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Electrocardiogram Quiz – Case 17

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A 74-year-old man with a history of an old myocardial infarction and coronary artery bypass grafting operation (left internal mammary artery graft to left anterior descending artery, and two saphenous grafts to left circumflex and right coronary artery, respectively) 15 years ago presents with exertional angina pectoris of a few weeks' duration. A stress test and a coronary arteriography were scheduled. The patient's 12-lead surface ECG is depicted in figure 1.

Questions

a. How can you explain the ST-segment elevation in leads V2 and V3?
b. What further abnormal findings are present and what can you deduce about the patient's cardiac status?

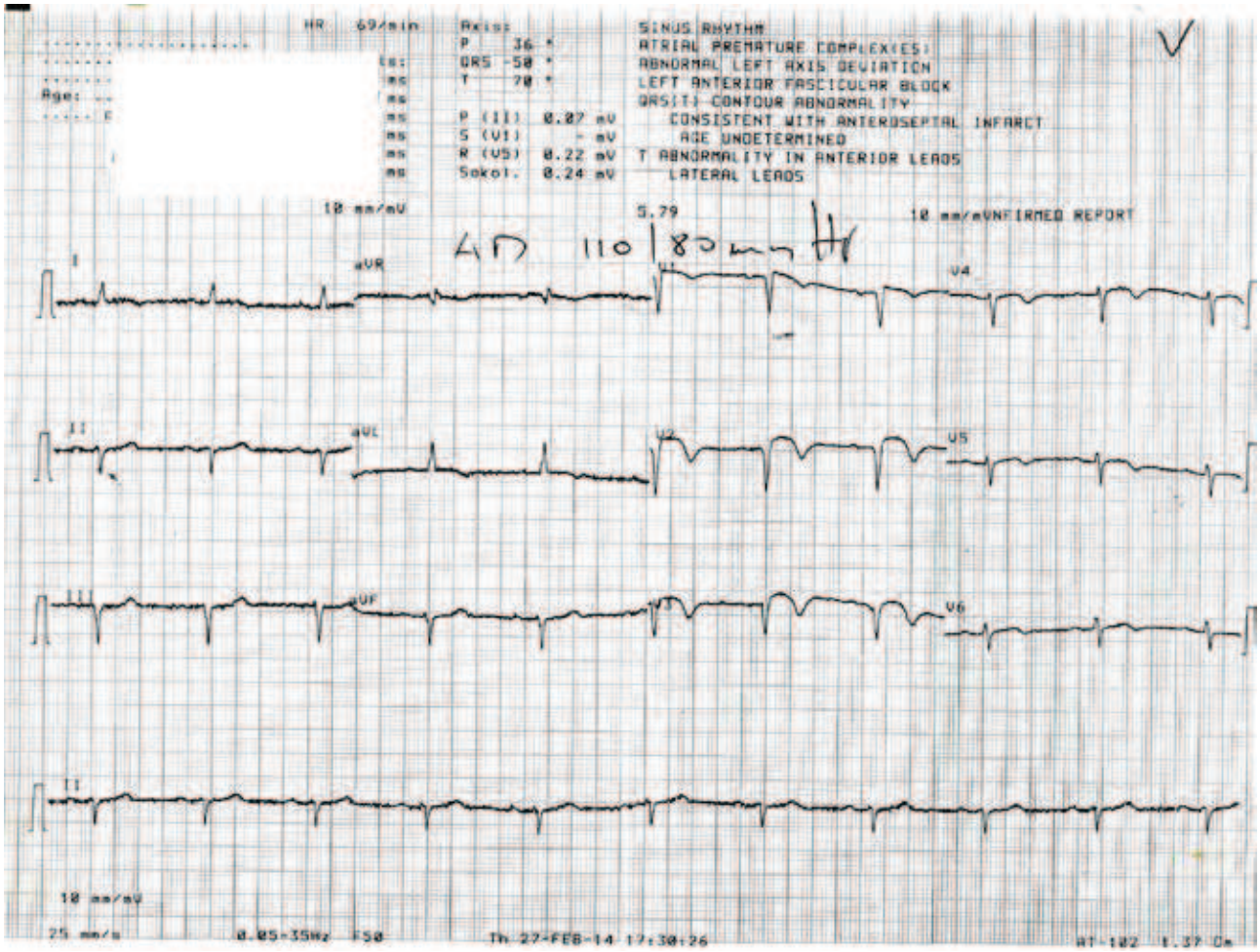

Figure 1

Comment

Lead aVR is frequently ignored in clinical medicine. In fact, many clinicians refer to the 12-lead ECG as the 11-lead ECG, noting the commonly held belief that lead aVR rarely offers clinically useful information.

The electrocardiographic significance of aVR can be summarized in the following; in coronary artery disease, ST-segment elevation in lead aVR (with mirror ST-segment depression in the inferior leads) identifies left main coronary artery (LMCA) obstruction. Lead aVR also helps in differentiating between LMCA and proximal left anterior descending artery (LAD) disease. A higher ST-segment elevation in aVR than that in lead V1 is suggestive of LMCA disease and vice versa indicates proximal LAD disease. Furthermore, in distal LAD occlusion, no ST-segment elevation but rather depression in aVR is observed. Moreover, in case of acute inferior wall myocardial infarction, PR-segment depression in aVR (with concomitant PR-segment elevation in inferior leads) is indicative of atrial infarction. In our patient, persistent ST-segment elevation in precordial leads (V2–V3) and R-wave in lead aVR are suggestive of ventricular aneurysm, an observation known as the Goldberger's sign. In acute ST-segment elevation myocardial infarction, lead aVR usually demonstrates a negative QRS-complex.

Concerning the significance of lead aVR in arrhythmias, a dissociated negative P-wave and a tall R-wave in lead aVR suggests a ventricular origin of the arrhythmia, and is particularly useful in differentiation from supraventricular tachycardia (SVT) with aberrancy. SVTs differentiation and pre-excitation syndrome-related narrow complex tachycardia are other conditions that can be diagnosed by aVR analysis.

Finally, acute pericarditis, tricyclic antidepressants ingestion, pneumothorax, acute pulmonary embolism and dextrocardia are all entities that can be suspected or diagnosed with the proper interpretation of lead aVR, the neglected lead.

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Diagnosis: *Left ventricular aneurysm (Goldberger's sign)*