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Acute Coronary Syndrome in Dextrocardia : A Case Report

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Abstract

Dextrocardia is a rare congenital condition in which the heart is positioned on the right side of the thorax, with an estimated incidence of one in 10,000 individuals. Recognizing acute coronary syndrome (ACS) in patients with dextrocardia and situs inversus is challenging due to the anatomical reversal of internal organs. We report a case of a 67-year-old woman presenting with substernal chest pain radiating to the back for 12 hours, accompanied by shortness of breath. The patient had no history of hypertension or diabetes mellitus. Physical examination revealed elevated blood pressure, while other findings were unremarkable. The electrocardiogram (ECG) demonstrated marked right axis deviation with T-wave inversion in leads V1–V4. Chest radiography showed an inverted cardiac silhouette and a right-sided gastric air bubble. In patients without a known diagnosis of dextrocardia, the recognition of ACS can be challenging because clinical and ECG findings may appear reversed.

In patients with confirmed or suspected dextrocardia, performing a right-sided ECG and reversed limb lead are essential to accurately identify ischemic changes and avoid misdiagnosis of acute coronary syndrome.

Keywords: *Acute Coronary Syndrome, Dextrocardia, Situs Inversus*
Kata kunci: Sindrom Koroner Akut, Dextrocardia, Situs Inversus

BACKGROUND

Dextrocardia is an uncommon congenital condition defined as the right-sided embryologic development of the heart. (7) The estimated frequency of dextrocardia is approximately one in 10,000 individuals, and its exact etiology remains unclear. Dextrocardia may occur with *situs inversus*, a complete "mirror image" of normal visceroatrial arrangement, or with *situs solitus*, which is the normal arrangement of the ventricles. (7)

Dextrocardia arises due to abnormal in the heart's embryological development. The embryonic heart tube, created by the fusion of endocardial tubes, is where the fetal heart originates. After the heart tube is created, looping establishes the location of the ventricle in relation to the atria. The heart tube can curve to the right (known as D-loop) or curve to the left side (referred to as L-loop). In a D-loop, the morphologic right ventricle is located to the right of the left ventricle, while in an L-loop, the morphologic right ventricle is situated to the left of the left ventricle. If an L-bulboventricular loop finishes its rotation in the right hemithorax, the heart may be positioned in the right hemithorax. (1,6)

In contrast to dextroversion (dextrocardia with situs solitus), which has a high prevalence of structural cardiac abnormalities, people with in situ inversus with dextrocardia typically have a normal life expectancy and, in 90–95% of cases, the heart is structurally intact. (7) Dextrocardia is usually discovered accidentally during standard radiological evaluations that indicate an atypical positioning of the heart. An electrocardiogram can indicate dextrocardia through right axis deviation, inverted complexes in lead I, and a lack of R-wave progression in the anterior leads. (2,4)

Identifying acute coronary syndrome

in patients with dextrocardia and situs inversus (SI) is challenging due to the anatomical asymmetry which can lead to misinterpretation of ECG findings. This case report highlights the importance of awareness and proper ECG technique, particularly the use of right-sided ECG, in accurately identifying ischemic changes in patients with this rare congenital condition.

