



FREEZING OF GAIT IN PARKINSON'S DISEASE PATIENTS AND NEUROREHABILITATION PROCEDURES

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Abstract

Aim: Parkinson Disease (PD) is a neurodegenerative disease with a progressive evolution, the second after Alzheimer disease as frequency. The PD diagnosis is exclusively clinical and the treatment administration will be started when the disease becomes symptomatic.

Freezing of gait (FOG) is an episodic gait disorder, characterized by the inability to generate effective forward stepping movements. The pathophysiology underlying freezing of gait remains insufficiently understood and this hampers the development of better treatment strategies.

Methods: Between March 2014 - March 2015 we hospitalized 22 patients with PD (only self-casualty). Demographic (sex, age), clinical data (UK Parkinson's Disease Society Brain Bank Clinical Diagnostic Criteria), the Unified Parkinson's Disease Rating Scale (UPDRS), FOG episodes before and after neurorehabilitation procedures, modified scale Hoehn & Yahr, and neurorehabilitation were all considered.

Results: A total of 22 PD patients with the UPDRS and MDS-UPDRS (12 males and 10 females) were examined. All Hoehn & Yahr stages were represented, with the majority of patients in stage 2 (stage 1= 2; stage 1,5= 4; stage 2 = 18; stage 2,5 = 10; stage 3=6 stage 4= 2). The mean age was 65,3 years (range: 52 - 84). All were medical treated and we proceed the neurorehabilitation procedures.

Conclusions: The MDS-UPDRS was designed to be more comprehensive than the original UPDRS, with new items devoted to several non motor elements of PD.

A modified version of the Hoehn and Yahr stage is commonly used in contemporary clinical trials. Physical therapy influence the disease evolution in the early stage of disease.

Key Words: Parkinson Disease, SCALE, FOG, neurorehabilitation.

Introduction

Parkinson disease (PD) is a neurodegenerative disease with a progressive evolution, the second after Alzheimer disease as frequency.

Methods

Between March 2014 - March 2015 we hospitalized 22 patients with PD (only self-casualty). Demographic (sex, age), clinical data (UK Parkinson's Disease Society Brain Bank Clinical Diagnostic Criteria), the Unified Parkinson's Disease Rating Scale (UPDRS), modified scale Hoehn & Yahr, were all considered. The UPDRS (55 items) is a scale that was developed as an effort to incorporate elements from existing scales to provide a comprehensive but efficient and flexible means to monitor PD-related disability and impairment (Goetz, 2003). The scale itself has four components, largely derived from preexisting scales that were reviewed and modified by a consortium of movement disorders specialists (Part I- Mentation, Behavior and Mood; Part II- Activities of Daily Living; Part III- Motor; Part IV- Complications). Despite its multidimensional approach with different sections, the UPDRS has proven an easy-to-use instrument in clinical

practice with an average time requirement for administration of the full scale between 10 and 20 minutes (Martinez- Martin et al, 1994). The UPDRS is less comprehensive in its assessment of non-motor features of the disease.

The Hoehn and Yahr stage, first described before effective dopaminergic treatment became available, outlines the milestones in progression of the illness from mild unilateral symptoms through the end-stage nonambulatory state. A modified version of the Hoehn and Yahr stage is commonly used in contemporary clinical trials (Bradley et al, 2008).

We performed neuroimaging studies (cerebral MRI) at all patients but there are not helpful in making a diagnosis of PD because they are generally normal or show only incidental abnormalities.

Results

A total of 22 patients (12 males and 10 females) with PD were examined initially with UK Parkinson's Disease Society Brain Bank Clinical Criteria. A set of well-validated criteria exist to assist in the clinical diagnosis of PD and have a high specificity and sensitivity. They bring together many of the aspects of history taking and

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examination discussed above. We use three steps:

1. Diagnosis of parkinsonian syndrome.
2. Exclusion criteria for Parkinson's disease.
3. Supportive prospective positive criteria for Parkinson's disease (Hughes et al, 1992).

