

Unusual manifestation of carotid sinus massage in a patient with left anterior hemiblock: case report

Nietypowe objawy po masażu zatoki szyjnej u chorej
z blokiem przedniej wiązki lewej odnogi – opis przypadku

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Abstract

A 65-year-old diabetic and hypertensive woman was admitted for evaluation of syncope. Her baseline electrocardiogram revealed normal sinus rhythm with left anterior hemiblock. Her treadmill test, holter monitoring and external loop recorder examinations were normal. Right sided carotid sinus massage (CSM) revealed 2:1 atrioventricular block (AV) (Mobitz II type) while left sided CSM had no effect. Permanent pacemaker implantation was performed (DDIR, St Jude Medical, USA). Mobitz II type AV block due to CSM reflects enhanced vagal efferent tone on AV node and his bundle fibre.

Key words: syncope, atrioventricular block, Mobitz II type, carotid sinus massage, left anterior hemiblock

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Introduction

Carotid sinus massage (CSM) is an important diagnostic manoeuvre for evaluation of syncope [1]. A normal response to carotid sinus massage is a transient decrease in the sinus rate, slowing of atrioventricular (AV) conduction, or both. It is an outcome of negative chronotropic and dromotropic response as a result of reflex parasympathetic response. The response of CSM can be cardioinhibitory (asystole), vasodepressive (fall of systolic blood pressure), or mixed. Carotid sinus hypersensitivity is defined as a sinus pause longer than 3 seconds and fall of systemic blood pressure of 50 mm Hg or more. It is detected in approximately one third of patients presenting with syncope and also commonly observed among asymptomatic elderly patients. Therefore, carotid sinus hypersensitivity should be approached cautiously after excluding alternative causes of syncope [2, 3].

Case report

A 65-year-old woman visited outdoor patient department for evaluation of an episode of transient loss of consciousness. She was diabetic and hypertensive for past 7-years for which she was receiving metformin – 500 mg twice daily and ramipril – 10 mg daily. Her past history indicated that she had experienced frequent similar episodes over 1–2 years. Physical examination was normal. Her blood pressure and pulse rate was 138/82 mm Hg and 72/minute respectively. Routine haemogram and electrolytes were normal. A 12-lead electrocardiogram showed sinus rhythm with left anterior hemiblock (Figure 1, 2). Echocardiography was within normal limits except from mild concentric hypertrophy of left ventricle. She was admitted and her treadmill test during subsequent evaluation was normal. Her holter examination and external loop recording test performed by Ambulatory Mars PC (Siemens, Germany) were also normal.

Subsequently during further workup, CSM was performed. Auscultation of both carotid arteries was normal. Surface electrocardiogram was recorded using limb leads (lead I, II and III). Beat-to-beat blood pressure was recorded by means of a digital photoplethysmographic device. After 10 minutes' supine rest, CSM was performed for 5 seconds over the point of maximal carotid pulsation (usually at the level of the upper border of the cricoid cartilage). Blood pressure and heart rate responses were monitored throughout. Right sided CSM revealed 2:1 AV block which was labelled as Mobitz type II with a drop of systolic blood pressure by 30 mm Hg (Figure 3). Left-sided CSM did not alter the cardiac rhythm. The finding of Mobitz type II AV block was consistent with her symptom and permanent pacemaker implantation was performed (DDIR; St. Jude Medical, USA). She was discharged in stable condition and is in regular follow up since then.

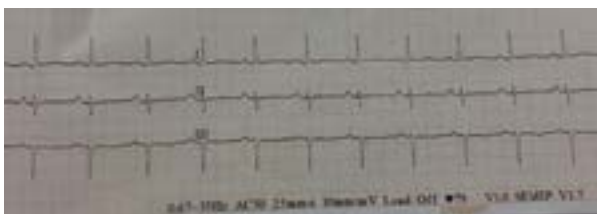


Figure 1. Baseline electrocardiogram showing normal sinus rhythm with left anterior hemiblock (only limb leads have been shown)

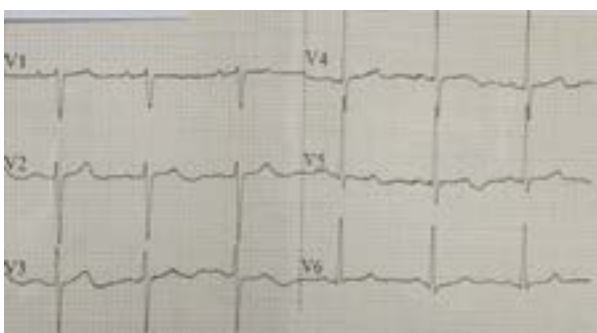


Figure 2. Baseline electrocardiogram showing normal sinus rhythm (only precordial leads have been shown)

