Country cardiograms case 49: Answer

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The electrocardiogram (ECG) in Figure 1 (on page 143) displays a rhythm of sinus tachycardia, with a rate of 101 beats/min. The PR interval, QRS duration and QT interval are normal. The QRS axis is 65°, a slight swing to the right compared with the previous ECG. P waves are normal. Lead III displays a Q wave of questionable significance — it is shallow but slightly widened. Minor ST segment abnormalities are evident. Abnormal T wave inversion is present in inferior leads II, III and aVF, and in precordial leads V1 through V6. T waves are particularly deeply and widely inverted in leads V1 through V3.

Given that the preoperative ECG was normal, these are clearly significant interval changes. An ischemic origin should be considered, but the negative troponin result is somewhat reassuring in this regard. The 1-week postoperative presentation prompts consideration of pulmonary embolism, which could potentially account for such ECG findings.

Prediction tools are often used to assess the pretest probability of pulmonary embolism, such as the Wells clinical prediction rule[1] in association with PERC (the Pulmonary Embolism Rule-out Criteria).[2] In this case, the Wells score is 4 (and would decrease to 2.5 if the heart rate were less than 100 beats/min rather than the 102 beats/min recorded). A Wells score of 4 or less makes pulmonary embolism "less likely."[3] Using PERC, D-dimer testing is indicated because of the slightly elevated heart rate and the recent surgery. However, the significance of a positive D-dimer result would have to be questioned, given the frequency with which this occurs in the postoperative phase.[4]

It is conceivable in such a scenario, given the abysmal weather and road conditions, as well as the potential risks of a long ground transfer, that a treating physician might derive reassurance from the normal chest radiograph and oxygen saturation levels, and hypothesize that the slight tachycardia is explained by the low-grade fever. In this challenging situation, without the local availability of more sophisticated tests, such as computed tomography angiogram or ventilation perfusion scan, the ECG (which is not part of the Wells or PERC models) becomes a valuable ancillary tool.

Although the ECG did not provide a specific diagnosis in this case, it did provide evidence through the substantial interval changes that something significant had occurred, which helped lead to a presumptive diagnosis of pulmonary embolism. The patient was given low-molecular-weight heparin and transferred for urgent investigations, which confirmed the presence of multiple pulmonary emboli. She was admitted to the regional hospital, where 2 days later she had a pulseless electrical activity arrest. Thankfully, extensive resuscitation and the administration of thrombolysis led to full recovery. Had she been sent home initially, the outcome would probably have been very poor.

With regard to the possible ECG findings in pulmonary embolism, it must be noted that often there are no changes at all. As with normal oxygen saturation level and chest radiography, a normal ECG does not exclude the diagnosis.

Findings on ECG may include sinus tachycardia; a swing of the QRS axis to the right; new right bundle branch

block or incomplete right bundle block; a variety of ST and T wave changes, including significant ST segment depression; and a combination of right axis deviation and T wave changes that gave rise to part of the old "S1Q3T3" terminology (a deep S wave in lead I and deep T wave inversion in lead III). In this patient, although the ECG changes were not specific, a number of the above features were present. They were substantial enough to aid in making the presumptive diagnosis and to contribute to appropriate management.

This case demonstrates the value of the ECG as an adjunct in instances of suspected pulmonary embolism. Although prediction tools are useful, their use can be enhanced by a flexible approach that considers other data.

For the question, see page 143.

Competing interests: None declared.

REFERENCES

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