



CLINICAL INVESTIGATIONS FROM THE RACP

Investigating the patient with impaired mobility

HUGH G. DICKSON MB BS, PhD, FACRM, FAFRM(RACP)

Key points

- The major investigative modalities for patients with mobility disorders are the clinical history and physical examination.
- Mobility impairment may arise from disorders of volition, perception, strength, mechanics and coordination.
- Gait (walking) patterns associated with specific pathological processes can be identified by any medical observer; a detailed knowledge of the components of normal gait is not necessary to do this.
- Even when the cause of impaired mobility appears to localise to a specific anatomical structure or system, it is necessary to determine whether the problem is local or systemic.

In this series, we present authoritative advice on the investigation of a common clinical problem, especially commissioned for family doctors and written by members of the Royal Australasian College of Physicians.

Mobility is the ability to move in a particular environment. People can be mobile in one environment and not in another. Mobility can refer to activities other than walking, such as moving in a wheelchair or even within a bed.

Mobility requires the performance of co-ordinated actions using learned motor patterns or 'engrams' to produce the desired change in position. To achieve a movement goal, a person needs to have a wish to move (volition) and the abilities to sense his or her position in the environment (perception), to move himself or herself or to activate a device (strength and mechanics) and to produce an action that is sufficiently controlled (coordination).

The assessment of a patient with impaired mobility follows the standard medical consultation pattern, beginning with a thorough clinical history and physical examination,

which leads to a provisional diagnosis and selection of appropriate tests. This article briefly summarises the many causes of mobility impairment in a classification system that can be used when compiling a differential diagnosis.

HISTORY

A careful history should be taken when a patient presents with impaired mobility. The history should include the duration of the impairment, its speed of onset and the nature of the problem from the point of view of the patient. If pain is contributing to the mobility disorder then it is necessary to record its site, onset, character, radiation, associations, timing, exacerbations/relieving factors and severity (SOCRATES). The family history should always be considered, as should drug and alcohol usage.

Professor Dickson is Conjoint Professor of Aged Care and Rehabilitation at South Western Sydney Clinical School, University of New South Wales. He is also Senior Staff Specialist and Director of Ambulatory Care (PIXI) at Liverpool Hospital, Sydney, NSW.

SERIES EDITOR: Christopher S. Pokorny MB BS, FRACP, FRCP, FACG

Associate Professor Pokorny is Conjoint Associate Professor of Medicine, University of New South Wales, and Visiting Gastroenterologist, Sydney and Liverpool Hospitals, Sydney, NSW.

The importance of an adequate history is illustrated by the following example:

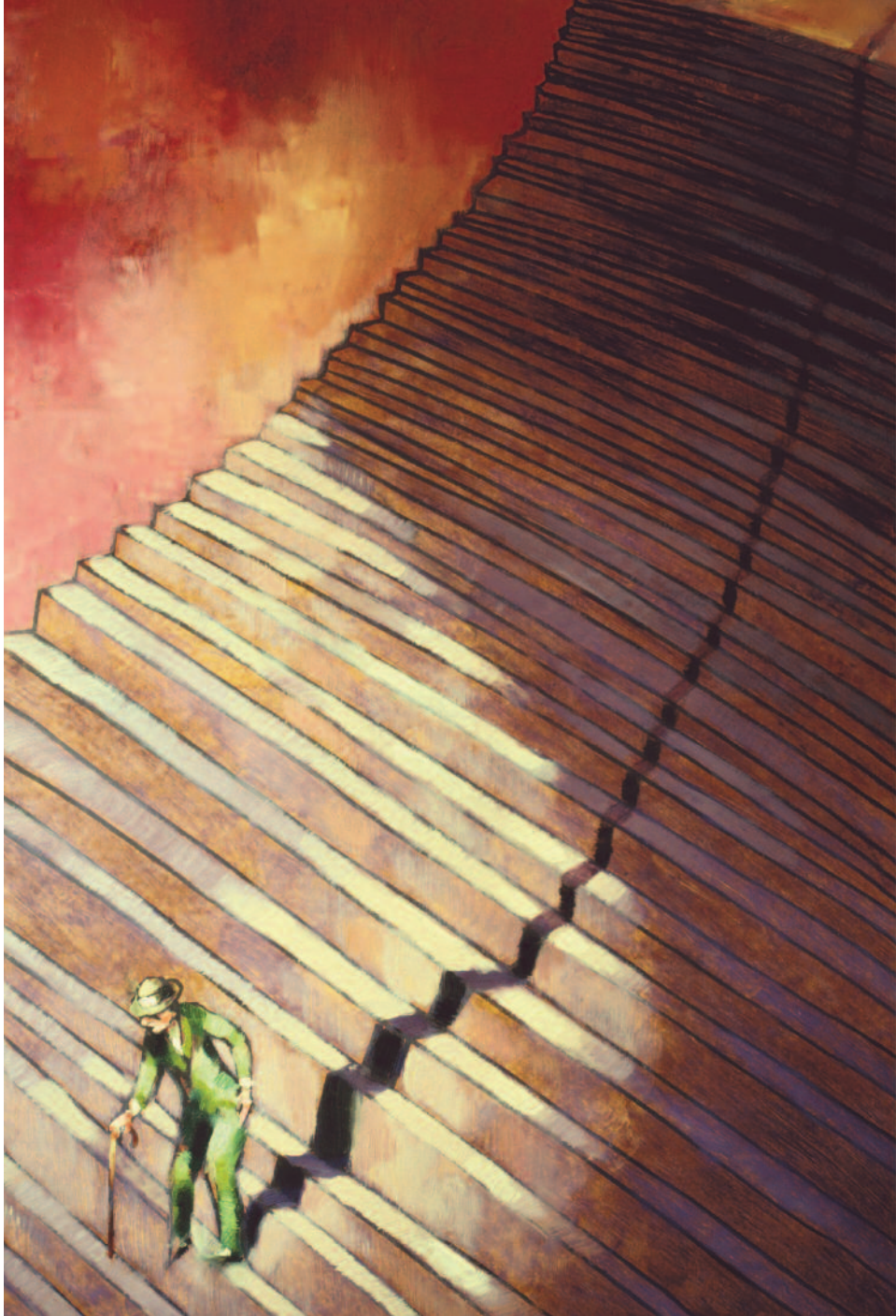
An elderly woman was referred for physiotherapy and walking aids. Her referring letter reported that she had difficulty walking because of pain in her knees. When the patient was asked about this, she said her knees were painful because she was falling frequently, especially when walking outside of her house. When asked why she thought she was falling, she replied that she was having great trouble seeing where she was going. Examination revealed bruising of the knees and bilateral dense cataracts. She was referred to an ophthalmologist for cataract extractions, which resolved her problems.

