

## ECG DILEMMA

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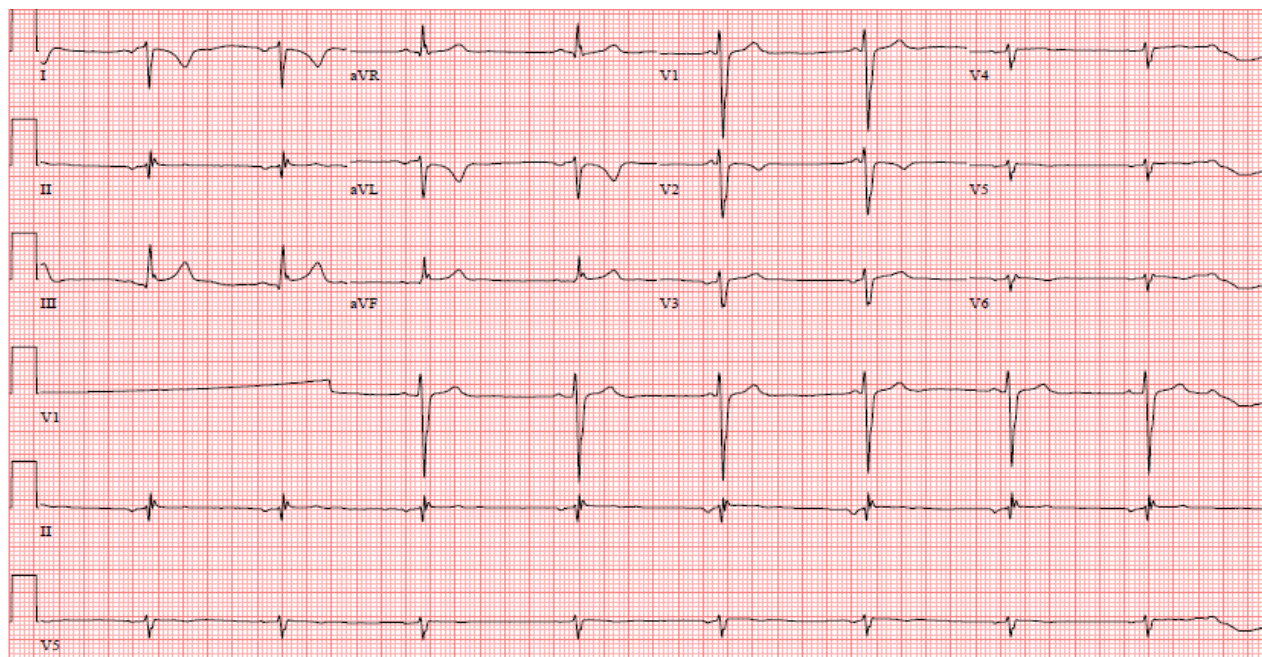
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### CASE

A 31-year-old man with an unremarkable past medical history presented with substernal chest pressure without radiation of two-hours duration. The patient's vitals remained stable and an ECG was obtained. What is the diagnosis?



**Figure A**

- |                                  |                        |
|----------------------------------|------------------------|
| A) Myocardial Infarction         | D) Dextrocardia        |
| B) Right Ventricular Hypertrophy | E) Normal Sinus Rhythm |
| C) Lead Malposition              |                        |

