Electrocardiographic Abnormality of Pure Posterior Myocardial Infarction

Key words: electrocardiogram, posterior myocardial infarction

Figure 1. Electrocardiogram. Slight ST elevation was present in lead a_{VL}. Tall R waves with long duration were seen in leads V₁ and V₂. The R amplitude was much lower in lead V₅ than in lead V₄. Marked positive U waves were present in leads V₂ and V₃.

Figure 2. Coronary angiogram. (A) Left anterior oblique view of the left coronary artery showed occlusion of the posterior descending artery (arrow). (B) Perfusion of the posterior descending artery was improved after percutaneous transluminal coronary intervention.

Figure 3. Gadolinium-enhanced T1-weighted magnetic resonance imaging from the mid-portion (A) to base (D) of the left ventricle in the short axis plane. The infarcted myocardium (arrowhead) of the posterior wall displayed high signal intensity.

A 70-year-old woman was referred to Keiaido Hospital for chest discomfort, which had persisted for two days. A physical examination showed no remarkable abnormality. Electrocardiogram (ECG) revealed a slightly elevated ST segment in lead aVL , initial R waves of 80 msec with an R/S amplitude ratio ≥ 1 in leads V_1 and V_2 , and a much lower R amplitude in lead V_5 than in lead V_4 (Fig. 1). In addition, marked positive U waves were seen in leads V_2 and V_3 . Laboratory findings showed elevated cardiac enzymes (AST 181 U/l, LDH 471 U/l, CK 2,327 U/l). The patient was transferred to Gunma University Hospital due to differential diagnosis of pure posterior myocardial infarction (MI). A coronary angiogram demonstrated occlusion of the peripheral left circumflex artery (LCx) (Fig. 2A). A percutaneous transluminal coronary intervention was performed with satisfactory results (Fig. 2B). Cardiac magnetic resonance imaging revealed focal MI in the posterior wall (Fig. 3).

The patient was diagnosed with a pure posterior MI due to LCx occlusion. However, the ECG did not show abnormal records characteristic of MI, except for the slight ST elevation in lead aVL , suggesting a high lateral MI.

It is difficult to diagnose posterior MI by ECG without inferior or lateral MI. Abnormal R waves (duration >40 msec and/or an R/S amplitude ratio ≥ 1) in the right precordial leads (V_1 and/or V_2) are thought to be markers for pure posterior MI (1). However, these symptoms also occur in right bundle branch block, Wolff-Parkinson-White syndrome, right ventricular hypertrophy and normal variants. Goldberger reported that a "drop off pattern" in the lateral precordial leads (a lower R amplitude in leads V_5 and V_6 than in leads V_3 and V_4) was a useful marker to distinguish posterior MI from normal variants (2). Subsequently, Kanemoto et al (3) proposed the following ECG criteria at the acute phase of posterior MI: 1) ST segment depression ≥ 0.1 mV in two consecutive precordial leads, 2) prominent positive U waves ≥ 0.1 mV in lead V_2 or V_3 , and 3) T/U ratio ≤ 4 in leads V_2 or V_3 . When two of the above criteria were positive, the diagnostic accuracy was 88.8% (3).

References

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Received for publication February 9, 2004; Accepted for publication May 15, 2004

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