

## Comparative Clinical Outcomes of Stress Echocardiography and Electrocardiography

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**Objectives:** Comparative diagnostic value and clinical outcomes associated with concordance and discordance of ischemic electrocardiographic (ECG) and echocardiographic (Echo) response during treadmill stress Echocardiography have not been established in patients with chest pain and no history of coronary artery disease (CAD). **Methods:** A total of 1725 patients who underwent treadmill stress echocardiography with newly developed chest pain but no history of CAD between Jan 2007 and Mar 2015 were examined. Ischemic ECG and Echo response were defined as ST depression and newly developed wall motion abnormality during exercise, respectively. The patients were classified as four groups [ECG-/Echo-, non-ischemic ECG and Echo response (1404 patients, 81.4%); ECG+/Echo-, ischemic ECG and non-ischemic Echo (192, 11.1%); ECG-/Echo+, non-ischemic ECG and ischemic Echo (33, 1.9%); ECG+/Echo+, ischemic ECG and Echo (96, 5.6%)]. Existent concomitant CAD was determined using coronary angiography or coronary computed tomography. Major adverse cardiac events (MACEs) including coronary revascularization, acute coronary syndrome, heart failure admission and all cause death were examined. **Results:** Among 775 patients, 111 events were observed. Group with ECG+/Echo- compared with group with ECG-/Echo- had higher prevalence of CAD (19% vs. 30%, not-significant;  $p=0.058$ ), but was not associated with higher MACEs [hazard ratio (HR), 1.62; 95% confidence interval (CI), 0.83-3.19;  $p=0.158$ ]. Group with ECG-/Echo+ compared with group with ECG+/Echo- had similar prevalence of CAD, but had higher MACEs (HR, 3.92; 95% CI, 1.78-8.65;  $p<0.001$ ). Group with ECG+/Echo+ compared with group with ECG-/Echo+ had higher prevalence of CAD (84% vs. 43%,  $p<0.001$ ), more diseased coronary vessels ( $p=0.001$ ) and higher MACEs (adjusted HR, 2.33; 95% CI, 1.36-4.00;  $p=0.002$ ). **Conclusions:** Alone ischemic response in ECG might have a benign course similarly to non-ischemic response regardless prevalence of concomitant CAD and in comparison with ischemic response in Echo. Concordant ischemic response in ECG and Echo compared with alone ischemic response in Echo might be associated with worse clinical outcomes due to more severe ischemic burden.

## Transient and evolutionary changes resembling stress-induced cardiomyopathy in CO poisoning

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A 57-year-old woman who had been exposed to carbon monoxide (CO) was evaluated in the emergency room due to altered mental status. She was drowsy with Glasgow comas scale score of 6 and had weakness in all extremities. Although her SpO<sub>2</sub> was 100%, COHb was 23.1% and O<sub>2</sub>Hb was 77.1%. She was diagnosed as CO poisoning. The initial EKG was normal sinus rhythm, but cardiac enzymes were elevated with hs-TnI 591.7 pg/mL, CK-MB 44.3 ng/mL, and CK 1,618 IU/L. After O<sub>2</sub> therapy, her mentality was fully recovered at 2<sup>nd</sup> hospital day. However, follow-up EKG demonstrated ST elevation in V2-V4 and T-wave inversion (TWI) in V2-V6. TTE showed akinesia at the apex and preserved wall motion in the mid-to-basal segments of left ventricle (LV), with 48 % ejection fraction (EF) (Fig A). We performed diagnostic coronary angiography (CAG) with an ergonovine provocation test. CAG showed normal coronary without spasm. We suspected stress induced cardiomyopathy (sCMP) related to CO poisoning. 1 week later, EF recovered to 63% with improvement of regional wall motion abnormality (RWMA), but hypokinesis persisted and concomitant EKG showed deep TWI in precordial leads (Fig B). 6 weeks later, TTE showed cardiac systolic function including RWMA normalized, but LV wall thickness was slightly increased and deep TWI still on EKG (Fig C). After 12 weeks, the EKG showed sinus rhythm and complete resolution of TWI (Fig D). We observed transient myocardial dysfunction mimicking sCMP with increased apical wall thickness but delayed EKG recovery caused by CO poisoning.

