

CLINICAL FEATURES AND CONSEQUENCES OF FALLS*

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A starting point for a better understanding of falls is to consider what turns a non-faller into a faller. Although the risk of falling increases with age and approximately 30 per cent of persons over the age of 65 living in the community fall each year,¹⁻³ it should not be assumed that this is simply due to ageing. The higher prevalence of falls in old age is a statistical feature of physiological variability.⁴ Depending on the population surveyed it is possible to find a cohort of fit, elderly, whose rate of fall is less than average.⁵ What distinguishes the vigorous and active 90 year old from the frail faller 30 years his junior is the integrity of the balance control system. The clinician's job is to identify which aspects of balance control are impaired, whether there are reversible factors and to co-ordinate relevant treatments and interventions.

Balance

A description of the exact circumstances of the fall is helpful, especially if witnessed, to allow determination if the fall was a straight forward trip or accident (external fall) or was spontaneous (internal fall). An external fall may happen to anyone and usually the account is clear. The individual may be fit and active with no sign of mental impairment and the prognosis is good. Following internal falls on the other hand the subject often gives a vague history and may use such phrases as 'my legs gave way' or 'I don't know what happened, I just suddenly went down', or 'I must have tripped' which is usually a rationalization of what happened. On presentation such patients have often had several falls, are characteristically frail and poorly mobile. They are more likely to be mentally impaired and they are at greater risk of further falls and becoming housebound. The risk of dying for someone so frail that they fall out of a chair or from their bed is 5-7 times greater than someone who is active enough to have fallen, say, whilst climbing a ladder.⁶ It can also be shown that postural sway is no higher in external fallers than in age matched controls, but there are significant increases in sway in the spontaneous fallers.⁷ The mechanisms underlying the achievement and control of balance are not discussed here as they are detailed by Colledge on p. 196 of this issue.

Internal fallers have multiple impairments.⁸ In the physical examination particular attention should be paid to the legs, assessing whether ankle proprioception is lost, and looking for quadriceps weakness. Cervical spondylosis may have damaged the mechano-receptors in the apophyseal joints of the cervical spine so that not only are neck movements impaired but patients complain of unsteadiness when rotating or extending the head. Clues to vestibular lesions are a history of tinnitus, vertigo and deafness, nystagmus or a positive Hallpike manoeuvre. The importance of vision is often overlooked. Many spontaneous fallers rely a good deal on vision to compensate for their other somato-sensory defects and a fair estimate of this reliance may be had by asking the patient to close their eyes when standing and

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observing for sway. Gross impairment of sway with eyes closed, a positive Romberg test, is not a normal feature of old age.

Central information processing has a crucial role. A person who is about to fall recognizes what is happening through one or more of the sensory inputs and the appropriate response is then selected, depending upon environmental circumstances, direction of the fall and prior experience and corrective muscular activity is initiated. Even a moderate slowing of response increases the risk of falls. One model has indicated that a 10 per cent increase in mean response time could result in a 5-6 fold increase in the number of critically slow responses.⁹ The main causes of central slowing are cerebrovascular, Parkinson's and Alzheimer's diseases.

Thirty years ago Lord Brain¹⁰ remarked that hemiplegic patients rarely fell because they had to concentrate so hard to walk at all. However, a recent study looking at stroke patients living at home showed that falls are more than twice as likely in this group as in the rest of the elderly community.¹¹ Apart from perceptual difficulties or the obvious ataxia seen after a posterior circulation stroke the hemiplegia itself affects balance. The stance is asymmetric with approximately 70 per cent of the total body weight shifted on to the unaffected leg and postural sway is increased.¹² The more unsteady the stance the more it affects the walking pattern. Objective laboratory measures of both correlate with clinical motor assessment (Fugl-Meyer) and the Bartel activities of daily living index.¹³

In Parkinson's disease there is abnormal timing and amplitude scaling of postural reflexes. Postural strategies are abnormal and patients may inadvertently select inappropriate responses. Anticipatory postural reflexes are diminished or absent and there may be problems with postural hypotension.¹⁴

Individuals with dementia are three times as likely as controls to have both falls and fractures. The risk of falling does not correlate with the severity of the dementia, but does correlate with concurrent physical disorders such as arthritis and cataracts. Wandering significantly increases the risk of falling and demented fallers are much more likely to have had an adverse drug reaction than non-fallers.¹⁵

Was there loss of consciousness?

