

## REFERENCES

- 1 Gerlis LM, Partridge JB, Fiddler GI, et al. Two chambered left ventricle: three new varieties. *Br Heart J* 1981; 46:278–284
- 2 Cantrell JR, Haller JA, Ravitch MM. A syndrome of congenital defects involving the abdominal wall, sternum, diaphragm, pericardium and heart. *Surg Gynecol Obstet* 1958; 107:602–614
- 3 Gruberg L, Goldstein SA, Pfister AJ et al. Cantrell's syndrome: left ventricular diverticulum in an adult patient. *Circulation* 2000; 101:109–110
- 4 Maron BJ, Hauser RG, Roberts WC. Hypertrophic cardiomyopathy with left ventricular apical diverticulum. *Am J Cardiol* 1996; 77:1263–1265
- 5 Kay PH, Rigby M, Mulholland HC. Congenital double chambered left ventricle treated by exclusion of accessory chamber. *Br Heart J* 1983; 49:195–198
- 6 Archbold RA, Robinson NM, Mills PG. Long-term follow-up of a true contractile left ventricular diverticulum. *Am J Cardiol* 1999; 83:810–813

## Exercise Testing in Wolff-Parkinson-White Syndrome\*

### Case Report With ECG and Literature Review

Matthew R. Jezior, MD; Steven M. Kent, MD; and J. Edwin Atwood, MD

**ECG changes during exercise stress testing, such as false-positive ST-segment depression and disappearance of the delta wave, are reported in patients with the Wolff-Parkinson-White (WPW) pattern. We present a case of exercise testing in a 53-year-old man with WPW syndrome with ischemic-appearing ECG changes and normal nuclear stress perfusion study findings who was thought to be at clinically low risk for having significant coronary disease. A literature review is discussed. Although ST-segment depression typical for ischemia occurs in half of the patients in whom WPW syndrome is reported, exercise testing is still an important tool in their evaluation. Data other than ECG response can be interpreted in the context of clinical history and physical examination findings to stratify the risk of coronary disease. Complete and sudden disappearance of the delta wave has been seen during exercise in 20% of patients with WPW syndrome and can identify those who are at low risk for sudden arrhythmic death.**

(*CHEST* 2005; 127:1454–1457)

**Key words:** exercise test; preexcitation syndromes; Wolff-Parkinson-White syndrome

**Abbreviations:** EP = electrophysiology; WPW = Wolff-Parkinson-White

**E**CG changes during exercise testing, including ST-segment depression and loss of the delta wave, occur in patients with Wolff-Parkinson-White (WPW) syndrome.<sup>1,2</sup> Since Lamb<sup>3</sup> first reported a case of a false-positive exercise test result in 1959, knowledge of ECG changes in the setting of WPW syndrome has been limited to several studies with small numbers of patients. The following case illustrates typical false-positive ECG changes and the disappearance of the delta wave that are elicited during treadmill testing in a patient with WPW syndrome. We review the literature to determine the frequency and clinical implications of these ECG changes, and discuss clinical situations in which exercise testing may be of value.

### CASE REPORT

A 53-year-old man was sent for exercise testing prior to rotator cuff surgery. He was noted to have the WPW pattern on the ECG during his preoperative evaluation. The patient complained of occasional mild, atypical, nonpredictable chest discomfort. His medical history was unremarkable with no risk factors for coronary artery disease. On physical examination, he was normotensive with unremarkable cardiovascular examination findings. His baseline heart rate was 60 beats/min, and his baseline BP was 118/68 mm Hg. He exercised for 12 min and 24 s, reaching 13 metabolic equivalents with a maximum heart rate of 162 beats/min and a BP of 154/84 mm Hg. The test was stopped because of fatigue. He had no chest pain.

His ECG during testing demonstrated the WPW pattern at baseline, which is consistent with a posteroseptal accessory tract. ST segments were normal at rest (Fig 1, *top left, a*). An ST-segment depression of 1 mm began at 2 min and 50 s (Fig 1, *left top middle, b*), reaching a maximum of 2 mm in leads V<sub>4</sub> to V<sub>6</sub> at 8 min and 50 s (Fig 1, *left bottom middle, c*). The delta wave suddenly and completely disappeared, and the PR interval lengthened at 9 min and 15 s (Fig 1, *left bottom, d*) at a heart rate of 151 beats/min with immediate normalization of ST segments extending through maximum exercise (Fig 1, *right top, e*). In recovery, ST segments remained normal until a heart rate of 90 beats/min occurred, at which time the delta wave reappeared with a recurrence of 1-mm ST-segment depressions (Fig 1, *right top middle, f*, and *right bottom middle, g*). At 5 min into recovery, the ECG had returned to baseline (Fig 1, *right bottom, h*), demonstrating resolution of the ST-segment depression with the normalization of the depolarization abnormality.

A nuclear exercise perfusion study was subsequently performed. The same ECG changes were demonstrated. Myocardial perfusion imaging was normal with no evidence of infarction or ischemia. Given his atypical symptoms, lack of risk factors, excellent exercise capacity without ischemic symptoms during

\*From the Cardiology Service, Walter Reed Army Medical Center, Washington, DC.

Manuscript received September 29, 2004; accepted September 30, 2004.

The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

Reproduction of this article is prohibited without written permission from the American College of Chest Physicians (e-mail: permissions@chestnet.org).

