

An elderly woman with unexplained falls and «tingling sensations in the head»

A fit and self-sufficient woman in her 80s was referred from the emergency department to the specialist outpatient falls clinic (Fallpoliklinikken) in the Department of Geriatric Medicine. She had fallen several times, abruptly and to the floor without being able to stop herself, and had dislocated a number of fingers as well as sustaining a facial haematoma. She did not think she had lost consciousness and attributed the falls to haste and carelessness.

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The patient, a woman in her 80s, had had a number of falls in recent years, both with and without injuries. She and her husband lived in a one-floor apartment. They received home-help only once every two weeks and no home nursing. The woman had bilateral hip prostheses after hip fractures sustained 35 and 15 years earlier respectively, and proven osteoporosis. She had also had a stroke four years earlier, with minor right-sided sequelae, and had developed claw foot on the left side after tendon rupture caused by a cortisone injection.

She recounted several episodes when she had fallen to the floor without warning. She believed she remembered what had happened and that she had not lost consciousness. At the same time, she also described frequent, short bouts of intense dizziness or «tingling» in her head where she felt she was about to faint. She had never fallen in these situations.

Her medical history made her an appropriate candidate for a multifactorial falls risk assessment (1). According to guidelines from the British and American Geriatrics Societies, elderly patients living at home who experience two or more falls, falls that require medical attention, or who have gait and balance problems, should be referred for falls risk assessment (2). The contents of such an assessment are briefly summarised in Figure 1.

The interdisciplinary investigation by the Fallpoliklinikken revealed an abnormal walking pattern — she walked without an aid indoors and had good static balance, but reduced dynamic and reactive balance. This meant that she had problems with balance when she walked and if she encountered an obstacle along the way, and in addition, she had impaired ability to recover from unsteadiness. There was general weakness in her legs, and reduced mobility in her hip joints.

Physical examination was unremarkable — she had normal coordination, normal sensibility in her feet, normal reflexes, no hypokinesia, rigidity or tremor and no tendency to fall in the Romberg test. Cognitive performance was normal. A drop in systolic blood pressure of 20 mm Hg was measured one minute after standing from a supine position, but she reported no symptoms and it was therefore not considered to be orthostatic hypotension. An ECG revealed sinus rhythm.

Impaired joint position sense due to hip prostheses, claw foot, and reduced strength and balance to the extent of requiring a walking aid were assumed to be significant contributors to her tendency to fall. Her description of «tingling in the head» is vague and unspecific. It was difficult to judge whether the «tingling» was related to the falls and was a key symptom. The patient was, however, otherwise cautious in her account of her illnesses and symptoms, and the dramatic falls made us suspect syncope. She was initially referred for the tilt-table test as part of a research project, where she managed 40 minutes tilted at 70° without a fall in blood pressure or bradycardia.

Suspicion of syncope or unexplained falls in the elderly should trigger syncope assessment. Falls in the elderly often go unwitnessed, amnesia for syncope is present in almost 30% (3, 4), and cognitive impairment may make it difficult to obtain a good history. Recommendation for use of the tilt-table test in syncope assessment has been moderated in the new guidelines (5), to only those cases where there is clear suspicion of reflex syncope and where it is thought the result will have therapeutic or pedagogic significance, for example, the patient will learn to recognise prodromal symptoms. The tilt-table test suffers from lack of specificity and sensitivity, and the syncope mechanism in

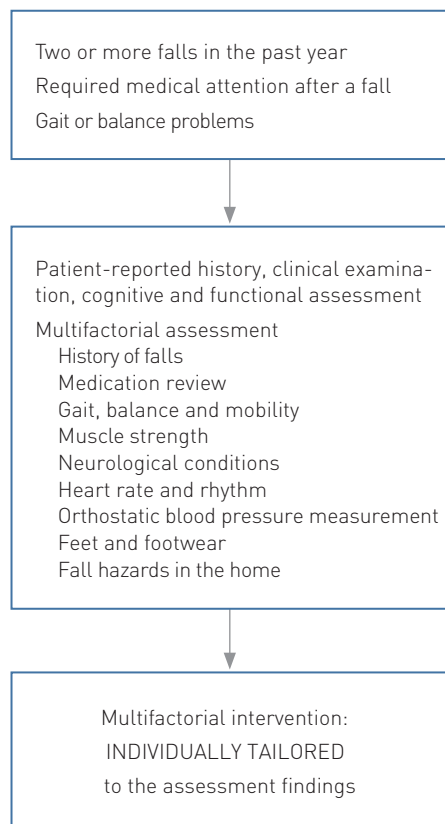


Figure 1 Algorithm for assessment of fall risk in the elderly (modified from the guidelines of the American Geriatrics Society and British Geriatrics Society) [2]