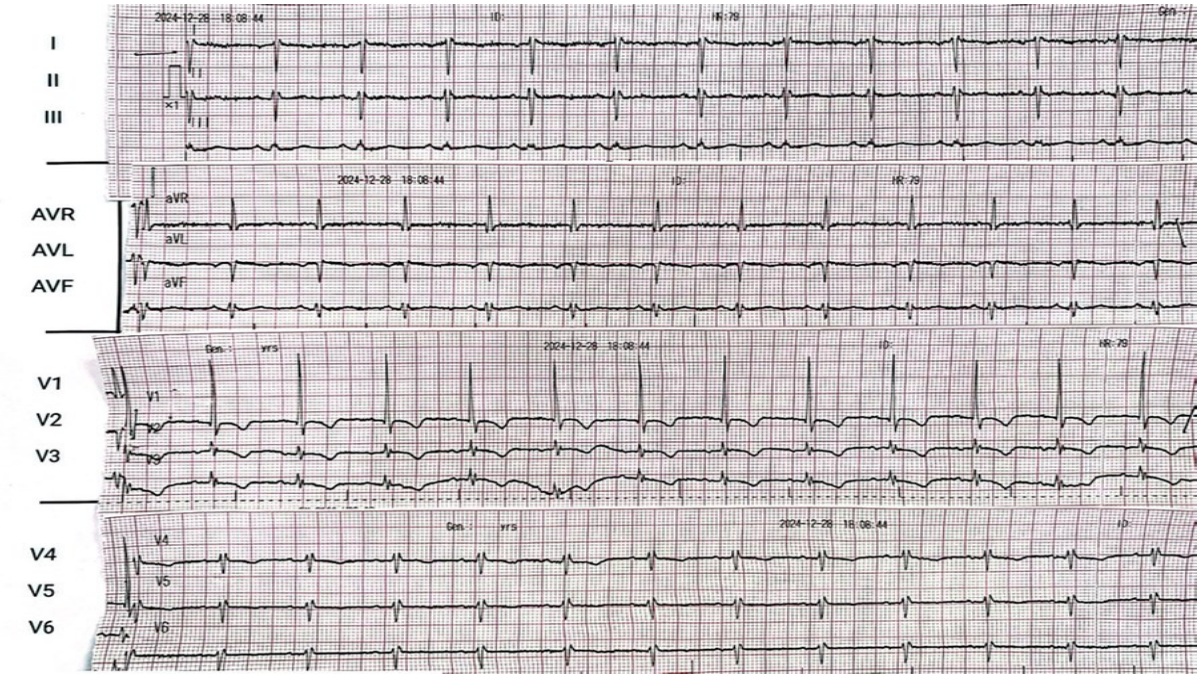

Figure 1. Standard 12 lead ECG showing findings suggestive dextrocardia : Sinus Rhythm, with Inverted P waves with negative QRS and inverted T wave in leads I, Positive QRS in lead aVR, and extreme Right Axis Deviation, and also the amplitude of QRS complexes decreased progressively from leads V1 to V6 or known as absent R wave progression, with sign of ischaemia were noted as T wave inverted at V1-V3.

Figure 2. Chest Radiograph found the cardiac silhouette and aortic arch on the patient's right side with right sided stomatch gas bubble

CASE PRESENTATION

A 67-year-old woman presented with substernal chest pain that had persisted for 12 hours, radiating to the back. The pain did not radiate to either arm and decreased after taking nitroglycerin. The patient also complained of shortness of breath for the past two days, accompanied by a productive cough with sputum. She had previously visited the emergency department with similar complaints two weeks earlier, where she was treated with nitroglycerin tablets that provided temporary relief. The patient denied any history of hypertension or diabetes mellitus.

On physical examination, her blood pressure was 155/65 mmHg, heart rate 86 beats per minute, respiratory rate 20 breaths per minute, body temperature 36.6° C, and oxygen saturation 98%. Cardiovascular examination revealed normal heart sounds, with the apex beat palpable on the right midclavicular line.

Standard 12 lead ECG examination (Figure. 1) showing findings suggestive dextrocardia : Sinus Rhythm, with Inverted P waves with negative QRS and inverted T wave in leads I, Positive QRS in lead aVR, and extreme Right Axis Deviation, and also the amplitude of QRS complexes decreased progressively from leads V1 to V6 or known as absent R wave progression, with sign of ischaemia were noted as T wave inverted at V1-V3. On chest radiograph found the cardiac silhouette and aortic arch on the patient's right side with right sided stomatch gas bubble (Figure 2). A repeat ECG was performed with reversed chest lead placement (Figure 3).

This modified ECG demonstrated normalization of the QRS progression pattern, with a transitional zone observed in lead V2, and persistent T-wave inversion in leads V1–V3, consistent with anterior ischemia. (Figure 3).

