Functional gait disorders

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INTRODUCTION

Functional gait disorders (FGD), previously termed psychogenic gait disorders are a subset of functional neurological disorders (FND) characterized by abnormal gait patterns that are incongruent with recognized neurological disease. Functional neurological disorder (FND) can include both motor and non-motor presentations. Abnormal gait is common in patients with motor-FND, being the sole presentation in 5.7% and part of a mixed movement disorder in 36.6% according to one study.[1]

The terminology used to describe Functional Neurologic disorders (FND) has undergone significant changes over time and is currently designated under 'Functional neurological symptom disorder (Conversion disorder)' in DSM-5TR, and 'Dissociative neurological symptom disorder' in ICD-11.[2]

EPIDEMIOLOGY

Functional motor disorders (FMD) account for approximately 3%–8% of visits to movement disorder clinics.[3,4] Functional gait disorders are more common in middle-aged and older adults and show a female preponderance. Recent studies suggest that gait symptoms are relatively more common in older individuals when compared with other functional movement phenotypes.[5,6]

PATHOPHYSIOLOGY

The pathophysiology of functional gait disorders is best understood using a biopsychosocial framework involving biological, psychological, and social factors. Neurobiological studies have demonstrated abnormalities in brain networks involved in motor planning, emotional processing, attention, and sense of agency.[7] Altered connectivity between motor and limbic regions may interfere with normal voluntary movement control.[8]

Current models explain FND using predictive processing theory, in which abnormal expectations and heightened self-focused attention override normal sensory feedback, leading to impaired perception of voluntary control over movement.[9] Psychological stressors, maladaptive illness beliefs, anxiety, and behavioural reinforcement may contribute to symptom development and persistence.[10] However, a precipitating psychological event is not necessary for diagnosis.

CLINICAL FEATURES AND DIAGNOSIS

The diagnosis of FND is primarily based on the identification of characteristic positive features, particularly inconsistency and incongruency with recognized organic gait disorders, rather than solely on the exclusion of an underlying organic neurological condition.[11] *Inconsistency* refers to unexplained variability across time and situations like discrepancy between examination findings and actual movement patterns, drastic fluctuation in symptoms, absence of falls despite severe abnormalities in gait and mismatch between observed disability and daily functioning. *Incongruency* refers to gait patterns or examination findings that are incompatible with recognized neurological disease, such as buckling gait despite normal strength, scissoring gait without corticospinal signs, or improvement of gait during distraction or dual-tasking.[12] Nonnekes et.al have classified functional gait symptoms into seven broad categories - ataxic gait, spastic gait, weak gait, antalgic gait, parkinsonian gait, hemiparetic gait, and dystonic gait.[12] The supportive tests to distinguish between functional and organic gait symptoms are shown in Table.1.

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Table 1 Classified Functional Gait Symptoms (Adapted from Nonnekes et al)[12]

Predominant sign	Supportive test	Suggest functional	Suggest organic
1. Ataxic gait : Variability in base. Claims of poor balance	Straight walking	Veering from side to side. Better balance than claimed	Vestibular / cerebellar – veering consistently to the side of lesion
	Walking backwards/ Walk with eyes closed	Improved performance	No change. Sensory/Vestibular ataxia worsen with eyes closed.
2. Spastic gait : Spasticity	Evaluation of tone	No adductor spasticity. Normal reflexes.	Adductor spasticity +. Brisk reflexes.
	Walking backwards	Scissoring disappears	Scissoring persists.
3. Weak gait : Weakness (Knees buckling/ Trendelenburg gait)	Muscle strength	No weakness	Weakness of quadriceps/gluteus
	Walk backwards/eyes closed	Buckling is inconsistent	Buckling consistently present
4. Antalgic gait : Limping	Physical examination	No pain	Pain +
5. Slowness (parkinsonian gait / bradykinetic)	Straight walking	Prolonged single leg stance time	Increase in double support time
	Pull test	Excessive trunk sway without falling. Balance appears good.	Small balance correcting steps .
6. Hemiparetic gait : Dragging	Physical Examination	No spasticity	Spasticity +
	Hoover test /Abductor sign	positive	negative
7. Dystonic gait : Abnormal posturing	Physical examination	No contractures or spasticity	Contractures or spasticity +

History taking: General principles

History taking should explore precipitating physical or emotional stressors, abrupt onset of symptoms, rapid progression, and marked variability across situations. Patients may report disability disproportionate to objective neurological findings, with fluctuations in gait and occasional spontaneous improvement.

