

Medicine in the elderly

Summary

Syncope and falls are often considered to be two separate diagnoses with two separate sets of aetiologies. However, although it remains controversial, the existence of an overlap between syncope and falls is becoming increasingly acknowledged. In the elderly, determining the cause of a fall can be difficult. Approximately 30% of cognitively normal elderly people are unable to recall documented falls three months later and a witness account for syncopal events is unavailable in about 50% of patients. We have found that in almost 40% of patients in whom an attributable diagnosis of carotid sinus syndrome was made, the only presenting symptoms were falls alone or falls with dizziness; syncope was denied. Amnesia for loss of consciousness can be demonstrated in over 20% of all patients with a diagnosis of carotid sinus syndrome and in 50% of those patients who present only with falls or falls and dizziness. There is a suggestion from studies in postprandial hypotension and orthostatic hypotension, where similar haemodynamic changes are found in patients complaining of either syncope or falls, that this phenomenon may be generalisable. The importance of the presence of an overlap between syndrome and falls in the elderly lies in the healthcare implications of missed diagnoses of cardiovascular syncope for which there are established effective treatments. Consideration of syncope in the differential diagnosis of unexplained falls should reduce the numbers of falls for which no attributable diagnosis is found and result in an improved standard of health care for elderly patients who fall.

Keywords: syncope, falls, carotid sinus syndrome, elderly

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Accepted 25 September 1996

The overlap between syncope and falls in the elderly

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The overlap between syncope and falls is a controversial issue and refers to consideration of syncope as the diagnosis when a patient presents only with a fall and denies all symptoms of syncope. There are those who refute the possibility of its existence,¹ although the weight of current opinion in this field appears to be gathering to acknowledge the presence of an overlap between syncope and falls in the elderly and to appreciate the importance of awareness that this occurs.^{2–10}

Background

SYNCOPE

Syncope is defined as a transient loss of consciousness, characterised by unresponsiveness and loss of postural tone, with spontaneous recovery, not requiring specific resuscitation intervention.¹¹ It occurs as a result of a sudden temporary reduction in cerebral blood flow to the parts of the brain that control the level of consciousness (reticular activating system).¹² The elderly are particularly prone to syncope as a result of age-related alterations in cerebral autoregulation, baroreflex sensitivity and volume regulation which impair their ability to adapt to rapid changes in blood pressure.^{11,12}

The aetiology of syncope is diverse (box 1),¹² and the relative prevalence of these diagnoses in the elderly population is unknown. Studies have found syncope to account for 3% of visits to the Accident and Emergency department,¹³ 1–6% of hospital medical admissions¹³ and to have a prevalence of 23% in an institutionalised elderly population.¹⁴

FALLS

A fall is traditionally defined as an event which results in a person coming to rest inadvertently on the ground or at another lower level, other than as a consequence of sustaining a violent blow, loss of consciousness (syncope), sudden onset of paralysis or an epileptic seizure.¹⁵ The specific exclusion of patients with loss of consciousness from this definition is being increasingly challenged.^{2–10} An unexplained fall is defined as a fall for which there is no apparent cause.⁷

The aetiology of falls is, in common with syncope, diverse. A summary of 12 studies, which identified causes for a total of 3684 falls,⁹ found the main attributable diagnoses to be accident/environment related (31%), gait/balance disorders or weakness (17%), dizziness/vertigo (13%), drop attack (9%) and confusion (5%).

Each year approximately 30% of people aged over 65 years living in the community will fall¹⁶; this figure rises to 40% in those aged over 80 and to 60% in nursing home populations.^{15,17} Approximately 10–20% of falls result in serious injury and 2–6% in fractures.¹⁶

Evidence for an overlap between syncope and falls in the elderly

The traditional definitions for both syncope and falls,^{11,15} consider them to be two separate diagnoses with separate aetiologies. However, the evidence for an overlap between syncope and falls in the elderly has been accumulating in recent years, although it remains patchy and has been much better elucidated in carotid sinus syndrome than for other diagnoses.