Once the diagnosis established, we performed a quantitative evaluation of the disease's severity, which allows a serious monitoring of the severity and therapeutic response.

We used two types of evaluation scales:

- UPDRS and MDS- UPDRS which makes a quantitative measuring of the neurological changes and of the impact upon the daily quality of life.

- A modified Hoehn and Yahr scale which performs a whole functional evaluation of the disease's severity degree.

A total of 22 participants were studied. Participants were male (51 %) and had a mean age of 65.3 years (range: 52-84).

The diversity of disability is captured by the range of scores for UPDRS score in on and off. The mean Hoehn and Yahr score 2 was indicative of a mild to moderately impaired of PD participants.

The range of scores for Hoehn and Yahr scale was 1.0- 3.0.

Table 1: Participant characteristics

Variable	Mean	Range
Age (yr)(n=42)	65.3	52 - 84
UPDRS total score in on	12.1	8 - 59
UPDRS total score in off	25	18-75
MDS - UPDRS	18.2	15 - 96
Hoehn and Yahr Score	2	1.0 - 3.0

Parkinson Disease is a clinical diagnosis and the investigations are not necessary for the majority of patients. Neuroimaging studies such as computed tomography (CT) and magnetic resonance imaging (MRI) are also not helpful in making a diagnosis of PD because they are generally normal or show only incidental abnormalities. Number of FOG episodes

Across all gait tasks, FOG episodes. The mean number of FOG episodes was significantly larger during the off periodes ($0,96 \pm 0,35$) compared with the normal gravity condition ($0,68 \pm 0,36$; $P < 0,01$).

Table 2 Mean number of FOG episodes during the normal gate condition in onn periodes

	Mean (SD)
Normal walking	0.18 (0.21)
Normal walking rapid	0.16 (0.21)
Turn left rapid	1.03 (0.58)**
Turn right rapid	0.87 (0.57)**
Short steps	0.80 (1.26)
Short steps rapid	1.10 (1.36)*

* Significant at $P < 0.05$ between the marked task and normal walking, normal walking rapid and short steps trials

** Significant at $P < 0.01$ between the marked task and normal walking, normal walking rapid and short steps trials.

Table 3 Mean number of FOG episodes during the normal gate condition in off periodes

	Mean (SD)
Normal walking	0.18 (0.21)
Normal walking rapid	0.08 (0.11)
Turn left rapid	1.00 (0.55)**
Turn right rapid	0.80 (0.50)**
Short steps	0.70 (1.16)
Short steps rapid	1.10 (1.36)*

* Significant at $P < 0.05$ between the marked task and normal walking, normal walking rapid and short steps trials

** Significant at $P < 0.01$ between the marked task and normal walking, normal walking rapid and short steps trials.

Table 4 Mean number of FOG episodes in on and off periods (SD)

	Norma l gait	Before neurorehabilita tion	After neurorehabilitati on
Across all gate tasks	0.68 (0.36)	0.86 (0.45)*	0.71 (0.53)
Turn left rapid	1.04 (0.59)	1.31 (0.89)	1.06 (0.70)
Turn right rapid	0.88 (0.58)	1.13 (0.46)††	0.73 (0.48)
Short steps rapid	1.11 (1.37)	1.42 (1.49)†,**	0.94 (1.19)



* Significant at $P < 0.01$ between the loaded and normal gait conditions

** Significant at $P = 0.05$ between the loaded and normal gait conditions

† Significant at $P < 0.05$ between the loaded and weight-supported conditions

†† Significant at $P < 0.01$ between the loaded and weight-supported conditions

Treatment

14 patients (in stage 1- 2) were just parkinsonian treated, 8 patients (in stage 2 - 3) were treated and we make a rehabilitation concomitant programme.

We examine FOG episodes that's appear in on or off periods.

