion of left main coronary artery orifice.

## Conclusions

Acute AD is an emergency situation and immediate intervention should be performed. In patients with a history of aortic insufficiency and/or enlargement of ascending aorta when admitted to the emergency departments with sudden chest pain, acute AD should be considered in the differential diagnosis. The ECG

changes such as diffuse ST segment depression with ST segment elevation in aVR lead may be a sign of not only coronary artery disease but also acute AD.

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## References

1. Hagan PG, Nienaber CA, Isselbacher EM, Bruckman D, Karavite DJ, Russman PL, Evangelista A, Fattori R, Suzuki T, Oh JK, Moore AG, Malouf JF, Pape LA, Gaca C, Sechtem U, Lenferink S, Deutsch HJ, Diedrichs H, Marcos y Robles J, Llovet A, Gilon D, Das SK, Armstrong WF, Deeb GM, Eagle KA: International Registry of Acute Aortic Dissection (IRAD): New insights from an old disease. *JAMA* 283, 897–903 (2000)
2. Braverman AC: Acute aortic dissection: Clinician update. *Circulation* 122, 184–188 (2010)
3. Hirata K, Wake M, Kyushima M, Takahashi T, Nakazato J, Mototake H, Tengan T, Yasumoto H, Henzan E, Maeshiro M, Asato H: Electrocardiographic changes in patients with type A acute aortic dissection. Incidence, patterns and underlying mechanisms in 159 cases. *J Cardiol* 56, 147–53 (2010)