Gait Disorders

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KEYWORDS

• Gait • Bradykinesia • Ataxia • Parkinsonism • Freezing of gait • Parkinson disease • Progressive supranuclear palsy • Basal ganglia

KEY POINTS

- Slowness of gait is a normal consequence of aging but can be accelerated in the setting of Parkinson disease and other parkinsonian disorders.
- Lower-body parkinsonism usually indicates the presence of a vascular cause.
- Most gait disorders in the elderly are of multifactorial origin, including prior strokes, orthopedic or arthritic problems, peripheral neuropathy, and a fear of falling.

Videos of typical Parkinson's Disease (1), Parkinson's Disease (2), progressive supranuclear palsy, progressive gait difficulty, and psychogenic tremor and gait accompany this article at http://www.neurologic.theclinics.com/

INTRODUCTION

Gait, the act and manner of walking, is a learned complex motor skill that facilitates locomotion. Although it can be performed automatically and without conscious effort, gait requires the integration of mechanisms of locomotion with those of balance, motor control, cognition, and musculoskeletal function.[1,2] Bipedal gait, along with language and speech, are the abilities that differentiate humans from their ancestors. Normal gait is critical to an individual's quality of life and, therefore, disorders of gait, often associated with postural instability, are a source of considerable handicap and distress. Because of reduced reserves to support balance and gait, the elderly are more prone to falls.[3] Although particularly common among the elderly, gait disorders can affect people of any age. Several studies of healthy elderly individuals have shown reduced velocity of gait and length of stride, increased double-limb support interval, decreased push-off power, and a more flat-footed landing. These changes indicate adaptation by the elderly toward a safer, more stable gait pattern because of deterioration in strength and motor responses for an efficient control of balance during walking. With aging, body sway increases, whereas dynamic balance becomes

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compromised, and leg strength, particularly ankle dorsiflexion strength, declines. Slow gait speed is one of the hallmarks of frailty of the elderly.[4,5]

Although walking tends to slow with normal aging, this abnormality does not seem to correlate with white matter changes.[6] A pooled analysis from 9 selected cohorts has provided evidence that the speed of gait may correlate with longer survival in older adults.[7]

Gait disturbances must have been recognized and treated throughout history, but cases with primary gait disturbance have been documented in the literature only in the last hundred years.[8] During that time, different terms have been used to describe various gait abnormalities, such as Bruns frontal ataxia, a form of severe disequilibrium caused by mass lesions in the frontal lobe; trepidant abasia, manifested by start hesitation, freezing, and turning pauses; and marche á petits pas, a small-stepped gait in patients with frontal lobe disorders.[9,10]

CLINICAL MANIFESTATIONS

Patients with gait or walking disability may have trouble characterizing their gait difficulties. They often complain of weakness, unsteadiness, slowness, shuffling, stiffness, heaviness, stumbling, staggering and falling, numbness, heaviness, fatigability, and pain. Slow and cautious gait may be accompanied by muscle stiffness (rigidity), postural instability, and fear of falling. Parkinsonian gaits are characterized chiefly by the combination of shuffling steps, start hesitation, and freezing (as if the feet were glued to the floor) associated with stooped posture, flexed knees, narrow base, and turning en bloc (Videos 1 and 2). Recognition of freezing is important because it denotes poor prognosis; most patients have to use a wheelchair within 5 years after onset of freezing.[11] In a cross-sectional survey of 672 patients with idiopathic Parkinson disease (PD), 257 (38.2%) reported freezing of gait (FOG) during the on state, which correlated with longer duration of PD duration, higher scores on the Unified Parkinson Disease Rating Scale (UPDRS), the presence of apathy, higher levodopa equivalent daily dose, and more frequent exposure to antimuscarinics.[12] Gait and balance are particularly problematic in the postural-instability–gait-difficulty (PIGD) subtype of PD.[13] In some patients with PD or other movement disorders, such as dystonia, gait may be impaired by marked flexion of the neck and trunk; so-called bent spine or camptocormia.[14]

In the assessment of gait and posture, the examiner should observe the pattern of movement of the whole body when the patient walks and turns.[15] The various gait disorders are differentiated by typical manifestations and physical signs into the following categories: hemiparetic, paraparetic, spastic, and sensory. Sensory ataxia causes uncoordinated gait, whereas bilateral footdrop indicates severe neuropathy; other gaits include waddling gait (indicates proximal myopathy), dystonic, choreic, antalgic, vertiginous, and psychogenic (**Table 1**). Although there are limitations to this categorization, including phenomenologic overlap, this classification is useful to facilitate communication among clinicians. Also, this classification may be helpful in localizing the responsible lesion or lesions and in finding the most likely cause of the gait disorder.

CAUSES

Gait disorders often result from lesions or dysfunctions at different levels of the central and peripheral nervous system and the musculoskeletal system. However, it may not always be possible to identify a single cause for the impaired gait. Multiple factors may contribute to a patient's ambulatory abnormality.