Neurorehabilitation

Rehabilitation is a process of active change by which a person who has become disabled acquires the knowledge and skills needed for optimum physical, psychological and social function

Role of Physical therapy:

- To improve or maintain gait, balance, mobility and posture.
- To improve or maintain general (cardiovascular) fitness.
- To improve or maintain flexibility and range of movement.
- To prevent contracture of muscles (Playford, 2003).

Steps of Physical therapy are in concordance with stage of PD:

1. Early-Stage PD - Gait changes in PD are generally mild in the beginning stage of the disease. Slowness, slight dragging of one leg, and slowed or absent arm swing on one side are the common changes noticed. Patients may describe themselves as feeling less coordinated and report episodes of tripping. In this stage, only minimal gait training may be necessary.

2. Moderate-Stage PD - With disease progression, gait becomes characterized by shortened stride, slower speed, narrowed base of support, and reduced heel strike. Together, these produce a shuffling gait, which leads to increased episodes of tripping. Even small changes in the walking surface, such as a threshold between a carpeted and noncarpeted room, can become obstacles due the decreased ground clearance of the feet. Gait changes coupled with environmental risk factors and postural instability can ultimately result in falls. This fear of falling is further heightened in patients who test poorly on portions (arising from a chair, posture, gait, postural stability) of the Unified Parkinson's Disease Rating Scale (UPDRS) and on particular standing balance tests.

Freezing is another gait deficit that occurs in the moderate stage of PD. This causes either the legs to tremble in place or the body's center of gravity to become so anteriorly displaced that the patient is standing on his/her toes and then loses his or her balance (Bunting, 2007).

Strategies for correcting posture deficits

1. Exercise
 - Stretching neck and hip flexors, chest, hamstrings, and heel cords.
 - Strengthening trunk, neck, and hip extensors, shoulders, scapular muscles, and abdominals.
2. Home modification
 - Use a lumbar roll in chairs to enhance natural lumbar curve (lumbar rolls can easily be used in cars, planes, and theater seats).
 - Avoid recliner chairs and allowing hips to slide forward in regular chairs.
 - Avoid excessive pillows with sleep. Attempt to use one appropriate height pillow at neck or a cervical roll. If side sleeping, use a pillow between knees.
 - Keep television and computer screens at eye level.
 - Place posture reminder signs in commonly used rooms to encourage frequent posture checks.
 - Ask family and friends to give posture reminders.
 - Prop elbows on table to hold books or magazines up directly in front of the face while reading, or use a book stand.

Gait initiation

- Stop all movement, and take a deep breath.
- Make sure weight is evenly placed throughout both feet.
- Visualize stepping over or kicking an object.
- Shift weight side to side and then step with unweighted foot.
- March in place before stepping.
- Have your care partner place his or her foot ahead of your foot and step to it.
- Gather all clothing and put it in one place first.
- Sit down to dress.
- Use adaptive devices like long-handled shoe horns, sock donners, and button hooks.

Assistive devices

Many patients with PD will need to use an assistive device to improve the safety of their gait. All patients in need of an assistive device for walking should have an assessment from a physical therapist to ensure that they receive the proper device. When safe ambulation with a walker is no longer possible, motorized wheelchairs and scooters can provide patients with an alternate means of mobility. Physical therapists can make recommendations concerning the proper type of device and features as well as provide education in using the device correctly.

Fall prevention

- Home assessments - Patients with PD can reduce and prevent falls not only by following new movement strategies, but also by making their home environments safer. A home safety assessment by a health professional will ensure that proper changes are made to accomplish this. The assessment should include, but need not be limited to, evaluating (a) the layout of each room's flooring, lighting, furniture, closets and cabinets, appliances, and maneuverability with and without a gait assistive device; (b) all entrances to the home; (c) parking areas; and (d) all hallways and stairways. The patient should then be evaluated walking, transferring, and performing ADLs in all of these areas. After this is accomplished, recommendations for home modifications can be made.
- Home modifications - Simple changes to a home can greatly improve patient safety. Attaching grab bars in hallways and showers and next to toilets and doors provides increased stability. Removing clutter and throw rugs from the floors reduces the chances of tripping. Rearranging furniture to allow for open spaces will increase maneuverability, especially for those using assistive devices for walking. Some modifications are more complex, like widening doorways, adding ramps, and remodeling bathrooms to make them wheelchair accessible.