PHYSICAL EXAMINATION

The systems to examine are indicated by the findings of the history, and usually include the neurological and musculoskeletal systems. A complaint of impaired mobility will always require an examination of the activity in question, whether it be walking, running, propelling a wheelchair, transferring from chair to bed (or vice versa) or adjusting position in bed.

The most common mobility problem arguably involves walking (see the box on page 44). Walking or gait analysis is usually performed by direct observation. Most clinics dealing with patients who have mobility problems (such as rehabilitation medicine, geriatric, neurology, neurological physiotherapy, amputee and orthotic clinics) operate without the use of sophisticated gait analysis systems. The most common abnormal gait patterns are hemiplegic, diplegic, neuropathic (foot drop), myopathic (waddling), Parkinsonian, ataxic and antalgic. Video demonstrations of pathological gaits are available on the internet – see, for example, the University of Utah website (http://library.med.utah.edu/neurologicexam/html/gait_abnormal.html).¹ Examples are also available on YouTube (www.youtube.com); the search function can be used to locate videos of specific gait patterns.

An adequate examination is necessary for a provisional diagnosis. This can be a challenge in small consulting rooms, and use of



common corridors or outdoor spaces may be required.

The importance of an adequate examination is illustrated by the following example:

A middle-aged woman presented with a request for custom-made shoes. She was rapidly wearing out the front of her shoes, even though her bootmaker had placed metal strips there. The problem had been worsening for several years. There was a family history of difficulty in walking in later life. On examination, the patient was observed to have a spastic diplegic gait. The final diagnosis was hereditary spastic paraplegia. She was treated with baclofen, which improved her gait.

WALKING DIFFICULTY IN OLDER PATIENTS

The causes of impaired walking are multiple and varied, and chronic disease is an important factor to consider during the assessment process. Common causes include foot problems caused by ill-fitting walking shoes, such as the blister shown here under the partially amputated toe of a 60-year-old man with diabetes (Figure 1). A degenerative disorder such as osteoarthritis, shown here affecting both knees of a 51-year-old woman (Figure 2), is another common cause of walking impairment.



Figure 1. Blister caused by ill-fitting walking shoes.



Figure 2. Knee x-ray showing bilateral osteoarthritis.

CLASSIFICATION OF MOBILITY DISORDERS

Mobility impairment may arise from disorders of volition, perception, strength, coordination and mechanics. Even if the cause appears to localise to a specific anatomical structure or system, it is necessary to determine whether the problem is local or systemic.

Disorders of volition

A history of a progressive decline in mobility without a history of joint pain should focus attention on investigation of neurological function. Drugs and systemic illness can interfere with cognition and movement patterns.

Akinesia/hypokinesia/bradykinesia

People with akinesia, hypokinesia or bradykinesia do not initiate movement (or do so only rarely) or move very slowly. The basic movement pattern is still present. The complaint of lack of initiative does not localise to a specific centre in the brain or to a specific condition. It

may occur in cerebral disorders such as dementia, stroke, Parkinson's disease and normal pressure hydrocephalus, in psychiatric disorders such as depression and catatonia, and in endocrine disorders such as hypothyroidism.