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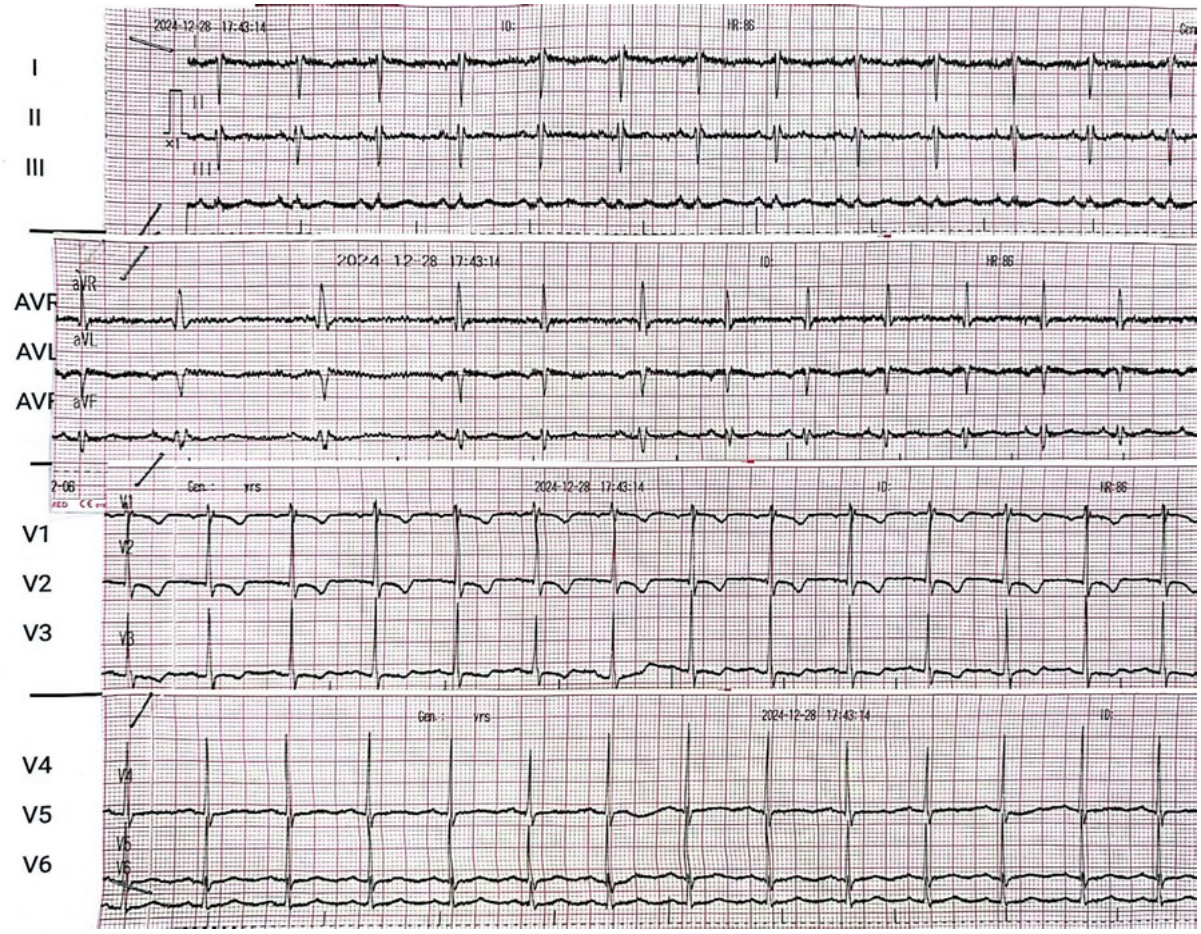

Figure 3. ECG with chest leads placed reversed and showing QRS transitional zone in lead V2 and T wave inverted V1-V3.

These comparative findings between the standard and dextro ECG confirmed the presence of dextrocardia and highlighted the importance of right-sided lead placement for accurate interpretation of ischemic changes in such patients.

On laboratory examination, creatinin serum 1.25mg/dl slightly upper referance limit and other tests were within normal limits. The patient was treated as acute coronary syndrome. Cardiac markers were assessed, showing a normal troponin T

level, which further supports the diagnosis of Unstable Angina Pectoris.