Rolling from supine to side lying

- Bend knees.
- Turn head in direction of turn.
- Gently rock knees side to side for momentum.
- Allow knees to fall together to the side while reaching upper arm in direction of turn.

When transferring to stand, patients with PD tend to not lean forward enough, causing their center of gravity (COG) to fall posterior to their feet. This leads to patients either not being able to lift themselves up or to continually "plop" back down into the chair. The correct technique is highlighted below:

- Scoot to the edge of the seat.

- Keep feet wide and posterior to knees.
- Hold armrests.
- Lean forward "nose over toes" and push to stand.

The transfer to stand can also be made easier by patients first mentally rehearsing the movement, by rocking back and forth before moving, and by sitting in a chair that has armrests and is the proper height. Chairs should be high enough so that the hips are in line with, or higher than, the knees. Patients should avoid low, soft furniture that sinks in when sat on, as is often the case with sofas. For patients with advanced PD, a motorized lift chair or physical assistance from a care partner may be necessary. (Bunting, 2007).

Patients with PD often land in a side sit position when returning to sit from a standing position. This partial landing on the seat edge occurs when patients reach for the surface they intend to sit on before fully turning around. Reaching forward too soon and too far causes an anterior shift in the COG. This shift leads patients to feel as though they are losing their balance, which they then try to resolve by landing in the chair as quickly as possible. Many falls result from patients tipping over chairs or sliding off the seat edge onto the floor. The correct technique is highlighted below:

- Turn completely around so backside is facing the chair.
- Be sure back of legs touch the chair.
- Reach back with both hands for armrests.
- Slowly lower to sit.

Discussions

In community-based series, PD accounts for more than 80% of all parkinsonism, with a prevalence of approximately 360 per 100,000 and an incidence of 18 per year (de Lau et al, 2006). PD is an age-related disease, showing a gradual increase in prevalence beginning after age 50 years and a steep increase after 60 years

Typically the onset and progression of PD are gradual. The most common presentation is with rest tremor in one hand. Bradykinesia and rigidity are often detectable on the symptomatic side. The presentation may be delayed if bradykinesia is the earliest symptom, particularly when the onset is on the nondominant side. The disorder usually remains asymmetrical throughout much of its course (Bradley et al, 2008).

There is no diagnostic test for Parkinson's disease, and it remains a clinical diagnosis. UPDRS remains one of the most important tools in quantitating chiefly the motor symptoms of PD.



The modified UPDRS (MDS - UPDRS) measures including non- motor symptoms. A modified Hoehn and Yahr stage is a descriptive scale to describe stages of PD progression.

FOG episodes are influenced by physical therapy just if doctors and the patients recognized this episodes in on or off periods.

Conclusions

1. The PD diagnosis is exclusively clinical.
2. A set of well- validated criteria exist to assist in the clinical diagnosis of PD and have a high specificity and sensitivity, like: UK Parkinson's Disease Brain Bank Clinical Criteria, UPDRS, and modified Hoehn and Yahr.
3. The mean Hoehn and Yahr score 2 was indicative of a mild to moderately impaired of PD participants.
4. Symptomatic pharmacological treatment should begin when the patient shows functional disability related to PD symptoms, using dopamine agonists for the first time.
5. Physical therapy cannot influence the disease evolution but it can improve the mobility
6. Rehabilitation therapy/ physical therapy enhances the lives people learn movement strategies.
7. At a practical level rehabilitation is a process which consists of a number of stages: assessment of physiological, psychological and social aspects, planning of short- term, intermediate or long- term goals, intervention to help patients achieve these goals.
8. Referring patients to physical and occupational therapy should occur soon after the diagnosis of PD is made.

9. FOG episodes are influenced by physical therapy just if doctors and the patients recognized this episodes in on or off periods of patients.

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