UNRELIABILITY OF THE HISTORY

Those who consider there to be no overlap between syncope and falls rely on obtaining an accurate history of syncope in all cases.¹ However, this is unlikely in most elderly patients. A study of 304 community dwelling men and women aged over 60,¹⁸ 80% of whom were aged between 60 and 80 and 92% of whom had normal cognitive functioning as assessed by the Mini-mental state

Aetiology of syncope

- neurocardiogenic (vasovagal syncope)
- orthostatic hypotension
- postprandial syncope
- drug-induced syncope
- carotid sinus syndrome
- epilepsy
- transient ischaemic attacks
- cardiac arrhythmias
- myocardial infarction
- mechanical obstruction
- pulmonary embolus
- subclavian steal syndrome
- hyperventilation syncope
- tussis syncope
- glossopharyngeal syncope
- swallow syncope
- micturition syncope
- defecation syncope

Box 1

Unreliability of history of syncope and falls in the elderly

- 32% of cognitively normal people age >60 years are unable to recall a documented fall within three months
- there is no witness account in approximately 50% of syncopal episodes

Box 2

examination (MMSE),¹⁹ provides evidence of poor recall of falls in a 'cognitively fit' group of elderly people. A total of 179 participants fell over a 12-month period; all falls were confirmed by a home visit which must have emphasised their occurrence. Overall, when interviewed three months later, 32% of patients with documented falls were unable to recall having fallen at all, let alone give an accurate history of the fall. Patients who did not recall their falls tended to be older and had a significantly lower average mental test score, although this was still within the range accepted as cognitively normal. The recall and reliability of a fall history in elderly patients with cognitive impairment or dementia will be considerably poorer.

LACK OF WITNESS ACCOUNT

A witness account, which can provide the additional history necessary to make the diagnosis of syncope,³ is often unavailable in the elderly. In institutional care, the majority of syncopal events or falls occur in the bedroom or bathroom and go unwitnessed.²⁰ A witness account was available for only 40–60% of syncopal events in elderly patients attending outpatient clinics.^{3,4}

Falls as a presentation of carotid sinus syndrome in the elderly

Carotid sinus syndrome is defined as greater than three seconds of asystole (cardioinhibitory) or a drop in systolic blood pressure, in the absence of diagnostic cardioinhibition, of greater than 50 mmHg (vasodepressor), produced by five seconds of carotid sinus massage.³ Although the prevalence of carotid sinus syndrome in the elderly community is unknown,⁵ it does not appear to be a feature of normal ageing²¹ and was the attributable diagnosis in 47% of patients with previously unexplained falls or syncope referred to a specialist clinic.^{3,4}

In order for the diagnosis of a syncopal event or a fall to be attributed to carotid sinus syndrome, either patients are required to confirm that the symptoms they experience during carotid sinus massage are the same as those experienced during syncope or a fall,⁷ or the response to carotid sinus massage is required to be reproducible.^{2–4} The latter approach is in keeping with accepted diagnostic practice.²²

The presentation of carotid sinus syndrome as a fall, involves the concept of amnesia for loss of consciousness; loss of consciousness is witnessed during testing but the patient subsequently denies it has occurred.

EVIDENCE FOR AMNESIA

We first published results highlighting the issue of amnesia for loss of consciousness in carotid sinus syndrome in a study of 33 patients, mean age 78 years, in whom an attributable diagnosis of carotid sinus syndrome had been made.² Seven patients (21%) presented with falls alone and another five patients (15%) presented with falls and dizziness. Of the seven patients who presented with falls alone, five had witnessed loss of consciousness when asystole was produced during upright carotid sinus massage. All of these patients continued to deny loss of consciousness, demonstrating amnesia for the event. A further four patients had amnesia for syncope, giving a total of 27% of this series of patients with carotid sinus syndrome in whom amnesia for loss of consciousness was demonstrated.

AN INTEGRATED APPROACH

On the basis of these data, showing that a correct diagnosis of syncope will be missed if the established definitions of syncope and falls are adhered to,^{11,15} we adopted an integrated approach to the investigation of syncope, falls and dizziness, including unexplained falls, in which there was no history of loss of consciousness, amongst the symptoms requiring investigation to establish causes of syncope.^{3,4} Data from 132 consecutive patients, mean age 81 years, attending our 'syncope' clinic showed that carotid sinus syndrome was the attributable diagnosis in 64 patients (48%).⁴ Of the patients in whom an attributable diagnosis of carotid sinus syndrome was made, 17 (27%) denied syncope and presented only with falls or falls and dizziness. Twelve of these patients (19% of those diagnosed as having carotid sinus syndrome; 71% of those with carotid sinus syndrome presenting only with falls or falls and dizziness) had witnessed syncope during carotid sinus massage and amnesia for loss of consciousness.

