CASE REPORT

Ventricular fibrillation induced by carotid sinus massage without preceding bradycardia

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Abstract Carotid sinus massage is widely used to detect carotid sinus hypersensitivity in patients presenting with syncope. Although generally safe, the risks associated with the procedure may not be fully appreciated by either the patient or the attending medical staff. We present the case of a patient who developed ventricular fibrillation during carotid sinus massage, not explained by preceding bradycardia or concomitant predisposing heart disease, and which highlights the need for ready availability of resuscitation equipment during this procedure. © 2005 The European Society of Cardiology. Published by Elsevier Ltd. All rights reserved.

Introduction

Carotid sinus massage is a simple and widely used procedure for the diagnosis of carotid sinus hypersensitivity, and the termination of certain types of supraventricular tachycardia. Although carotid sinus massage is generally safe, there are some potentially serious complications, of which the best known include thromboembolic stroke and prolonged asystole or hypotension. We report an additional little known complication, which emphasizes the need for careful monitoring and the availability of full resuscitation equipment when undertaking carotid sinus massage, particularly when this is performed in an outpatient setting.

Case

A 76-year-old man was admitted with a history of recurrent spontaneous syncope. He was previously in good health, took no regular medications, and had no history or major risk factors for...
ischaemic heart disease. Cardiovascular and neurological examinations were normal. A 12-lead electrocardiogram (ECG) showed sinus rhythm without conduction system disease and with a normal QT interval. Voltage criteria for left ventricular hypertrophy were present with inferolateral repolarisation changes. Urea, electrolytes including magnesium, thyroid function, and chest X-ray were all normal.

He was monitored on the coronary care unit without documented arrhythmia, and carotid sinus massage was performed for diagnostic purposes. Right-sided carotid sinus massage was uneventful, but within 3 s of left sided carotid sinus massage, he developed ventricular fibrillation, requiring DC cardioversion. Sinus rhythm was successfully restored following a single external monophasic 200 J shock. Analysis of the recorded rhythm strip during carotid sinus massage showed no evidence of preceding bradycardia or degenerating polymorphic ventricular tachycardia (Fig. 1).

A 12-lead ECG showed no evidence of subsequent myocardial infarction, and cardiac troponin T measured on two occasions was within the normal range (<0.02 μg/L). Transthoracic echocardiography was normal. He was transferred to a tertiary centre for further assessment. Signal averaged electrocardiography did not reveal late potentials, the administration of a 100-mg intravenous bolus of flecainide revealed no ECG changes to suggest the Brugada syndrome, and a ventricular stimulation study using a drive train of 450 ms and three extrastimuli were negative. Repeated right and left carotid sinus massage did not reproduce any ventricular arrhythmias. Despite these results, it was felt that there was a high likelihood of recurrent ventricular arrhythmias, and he subsequently underwent uncomplicated implantation of a defibrillator (ICD). To date, he has had no recurrence of ventricular arrhythmia or delivered therapy from the device. The cause of his syncope, and its relationship to his episode of ventricular fibrillation during carotid sinus massage, remains unclear.

Discussion

A handful of case reports from the 1960s describe ventricular arrhythmias, including ventricular fibrillation and ventricular tachycardia, following carotid sinus massage [1–4]. There have been no similar reports in the modern era of invasive cardiology [5], and this would suggest that ventricular fibrillation following carotid sinus massage is rare. Despite this, current awareness of the potential for this to occur appears poor, and recent guidelines on upright CSM on a tilt table do not include this as a potential complication [6].

Most previously reported cases occurred when carotid sinus massage was used in an attempt to terminate supraventricular tachycardia, and many patients were reported to have had other coexisting conditions including ischaemic heart disease, heart failure and atrioventricular block. As such, most patients were not in sinus rhythm at the time of carotid sinus massage. Potential mechanisms leading to ventricular fibrillation may have included increased vagal tone, and vagally mediated catecholamine release leading to ventricular ectopy and tachyarrhythmia, possibly augmented by the use of digoxin. Rebound sympathetic activity following carotid sinus stimulation may have also played a role.

In the case featured, extensive investigation revealed no underlying structural heart disease, or obvious predisposition to ventricular arrhythmia, and the patient was in sinus rhythm at the time of carotid sinus massage. Although he did not undergo coronary angiography, there was no clinical evidence of coronary artery disease. The mechanism for induction of ventricular fibrillation is unclear, but this was not due to preceding bradycardia. This case highlights the need for

Figure 1  Rhythm strip showing induction of ventricular fibrillation without preceding bradycardia following left carotid sinus massage.
vigilance and the ready availability of resuscitation equipment. This also raises the question of requirement for informed consent prior to carotid sinus massage.

References


