Ischaemia during exercise stress testing in an athlete with Wolff-Parkinson-White pattern

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DESCRIPTION

A 26-year-old asymptomatic competitive athlete was found to have a delta wave consistent with Wolff-Parkinson-White (WPW) pattern on a preparticipation screening ECG. His medical history was unremarkable and without risk factors for coronary artery disease. Physical examination was normal. An echocardiogram showed a structurally normal heart without evidence of hypertrophic cardiomyopathy or Ebstein's anomaly. He underwent maximal effort cycle ergometer stress testing using 50 mm/s paper speed to minimise artefact and enhance visualisation of the delta wave as part of his risk stratification for sudden cardiac arrest/death.¹ Stress testing revealed 4–5 mm ST segment depressions in II, III, aVF, V4 and V5 with a persistent delta wave at a heart rate at 186 beats/min. At a similar heart rate, there is abrupt loss of the delta wave and complete normalisation of the ST segments (figures 1 and 2). Intermittent delta waves were noted in recovery at 110 beats/min. CT coronary angiography revealed no evidence of coronary artery disease, myocardial bridging or anomalous coronary arteries. The patient was referred for electrophysiology study and ultimately underwent ablation of a left lateral accessory pathway. His postprocedure ECG was normal, and he has returned to competition with no complications.

WPW accounts for at least 3% of sudden cardiac death/arrest in competitive athletes.² Stress testing in athletes with WPW pattern is done to help risk

Figure 1 Computerised average of exercise test showing ST segment depressions in leads II, III, aVF, V4 and V5 concerning for ischaemia. HR, heart rate.

Figure 2 ECG during cycle ergometry exercise testing showing a persistent delta wave with 4–5 mm horizontal/downslowing ST segment depressions in inferolateral leads at a heart rate of 186 bpm (red arrows) and with abrupt loss of the delta wave that coincided with complete normalisation of the ST segments (black arrows).

stratify for sudden cardiac arrest/death. However, exercise testing can result in ST segment depression that in the presence of delta wave are generally felt to be a false positive finding. These abnormal ST segment changes are due to conduction over the

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accessory pathway that result in aberrant depolarisation and repolarisation.³ The ST segment depression generally normalise after loss of the delta wave and with the return of normal ventricular repolarisation via the His-Purkinje system.⁴ Thus, in circumstances when the delta wave and concomitant ST segment depression persist throughout maximal effort stress testing, an individualised approach should be taken to determine the need

for further risk stratification to assess for ischaemia. However, when loss of the delta wave near peak exercise is accompanied by complete resolution of the ST segment depression, further risk stratification is generally not warranted as the ST segment normalisation confirms a false positive finding.

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Patient's perspective

When I found out I had WPW it was quite a shock. I've been active all of my life and elevated my heart rate countless time with no problems. It was frustrating at the time because the diagnosis prevented me from playing rugby for a couple of weeks, but the ablation procedure was quick and recovery was instantaneous.

Learning points

- Exercise testing in athletes with Wolff-Parkinson-White pattern can result in ST segment depression that in the presence of delta wave are generally felt to be a false positive finding.
- The abnormal ST segment changes are due to conduction over the accessory pathway that result in aberrant depolarisation and repolarisation.
- After loss of the delta wave, normal ventricular repolarisation via the His-Purkinje system returns and coincides with normalisation of the ST segments.

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