Apraxia/dyspraxia

In patients with apraxia or dyspraxia, the stored information for coordinated movements of a learnt motor task is either damaged or rendered inaccessible. The difficulty observed in performance is out of proportion to the deficits detected in examination of the limbs in isolation. The basic movement pattern is lost. The presence of apraxia and dyspraxia can be seen in patients with neurological conditions such as stroke or advancing dementia, and is not strongly linked to any particular area of the brain.

Hyperkinesia

People with nondominant hemisphere impairment such as stroke can exhibit impulsive behaviour and are at high risk

of falls. Added movements such as tremor, hemiballismus, chorea, tic, myoclonus and spasm can produce bizarre patterns of movement.

Disorders of perception

Visual problems can lead to tripping and result in falls. Proprioception is essential for balance in the dark. Proprioceptive loss is usually profound before it produces problems. Balance can be maintained without vestibular function, with vision and proprioception able to compensate, but acute vestibular disease can produce incapacitating vertigo. Impairment of light touch and pain sensation is usually well tolerated as regards mobility.

Pain produced by movement is a very common cause of decreased mobility. In walking, this results in an antalgic gait, in which the time spent weight bearing through the affected limb (stance phase) is significantly shortened in comparison to the normal side. In patients who use a wheelchair, pain in the upper limbs can interfere with mobility.

Disorders of strength

Central weakness can arise from cerebral or spinal causes; peripheral weakness can arise from disorders of the peripheral nerves, neuromuscular junctions or muscles. The list of possible causes of weakness is long, and may involve systemic as well as local conditions. Systemic disorders include drug side effects and endocrine disorders.

Patients with known neurological disease can experience impaired mobility as the disease progresses. If spasticity is present, occult painful lesions can significantly increase spasticity or spasms.

Disorders of mechanics

Loss of mobility frequently arises from musculoskeletal problems. Disorders of the bones and of the joints and their ligaments, tendons and bursae can interfere with normal movement.

Disorders of coordination

The major causes of disordered coordination are lesions of the cerebellum or its pathways. Systemic as well as local disorders should be considered. Ataxia can affect the trunk and head as well as the limbs.

INVESTIGATIONS

The choice of investigations for a patient presenting with mobility impairment will be dictated by the findings of the clinical history and physical examination. Appropriate investigations might include imaging, electromyogram (EMG), nerve conduction studies, genetic testing, biochemical testing (such as creatine kinase measurement) and nerve and muscle biopsy. Making a simple video of the behaviour in question is valuable in allowing analysis without causing the patient unnecessary fatigue.

There are formal tests of transfer and gait that are general predictors of pathology and fall risk – an example is the ‘Get Up and Go’ test (see <http://www.fpnotebook.com/mobile/geri/exam/GtUpAndGtst.htm>).² Such tests allow observation and analysis of several aspects of mobility but do not of themselves produce a diagnosis.

Although stereotypical gait patterns are easily recognised, proficiency in gait analysis requires study and practice. Illustrations of the gait cycle are available online (see <http://www.ncbi.nlm.nih.gov/books/NBK27235>).³

REFERRAL

For patients with complex problems, the process of assessment can be both complex and lengthy. Referral to a neurologist or neurological physiotherapist is often required.

SUMMARY

In assessing a patient who has a mobility disorder, the importance of the clinical history and physical examination cannot be overemphasised. Mobility problems may arise from disorders of volition, perception, strength, mechanics and

coordination, and it is always important to consider whether the cause of the problem is local or systemic. **MT**

REFERENCES

1. Larsen PD, Stensaas SS. Neurological exam videos and descriptions: an anatomical approach [online tutorial]. University of Utah; 2001, updated September 2010. Available online at: http://library.med.utah.edu/neurologicexam/html/gait_abnormal.html (accessed February 2013).
2. Podsiadlo D, Richardson S. The timed ‘Up & Go’: a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc* 1991; 39: 142-148.
3. Uustal H, Baerga E. Prosthetics and orthotics (ch 6, section 1 [gait analysis]). In: Cuccurullo S, ed. *Physical medicine and rehabilitation board review*. New York: Demos Medical Publishing; 2004. Available online at: <http://www.ncbi.nlm.nih.gov/books/NBK27235> (accessed February 2013).

FURTHER READING

Frontera WR (ed). *DeLisa's Physical medicine and rehabilitation: principles and practice*, 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2010. Vol 1, ch 5: 121-137.

COMPETING INTERESTS: None.

Online CPD Journal Program



What are the major investigative modalities for a patient presenting with a mobility disorder?

Review your knowledge of this topic and earn CPD/PDP points by taking part in **Medicine**today's Online CPD Journal Program.

Log in to

www.medicinetoday.com.au/cpd