The patient was diagnosed with Unstable Angina Pectoris, Dextrocardia with Situs Inversus, and Hypertension. Initial management was provided according to guideline-directed medical therapy for Unstable Angina. The patient received Aspirin 160 mg as a loading dose followed by a maintenance dose of 80 mg once daily per oral, Clopidogrel 300 mg as a loading dose followed by 75 mg once daily per oral, Atorvastatin 40 mg once daily per oral, Ramipril 2.5 mg once daily per oral, Bisoprolol 1.25 mg once daily per oral, Enoxaparin 0.6 mL subcutaneously twice daily, sublingual ISDN 5 mg as needed for chest pain. Lactulose syrup 10 mL three times daily per oral, Lansoprazole 30 mg once daily intravenously.

Although Clopidogrel was selected as the P2Y12 inhibitor in this case, this choice was primarily influenced by limited drug availability, as other agents such as Ticagrelor or Prasugrel were not accessible at the time. In addition, considering the patient's advanced age (67 years) and the associated increased bleeding risk, Clopidogrel was deemed a safer alternative among the available options.

Enoxaparin 0.6 mL subcutaneously twice daily was administered as anticoagulant therapy to prevent further thrombus formation and reduce the risk of myocardial infarction, in accordance with current ACS management guidelines.

Bisoprolol 1.25 mg once daily was administered to reduce heart rate, myocardial oxygen consumption, and blood pressure, thereby decreasing ischemic burden and risk of arrhythmia, in accordance with ACS management guidelines.

Atorvastatin 40 mg once daily was administered as part of secondary prevention to reduce low-density lipoprotein cholesterol (LDL-C) levels and stabilize atherosclerotic plaque, in accordance with current ACS management guidelines.

Sublingual Isosorbide Dinitrate (ISDN) 5 mg was administered as needed for chest pain to provide rapid symptom relief through coronary vasodilation and reduction of myocardial oxygen demand.

Following the initiation of medical therapy, the patient's chest pain gradually subsided, and no new ischemic events were observed during hospitalization, indicating a favorable clinical response to treatment.

DISCUSSION

Complete situs inversus (SI) with dextrocardia is an uncommon congenital condition characterized by a mirror-image arrangement of the thoracic and abdominal organs [(6)]. In over 90% of instances, dextrocardia with situs inversus is associated with a structurally normal heart [(3, 6, 7).]

In relation to the general population, dextrocardia does not appear to be an independent risk factor for the development of coronary artery disease (CAD) [(5).] However, in patients without a confirmed diagnosis of dextrocardia, recognizing acute coronary syndrome (ACS) can be challenging, as the left–right transposition results in symptoms occurring on the opposite side of the body [(5).] Patients may present with right-sided chest pain radiating to the right jaw or shoulder, which can delay accurate diagnosis and appropriate management [(3, 5).]

Chest X-ray findings in dextrocardia typically reveal a right-sided cardiac silhouette, with the aortic knob and gastric bubble also appearing on the right side of the body [(1, 4).] Electrocardiogram (ECG) findings classically demonstrate global negativity in leads I and aVL (inverted P waves, T waves, and QRS complexes), a positive QRS complex in lead aVR, and absent R-wave progression in the standard precordial leads [(2, 3, 4).]

For accurate ECG interpretation, especially in patients with known or suspected dextrocardia, the reversal of both limb and precordial electrodes is recommended. This right-sided ECG configuration allows for correct assessment of cardiac electrical activity and ischemic changes [(2, 3, 4).] Failure to recognize this anatomical variation can result in missed or

misinterpreted ischemic patterns on ECG, potentially delaying life-saving therapy.

CONCLUSION

Situs inversus with dextrocardia is a rare condition. A chest radiograph and an standart ECG with poor R-wave progression and right axis deviations should raise suspicion for dextrocardia. In order to detect acute coronary syndrome, a clinician should be alerted to obtain a right-sided ECG that includes reversal of limb leads in patient with dextrocardia.

CONFLICT OF INTEREST

All authors declared that there is no conflict of interest related to the publication of this article.

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