Original Research Paper

Cardiology

EXERCISE ECG ST ELEVATION IN AVR- PREDICTOR OF LEFT MAIN CORONARY ARTERY DISEASE: A CASE REPORT

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ABSTRACT We report a patient with ST elevation in lead aVR more than ST elevation in lead V1 during treadmill test predicting left main coronary artery disease, subsequently confirmed by coronary angiogram and briefly review relevant literature.

KEYWORDS : Exercise ECG, ST Elevation Avr, ST Elevation V1, Left Main Coronary Artery Disease

Case Report

It is well known that ST elevation in lead aVR (aVR STE) in acute coronary syndromes is a sinister finding associated with severe coronary artery disease and high incidence of adverse cardiac events. We report a case of exercise induced aVR STE in a 70 year old symptomatic male predicting left main coronary artery occlusion which was subsequently confirmed by coronary angiography.

A 70 year old male, known hypertensive, presented to our cardiology outpatient services for evaluation of typical exertional chest pain. His clinical examination was unremarkable and baseline ECG was normal except for q waves in septal leads. His detailed echocardiogram showed normal biventricular systolic function and no regional wall motion abnormality. He underwent exercise Treadmill testing (TMT) with Bruce protocol in which he developed progressively increasing ST depressions in inferior and lateral leads associated with ST elevations in leads aVR and V1. Test was stopped at 10 minutes when inferior and lateral leads showed 2-3 mm horizontal ST depressions and leads aVR and V1 showed ST elevations of 2mm and 1.5mm respectively associated with chest discomfort (Figure 1,2a, 2b) which normalized late in recovery. He underwent coronary angiogram by radial route which revealed a severe (90%) stenosis of ostial left main coronary artery (Figure 3). He has been referred to cardio thoracic surgeon for early coronary artery bypass surgery.

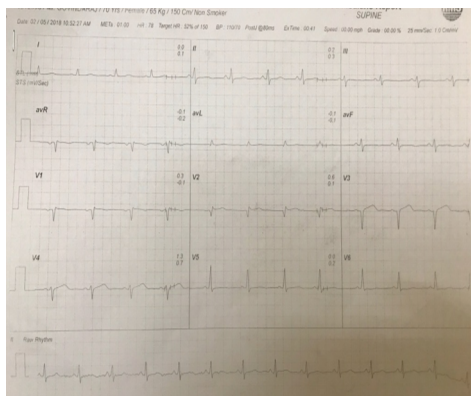**Figure 1: Baseline ECG during Treadmill Test**

Figure 2a: ECG at Peak Exercise showing ST elevation in aVR more than that in Lead V1; Figure 2b showing magnified image of Inset
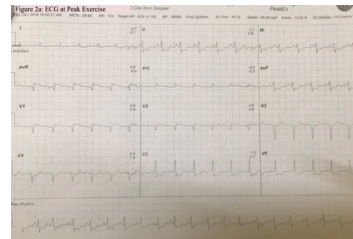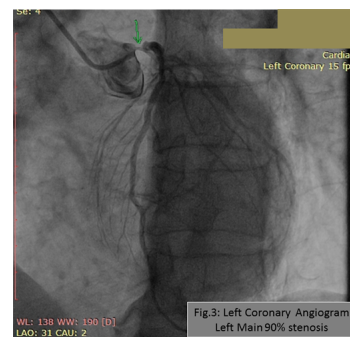

Figure 3: Coronary Angiogram showing Ostial Left Main Coronary Artery Severe Stenosis

Fig.3: Left Coronary Angiogram Left Main 90% stenosis

Discussion

Our case illustrates the significance of ST elevation in often neglected lead aVR during TMT in indicating severe LMCA disease . It also emphasizes the importance of ST elevation in aVR exceeding that in lead V1 as indicative of LMCA disease rather than proximal LAD.

As reported by Ozmen et al (2010). and Uthamalingam et al. (2011), in patients undergoing exercise stress testing, ST segment elevation (STE) of ≥ 1mm in lead aVR predicts:

- Left main coronary artery (LMCA) stenosis
- Ostial left anterior descending (LAD) stenosis
- Severe triple-vessel disease (TVD)

• Diffuse subendocardial ischaemia.

The sensitivity and specificity of aVR STE during treadmill testing is reported by Ozmen et al (2010) as 84% and 88%, respectively. The values of positive and negative predictive value of this finding in diagnosing the presence of LMCA stenosis were 76% and 93%, respectively As elaborated by Yamaji et al. (2001), aVR being the reciprocal lead of the basal interventricular septum, it is affected by the perfusion changes of this region. In acute coronary syndromes, aVR STE with less elevation in lead V_1 is an important predictor of acute LMCA obstruction, whereas with proximal LAD disease, V1 ST elevation is more than that of aVR. The finding of lead aVR ST segment elevation greater than or equal to lead V1 ST segment elevation distinguished the LMCA group from the LAD group, with 81% sensitivity, 80% specificity and 81% accuracy. While the mortality is 5 times higher in patients with aVR STE compared to overall STEMI patients, there is also direct correlation of the amount of ST-segment elevation to patient's outcomes, with greater the ST segment elevation correlating with higher patient mortality.

Conclusion

We report a patient with exercise induced ST elevation in aVR exceeding that in lead V1 correlating with severe ostial left main disease.

References

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