Psychiatric comorbidities such as anxiety, depression, and post-traumatic stress disorder are common. Associated non-motor symptoms including pain, fatigue, sleep disturbance, cognitive complaints, fear of falling, and excessive self-monitoring may also be present.[19] Many patients have undergone multiple prior consultations and investigations before diagnosis.

Gait phenotypes

The term "astasia-abasia" was introduced in the 19th century, to describe psychogenic gait disorder. *Astasia* refers to the inability to stand upright, while *abasia* denotes an inability to walk with coordination.[13]

- *Psychogenic Romberg*: Large amplitude body sway, building up after a silent latency of a few seconds, with improvement by distraction.[14]
- *Uneconomic postures*: Body maintained in poorly balanced postures, like a shifted centre of gravity or flexed hips and knees, which requires excessive muscular effort and energy expenditure.[14]
- *Walking on ice gait*: Wide based, cautious steps with decreased stride length, stiff knees and ankles, and shuffling of the feet resembling walking on a slippery surface.[14]
- *Sudden buckling of knees*: Patient falls forward with sudden flexion of hips and knees and remains in an uneconomic half-flexed posture. Falling is often prevented by activating antigravity muscles.[14]
- *Monoparesis with leg dragging*: Monoparesis with normal swing on the unaffected side. Affected leg drags with forefoot in contact with the floor. The limb may be externally or medially rotated, with exaggerated effort to advance it during swing, often with extended hip or knee.[14,15]
- *Tightrope walking*: Exaggerated truncal sway while maintaining a narrow base, with legs appearing to follow a tightrope, truncal instability and targeting of nearby walls or furniture to avoid falls.[2]
- *Functional dystonic gait:* Abnormal posturing of the leg or trunk during gait cycle. Abnormal posturing may change with varying positions.[2]
- Neurological disease mimics like camptocormic gait, spastic, ataxic, sensory- ataxic, choreoballistic, parkinsonian and trendelenberg gait.[2]

Functional gait disorders are often equated with bizarre gait patterns. This is a common diagnostic pitfall because organic conditions can also result in seemingly atypical gait like dystonic gait, chorea, dyskinesias. Conversely FGDs need not always manifest bizarre gait patterns. For instance, the sudden knee buckling which is a common phenotype of functional

gait, can also occur in negative myoclonus of lower extremities. [12]

Positive clinical signs

The diagnosis of functional gait disorders is supported by the presence of positive clinical signs demonstrating inconsistency, incongruity, distractibility, and preserved automatic movement.

Hoover's sign: In organic hemiparesis, when the patient is asked to flex the *unaffected* hip against resistance, there is no downward pressure from the affected heel on the examiner's hand. In functional weakness, increased pressure is felt under the affected heel.[16]

Abductor sign: In patients with unilateral functional leg weakness, voluntary abduction of the affected leg is weak when tested directly. However, strength normalizes when the contralateral leg abducts against resistance.[18]

"Huffing and puffing" sign: Excessive demonstration of effort through behaviours like grimacing, huffing, grunting, crying, and breath holding, which is inconsistent with objective neurological impairment.[17]

Swivel chair sign: Patients who show even bizarre gait patterns are able to propel themselves normally on a swivel chair. [17]

"Whack-a-mole" sign: Whack-a-mole is a simple arcade-style game where players use a soft mallet to hit ("whack") toy moles that randomly pop up from holes on a board. It describes the immediate reemergence of an involuntary movement in another body part after suppression of the movement of an affected part by the examiner holding that part of the body.[18]

Tandem walking test: Patients with a functional gait pattern resembling ataxia may perform the tandem gait without sidesteps . Might display scissoring or an exaggerated performance with prolonged single-leg stance or "windmill like" movements of the arms, but without falling.[12]

Non-motor symptoms are also common in patients with motor-FND. Anxiety, fatigue and pain were found to be the most common non-motor symptoms. Somatosensory symptoms, insomnia, cognitive symptoms and fatigue also might be present and can significantly impact the gait and functional mobility.[19] Fear of falling and kinesiophobia are common associated features in elderly population with functional gait disorders. Often a "cautious gait" is present in these patients when postural instability and fear of falling is present.[2]

