A Case of Atrial Flutter with Diffuse ST depression with ST elevation in aVR

Dr. Jake Cho, M.D. 1, 2, Dr. Rakesh Prashad, M.D. 3, 4, 5

1. University of Central Florida College of Medicine, Graduate Medical Education, Orlando, FL
2. Ocala Regional Medical Center, Internal Medicine Residency Program, Ocala, FL
3. Ocala Regional Medical Center, Internal Medicine Faculty, Ocala, FL
4. Ocala Regional Medical Center, Interventional Cardiology, Ocala, FL
5. Citrus Cardiology Consultants, Ocala, FL

Introduction

This case involves the controversy of whether the ECG pattern of ST elevation (STE) in lead aVR with diffuse ST depression is associated with left main coronary artery occlusion versus insufficiency. This may also be seen with left anterior descending artery (LAD) occlusion, severe triple-vessel disease or subendocardial ischemia in both ACS and non-ACS etiologies.

Case Presentations

**Case 1:** A 80 year old female with hypertension and unikidney admitted after suffering a left displaced femoral neck fracture. She was recovering from left hip arthroplasty when she experienced chest pain. ECG showed atrial flutter pattern with HR 151, ST elevation in aVR and diffuse reciprocal ST depression (Figure 1 series).

The flutter did not respond to IV metoprolol or diltiazem but converted to sinus on amiodarone drip. Serial troponins started at 0.13 ng/mL and peaked to 0.92 ng/mL. The diagnostic challenge is whether the STE in aVR and ST depression in other leads should be considered a STEMI equivalent. Due to the troponins and angina at rest, ACS was suspected and catheterization confirmed 3 vessel disease in the left main coronary artery (LMCA), left anterior descending (LAD) artery and left circumflex. Cardiothoracic surgery was consulted but the patient declined coronary artery bypass grafting (CABG), opting for rehab.

**Case 2:** A 82 year old male with panic attacks who presented with complaints of sudden onset dyspnea, chest pressure and palpitations. Patient reports he was watching TV when he developed shortness of breath, at this time he reports substernal chest heaviness, non radiating, non exertional associated with diaphoresis and palpitations. Prior similar episode was attributed to a panic attack.

Admission ECG showed prominent ST elevation in aVR and moderate elevation in lead V1 with diffuse ST depression in all other leads. Initial point of care troponin was 0.02 ng/mL, rising to a maximum of 13.50 ng/mL. Cardiac angiography showed severe multivessel disease with 95-98% LMCA disease, 99% ostial LAD and 80% mid left circumflex vessel. Patient was referred to cardiothoracic surgery and underwent CABG surgery. Figure 2 series.

**Case 3:** A 72 year old male with COPD, HTN and diabetes who presented with chest pressure and exertional dyspnea. Patient had a prior history of angina at rest, ACS was suspected and underwent angiography that confirmed 3 vessel disease.

Presenting ECG showed ST elevation in aVR, isoelectric in lead V1 but diffuse ST depression in all other leads. Initial troponin was 0.05 ng/mL, rising to 0.73 ng/mL. Patient was taken to cath lab where angiography revealed severe distal LMCA disease and multivessel CAD. Patient underwent CABG surgery. Figure 3 series.

Conclusion

In suspected acute coronary syndrome, ST-segment elevation in lead aVR with reciprocal ST-segment depressions may be associated with severe LMCA or multivessel disease.

Left main coronary artery or multivessel disease should proceed directly to coronary angiography.

Greater ST segment elevations in lead aVR during acute LMCA insufficiency may predict higher mortality.

References

2. Dr. Smith’s ECG Blog: ST Elevation in Lead aVR, with diffuse ST depression, does not represent left main occlusion. Instructive ECGs in Emergency Medicine Clinical Content. Published Online. N00202016

This research was supported (in whole or in part) by HCA and/or an HCA affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA or any of its affiliated entities.