ECG in a 44-Year-Old Man With Chest Pain

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What is your diagnosis?

Explication is on p. 263
ECG of the Month
Presentation is on p 262.

DIAGNOSIS: Arm-lead reversal; normal sinus rhythm; right atrial enlargement and right ventricular enlargement suggesting an ostium secundum atrial septal defect; acute inferior myocardial infarction.

Negative P waves, QRS complexes, and T waves in lead I suggest arm lead reversal or situs inversus. Progressively larger QRS complexes in standard chest leads V₁ to V₅ exclude situs inversus. When the arm leads are reversed, true lead I is inverted, producing the negative P, QRS, and T; lead II is actually true lead III; lead III is true lead II; lead aVR is true lead aVL; lead aVL is true lead aVR; and lead aVF and the precordial leads are unchanged.

The presence of an incomplete right bundle branch block pattern in true lead aVR and in lead V₅, S waves in leads V₅ and V₆, SV₅ > 7 mm (where 10 mm = 1.0 mv), and RV₁ + SV₅ > 10 mm suggest right ventricular enlargement.¹,² The 2 mm P waves in lead V₂ indicate right atrial enlargement,³ helping to confirm right ventricular enlargement and to suggest a fossa-ovalis type (ostium secundum) atrial septal defect. The atrial septal defect was confirmed by echocardiography.

Correcting for arm-lead reversal, one can also recognize the changes of acute inferior myocardial infarction: large Q waves, ST-segment elevation, and T-wave inversion in the inferior leads with reciprocal tall R waves, ST-segment depression, and upright T waves in true leads I and aVL.

Misplaced electrocardiographic leads are common. Some misplacements, such as arm lead reversal or both electrodes of a bipolar lead on the legs resulting in miniscule P, QRS, and T voltage in that lead, are easy to recognize, as are gross chest lead misplacements, such as placing the V₁ lead in the V₆ position and vice versa or placing all of the chest leads on the right side of the chest. Many lead misplacements, however, go unrecognized. When the positions involved in lead misplacement can be recognized, an electrocardiographic diagnosis usually can be made.

REFERENCES

3. ibid. 28-43.

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