Letters

Prognostic Value of ST-Segment Elevation in Lead aVR in Patients With Type A Acute Aortic Dissection

In type A acute aortic dissection (AAD), ST-T changes on the admission electrocardiogram (ECG) are associated with poor outcomes (1,2). Although ST-segment elevation in lead aVR (STE-aVR) is an ECG marker of severe acute myocardial ischemia (3), its prognostic significance in type A AAD remains unknown. We studied the relationship of admission ECG findings to clinical features at admission and in-hospital death in 409 patients (mean age, 64 ± 12 years; 231 men; mean time from symptom onset to admission, 3.1 ± 2.4 h; the rate of urgent surgery, 90%) with type A AAD who were admitted within 12 h from symptom onset. The Ethics Committee at our institution approved the study, and all subjects gave informed consent.

Twelve-lead ECGs were recorded on admission. Left ventricular hypertrophy was defined using the Sokolow-Lyon voltage criteria. We used globally accepted criteria defining ST-T changes (4) to diagnose acute myocardial ischemia. Patients were divided into the 4 groups: no significant ST-T changes (n = 110, group A), bundle branch block or left ventricular hypertrophy (n = 86, group B), and the absence (n = 163, group C) or the presence (n = 50, group D) of STE-aVR ≥0.05 mV with ST-T changes in other leads. Renal dysfunction was defined as an estimated glomerular filtration rate calculated using serum creatinine levels on admission of <60 ml/min/1.73 m².

Data were compared by 1-way analysis of variance or chi-square analysis. Multivariate logistic regression analysis was used to identify clinical predictors at admission of in-hospital mortality among the 4 ECG patterns and variables associated (p < 0.05) with this outcome on univariate analysis.

In groups A, B, C, and D, the rates of shock were 2.7%, 12.8%, 19.0%, and 64.0%; the rates of cardiac tamponade were 3.6%, 20.9%, 17.8%, and 60.0%; and the rates of renal dysfunction were 40.9%, 55.8%, 56.4%, and 68.0% (all p < 0.01), respectively. Among 370 patients who underwent urgent surgery in groups A, B, C, and D, the rates of coronary ostial involvement were 3.0%, 2.6%, 9.9%, and 31.8% (p < 0.01); the rates of left coronary artery involvement were 2.0%, 1.3%, 0.7%, and 18.2% (p < 0.01); the rates of right coronary artery involvement were 1.0%, 1.3%, 7.9%, and 9.1% (p = 0.02); and the rates of both left and right coronary artery involvement were 0%, 0%, 1.3%, and 4.5% (p = 0.07), respectively. Age, sex, time from symptom onset to admission, and the rate of urgent surgery were similar among the 4 groups.

STE-aVR was associated with the highest inhospital mortality, regardless of treatment strategy (Figure 1). Age, shock, cardiac tamponade, and renal dysfunction were included as variables in the multivariate analysis, but were not significantly related to in-hospital death. STE-aVR was the strongest predictor of in-hospital death (odds ratio: 23.4; 95% confidence interval: 6.10 to 62.2; p < 0.01), followed by no surgical treatment (odds ratio: 10.4; 95% confidence interval: 3.71 to 29.2; p < 0.01).

This study demonstrated that in patients with type A AAD, STE-aVR at presentation was associated with serious conditions such as shock, cardiac tamponade, or coronary ostial involvement and was the strongest predictor of in-hospital death.

In acute coronary syndrome (ACS), STE-aVR reflects severe acute myocardial ischemia due to severe coronary artery disease (3). In ST-segment elevation myocardial infarction, STE-aVR is caused by transmural ischemia in the basal septum, often resulting from obstruction of the left main or the proximal left anterior descending coronary artery. In non-ST-segment elevation ACS, lead aVR is referred to as a cavity lead, and STE-aVR might reflect global subendocardial ischemia of the left ventricle, often associated with left main or 3-vessel disease.

In type A AAD, the mechanisms underlying STE-aVR remain unclear. Under certain limited conditions, however, severe acute myocardial ischemia is thought to provoke STE-aVR. If the left coronary artery ostium is completely obstructed, transmural ischemia in the basal septum can cause STE-aVR. In coronary ostial involvement (especially of the left coronary artery) associated with severe stenosis but
not complete occlusion, global subendocardial ischemia of the left ventricle can also cause STE-aVR. Furthermore, serious conditions, such as shock and cardiac tamponade, can lead to severe subendocardial ischemia of the left ventricle (2), resulting in STE-aVR. In any of these conditions, patients with STE-aVR are considered to have a poor prognosis. To our knowledge, this is the first study to demonstrate the prognostic significance of STE-aVR in type A AAD.

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REFERENCES

Low-Density Lipoprotein Particle Number Is Associated With Cardiovascular Events Among Those Not Classified Into Statin Benefit Groups

The 2013 American Heart Association/American College of Cardiology guideline for the treatment of cholesterol to reduce the risk of cardiovascular disease (CVD) defined 4 groups of patients who are candidates for statin treatment (1). For those not