Country cardiograms case 47: Answer

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The electrocardiogram (ECG) shown in Figure 1 (on page 62) reveals a normal sinus rhythm at a rate of about 75 beats/min. A 2-mm ST-segment elevation (STE) is seen in limb lead aVR. There is diffuse ST-segment depression (STD) in limb leads I, II and aVL, and precordial leads V2 through V6. ST-segment changes appear in limb lead aVL; these changes were not seen in the patient's previous ECG. Based on these changes, the clinical history and the laboratory results, non-STE acute coronary syndrome (NSTE-ACS) complicated by congestive heart failure was diagnosed.

Elevation of the ST-segment in lead aVR is common and has been reported to occur in 13.4%–32.2% of patients presenting with NSTE-ACS.[1–3] In a sample of 572 patients with NSTE-ACS who underwent coronary angiography, elevation in the ST-segment of lead aVR of 1 mm or greater was shown to be the strongest predictor of severe (i.e., requiring surgical intervention) left main and/or 3-vessel disease (LM/3VD).[2] The reported odds ratio was 29.1, with a sensitivity of 80% and a specificity of 93%.[2] By comparison, a positive troponin result was found to have an odds ratio of only 1.27, a sensitivity of 60% and a specificity of 69% for severe LM/3VD.[2]

Limb lead aVR has been called the disregarded lead in ECG interpretation, with most physicians found to be using 11-lead ECG in clinical practice.[4] The reason for this likely relates to the fact that the positive vector of aVR is directed opposite to the other limb leads toward the right upper side of the heart. As such, lead aVR looks into the lumen of the left ventricle.[5] Given this orientation, STE in lead aVR may reflect global subendocardial ischemia.[2,6]

In patients with NSTE-ACS, STE in lead aVR — with or without STD in other leads — has been shown to be predictive of both short-term (in-hospital and 90-day) and 1-year cardiovascular-related death when compared with other ECG changes.[1,3,7] Moreover, the degree of STE in lead aVR has been positively associated with a worse clinical outcome.[1,8]

When a patient presents to the emergency department, signs and symptoms suggestive of ACS with new STE in lead aVR should alert the treating physician to the likelihood of severe LM/3VD, even in the absence of a positive troponin result and other ST-segment changes. Whereas about 10% of patients admitted with ACS will require coronary artery bypass grafting (CABG),[9] patients with NSTE-ACS and STE in lead aVR are significantly more likely to require CABG during the index admission to hospital.[2,3,10]

With respect to the emergency management of NSTE-ACS, current Canadian[9] and American[11] guidelines recommend dual antiplatelet therapy with acetylsalicylic acid and clopidogrel be started at the earliest opportunity, owing to clear improvement in clinical outcomes. That said, the Canadian Cardiovascular Society states that "if it were possible to predict which patients with ACS, at the time of presentation and before coronary angiography, will likely require urgent CABG, it might be possible to withhold clopidogrel in these patients".[9] Historically, this prediction has been difficult to make with accuracy. However, based on some recent evidence[2,3] and prior experience,[10] consideration should be given to withholding clopidogrel if the hospital is equipped with cardiac catheterization, because the probability of these patients requiring in-hospital CABG is high. In the rural setting, NSTE-ACS should be treated in the

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usual manner; however, an argument could be made in favour of giving these patients a higher priority for transfer to a cardiac catheterization centre.

This patient underwent coronary catheterization, which revealed critical 3-vessel disease including 80% stenosis of the left main coronary artery. She subsequently underwent CABG.

For the question, see page 62.

Acknowledgement: The authors thank Dr. Robert Stevenson for critically reviewing the content of this manuscript.

Competing interests: None declared.

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