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Original article

NEUROREHABILITATION AT PATIENTS WITH PARKINSON'S DISEASE

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Abstract

Objectives. 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.

Methods: Between February 2012 - February 2014 we hospitalized 42 patients with PD (only self -casuistry). Demographic (sex, age), clinical data (UK Parkinson's Disease Society Brain Bank Clinical Diagnostic Criteria), the Unified Parkinson's Disease Rating Scale (UPDRS), a clinimetric assessment of the Movement Disorder Society (MDS) - sponsored revision of the UPDRS (MDS-UPDRS), modified scale Hoehn & Yahr, imagistic data (cerebral MRI) as well as risk factors, treatment, evolution and neurorehabilitation were all considered.

Results: A total of 42 PD patients with the UPDRS and MDS-UPDRS (22 males and 20 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 66,4 years (range: 52 - 84).Twenty- for patients (in stage 1- 2) were treated with dopamine agonists in monotherapy or with MAO inhibitors. Eighteen patients (in stage 2,5 - 4) were treated with levodopa in combination with another symptomatic treatment (dopamine agonists, MAO inhibitors, COMT inhibitors and piribedil).Thirty-six patients, starting with stage 2 Hoehn&Yahr, followed a neurorehabilitation treatment, the physiotherapist considering the clinical type as well as the seriousness of the functional deficit.

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. Symptomatic pharmacological treatment should begin when the patient shows functional disability related to PD symptoms, using dopamine agonists for the first time. Therapy with Levodopa should be introduced in the later stages of the disease, considering the occurrence of the motor fluctuations and dyskinesia. Physical therapy cannot influence the disease evolution but it can improve the mobility under the current pathologic conditions.

Key Words: Parkinson Disease, MDS-UPDRS, dopamine agonists, levodopa, neurorehabilitation.

Introduction

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

The pathological hallmarks of PD are the presence of Lewy bodies and loss of pigmented (dopaminergic) neurons in pigmented brainstem nuclei (Edwards at al, 2008). Lewy bodies are inclusions within the cytoplasm of neurons that are composed of alfa - synucleid, ubiquitin and other neurofilament protein. In PD, Lewy bodies are found in the basal ganglia, brainstem and cortex, and number correlates with disease progression.

Mean age at onset is 60 and prevalence is slightly higher in men than women. The fundamental feature of PD is akinesia but there are three other components that may or may not be present: rigidity, tremor, postural and gait disturbance. The PD diagnosis is exclusively clinical and the treatment administration will be started when the disease becomes symptomatic. Unified Parkinson Disease Rating Scale (UPDRS)

remains one of the most important tools in quantitating chiefly the motor symptoms of PD and is also used to chart the course of the disease (Jancovic, 2005).

We use symptomatic treatment of Parkinson disease: anticholinergics, amantadina, MAO-inhibitors, dopamine agonists, catechol -O- methyltransferase inhibitors, Levodopa. There is universal agreement that LD is the most potent drug in the PD arsenal, but there are concerns that is might be toxic to dopaminergic neurons and that it promotes the development of motor fluctuations (Bradley at al, 2008). In our study we start for initial therapy with dopamine agonists.

Physiotherapy should be available for people with PD and should be given to gait re-education, improvement of balance and flexibility, enhancement of aerobic capacity, improvement of movement initiation, improvement of functional independence including mobility and activities of daily living (Edwards at al, 2008).

Patients and methods

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Between February 2012 - February 2014 we hospitalized 42 patients with PD (only self - casuistry). Demographic (sex, age), clinical data (UK Parkinson's Disease Society Brain Bank Clinical Diagnostic Criteria), the Unified Parkinson's Disease Rating Scale (UPDRS), a clinimetric assessment of the Movement Disorder Society (MDS)- sponsored revision of UPDRS (MDS- UPDRS), modified scale Hoehn & Yahr, imagistic data (cerebral MRI), as well as risk factors, treatment and neurorehabilitation 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 section, 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 at al, 1994).The UPDRS is less comprehensive in its assessment of non- motor features of the disease.

The modified UPDRS (MDS - UPDRS) retains the four-scale structure with a reorganization of the various subscales. The scales are now titled: 1- non-motor experiences of daily living (13 items), 2- motor experiences of daily living (13 items), 3- motor examination (18 items), 4 - motor complications (6 items). Each subscale now has 0 - 4 rating, where 0= normal, 1= slight, 2= mild, 3= moderate, 4= severe.

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 at 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 42 patients (22 males and 20 females) with PD were examined initial 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 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 at 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 42 participants were studied. Participants were Caucasian (100%) and male (52 %) and had a mean age of 66.4 years (range: 52-84).

The diversity of disability is captured by the range of scores for total UPDRS (8- 96) and MDS- UPDRS (18 - 126).

The mean Hoehn and Yahr score 2.2 was indicative of a mild to moderately impaired of PD participants.

The range of scores for Hoehn and Yahr scale was 1.0- 4.0.