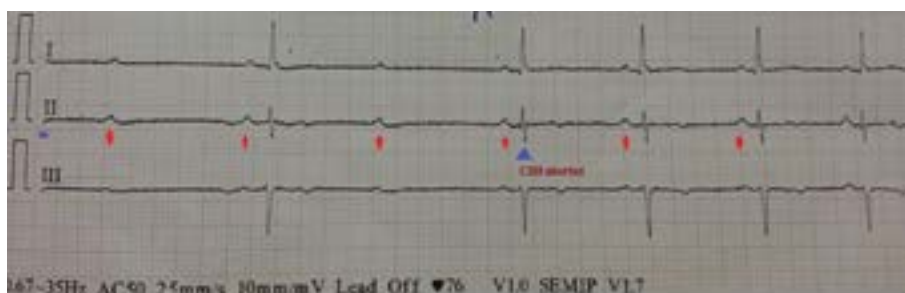


Figure 3. Electrocardiogram showing Mobitz type II atrioventricular block after carotid sinus massage (blue star) and resumption of normal rhythm after termination of carotid sinus massage (blue arrow head)

Discussion

The ventricular conduction system is composed of three main anatomically and physiologically discrete fascicles: the right bundle branch and the anterior and posterior divisions of the left bundle branch. Chronic asymptomatic fascicular block is frequently bifascicular in nature, involving most often the right bundle and the anterior division of the left bundle. Electrophysiological studies of His bundle have shown that failure of impulse propagation occurs usually in the ventricular Purkinje system which is considered to be devoid of significant cholinergic innervations. Patients prone to Stokes-Adams attacks often have evidence of bundle branch disease during periods of intact AV conduction [4]. Transient complete heart block occurs frequently during CSM which usually results from suppression of conduction in the AV node and is often accompanied by evidence of first degree or Mobitz I block immediately preceding or following the period [5, 6].

The rhythm strip recorded prior to CSM shows a baseline sinus rhythm with left anterior hemiblock. Right sided CSM triggered a Mobitz type II AV block which was a 'positive' CSM response although atypical. It was atypical in the sense that there was neither sinus node dysfunction nor any vasodepressor reflex. Sinus node dysfunctions in form of sinus pauses, asystole, and sinus arrest are anticipated events with CSM in patients with carotid sinus hypersensitivity. Since these elements of the cardiac conduction system are influenced by vagal efferent fibres, the physiological effects of CSM are attributed primarily to enhanced vagal efferent tone. Influence of parasympathetic system diminishes substantially in more distal aspects of the conduction system.

Phase-4 depolarization at slow heart rates has been implicated in the mechanism of conduction block induced by CSM. Rosenbaum et al. [7] concluded that the most likely explanation for bradycardia-dependent block was hypopolarization, spontaneous diastolic depolarization and a shift of the threshold potential toward zero. The resultant lowered membrane potential would adversely affect the rate of depolarization of the

subsequent beat and could produce conduction block. In their reported cases, cessation of paroxysmal A-V block was always associated with a ventricular escape beat which presumably activated the blocked region, thus depolarizing it, and allowing antegrade conduction to resume [8]. In our case, it was not observed. Thus, our case supports the notion that in selected case certain infra-AV nodal sites may be sensitive to vagal manoeuvre. The CSM observation in this patient demonstrates once

again the wide range of manifestations of neural reflex activity in the heart. Our case also illustrate that the neural reflex associated with CSM has multiple facets, and the impact of the manoeuvre extends beyond the sinus node.

Conflicts of interest(s)

There are no conflicts of interest.

Streszczenie

Kobieta w wieku 65 lat z cukrzycą i nadciśnieniem tętniczym została przyjęta na obserwację z powodu omdlenia. W wyjściowym elektrokardiogramie stwierdzono prawidłowy rytm zatokowy z blokiem przedniej wiązki lewej odnogi pęczka Hisa. Wyniki testu wysiłkowego na bieżni oraz zapisy z monitora holterowskiego i zewnętrznego rejestratora pętlowego były prawidłowe. Prawostronny masaż zatoki szyjnej (CSM) ujawnił blok przedsionkowo-komorowy (typu Mobitz II) 2:1, natomiast lewostronny CSM nie spowodował żadnego efektu. Chorej wszczepiono stały stymulator serca (DDIR, St Jude Medical, Stany Zjednoczone). Blok przedsionkowo-komorowy typu Mobitz II spowodowany CSM odzwierciedla wzmożone napięcie części eferentnej nerwu błędnego w węzle przedsionkowo-komorowym i włóknach odnogi.

Słowa kluczowe: omdlenie, blok przedsionkowo-komorowy, typ Mobitz II, masaż zatoki szyjnej, blok przedniej wiązki lewej odnogi

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