Electrocardiographic changes beyond ST elevation in the differentiation of ischemic and non-ischemic ST elevation in patients with chest pain

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Introduction

Pericarditis, takotsubo cardiomyopathy (TC) and early repolarization syndrome (ERS) are well-known ST elevation myocardial infarction (STEMI) mimics. We aimed to study whether reciprocal ST depression (STD), PR depression, ST-segment convexity or ECG findings of terminal QRS distortion (TQRSD) can discriminate between ST elevation (STE) due to ischemia and non-ischemic conditions.

Methods

We studied 85 patients with STEMI and 94 patients with non-ischemic STE (pericarditis (n=38), TC (n=21), ERS (n=35)). All patients had chest pain and at least 0.1 mV STE.

PR depression (≥ 0.05 mV), J waves, ST segment convexity, findings of TQRSD and reciprocal STD were analyzed for each ECG.

Results

In anterior STE, **STD in lead II** (>0.025 mV) occurred in 40 % of STEMI patients, but in none of the non-ischemic patients. In inferior STE, **STD in lead I** (>0.025 mV) was present in 83 % of STEMI cases, but in none of the non-ischemic patients.
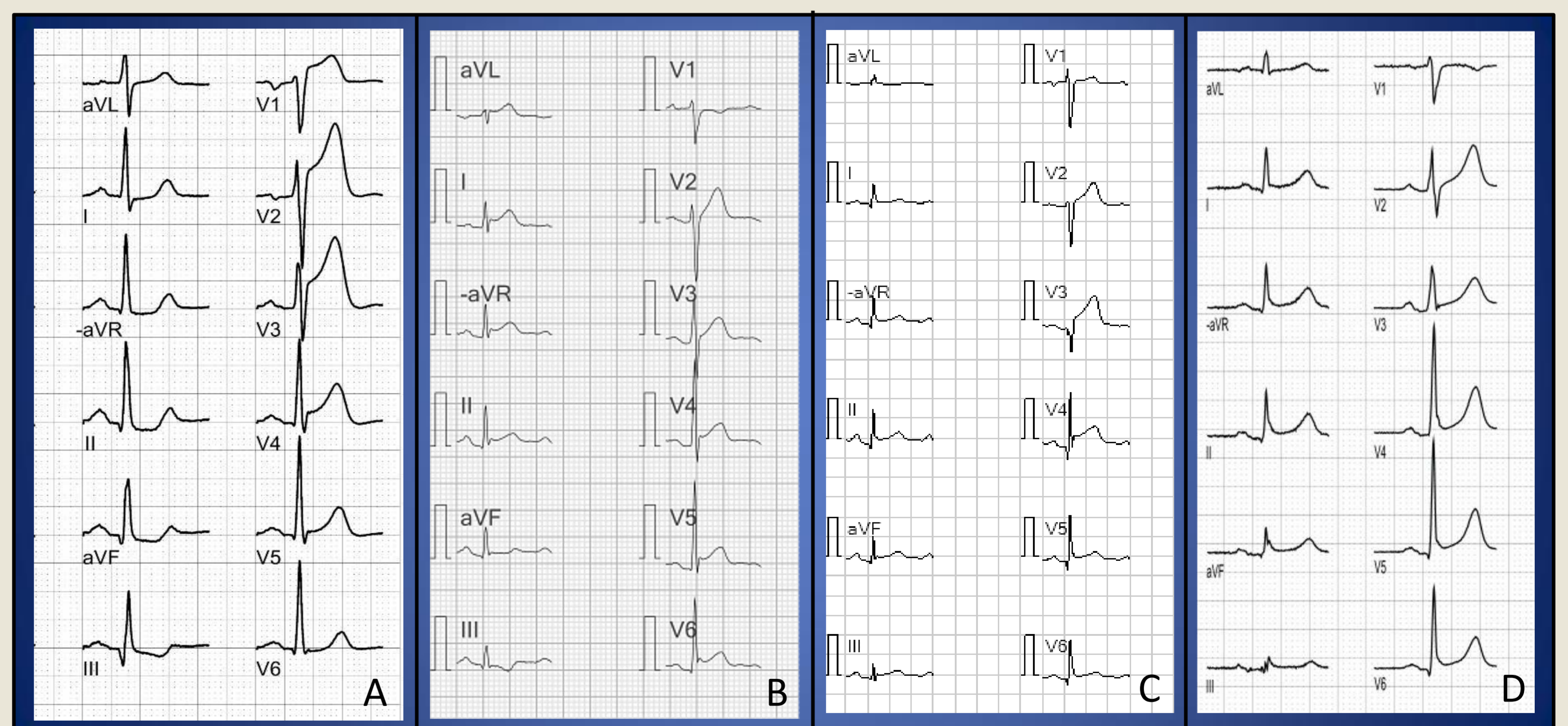
PR depression occurred in 45 % of non-ischemic patients and in 31 % of STEMI patients (p=0.06). **Chest-lead PR depression** was uncommon in STEMI (12 %) compared to non-ischemic patients (38 %) (p<0.001).

J waves were more prevalent in non-ischemic STE (59 %), but occurred in 26 % of patients with STEMI (p<0.001). **Convex STE** occurred in 22 % of STEMI patients and in 9 % of non-ischemic patients (p=0.01). Findings of **TQRSD** were more prevalent in ischemic STE (40 %), than in non-ischemic STE (7 %).

Reciprocal ST depression, PR depression in the chest leads and **terminal QRS distortion** may improve detection of **true STEMI**.

Convex STE is more common in ischemic than in non-ischemic patients, but the majority of STEMI patients present without convex STE.

A | B | C | D

Pick the diagnosis!

Which of ECG belongs to which diagnosis?

Takotsubo cardiomyopathy
Pericarditis
Early repolarization syndrome
STEMI

The correct clinical diagnosis can be found in the left bottom corner of the poster

Further reading

Bischof et al 2016. ST depression in lead aVL differentiates inferior ST-elevation myocardial infarction from pericarditis. Am J Emerg Med.

Lee et al 2016. Terminal QRS distortion is present in anterior myocardial infarction but absent in early repolarization. Am J Emerg Med.

Zorzi et al 2016. Differential diagnosis at admission between Takotsubo cardiomyopathy and acute apical-anterior myocardial infarction in postmenopausal women. Eur Heart J Acute Cardiovasc Care.

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A: STEMI, B:Pericarditis, C:Takotsubo cardiomyopathy, D Early repolarization syndrome