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Case Report

A case of left circumflex artery stenosis involving ST segment depression in multiple leads with ST elevation in lead augmented vector right

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ABSTRACT

Electrocardiography (ECG) patterns of ST-segment elevation in lead aVR with or without diffuse ST segment depression may predict either left main coronary artery or triple vessel stenosis. Here, we have presented the case of a 56-year-old female involving such an ECG pattern with ST-segment depression in more than eight leads and ST Segment elevation in lead aVR, however, showing stenosis of the mid-segment of the left circumflex artery (LCX). She was scheduled to undergo percutaneous coronary intervention with implantation of a drug-eluting stent with respect to mid LCX stenosis. The patient was asymptomatic post procedure and was discharged on beta blockers. To conclude, the ECG pattern of ST depression in multiple leads with ST-elevation in aVR lead can occur in LCX obstruction as well.

Keywords: Electrocardiography, Left circumflex artery, ST-segment

INTRODUCTION

Electrocardiography (ECG) plies as one of the most valuable diagnostic and prognostic tools for evaluating the patients with ischemic heart disease. The precordial leads and the limb leads are considered reliable for evaluating cardiac impairment. However, the interpretation of lead augmented vector right (aVR) in the diagnosis of patients with the acute coronary syndrome (ACS) has not been widely studied.[1,2] Previous studies depicted that echocardiogram (ECG) patterns of ST-segment elevation in lead aVR with or without diffuse ST segment depression may predict either left main coronary artery (LMCA) or triple vessel stenosis.[3,4] Here, we have presented the first case-report to the best of our knowledge, involving such an ECG pattern showing stenosis of the mid-segment of the left circumflex artery (LCX).

CASE REPORT

A 56-year-old female presented to the emergency room in the early morning with the complaint of constricting midsternal chest pain and sweating/perspiration lasting 10-15 minutes since the previous night. She had no past medical history of diabetes, hypertension, dyslipidemia, coronary artery disease (CAD) or family history of CAD. She attained menopause at 55 years of age. Clinical examination was unremarkable and blood pressure was normal. The first ECG showed ST-segment depression in multiple leads with ST-segment elevation in lead aVR. She continued to experience pain and a repeat ECG after an hour showed worsening of ST-segment depression in more than eight leads and ST segment elevation in lead aVR. (Figure 1).

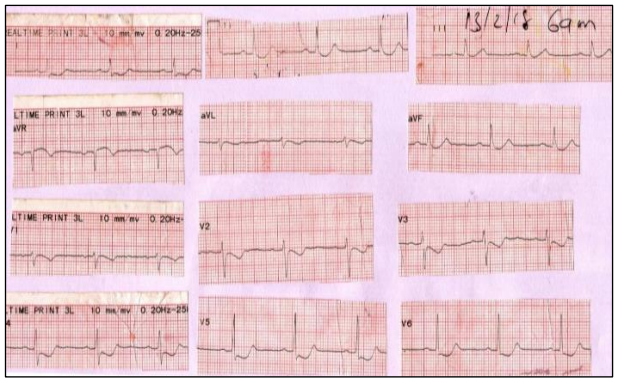

Figure 1: ECG at the time of pain.

The left ventricular function was normal without regional wall motion abnormality or left ventricular hypertrophy. Troponin T level was elevated. Serum electrolytes were within normal limits. She was started with antianginal drugs and unfractionated heparin regime. As she suffered from recurrence attacks of chest pain and coronary angiogram was performed on the next day of admission, which revealed 90% stenosis involving the mid segment of left circumflex artery (LCX) (Figure 2a), normal left main coronary artery (LMCA) (Figure 2b), normal proximal left anterior descending artery (LAD) with 50% stenosis in mid segment (Figure 2c) and normal right coronary artery (RCA) (Figure 2d). She underwent percutaneous coronary intervention with a drug-eluting stent implantation with respect to the mid LCX stenosis (Figure 2.e). The LAD lesion was not scheduled as it was only 50% (Figure 2f).

