Isolated ST elevation in lead aVR during TMT at high workload as a marker of ostioproximal LAD occlusion

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DESCRIPTION

ST segment elevation in lead aVR of a resting ECG along with ST segment depression in multiple other leads during acute coronary syndrome (ACS) has been previously described to be a predictive marker of critical stenosis of the left main coronary artery or proximal left anterior descending artery (LAD).¹ The importance of isolated ST segment elevation in lead aVR during a treadmill test (TMT) has never been stressed on before.

We present an interesting case of a 49-year-old man who presented with anginal chest pain, without a prior history of diabetes, hypertension or smoking. TMT performed 4 months ago was

reported negative by an experienced physician. There was ST elevation of 1.5 mm at peak exercise (10.21 Mets) and it persisted into recovery; there was no ST depression in any other leads (figures 1 and 2) with symptoms of fatigue and mild chest pain which were incorrectly presumed by the physician to be non-cardiac. The patient had a normal

Figure 1 The standing ECG at baseline showing normal level of ST segment in lead aVR.

Figure 3 Fluoroscopic image in right anterior oblique caudal view showing proximally occluded left anterior descending coronary artery.

Figure 2 ECG recorded at the stage of peak exercise showing ST elevation in lead aVR without significant changes in other leads.

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Figure 4 Fluoroscopic image showing retrograde filling of the left anterior descending coronary artery up to the proximal portion through collaterals from the right coronary artery.

Video 2 Fluoroscopic image showing retrograde filling of the left anterior descending coronary artery up to the proximal portion through collaterals from the right coronary artery.

Video 1 fluoroscopic image in RAO caudal view showing proximally occluded Left anterior descending coronary artery.

echocardiogram which had no evidence of ischaemia or prior infarction at baseline.

Since symptoms were persistent a diagnostic coronary angiogram was performed. The angiogram revealed the presence of complete occlusion of the ostioproximal LAD, which filled retrogradely via RCA until the proximal segment (figures 3 and 4, videos 1 and 2). The presence of good collateralisation, can explain the good effort tolerance. The patient was percutaneously revascularised subsequently and a repeat TMT performed after 2 months of the procedure revealed that the ECG change had disappeared and so had the exertional symptoms. This retrospectively proved beyond doubt that the pain and the ECG change were ischaemia induced.

Another rare aspect of this disease was the fact that the patient had this ECG change at a high workload during the TMT which was missed, which stresses the importance of recognising this ECG change during TMT and also suggests an equivalent artery localising value of this ECG change as it is considered during ACS.

Learning points

- ▶ The role of isolated ST elevation in lead aVR as a marker of coronary artery disease during a treadmill test (TMT) has often been underestimated and can be easily missed as happened in our case.
- ▶ The importance of this ECG change during a TMT test as a marker of left anterior descending artery (LAD) occlusion is valid even when it occurs at a high workload
- ▶ Exercise induced ST elevation during TMT in lead aVR is an important indicator of significant left main coronary artery or ostial LAD stenosis and may have an equivalent localising value similar to what it has during an acute coronary syndrome.

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- 1 Uthamalingam S, Zheng H, Leavitt M, *et al.* Exercise-induced ST-segment elevation in ECG lead aVR is a useful indicator of significant left main or ostial LAD coronary artery stenosis. *JACC Cardiovasc Imaging* 2011;4:176–86.

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