the test corresponds poorly with mechanisms of genuine syncope (5).

The tilt-table test did not yield an answer, but the suspicion of syncope indicated further assessment. She was therefore given another appointment. In the weeks since the first consultation, the bouts of warm feelings in the chest and tingling in the head had become more frequent, and it became clearer to us that they probably were related to the falls and unsteadiness. The episodes could occur either while sitting or standing upright, but she usually avoided

falling by holding on to something or leaning against a wall.

The Fallpolikliniken was at that time quite new, interest in syncope was increasing and diagnostic skills improving, and during continuous blood pressure measurement and ECG recordings, we performed the clinic's first carotid sinus massage.

Carotid sinus massage belongs in the initial assessment of patients over 40 years of age who have experienced syncope, along with their self-reported medical history, physical examination with ECG and orthostatic blood pressure measurement (5). Compression of the carotid artery bifurcation leads to lower heart rate and a fall in blood pressure in most people, but in some it triggers an abnormal response.

Carotid sinus hypersensitivity is defined as a ventricular standstill for more than three seconds (cardioinhibitory type) or a fall in systolic blood pressure of more than 50 mm Hg (vasodepressive type) in association with carotid sinus massage. To merit a diagnosis of carotid sinus syncope, there should be simultaneous reproduction of symptoms.

Carotid sinus massage is performed for ten seconds, first on the right side (most often the source of symptoms) and then the left, in both supine and upright positions since approximately 30 % of patients have symptoms only when they stand. Contraindications for carotid sinus massage are a carotid bruit or having had a heart attack or stroke/TIA in the last three months. In the case of a carotid bruit, the patient must undergo ultrasound examination of the carotid arteries to exclude significant stenosis; if there is more than 70 % stenosis carotid sinus massage should not be performed.

In our patient, right-sided carotid sinus massage in a supine position produced bradycardia with a frequency of 30 beats per minute, while there was a normal physiological response to left-sided massage. Right-sided massage in the 70° tilted position triggered

a sinus pause of six seconds, with subsequent blood pressure decrease and loss of consciousness. She came around while the bench was being lowered, had amnesia for the syncope, but exclaimed, «I just got that tingling in my head again, how lucky it happened here with you.» This was a positive test for cardioinhibitory carotid sinus hypersensitivity, and documentation of the pause (Figure 2) was included with the referral to cardiologists in the pacemaker and ICD centre to assess whether she was a candidate for a pacemaker.

Fourteen days after the investigation, the woman had a dual chamber pacemaker implanted since the falls were now regarded as likely due to carotid sinus syncope. She was informed that there was some uncertainty about the diagnosis and that a pacemaker does not always completely eliminate this type of syncope. This is because vasodilatation can produce a fall in blood pressure, even though the momentary asystole is prevented. She still agreed to have the procedure because the falls were now a major problem for her. The pacemaker was set to DDD 60–130 with AV search hysteresis, to reduce ventricular pacing.

A week later, she contacted the pacemaker centre by telephone and told them that she was still dizzy, but that the episodes of «head tingling» were gone. By the time of her 14-day pacemaker check, her symptoms had resolved. After two and a half months, she was very happy – she had not fallen again and thought her balance had improved, which was probably related to reduced anxiety about falling. She was working in the garden and managed to do a great deal without getting dizzy. Later pacemaker checks have revealed short runs of supraventricular tachycardia, which barely cause symptoms.

Our last contact with the patient was 5.5 years after she received the pacemaker. She lives at home, the tingling in her head has not returned, but she has been diagnosed with benign paroxysmal positional vertigo (BPPV) and has had one fall, probably due to this.