**ANSWER**

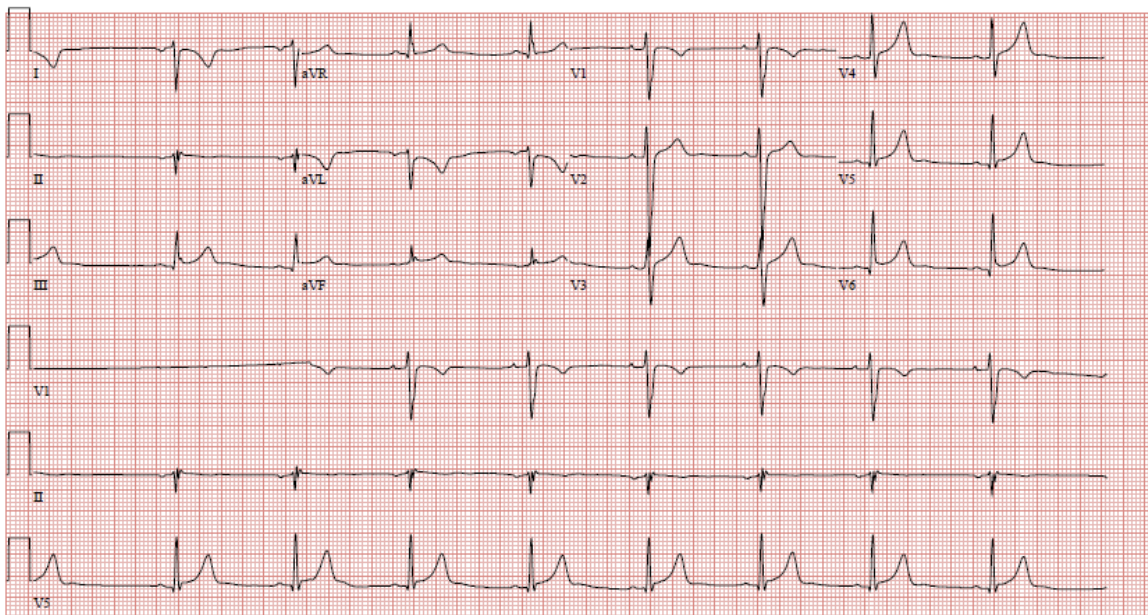
D) Dextrocardia

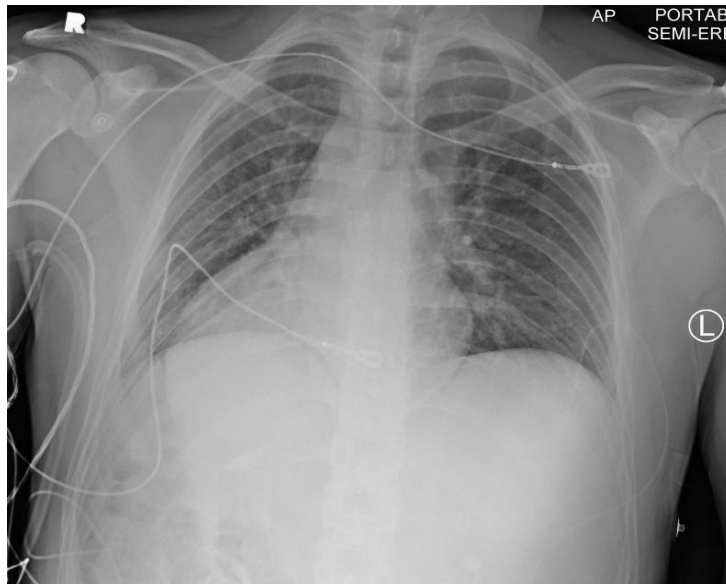
**DISCUSSION**

Situs inversus totalis is a rare congenital condition with complete reversal of visceral organ orientation occurring in approximately 1/10,000 live births (1). In this condition, the heart is also found in a mirrored position within the right chest with its apex pointing right. This anatomical transposition creates a falsely distorted electrocardiographic polarity with standard lead placement. In a normal position, the electrical conduction of the heart creates a downward and leftward vector. In dextrocardia, however, the vector of electrical conduction is downward and rightward. With standard lead placement, dextrocardia is electrocardiographically seen as RAD, negative P-QRS-T complexes in lead I, positive P-QRS-T complexes in aVR, and poor R-wave progression of the precordial leads (2). The ECG (Figure A)

presents this as atrial bradycardia with right axis deviation, negative P-QRS-T complexes in lead I, positive QRS complex in lead aVR and poor R wave progression in the precordial leads.

To adequately correct for this, all ECG leads must be reversed from their standard positions. In our case, only the precordial leads were reversed which is why there was correction of the poor R-wave progression with no change in the limb leads. The reversal of only the precordial leads allowed for analysis of the ECG from 2 perspectives; being able to differentiate the precordial vectors adjusted for situs inversus, while understanding unchanged limb lead properties simultaneously (Figure B). A chest x-ray confirmed the diagnosis of dextrocardia (Figure C). Our patient was likely in sinus bradycardia. However, because the limb leads were not also reversed, this can only be assumed, as a sinus rhythm is defined as positive P-waves in leads I and II and inverted in aVR (3).

**Figure B**



**Figure C**

#### Notes

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