It is vital to recognize that, presence of any of these signs and a diagnosis of functional movement disorder doesn't rule out an underlying medical or "organic" disorder. Functional symptoms could coexist with neurological disorders like brain injury, parkinsonism and multiple sclerosis.[2] In a study by stone et al, 12% patients with confirmed neurological disorders also demonstrated functional symptoms.[20]

MANAGEMENT

Delivering the diagnosis

Delivering the diagnosis of functional neurological disorder (FND) to patients requires clarity, empathy, and reassurance. The diagnosis should be presented as a positive clinical diagnosis based on characteristic examination findings rather than as a diagnosis of exclusion. It should be emphasised that their symptoms are genuine and arise from a dysfunction in nervous system functioning and not due to structural damage. Avoiding stigmatizing language and emphasizing the potential reversibility of symptoms and availability of treatment can enhance patient engagement and therapeutic outcomes.[2]

General Principles of Management

1. Multidisciplinary care.
2. Motor retraining and goal setting with graded approach.
3. Individualized treatment tailored to the patient.
4. Address psychiatric comorbidities like anxiety disorders, depressive disorders, PTSD and related psychiatric conditions.
5. Manage associated non-motor symptoms like insomnia, fatigue, cognitive impairment and pain.
6. Psychoeducation of patient and family.
7. Facilitation rather than support.
8. Minimising reinforcement.

Many studies have assessed multidisciplinary rehabilitation programs with duration ranging from 3 to 14 weeks which combine multiple specialties. It has been demonstrated that majority of patients had a significant improvement in physical functioning and quality of life.[21-23]

Psychotherapy

Psychotherapy plays an important role in the management of FNDs, particularly in addressing maladaptive thoughts, emotional stressors, and illness-related behaviours. Cognitive Behavioural Therapy (CBT) and Psychodynamic therapy have shown benefits in improving symptom severity, functional outcomes, and quality of life. Psychotherapy also helps patients develop coping strategies and improve insight into symptom triggers.[24]

Pharmacotherapy has only a limited role . Presence of psychiatric comorbidities might require treatment with medications like SSRIs or antipsychotics .

Rehabilitation

Rehabilitation has a key role in the multidisciplinary management of patients with FGD. Treatment should address illness beliefs, self-directed attention and abnormal habitual movement patterns through a process of education, movement retraining and self-management strategies within a non-judgemental context.[25]

General principles of rehabilitation for functional movement disorders include building trust, creating an expectation of improvement while helping the patient recognise and challenge maladaptive beliefs and behaviours. Emphasis should be more on facilitation rather than support. Rehabilitation efforts should be goal directed, focusing on function and automatic movement (e.g. walking) rather than the impairment (e.g. weakness) and controlled movement (e.g. strengthening exercises). Minimising reinforcement of maladaptive movement patterns and postures, and the use of adaptive equipment and mobility aids is crucial. Use of splints and devices that immobilise joints should be avoided.

Additional strategies include retraining movement with diverted attention, non-specific graded exercise, visualization techniques, mirrors and videos to give feedback about posture or gait pattern and keeping a rehabilitation diary.[26]

PROGNOSIS

Overall, the prognosis of functional motor symptoms appears unfavourable. A systematic review with more than 10,000 patients reported that more than one third of patients did not show improvement or were worse at follow up. Short duration of symptoms, early diagnosis and high satisfaction with care were good prognostic factors. Gender had minimal effect. Delayed diagnosis and personality disorders were poor prognostic factors. Age, comorbid anxiety and depression, IQ, educational status, marital status and pending litigation showed marked heterogeneity across studies.[27]

CONCLUSION

Functional gait disorders are a disabling subtype of functional neurological disorder. Diagnosis relies on identifying positive clinical signs demonstrating inconsistency and incongruency of the functional symptoms. Management requires a multidisciplinary approach involving physiotherapy, psychotherapy, psychoeducation, and treatment of associated psychiatric and non-motor symptoms. Although prognosis is variable, early diagnosis and individualized multidisciplinary rehabilitation are associated with better functional recovery and quality of life.

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