

Brief Report

Exercise-induced left bundle branch block in a young female athlete

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Abstract An 11-year-old female, in apparent good health, was referred to our Institute because of exercise-induced left bundle branch block detected during a Master's step test performed to obtain the clearance for competitive sport. The tests that we performed to investigate the possible causes were all negative. We suspect, however, that the left bundle branch block is the initial sign of cardiomyopathy. If our suspicions are correct, close follow-up is important to chart the possible progression of the disease.

Keywords: Electrocardiography; child; exercise

IN ALMOST NINE-TENTHS OF CASES, LEFT BUNDLE branch block is caused by surgery involving the aortic valve or the subvalvular outflow tract. Less commonly, it can be produced by endocarditis, hypertrophic cardiomyopathy, myocardial infarction, or other idiopathic causes.¹ Exercise-induced left bundle branch block is a phenomenon that has been observed in exercising adults, but to the best of our knowledge has not previously been encountered in children. When adults are exercised, the abnormal electrocardiographic pattern is seen in 0.5% of studies, and has been found to be an independent predictor of mortality and morbidity.² We describe here the induction of the abnormal pattern in an 11-year-old girl.

Case report

It was reported to us that CT, an 11-year-old girl, in apparent good health, had developed left bundle branch block during a Master's step test. For this reason, she came to our Institute to exercise on the cycle ergometer³ in order to obtain clearance for competitive sport, specifically artistic skating.

The girl was completely asymptomatic, she was not taking any medication, and had no significant

previous history; although her parents remembered a feverish episode, with a skin rash, 1 year ago. The grandmother also has left bundle branch block, first diagnosed at the age of 72 years.

The cardiological examination was normal. Her electrocardiogram revealed sinus rhythm, with a PR interval of 0.12 s. The heart rate was 80 beats/min, and the corrected QT interval was 0.36 s, normal for her age. Her echocardiogram was also normal.

The cycle ergometer exercise test was conducted with impedance cardiography according to the protocol of James. Left bundle branch block appeared at a heart rate of 136 beats/min. At this stage, there was a decrease in both systolic blood pressure and in cardiac output. Prior appearance of the bundle branch block, systolic blood pressure had been 132 mmHg, and cardiac output was 11.7 l/min. Subsequent to the development of the bundle branch block, systolic blood pressure fell to 110 mmHg, and cardiac output to 6.6 l per min (Fig. 1). During the period of recovery, normal atrioventricular conduction was restored at a rate of 120 beats/min. (Fig. 2).

Twenty-four-hour Holter monitoring revealed that atrioventricular conduction was normal except that left bundle branch block appeared when the heart rate was greater than 130 beats/min, albeit that no symptoms were described in the diary.

Cardiac magnetic resonance imaging failed to reveal any evidence of structural abnormalities, or replacement of myocardium by adipose or fibrous tissues. Myocardial scintigraphy demonstrated no

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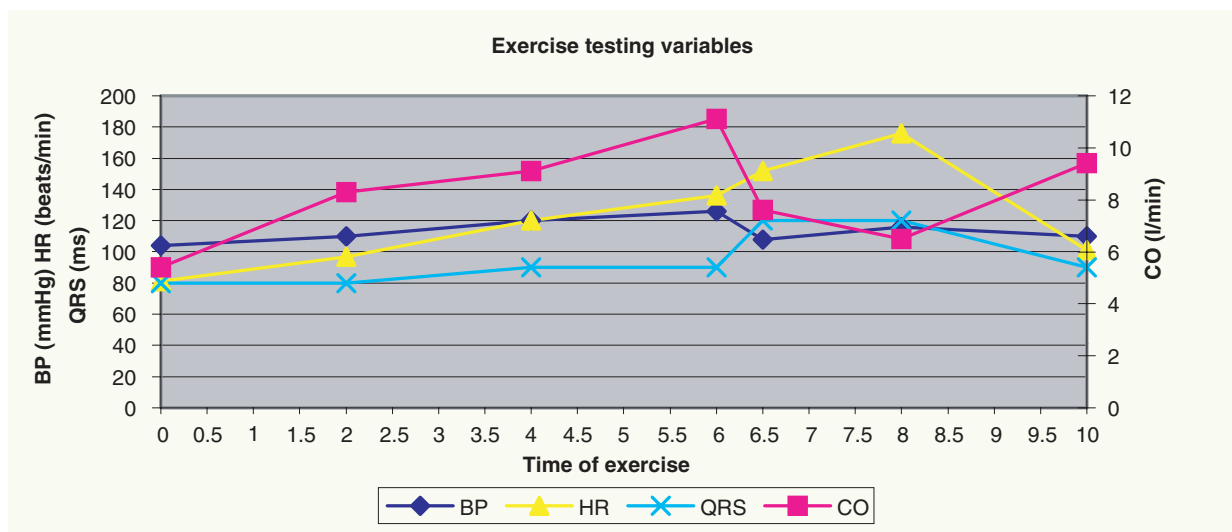


Figure 1.