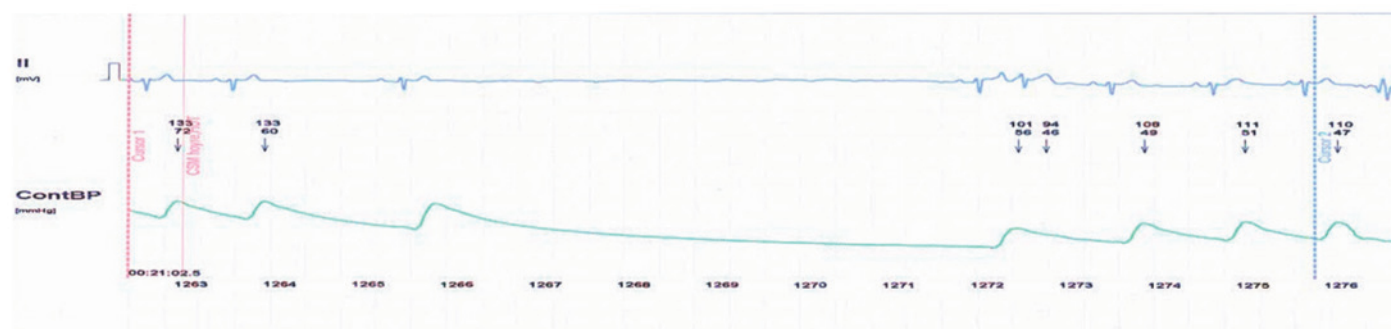


Figure 2 Print-out of ECG and blood pressure recording in our patient, showing bradycardia and a six-second sinus pause in association with right-sided carotid sinus massage in a tilted position

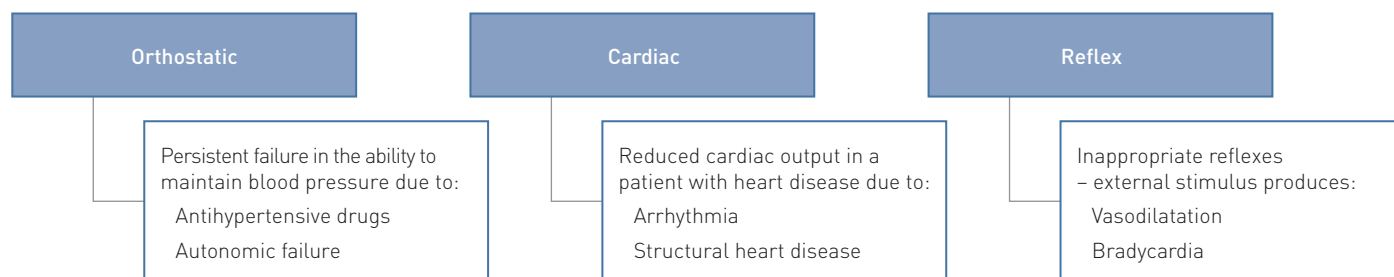


Figure 3 Schematic showing classification of syncope subtypes, with basic details of mechanisms and causes

Discussion

The causes of falls in elderly people are often complex, and it can be difficult to identify the main contributing factor. Thorough investigation and intervention against all controllable causes takes account of this and has proven efficacy (2). The patient-reported medical history, including the circumstances and symptoms before, during and after the fall and any previous falls, is used together with information on comorbidities and other risk factors for more targeted assessment. This should be accompanied by a medication review, investigation of physical function, including assessment of gait and balance as well as inspection of feet/footwear, and assessment of the patient's fear of falling.

The clinical examination also includes a cursory neurological examination and cognitive assessment. There is overlap between falls and syncope (4), and information from witnesses or those known to the patient is often lacking because patients typically fall when they are alone. Knowledge and awareness of this adds to the fall risk assessment in accordance with the guidelines (2) and makes it, in our opinion, more interesting.

Syncope is a brief, self-limiting loss of consciousness and postural tone due to a global disturbance in cerebral perfusion. Syncope must be differentiated from epileptic seizures, coma, hypoglycaemia, vertigo etc., and this is achieved primarily on the basis of medical history, often supplemented by information from others. Syncope is commonly divided into three main types based on mechanism (6), as described recently in this journal (7), and illustrated in a somewhat simplified form in Figure 3.