Table 1: Participant characteristics

Variable	Mean	Range
Age (yr)(n=42)	66.4	52 - 84
Race (White)	100	-
UPDRS total score	32.1	8 - 96
MDS - UPDRS	48.2	18 - 126
Hoehn and Yahr Score	2.2	1.0 - 4.0

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. Sometimes, neuroimaging abnormalities can be useful in suggesting alternative diagnosis such as progressive supranuclear palsy (PSP) and multiple system atrophy (MSA) (Bradley at al, 2008). However, we made cerebral - MRI to all patients before the start of treatment.



There is no role for routine electrophysiological testing in the diagnosis of PD. Because identified genetic causes are rare and their interpretation for genetic counseling is difficult, DNA tests should not be used routinely in the diagnosis of PD.

Treatment

Twenty - four patients (in stage 1- 2) were treated with dopamine agonists in monotherapy or with MAO inhibitors. Symptomatic pharmacological treatment should begin when the patient shows functional disability related to PD symptoms, using dopamine agonists for the first time. Dopamine agonists directly stimulate postsynaptic dopamine receptors. We used non- ergot agonists such as: Pramipexole, Rotigotine and Ropinirole in our study. Dopamine agonists are effective in the treatment of motor symptoms in PD as monotherapy and are only rarely associated with the long- term side effects of dyskinesia and the on - off fluctuation seen with levodopa. Some patients have common side effects like nausea, vomiting and postural hypotension. Four patients were treated with Rasagiline, a newer monoamine oxidase B inhibitor which is licensed for monotherapy. Rasagiline prevent breakdown of dopamine in the synapse and is not metabolized to amphetamine derivatives.

Eighteen patients (in stage 2.5 - 4) were treated with Levodopa in combination with another symptomatic treatment (dopamine agonists, MAO- B inhibitors, COMT inhibitors and piribedil). Levodopa is recognized as the most effective drug for the treatment of motor symptoms in PD. However, the long time consequences of levodopa treatment in terms of dyskinesia and fluctuations can be serious. For this reason we try to withhold levodopa for as long as possible.

Neurorehabilitation

Thirty- six patients, starting with stage 2 Hoehn and Yahr scale, followed a neurorehabilitation treatment, the physiotherapist considering the clinical type as well as the seriousness of the functional deficit. 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. This definition recognizes that the disabled person plays an active role in determining the end points of the rehabilitation process and how they may be reached. Rehabilitation therapy/ physical therapy enhance the lives of people with Parkinson's disease.(Sharma, 2008). A program of physical therapy and occupational therapy can help people learn movement strategies: how to roll over and get out of bed more easily, rise from a chair, or get out of a car. Therapists sometimes suggest simple devices to assist with daily activities, such as shower grab bars, shower stools, or an elevated toilet seat. Occupational therapists and physical therapists have experience finding ways to help people button shirts, cook, and

generally keep their lives going. They know about special kinds of utensils that help keep food on a spoon or a fork. Even people with serious tremor, slowness, or rigidity can use these utensils to feed themselves without making a mess. In addition to allowing people to enjoy their meals, this kind of therapy helps people maintain their independence and self-respect (Weiner, 2001).

Physical therapy – it's used:

- 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).

Gait deficits

- 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.
- 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.
 3. Office modification
 - Use a lumbar roll or chair with lumbar support to enhance natural lumbar curve.
 - Keep computer screen at eye level.
 - Place posture reminder sign on computer.
 - Keep chair and desk at appropriate height to one another.
 - Avoid sitting for longer than 20–30 min. During breaks, stretch arms up over the head.
 4. Braces
 - Lumbar braces made of elastic and Velcro can provide tactile reminders to keep spine erect.
 - Rigid braces for the neck and trunk can be used with more advanced disease progression.
3. Walking in crowds
 - Try to walk near walls.
 - Take slow, deep breaths and focus only on how your feet are moving, not on the people around you.
 - Cycle between only walking a few feet, stopping yourself, and then starting again.
 4. Turning
 - Never pivot.
 - If turning right, step with the right foot first. If turning left, step with the left foot first.
 - Try making a U-turn in open spaces.
 - Try marching to turn.
 - Try to avoid stepping backward to turn.
 - Keep areas where turns commonly occur, like the kitchen and bedroom, open and free of clutter.
 - If there is not enough room to make a safe turn, try sidestepping.
 - Finish one task at a time—do not try to turn while closing the refrigerator.
 5. 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.

New movement strategies to reduce loss of balance

Freeze reduction strategies

1. Answering the phone
 - Never rush to answer the phone.
 - Keep pathways open by rearranging furniture, and keep floors free of clutter.
 2. Walking through doorway
 - Tell yourself not to focus on the doorway, but rather how your feet are hitting the ground.
 - Guess how many steps it will take to walk from where you are through the doorway, then count your steps as you move through to see how close you were to your guess.
 - Look through the doorway at an object inside and focus on stepping to approach the object.
 - Walk up to the threshold, stop, and then focus on stepping over it.
 - Place colored tape on threshold to draw attention to stepping over it.
1. Reaching into a high cabinet in kitchen or bathroom
 - Stand as close to the counter or sink as possible (body can touch surface) before reaching.
 - If you must move up onto your toes to reach an object, it is too high. Bring the object to a lower shelf or keep it on the counter.
 - Avoid step stools.
 - If possible, slide objects along counter instead of carrying.
 2. