# 'Dextroposition' a More Likely Diagnosis

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## ABSTRACT

Disorders of cardiac positioning can pose difficulty during the acquisition of transthoracic echocardiography views. Especially when adequate clinical history is unavailable to the echocardiographer, the presence of the heart within the right hemithorax brings dextrocardia to mind, especially in young adults. Cardiac dextroposition is a great mimic of dextrocardia except that the base to the apex is directed leftwards. We report the resting electrocardiogram (ECG) findings in two cases of cardiac dextroposition due to the mass effect of an emphysematous bulla in a young female and a left-sided diaphragmatic hernia in a middle-aged man. Our findings of low QRS voltages in V4-V6 in case one and V2-V6 in the second case suggest that the non-specific findings of low QRS in precordial leads without poor R wave progression in the presence of cardiac silhouette within the right hemithorax in suggest dextroposition rather than dextrocardia.

**Keywords:** Dextroposition, Dextrocardia, resting electrocardiogram, Cardiac malposition.

## INTRODUCTION

Cardiac dextroposition is the rightward displacement of the heart due to causes extrinsic to the heart[1]. The causes include diaphragmatic hernia, right lung collapse, right lung hypoplasia, or left pneumothorax. This differs from dextrocardia which is a disorder of cardiac positioning due to intrinsic rather than acquired causes. Also, dextrocardia is a mirror-image reversal of the cardiac chambers and heart location [12].

Unlike dextrocardia, EKG findings in dextroposition are nonspecific and could be within normal limits, with possible diffuse low-voltage waves[2]. Golzarian *et al.* reported ECG findings of right-axis deviation, inversion of complexes in lead I, and poor R-wave progression in precordial leads as classic findings consistent with dextrocardia[3]. This write-up highlights other ECG findings in cardiac dextroposition.

## CASE PRESENTATIONS

### CASE 1:

A 23-year-old female was referred for transthoracic echocardiography on account of chronic cough and

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worsening exertional dyspnea of 6 months duration. The ECG (figure 1) showed sinus rhythm, normal axis, negative complexes in aVr and low QRS voltages in V4-V6. The chest X-ray showed a hyperlucent left hemithorax with the absence of lung markings and multiple linear fibrotic bands seen within it. A significant mass effect is demonstrated by tracheal deviation and mediastinal shift to the right. The chest CT scan (figure 2) revealed extensive numerous thin-walled lucent areas of varying sizes occupying both left upper and lower lobes with a maximum diameter of 8.2cm. The left lung volume is markedly increased with mass effect as evidenced by contralateral mediastinal shift. There is also herniation of the medial aspect of the lung across the midline to the contralateral side. The heart and great vessels are displaced to the right. The demonstrated cardiac chambers are preserved.

**CASE 2:**

A 55-year-old male presented for evaluation on account of a diaphragmatic hernia. The resting ECG shows sinus rhythm, Normal axis $+51^0$, positive QRS complexes in aVL with flat T waves, negative complexes in aVR, and low QRS voltages in V2-V6 (figure 3). The chest CT scan revealed multiple bowel loops and omentum occupying the left hemithorax. The stomach is also noted with the thorax. The heart is normal in size and contour but displaced to the right (figure 4).

## DISCUSSION

A standard ECG can be used in determining cardiac positioning in clinical conditions such as dextrocardia[4]. However, cardiac malposition still leaves many physicians confused[1]. Cardiac dextroposition can be associated with various ECG features[2]. In the first case, the QRS complexes in aVL were negative as opposed to the second where the QRS complexes in aVL were positive with flat T-waves and this could be due to differences in the polarity of this lead between these two patients. The QRS transition in precordial leads in both cases were largely unremarkable despite the downward and/or rightward displacement of the heart[56]. Similarly, they both have low QRS voltages in V4-V6 which could be due to the attenuating effect of QRS voltages and/or increased heart-to-lead distance from the air in the emphysematous bullae in the first case and abdominal viscera within the thorax in the second case[7].

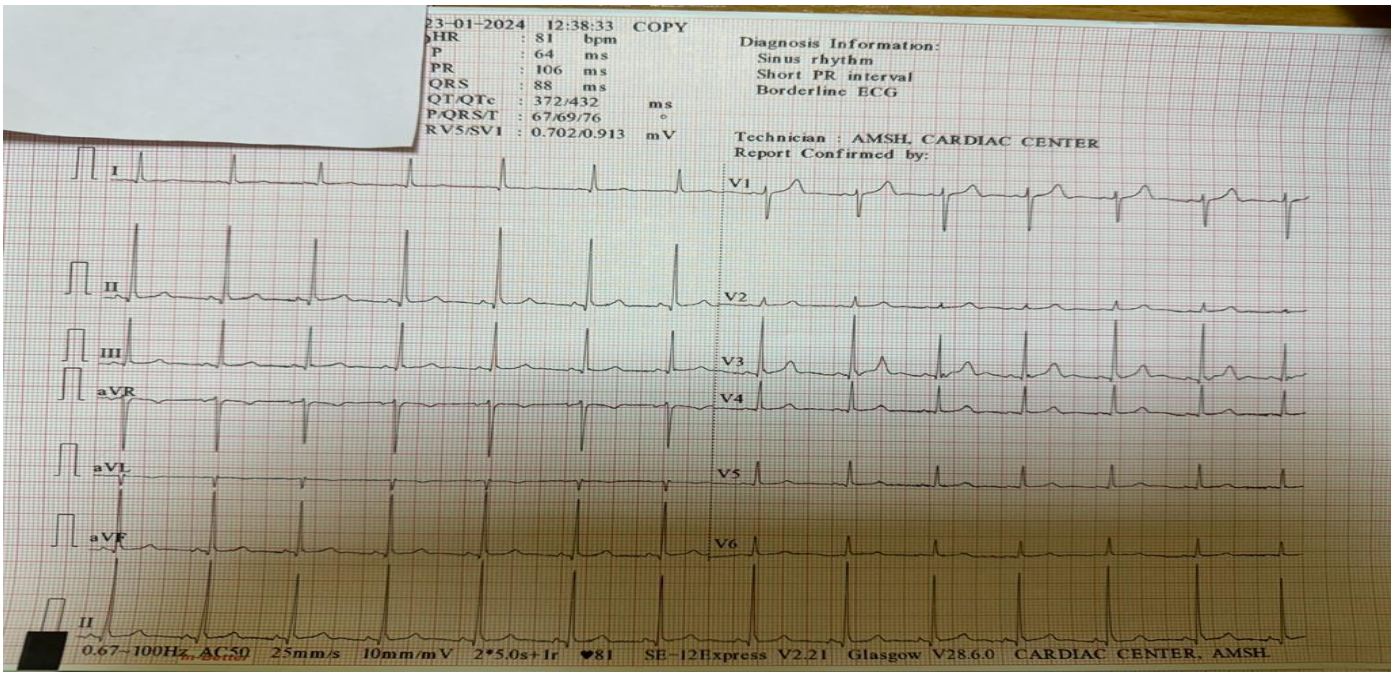


Figure 1: shows sinus rhythm, Normal axis, negative complexes in aVR, poor R-wave progression in precordial leads and low QRS voltages in V4-V6.

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Figure 2: There is extensive numerous thin-walled luscencies of varying sizes occupying the left upper and lower lobes. The left lung volume is markedly increased with mass effect as evidenced by contralateral mediastinal shift. No normal residual lung parenchyma is noted in the left hemithorax; multiple pleuro-parenchymal fibrous bands are noted. The right lung parenchyma shows normal attenuation with no focal or diffuse lesion seen.

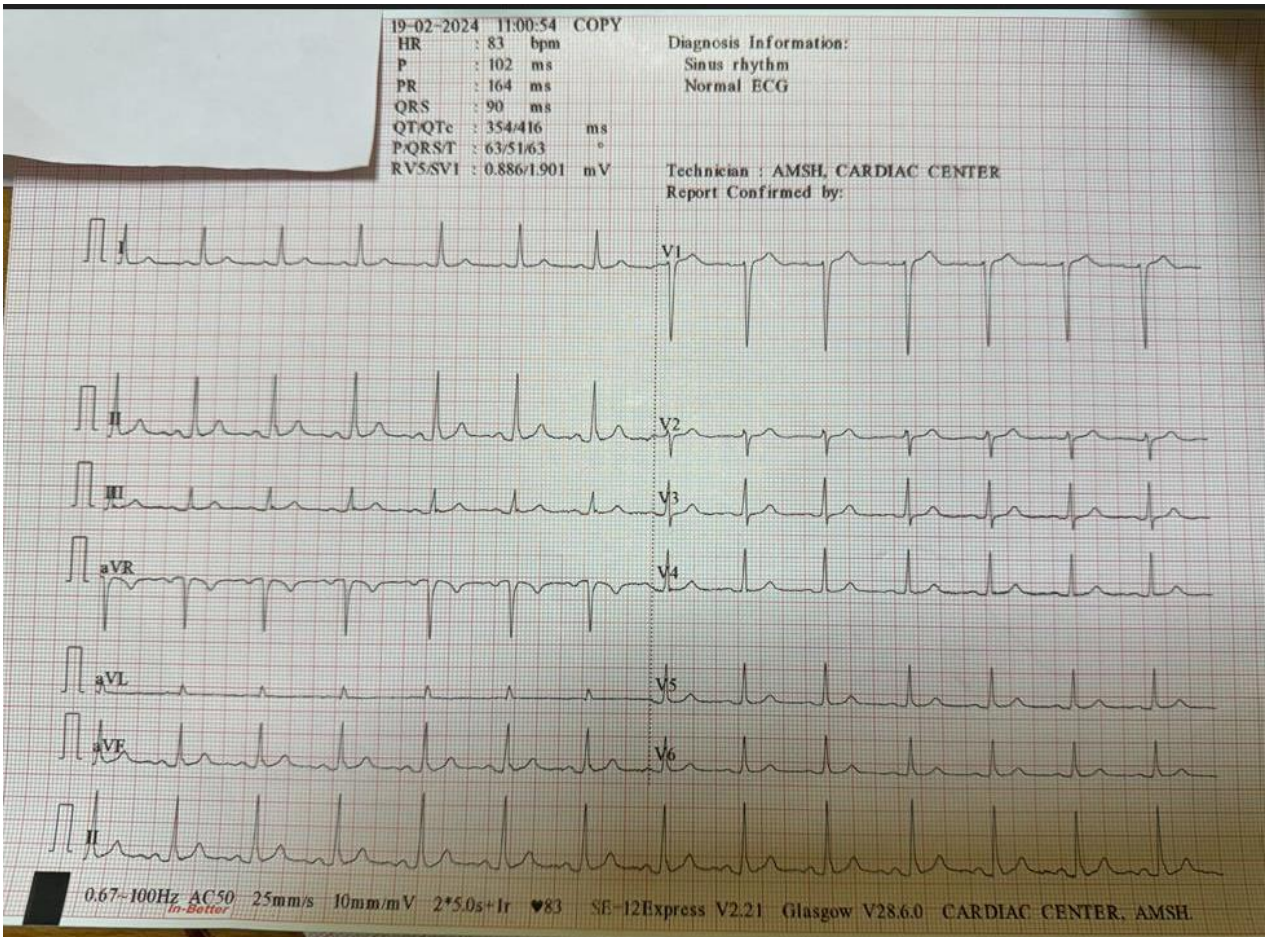


Figure 3: ECG shows sinus rhythm, Normal axis+$51^0$, positive QRS complexes in aVL, negative complexes in aVR, and low QRS voltages in V2-V6.