Orthostatic syncope is syncope as a component of orthostatism, a more or less continuous failure to maintain blood pressure when in an upright position, and is most often caused by antihypertensive drugs or autonomic failure. Orthostatic blood pressure is measured in supine and upright positions after one and three minutes, and a drop in blood pressure of 20 mm Hg systolic or 10 mm Hg diastolic or to less than 90 mm Hg systolic, together with symptoms such as dizziness, cold sweats or fatigue, is con-

sidered diagnostic of orthostatic hypotension and may explain falls.

Cardiac syncope is caused by a sudden drop in cardiac output due to arrhythmia or structural heart disease (valve defects, proximal coronary artery disease, hypertrophic obstructive cardiomyopathy or myxoma). Syncope in a patient with heart disease should always be suspected to be cardiac. Untreated, these patients have a poor prognosis and they should undergo cardiac evaluation, often on an urgent basis. They are seldom referred for fall risk assessment at the geriatric outpatient clinic. Palpitations, symptoms during exertion or while supine, and sudden deaths in family members under the age of 40 should create suspicion of cardiac syncope (8). Left bundle branch block, or bi- or trifascicular block are clues indicating cardiac conduction abnormalities, and in the case of otherwise unexplained syncope, intermittent AV block is such a likely explanation that a pacemaker is indicated.

Reflex syncope is a temporary and short-lived dysfunction of an otherwise well-functioning system of blood-pressure regulation. The fall in blood pressure is due to vasodilatation and/or bradycardia, in varying combination. Reflex syncope can often be diagnosed on the basis of the patient-reported medical history alone, and there is almost always an orthostatic component in the form of syncope while upright, or sometimes just while sitting. Among the elderly, carotid sinus syncope is the most common reflex syncope (5). Micturition syncope and syncope related to coughing or meals are also relatively common forms of reflex syncope in the elderly.

Carotid sinus syncope is rare before the age of 40. The classic variant where a tight collar or pressure on the neck triggers syncope is rare. Turning the head or scratching oneself on the neck may be sufficient to trigger syncope, and in the elderly such syncope can occur without known carotid sinus stimulation. Most commonly, no triggering mechanism is identified, but the diagnosis is made by carotid sinus massage. It is seldom that one observes such convincing symptom reproduction as that shown here – the patient's

spontaneous exclamation as she came round confirms the relationship between the symptom of falls and the cause, carotid sinus syncope.

The requirement for symptom reproduction is important, because carotid sinus hypersensitivity is common in the elderly, especially in men (5). If syncope is not suspected and/or there is an awareness of other factors that can readily explain falls, the discovery of a cardioinhibitory response without symptoms will probably not have any significance for the risk of falls, and the patient should consequently not be treated with a pacemaker. According to new guidelines, pacemakers are usually only indicated if there is a demonstrated sinus pause of at least six seconds. At the same time, evidence of a reduced syncope relapse rate supports an effect of pacing (9).

It is important not to overstate the efficacy of pacemaker therapy in reducing the tendency to fall, because additional causes are present in the majority of cases. Among the most frail, smaller haemodynamic changes can also trigger dizziness and unsteadiness with subsequent falls, even if they do not induce syncope (5). In these patients, tailored strength and balance training could be effective in preventing further falls, even when syncope is identified and treated.

Much of the syncope assessment can be performed in general practice. A thorough medical history from the patient with emphasis on symptoms and triggering situations will often reveal whether there is vasovagal syncope. If that is the case, the mechanism can be explained and the patient reassured. It is important to ask directly about alarm symptoms: syncope upon exertion or while supine, the absence of triggering factors and cases of sudden death in the family must lead to referral.

Carotid sinus massage can also be performed in general practice, in accordance with the guidelines outlined above. Continuous ECG monitoring during the manipulation itself will document any sinus pause. If the diagnosis of syncope is uncertain or there is a risk of serious consequences, the patient must be referred. Elderly people can pose

a diagnostic challenge due to comorbidity, uncertainty with regard to the self-reported medical history and the risk of serious consequences.

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