

Postural heart block*

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SUMMARY A patient presented with orthostatic dizziness and syncope caused by postural heart block. When the patient was supine, atrioventricular conduction was normal and he was asymptomatic; when he was standing he developed second degree type II block and symptoms. The left bundle-branch block on his electrocardiogram and intracardiac electrophysiological study findings suggest that this heart block occurred distal to the His bundle.

Orthostatic symptoms are usually presumed to be secondary to an inappropriate distribution of intravascular volume or to autonomic nervous system abnormalities. As shown in this patient, these symptoms may be the result of orthostatic heart block. Ambulatory monitoring may be useful in patients with orthostatic neurological symptoms, particularly when conduction abnormalities are present on the electrocardiogram.

Orthostatic neurological symptoms usually result from inadequate cerebral perfusion caused by disturbances of the autonomic nervous system,¹⁻³ ineffective or inappropriate shifts in volume distribution,⁴ or drugs.⁵ We report a patient with orthostatic dizziness and syncope caused by intermittent postural heart block.

Case report

A 53-year-old truck driver was asymptomatic until February 1976 when he experienced dizziness and syncope after standing. In the next 18 months he experienced three more episodes of syncope and many of dizziness. All occurred when he changed from a sitting or supine to a standing position. Neurological examination, an electroencephalogram, and a brain scan were normal. An electrocardiogram revealed left bundle-branch block and a prolonged PR interval. Twenty-four hour ambulatory monitoring and a treadmill exercise test were unremarkable. He was referred to the University of Oregon Health Sciences Center in October 1977 for further evaluation.

On examination, the supine blood pressure was 140/70 mmHg and the upright pressure was 125/70 mmHg. The pulse rate when supine was 80 beats a

minute and regular, and increased to 90 beats a minute with some irregularity when he was upright. The carotid pulse was normal, and there were no carotid bruits. The cardiac impulse was normal. The second heart sound was paradoxically split. There was a grade 2/6 apical systolic murmur. These findings did not change when the patient changed from the supine to the standing position. The remainder of the physical examination was normal. An electrocardiogram disclosed left bundle-branch block with a PR interval of 0.21 second. Chest x-ray film was normal. An echocardiogram disclosed left atrial enlargement. All blood tests performed including the glucose level were normal.

On numerous occasions the patient's pulse rate fell with standing, and each time he felt dizzy. Because of the pulse changes, a continuous electrocardiographic rhythm strip was taken during the change of position (Fig. 1). When supine, the patient had a regular sinus rhythm at 100 beats a minute; when he stood up, he was again dizzy and intermittent type II second-degree atrioventricular block was seen. After resuming a supine position he returned to normal sinus rhythm at a rate of 100 beats a minute. Carotid sinus massage resulted in sinus arrest with two second pauses but no symptoms.

His bundle electrocardiography was performed the following day. At the start of the study the patient was in normal sinus rhythm. When a

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number 7 French tripolar His bundle recording catheter was advanced across the tricuspid valve into the right ventricle, the patient developed complete heart block below the His bundle (Fig. 2); the ventricular escape rate was 24 beats a minute. The patient felt dizzy but was alert and able to speak. The third degree heart block was not abolished by the intravenous injection of 1 mg atropine or by withdrawal of the wire from the right ventricle. The wire was then advanced into the right ventricle and ventricular pacing was established; the patient became pacemaker dependent. Subsequently, he returned to sinus rhythm with first degree atrioventricular block. His bundle recordings showed normal PA and AH intervals but the HV interval was much prolonged (116 ms, normal <55 ms).⁶ His bundle recordings could not be obtained during standing because of his condition. A permanent pacemaker was implanted and after 14 months the patient remains completely free from his previous symptoms.

Discussion

The orthostatic symptoms in this patient were caused by the development of high degree atrioventricular block when he assumed the upright

position. This is the first case that we are aware of where heart block was shown to be orthostatic. Though postural symptoms are most commonly secondary to volume or autonomic nervous system abnormalities (which may be caused by micturition, swallowing, coughing, and hiccoughing),⁵ changes in conduction should now also be considered.

There are a number of features that suggest that the type II block occurred distal to the His bundle. The initial electrocardiogram showed left bundle-branch block. The patient developed type II block which usually occurs below the His bundle,⁷ particularly in the absence of digitalis toxicity or congenital cardiac defects. The HV interval was greatly prolonged and the site of heart block was shown to be below the His bundle. The latter cannot be related directly to his presentation because induction of the right bundle-branch block by a catheter in the right heart⁸ in this patient with left bundle-branch block could have been the cause of the complete heart block. This rhythm could not be precipitated by carotid sinus massage nor, when present, did it respond to the administration of atropine; both suggest that the block was more likely to have occurred in the distal conduction system.⁵ Though complete heart block below the His bundle has been reported secondary to carotid sinus massage suggesting some vagal or sympathetic

Fig. 1 When supine the patient was asymptomatic and in sinus rhythm at the rate of 100 beats a minute (top strip): when he stood, intermittent type II second degree atrioventricular block developed (bottom strip) and he was dizzy. Paper speed 25 mm/s.

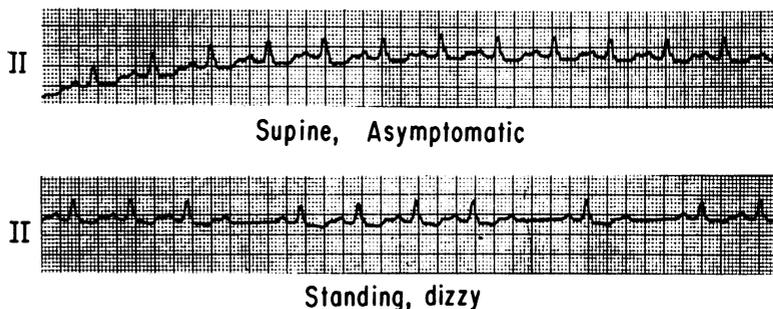
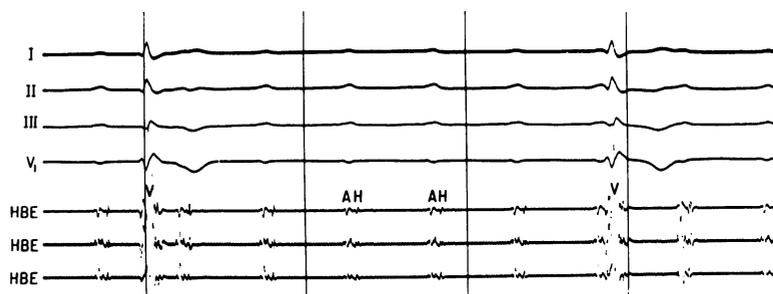


Fig. 2 His bundle tracings taken as the recording catheter was passed into the right ventricle shows complete heart block below H with a ventricular (V) escape rate of 24 beats/min. Leads I, II, III, and V₁, from the surface electrocardiogram, and three His bundle leads (HBE) are shown. A is the atrial depolarisation and H is the His bundle depolarisation. Paper speed 100 mm/s.



withdrawal effects on distal Purkinje conduction,⁹ this is unusual.¹⁰

Our patient demonstrates that orthostatic neurological symptoms may be secondary to postural heart block. He did not have symptoms with all changes in posture, which is probably why 24-hour electrocardiographic monitoring failed to provide the answer. In a patient with orthostatic symptoms, however, a determined effort should be made to obtain ambulatory electrocardiograms, especially in patients with electrocardiographic evidence of conduction disease.

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