

FALLS AND GAIT DISORDERS AND THEIR RELATION TO DRUG THERAPY IN THE ELDERLY

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Gait and balance impairment and recurrent falling are common syndromes in Geriatric Medicine. Not only are patients at risk of physical injury, but they frequently become fearful of further falls (post fall or '3-F Syndrome'). Fear of falling can lead an elderly person to restrict activities to the point of becoming housebound and socially isolated. A variety of drugs (See Table 1) can impair balance and mobility and predispose to falling.

Table 1: Drugs that may impair mobility or increase falling tendency

<p>Central Nervous System Depressants: Major and minor tranquillisers, especially long acting benzodiazepines (nitrazepam, flunitrazepam, diazepam) Antiepileptic drugs (phenytoin, carbamazepine) Narcotic analgesics Tricyclic antidepressants (variable) Some vestibular sedatives (especially prochlorperazine) Alcohol</p> <p>Drugs with Side Effects of Parkinsonism: ⁽⁸⁾ Prochlorperazine Metoclopramide Major tranquillisers (variable including risperidone) Lithium</p> <p>Drugs causing postural hypotension: Antihypertensives Diuretics Antiparkinsonian drugs Major tranquillisers (especially haloperidol, trifluoperazine)</p> <p>Drugs causing cerebellar ataxia: Phenytoin Benzodiazepines (truncal ataxia) Alcohol</p> <p>Drugs which may produce neuropathy or muscle weakness: Alcohol Phenytoin Corticosteroids Nitrofurantoin (should not be prescribed in the elderly)</p>
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Maintenance of Postural Stability

Maintenance of postural stability involves sensory (afferent) systems, effector systems and integrating processes in the central nervous system (See Table 2). These components are overlapping and compensatory; a fall may not occur until several parts of the system are dysfunctional. Maintenance of an adequate blood pressure is also necessary in avoiding falls.

Table 2: Maintenance of Postural Stability

<p>Sensory Systems:</p> <ul style="list-style-type: none"> • Visual • Proprioceptive • Vestibular <p>Central Nervous System: (Integrated System)</p> <p>Effector Systems:</p> <ul style="list-style-type: none"> • Muscles • Joints • Feet

Clinical Evaluation of Recurrent Falling Tendency

Though mobility and balance impairment may be associated with ageing per se, age-related diseases and iatrogenic factors are frequent causes. The key to management is a systemic approach to diagnosis. Gait and balance can deteriorate sharply in acute illness.⁽¹⁾

Excessive bed rest is a common and hazardous feature of hospitalisation. The resultant deconditioning involves many psychological systems. Enforced bed rest leads to at least 10% loss of leg muscle strength in one week. The decubitus position leads to contraction and redistribution of plasma volume predisposing to postural hypotension. Deconditioning also affects cardiorespiratory function, leading to loss of exercise tolerance. Reversal of these changes may be difficult and prolonged, prevention is the key-note.⁽²⁾

If assessing a patient during an inter-current illness, it is essential to elucidate the patient's baseline function prior to the onset of the illness.

If a fall has occurred, what is the cause? Was it due to syncope, seizure, vertigo, tripping, slipping or loss of balance during postural change? Neurological, cardiovascular and rheumatological examinations must be performed. Cognition must be assessed. Standard neurological examination, essential in arriving at an anatomical diagnosis, is not adequately sensitive at identifying patients at risk of fall. Observation of the four performance tasks:

1. Getting up from a chair
2. Sitting down
3. Turning while walking and
4. Raising feet whilst walking

allows better risk prediction (functional diagnosis).⁽³⁾

Blood pressure should be measured lying, standing and after a two-minute walk. Ask the patient how he/she feels when upright – are they comfortable, light-headed or fearful?

Who is at special risk of drug-induced falls?