The patient became asymptomatic post-procedure, exhibiting normal ECG. (Figure 3) She was discharged on beta blockers.

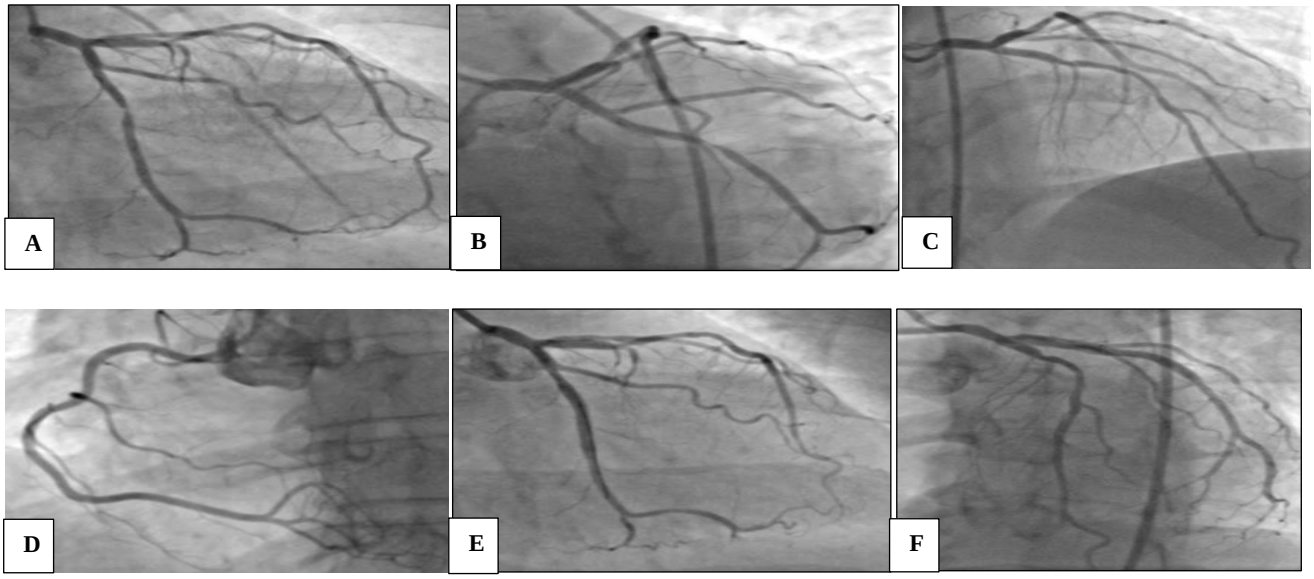

Figure 2: (A) Mid LCX 90% stenosis (B) Normal LMCA and proximal LAD (C) Mid LAD 50% stenosis (D) Normal RCA (E) LCX- post angioplasty (F) Mid LAD stenosis left alone.

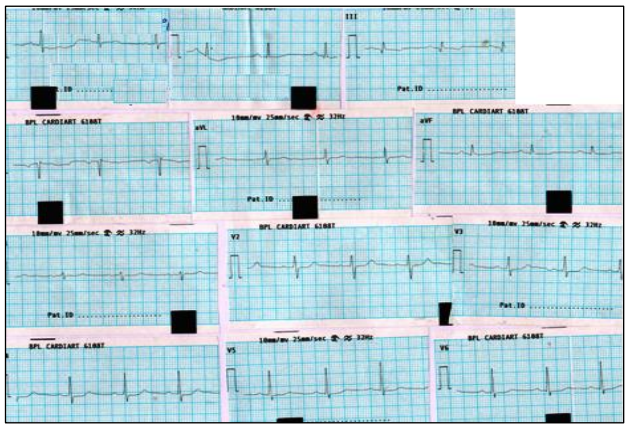

Figure 3: ECG after PTCA.