Correspondence to: Matthew R. Jezior, MD, Captain, US Army Medical Corps, Cardiology Service, Walter Reed Army Medical Center, Washington, DC 20307; e-mail: matthew.jezior@na.amedd.army.mil

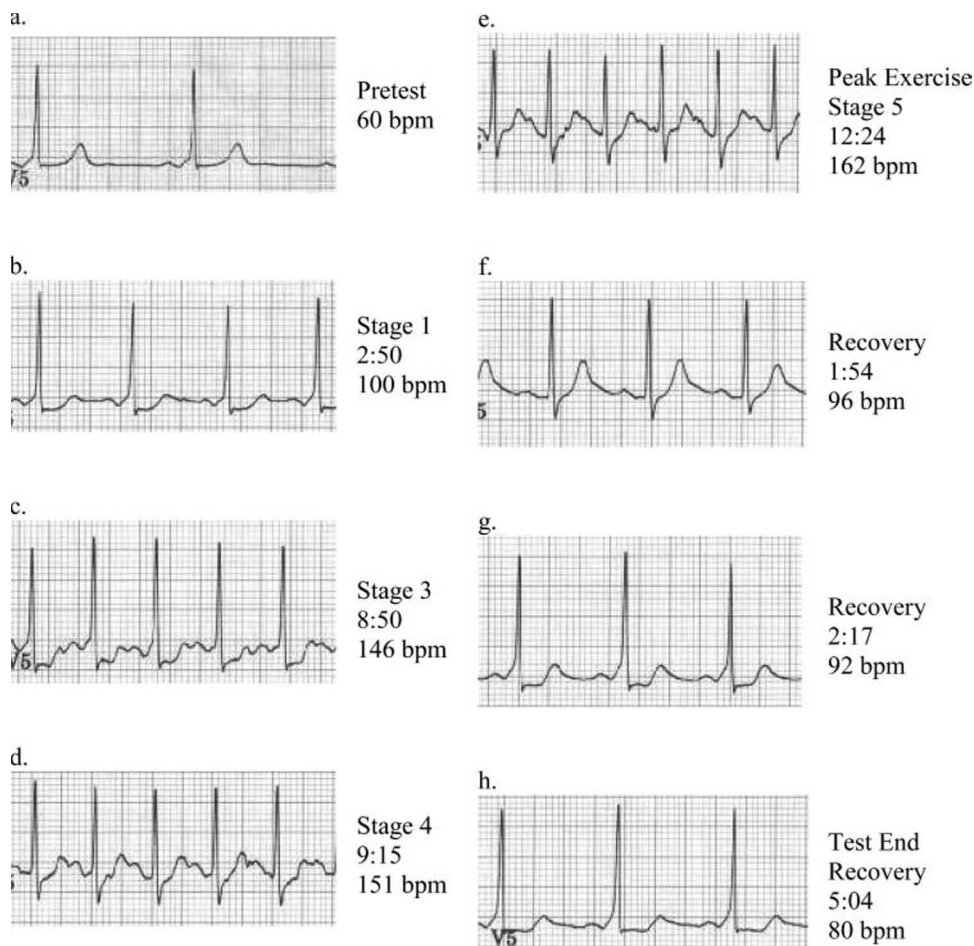


FIGURE 1. Exercise test ECGs. bpm = beats per minute.

exercise testing, and normal nuclear perfusion imaging findings, the patient was thought to be at low risk for having significant coronary artery disease. As concluded in several reports<sup>1,2,4</sup> describing otherwise low-risk patients with exercise-induced ST changes in the setting of WPW syndrome, our patient was thought to have had a false-positive exercise test result. He completed noncardiac surgery without complication.

## DISCUSSION

WPW is a conduction disturbance in which atrial impulses are transmitted to the ventricle by an accessory pathway in addition to normal atrioventricular conduction. The result of these multiple fronts of depolarization is the delta wave, as well as a short PR interval and a widened QRS complex.<sup>5</sup> During exercise, increases in sympathetic tone and vagolysis, and subsequent changes in the automaticity of conductive tissues may result in several ECG changes. ST-segment depression typical for ischemia has been reported.<sup>1,2</sup> Accordingly, the current guidelines classify exercise testing in patients with WPW syndrome as a IIb indication (*ie*, usefulness/efficacy is less well established by evidence/opinion).<sup>6</sup>

### ST-Segment Changes

The ischemic-appearing ST segment has been reported during exercise with depressions of up to 8 mm having

been described.<sup>2</sup> We identified 176 patients who underwent exercise testing in eight studies<sup>1,2,4,7-11</sup> as having preexcitation, with ischemic-appearing changes occurring in 86 patients (49%) [Table 1]. Although the majority of these patients did not undergo angiography, most were thought to be at low clinical risk for significant coronary artery disease. Therefore, these ST changes were thought to be false-positive results.<sup>2</sup>

In the case of a complete block of the accessory pathway resulting in the disappearance of the delta wave, the ST segments typically normalize, representing ventricular activation and repolarization via the His-Purkinje system alone. However, the ischemic-appearing ST segments may persist despite disappearance of the delta wave. In a population thought to be experiencing false-positive exercise tests, Poyatos et al<sup>2</sup> demonstrated the normalization of ST segments on the ECGs of 20 of 28 patients whose delta waves had disappeared, with 8 patients continuing to display ST-segment depression on their ECGs. A proposed mechanism for this phenomenon is the concept of "cardiac memory" with persistence of abnormal repolarization, as can be seen with the cessation of pacing or the resolution of a bundle branch block.<sup>12</sup>

To improve diagnostic accuracy, nuclear perfusion imaging has been evaluated. However, several studies<sup>2,7-10</sup>

Download English Version:

<https://daneshyari.com/en/article/9161951>

Download Persian Version:

<https://daneshyari.com/article/9161951>

[Daneshyari.com](https://daneshyari.com)