Many researches have contributed to a better understanding of this issue. Most high-risk patients can be readily identified. (Table 3) ⁽⁴⁾

Table 3: Common age-related disorders which increase risk of falling

Special sensory dysfunction:

- Vision and hearing impairment

Neurological disorders:

- Dementia, delirium
- Stroke
- Parkinson's disease
- Cerebellar degeneration
- Peripheral neuropathy

Musculoskeletal disorders:

- Osteoporosis with kyphosis
- Arthritis affecting spine, hips and knees

Foot disorders:

- Any painful conditions eg bunions

Multiple drug use (four or more medications), abnormalities of gait and balance on direct observation, extreme old age (>85 years), the 'senile gait disorder' and the disorders listed in Table 3, predict a particularly high risk of drug-induced falls. It is important to note that it is particularly the drugs which depress the central nervous system function which are associated with falls in epidemiological studies.⁽⁵⁾ Compensation for physical disability can much more readily occur with a clear brain.

In the last decade an entity termed 'dementia with Lewy bodies' has been recognised clinically and on a neuropathological basis. Affected people have a dementing illness with strong subcortical emphasis as well as Parkinsonism. Frequently these people have visual hallucinations and delusions and antipsychotic therapy may be necessary. Characteristically these patients show extraordinary neuroleptic sensitivity. Even neuroleptics with relatively low potential for extra-pyramidal side-effects, eg low dose risperidone, may induce dramatic Parkinsonism. At this point olanzapine appears a safe and effective therapy for this condition.

Frontal Gait Dyspraxia

Frontal apraxic gait is a very wide characteristic clinical picture which presents with short, shuffling steps on a wide base with good arm swing. There is usually no evidence of Parkinsonian symptoms. There is, however, an associated postural difficulty which is very similar to Parkinsonian postural deficits. Patients usually have great difficulty in maintaining the upright posture and have no reflexes in protecting themselves from falls if they are suddenly perturbed. The combination of symptoms

of postural disturbance with a wide-based short stepping gait varies from one individual to another. Some individuals may have predominately the gait disturbance with very little postural disturbance yet others may have significant postural disturbance with falls and have little gait disturbance. Mild cognitive deficits especially constructional dyspraxia and retrieval type memory impairment are frequent.

The cause of this complaint is usually due to a disconnection of the pre-frontal and frontal regions at the sub-cortical white from other parts of the motor control system. The most common cause for this is small subcortical strokes involving small penetrating blood vessels that affect the white matter of the frontal regions. This is known as 'subcortical white matter ischaemia' or 'small vessel disease'. The risk factors for this complaint are ageing, smoking, hypertension and diabetes. Other causes can be normal pressure hydrocephalus and a tumour within the frontal regions.

Summary

A great variety of drugs may contribute to gait and balance impairment and increase risk of falling in elderly people. A multiple risk factor intervention approach has been shown to reduce falling.⁽⁷⁾

Careful review of the risks versus benefits of drug therapies which contribute to falling is an essential component of overall strategies to reduce the frequency of common clinical problems.

References:

- (1) Steiger MJ and Berman P Gait disorders in the Acute Medically Ill Elderly Postgraduate Medical Journal (1993) 69, p141-146
- (2) Heoing HM and Rubenstein LZ Hospital Associated Deconditioning and Dysfunction. Journal of the American Geriatrics Society (1991) 39, p220-2
- (3) Tinetti ME and Ginter SF Identifying Mobility Dysfunctions in Elderly Patients. Standard Neuro Muscular Examination or Direct Assessment? Journal of the American Medical Association (1988) Vol 259 No 3 p190-95
- (4) Robbins As and Rubenstein LZ Predictors of Falls among Elderly People Archives of Internal Medicine (1989) Vol 149 p1628-33
- (5) Ray WA, Griffen MR et al Psychotropic Drug Use and the Risk of Hip Fracture New England Journal of Medicine (1987) Vol 316, p363-369
- (6) Tinetti ME and Baker DI A Multifactorial Intervention to Reduce the Risk of Falling among Elderly People Living in the Community new England Journal of Medicine (1994) Vol 331 p821-7
- (7) Stephen PJ and Williamson J Drug-induced Parkinsonism in the Elderly Lancet (1984) Vol 2 p1082-3