Findings during the cycle ergometer test. CO: cardiac output (l/min); HR: heart rate (beats/min); BP: blood pressure (mmHg); QRS: QRS complex duration (ms).

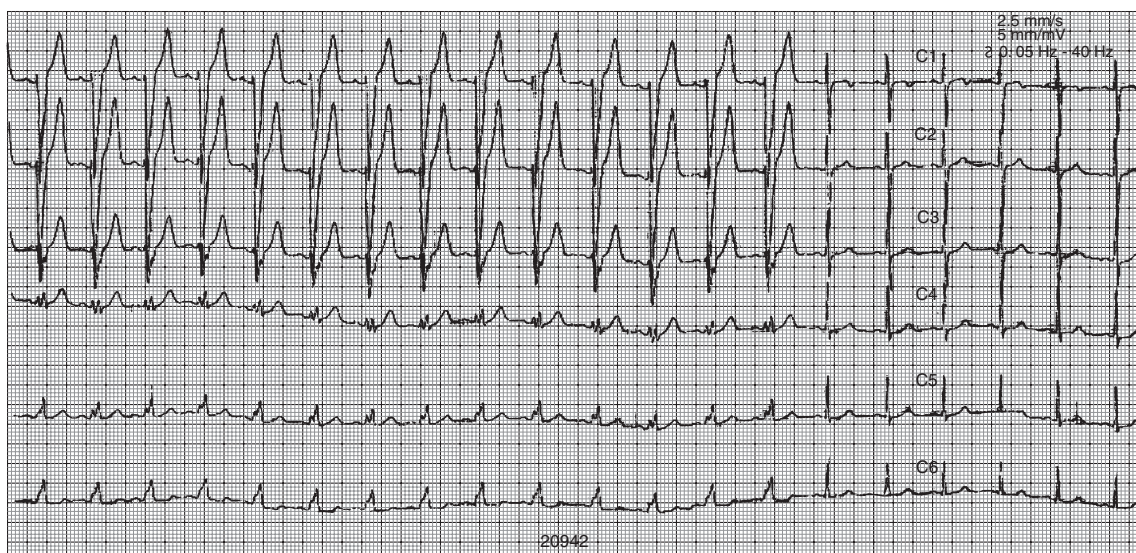


Figure 2.

The electrocardiographic tracings normalised in the recovery period after exercise at a heart rate of 120 beats/min.

abnormalities, and neither did cardiac catheterisation or coronary angiography. Searches for Parvovirus B19, Cytomegalovirus, Herpesvirus 6, and Coxsackie virus were all negative.

Discussion

Previous studies have attempted to stratify exercise-induced left bundle branch block by the heart rate at onset, showing that a heart rate of 125 beats/min or more at the onset of left bundle branch block correlates with normal coronary arterial perfusion at

angiography.⁴ Patients with normal coronary angiograms, however, were subsequently found to have perfusion defects on isotope perfusion studies, suggesting that the lesion was a deficiency of the coronary microcirculation.⁵ Other studies have identified coronary arterial spasm as the cause of the exercise-induced left bundle branch block.⁶ In one instance, nonetheless, an adult with exercise-induced left bundle branch block and otherwise normal investigations subsequently developed dilated cardiomyopathy.⁷ In our patient, the abnormal electrocardiographic finding was unlikely to be related to coronary artery

disease, so it was logical to screen the child carefully for developing cardiomyopathy. Although the tests have thus far proved negative, we retain the suspicion that there may be a latent cardiomyopathy, so we will follow that patient carefully. At this stage, it was imperative for the patient to refrain from competitive sport, following the guidelines of the Italian Cardiology Committee for Sports Participation.⁸ In those with exercise-induced left bundle branch block, the risks of low cardiac output are significant during sporting activity.

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