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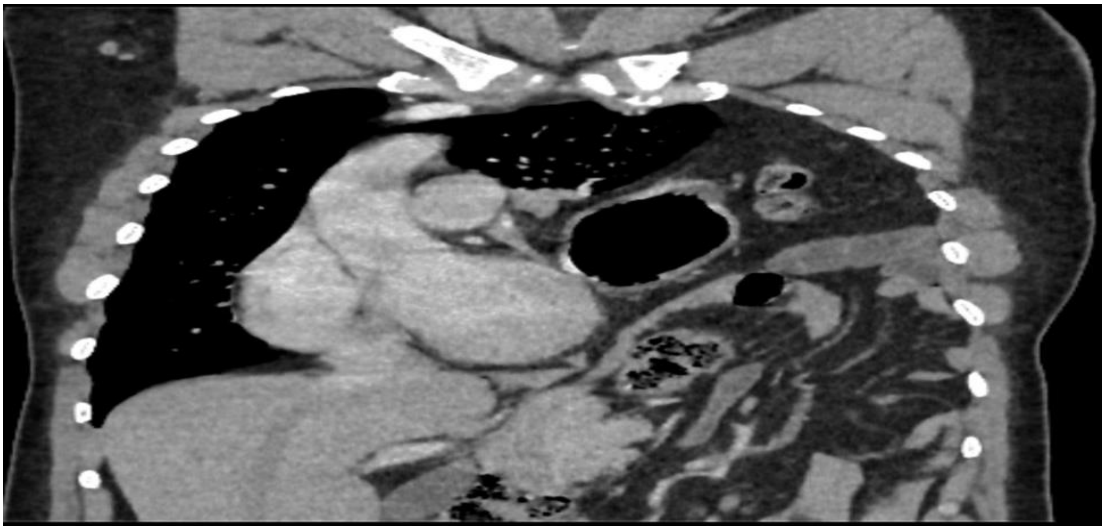

Figure 4: Shows multiple bowel loops and omentum occupying the left hemithorax. The stomach is also noted with the thorax. The heart is normal in size and contour but displaced to the right

## CONCLUSION

The following cases highlight that ECG changes in cardiac dextroposition is subtle. It also suggests that the presence of the heart in the right hemithorax with an ECG finding not typical of dextrocardia may be the first hint of cardiac dextroposition rather than dextrocardia.

## ETHICAL CONSIDERATIONS

Ethical approval was obtained from the ethics and research committee of Afe Babalola University Multi-System Hospital (AMSH/REC/24/073), Ado-Ekiti; Ekiti State.

## CONFLICT OF INTEREST

We declare that we have no financial or personal relationship that may have inappropriately influenced me in writing this paper.

## AUTHOR CONTRIBUTIONS

**Oguntola B O**– Conceptualization, Data Curation, Resources, Writing – Original Draft; **Ojo O E**– Validation, Visualization, Writing – Review & Editing; **Oyelayo Oluwaseun O**– Data Curation, Validation, Visualization; **Ukpabio P A**– Data Curation; **Oguntola S O**– Project Administration, Writing – Review & Editing.

## REFERENCES

1. Rao PS, Rao NS. Diagnosis of Dextrocardia with a Pictorial Rendition of Terminology and Diagnosis. Children (Basel). 2022 Dec 16;9(12).
2. Mehra D, Alvarado J, Diaz-Martell Y, Saavedra L, Davenport J. Recurrent Hiatal Hernia Resulting in Rightward Mediastinal Shift: Diagnostics in Cardiology and Clinical Pearls. Cureus. 2021 Jul;13(7): e16521.
3. Golzarian H, Widmer M, Shah S, Shaikh M, Patel SM. Acquired Cardiac Dextroposition: A Step in the Right Direction? JACC Case Rep. 2023 May 17;14:101838.
4. Moumpala Zingoula LC. Dextroposition: Cardiac Malposition on Mass Effect. International Journal

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of Clinical Studies and Medical Case Reports. 2022 Jul 22;21(1).
5. Ogunlade O, Ayoka AO, Akomolafe RO, Akinsomisoye OS, Irinoye AI, Ajao A, et al. The role of electrocardiogram in diagnosing dextrocardia with mirror image atrial arrangement and ventricular position in a young adult Nigerian in Ile-Ife: a case report. J Med Case Rep. 2015 Sep 28;9:222.
6. Isono H, Watanabe S, Sumiya C, Toyama M, Ojima E, Maruta S, et al. Clinical significance of reversed R wave progression in right precordial leads. J Rural Med. 2019 May;14(1):42–7.
7. Madias JE. Low QRS voltage and its causes. J Electrocardiol. 2008 Nov;41(6):498–500.