Taking this argument one step further, a more recent study looked specifically at patients presenting to Accident and Emergency with unexplained falls or recurrent falls (three or more falls) within two years, in whom a history of loss of consciousness was denied.⁷ Of 18 patients, mean age 79 years, who

Table Summary of data on amnesia in carotid sinus syndrome (CSS)

Reference	Patients			No with CSS	No with CSS presenting only with falls or falls and dizziness	No with CSS with amnesia for loss of consciousness	No of fallers with amnesia for loss of consciousness*
	n	mean age (years)	range				
2	130	78	67–89	33	12	9	5
4	132	81	67–94	64	17	12	12
7	18	79	65–94	12	12	4	4
Total	280			109 (39%)	41 (38%)	25 (23%)	21 (51%)

*Includes patients presenting with falls alone or falls and dizziness. None of these patients presented with a history of syncope

met these criteria, 12 (67%) were found to have an attributable diagnosis of carotid sinus syndrome, four (33%) of whom had amnesia for witnessed loss of consciousness produced by carotid sinus massage.

The results of these studies are summarised in the table.^{2,4,7}

Other contributing evidence

AMNESIA FOR LOSS OF CONSCIOUSNESS IN SYNCOPE CAUSED BY OTHER CONDITIONS

A study of 59 healthy volunteers, mean age 24 years, in whom syncope was induced through a sequence of hyperventilation, orthostasis and the Valsalva manoeuvre, produced witnessed syncope in 56 people.²³ One person in whom syncope was induced had amnesia for the whole episode, suggesting the possibility of generalisability of amnesia for loss of consciousness to other causes of syncope.

DIFFERENCES IN SYMPTOMATOLOGY WITH SIMILAR HAEMODYNAMIC CHANGES

In a study of postprandial hypotension (defined as hypotension occurring within 90 minutes of a meal) in 499 residents of a long-term care facility, mean age 80 years, the mean maximal reduction in postprandial systolic blood pressure in residents with a history of syncope in the previous six months was 24 mmHg compared to a reduction of 21 mmHg in residents with only a history of falls.²⁴ Both of these values were significantly different from the mean control values in residents without syncope or falls in the previous six months, of 14 mmHg and 13 mmHg, respectively. This hints at the possibility of a similar drop in blood pressure producing different responses or perhaps differently recalled responses.

A similar result is found for orthostatic hypotension. In a series of 40 patients, mean age 77 years, with orthostatic hypotension,⁶ defined as a drop in systolic blood pressure of 20 mmHg or a fall in systolic blood pressure to less than 90 mmHg on standing,³ 27 patients (68%) presented with unexplained falls and 13 (32%) with syncope. There was no significant difference in blood pressure response between these two groups, supporting the hypothesis that similar haemodynamic changes can produce different symptomatology amongst elderly patients or that some patients may have amnesia for the transient loss of consciousness which precipitated their fall.

Healthcare implications

The importance of the issue of overlap between syncope and falls in the elderly lies in the healthcare implications of missed diagnoses of syncope for which there are established effective treatments. On available evidence, this is unlikely to be a rare occurrence if the overlap between syncope and falls in the elderly is disregarded.

Although epidemiological evidence is limited, it suggests that unexplained falls are a significant problem. In a summary of 12 studies, six in community populations and six in institutionalised populations, which were specifically designed to ascertain the diagnosis of falls, the diagnosis remained unresolved in 5% of 3684 falls (range 0–21%).⁹ In another study of 188 elderly patients presenting to casualty with a fall, 139 were judged capable of giving an accurate history and of these patients 26% had unexplained or recurrent falls.⁷

There is increased mortality in the elderly who fall²⁵ and in patients with syncope,¹¹ but there is no evidence that elderly patients with falls in whom no diagnosis has been established suffer particular excess mortality. In fact, data on carotid sinus syndrome, which possibly underlies a significant proportion of these diagnoses, suggest that this cause of unexplained falls is not associated with increased mortality over the general elderly population.²⁶

Healthcare implications

- unexplained falls are a significant problem
- morbidity is increased in elderly fallers with the diagnosis of carotid sinus syndrome
- loss of confidence occurs in patients with unexplained or recurrent falls
- effective treatments are available for most causes of syncope