DISCUSSION

ECG changes for prediction of acute LMCA obstruction have always attracted attention. It is important with regard to selecting the appropriate treatment strategy as acute LMCA obstruction leads to severe hemodynamic deterioration and a less favourable prognosis.[5,6] Yamaji et al postulated that such an ECG pattern is an important predictor of isolated acute LMCA obstruction. In this study the admission 12-lead ECGs were correlated with angiographic findings. It was seen that Lead aVR ST-segment elevation (>0.05 mV) occurred with a significantly higher incidence in the LMCA group (88%) than in the LAD (43%) or RCA (8%) groups. The amount of Lead aVR ST-segment elevation was significantly higher in the LMCA group than in the LAD group while

Lead V1 ST segment elevation was lower in the LMCA group than in the LAD group.[7] 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. The death occurred more frequently in patients with higher ST-segment elevation in lead aVR than in those with less severe elevation. Thus the "neglected lead aVR" became an important lead. In 2008 an ECG pattern of ST depression and peaked T waves in the precordial leads was first described by de Winter et al. in a case series.[8] This pattern was considered as anterior STEMI equivalent that presents without obvious ST-segment elevation. Verounden and colleagues replicated this finding in another case series in 2009. Thus there was evidence to suggest that the de Winter ECG pattern is highly predictive of acute LAD occlusion. Some authors even proposed that the de Winter pattern should be considered a STEMI equivalent in patients with chest pain and no ST elevation in ECG and that they should receive emergent reperfusion therapy with PCI or thrombolysis. The diagnostic criteria for the De Winter pattern included (i) Tall, prominent, symmetric T waves in the precordial leads (ii) Up sloping ST segment depression >1 mm at the J-point in the precordial leads (iii) Absence of ST elevation in the precordial leads and (iv) ST segment elevation (0.5 mm-1 mm) in aVR. The De Winter pattern had positive predictive values of around 95% for proximal LAD lesion in various studies. So the combination of ST-Segment depression in multiple leads with ST-segment elevation in aVR came to be considered as representing acute occlusion of LMCA or Proximal LAD. However there have been reports that such a pattern need not be specific and that it can occur in other lesions as well. Knotts et al. and Montero et al also suggested that such an ECG pattern of ST depression in >7 body surface leads combined with ST elevation in aVR and V1 and its predictive value for LMCA stenosis or left main equivalent (LMEQ) disease.[6,9] They studied 133 patients showing this particular ECG pattern. LMCA/LMEQ disease was found in only 23% of these patients on coronary angiography. Their conclusion was that this ECG pattern is not always caused by LMCA/LMEQ disease. Therefore, the term "suspect circumferential subendocardial ischemia" may be preferred. Such a pattern has been described in a case of diagonal occlusion without LMCA or LAD disease by Montero et al.[9] The pattern of ST Depression in multiple leads with aVR ST elevation has been described in LMCA spasm.[5] Contrary to popular belief that spasm and Prinzmetals angina show ST elevation in ECG, LMCA spasm can lead to widespread ST depression. This patient had ST depression of 2-3 mm in more than seven leads with ST elevation of 1.5 mm in aVR. An LMCA or Proximal LAD obstruction was expected. However only a mid LCX lesion was found on coronary angiography. LMCA and proximal LAD were normal. It is unlikely that there was an obstruction in LMCA or LAD by a thrombus which got spontaneously lysed. She had no hemodynamic compromise despite recurring angina which is expected in LMCA lesion. The possibility of LMCA spasm which got relieved prior to angiogram must be considered in view of previous reports. But this patient did not have any LMCA spasm even after cannulating LMCA with diagnostic and later by a guide catheter. She was given beta blockers which could have worsened any spasm and produced symptoms even after PTCA had the initial ECG changes been due to spasm.

We concluded that a pattern of ST depression in multiple leads with ST elevation in aVR can occur in Left Circumflex artery obstruction also. However the more ominous LMCA or proximal LAD lesion needs exclusion by early coronary angiography.

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