This is an important point to establish since loss of consciousness virtually restricts the diagnostic possibilities to epilepsy and the various causes of cardiac syncope. Vasovagal episodes are rare in the elderly and although hypoglycaemia is a well recognized side effect of long acting drugs such as chlorpropamide, the diagnosis is usually straight forward. The diagnosis of epilepsy and cardiac syncope, however, depend on an eye witness account, especially since patients with carotid sinus syncope may experience amnesia for the event.¹⁶ These patients may show all the fear and frailty of the typical internal faller, but they often remain quite well. Patients with frequent falls in unexplained circumstances, who maintain normal gait and balance should be investigated for epilepsy and cardiac syncope.

Drop attacks

The first clinical description of these was by Sheldon¹⁷ who referred to them as 'falls due to sudden collapse or to the legs giving way'. He distinguished them from trips and falls associated with vertigo or due to difficulty in recovering balance: 'the characteristic feature of this type of fall is its dramatic suddenness: one moment the old person is on her feet and apparently all right and the next moment is full length on the floor—without knowing why'. It was suggested by Kremer¹⁸ that drop attacks occurred when there was compression of the brain stem, which

impaired the blood supply and temporarily interrupted the cerebellar descending pathways controlling the efferents from cord to muscles, leading to loss of postural tone. Many other explanations have since been offered, including normal pressure hydrocephalus,¹⁹ carotid sinus syncope¹⁶ and ego extinction.²⁰ Vertebro basilar insufficiency should be regarded as a rare cause of drop attacks, unless there are additional signs of symptoms of brain stem ischaemia. There is no single cause for drop attacks and they are best regarded as a type of spontaneous fall where, while there may be a single explanation, more often the patient is found to have multiple postural defects.

Risk factors

The effort spent in identifying risk factors for falls have consistently highlighted the role of ill health and the multiplicity of defects in the balance system. Sometimes the 'final straw' is apparent, where a frail person whose balance is at best on a knife-edge, falls as a result, say, of a chest infection, worsening heart failure or the prescription of a sedative drug. Hypnotics and anxiolytics with long elimination half-lives, tricyclic antidepressants and anti-psychotics still constitute a risk even when dementia and depression are controlled.^{2, 21} Low levels of physical activity are commonly associated with falls. This may show up as loss of proximal muscle strength, particularly difficulty in getting up from a chair, instability when standing or muscle grip strength.³ Low contrast visual acuity and contrast sensitivity, vibration sense and proprioception, slow reaction time and impaired balance all identify multiple fallers.²² Cognitive impairment, strokes and Parkinson's disease have already been mentioned as major risk factors. Smoking and not consuming alcohol compared with moderate drinkers appears to have disadvantage in balance,²³ although multivariate analysis does not reveal them as significant risk factors for hip fracture.²⁴

Consequences

Between 3-6 per cent of falls result in fractures.^{2, 25} Risk factors for a hip fracture include a history of a previous fracture of any type after the age of 50, having a mother who had a hip fracture, previous hyperthyroidism, treatment with long acting benzodiazepines or anticonvulsants, an above average intake of caffeine and the spending of no more than four hours a day on their feet.²⁴ Whether a fall results in a fracture depends on bone strength and neuromuscular responses that protect the skeleton against trauma. Below 75 years, osteoporosis is a strong independent risk factor for fracture, but above that age osteoporosis appears to be less important than neuromuscular protective responses.²⁶

Less traumatic consequences of falling include the inability to get up after a fall and loss of confidence. Forty-seven per cent of non-injured fallers report inability to get up after a fall and the risk factors are similar to those for falling and include age over the age of 80, depression, and poor balance and gait. Compared with fallers who are able to get up, those unable to do so are more likely to suffer a lasting decline in activities of daily living. There is also a tendency for them to have an increased risk of dying or being hospitalized and the inability to get up is clearly a marker of frailty.²⁷

Loss of confidence and fear of falls can be a major problem after falls, resulting in functional deterioration. Up to a third of fallers limit their activity because of fear.²⁸ Although fallers are more anxious and depressed than non-fallers the

direction of causation is not clear and the main cause of their neuroticism is possibly their general physical disability.²⁹

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