Box 3

Morbidity is also increased in the elderly who fall¹⁶ or have syncope²⁷ but again the potential additional morbidity that accompanies falls caused by undiagnosed and therefore untreated syncope is difficult to quantify. However, for carotid sinus syndrome, data from our 'syncope' clinic found that 49% of elderly patients sustained an injury prior to diagnosis and of injured patients, 52% sustained a fracture.⁴ We have also demonstrated an association between carotid sinus hypersensitivity and fracture neck of femur.^{5,28} Carotid sinus hypersensitivity was present in 36% of patients with fracture neck of femur compared to none of the patients admitted for elective surgery, 17% of patients admitted acutely for reasons other than falls, and 13% of frail day-hospital attenders. In addition to physical injuries, unexplained or recurrent falls can produce a fear of falling in the elderly, with the subsequent loss of confidence resulting in restriction of activities and ultimately loss of independence.^{12,29}

Available data suggest that insertion of a permanent pacemaker has the potential to prevent syncope and falls in carotid sinus syndrome,² with 17 patients fitted with pacemakers experiencing no further episodes of syncope or falls during a median eight-month follow-up period. The integrated approach adopted by our 'syncope' clinic includes³: insertion of dual chamber pacemaker systems for cardioinhibitory or mixed carotid sinus syndrome; treatment with medication such as fludrocortisone or midodrine for vasovagal syncope, vasodepressor carotid sinus syndrome or orthostatic hypotension; stopping of medications known to impair pulse and blood pressure responses³⁰; and behavioural advice, in the treatment of a range of causes of syncope. These interventions were found to be beneficial by 76% of patients as assessed by postal questionnaire.

Conclusions

We have outlined data showing the history of syncope and falls to be unreliable in the elderly. Evidence for carotid sinus syndrome presenting as 'only a fall' has been detailed and the role of amnesia for loss of consciousness in this context discussed. Other contributing evidence in the form of generalisability of amnesia for loss of consciousness and the possible overlap between syncope and falls in postprandial hypotension and orthostatic hypotension has also been considered. These strands of data link together to support the existence of an overlap between syncope and falls in the elderly.

Although the emphasis on carotid sinus syndrome is influenced by our research interests and the ease of reproduction of symptoms during upright carotid sinus massage, the high prevalence of carotid sinus syndrome as the attributable diagnosis in elderly patients with unexplained falls is a consistent finding. The evidence of a plausible explanation for this in the form of demonstrable amnesia for loss of consciousness further supports our hypothesis.

It is of paramount importance that the overlap between syncope and falls is appreciated in the investigation of all patients presenting with an unexplained fall. The more recent definition of a fall as an event reported either by the faller or a witness resulting in the patient inadvertently coming to rest on the ground or at another lower level, with or without loss of consciousness or injury,⁸ is more appropriate than traditional definitions, as it reminds the doctor to consider syncope in the differential diagnosis of falls. Adoption of this approach should result in a reduction in unexplained and recurrent falls causing unnecessary morbidity in the elderly and lead to an improved standard of healthcare for elderly patients who fall.

Summary points

- the history of syncope and falls is unreliable in the elderly
- amnesia for loss of consciousness is frequently found in carotid sinus syndrome
- there is evidence for the generalisability of this phenomenon
- patients with unexplained or recurrent falls suffer increased morbidity
- the healthcare implications are of missed diagnoses for which there are effective treatments
- patient management will be improved by including syncope in the differential diagnosis of unexplained falls

Box 4

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Images in clinical medicine

Right atrial thrombus from deep venous thrombosis

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Accepted 25 June 1997

A 65-year-old man presented with sudden onset of irregular palpitations and breathlessness. Two weeks previously he had spent four days in bed on account of a 'flu-like' illness.

Examination revealed atrial fibrillation with a rapid ventricular response rate and a jugular venous pressure raised by 3 cm, but no other signs or symptoms. Transoesophageal echocardiography revealed multiple clots within dilated right-sided chambers (figure). Subsequent Doppler ultrasound of the legs demonstrated bilateral deep venous thrombosis extending up to the common iliac veins.

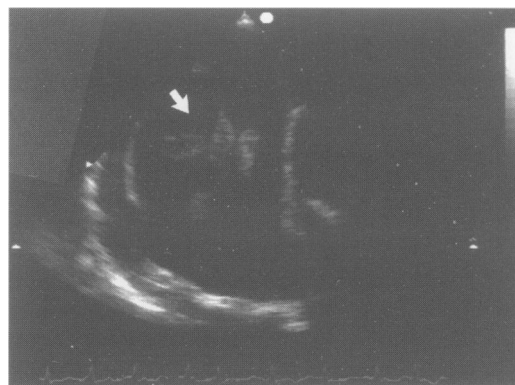


Figure Transoesophageal echocardiogram (transverse view) showing thrombus within a dilated right atrium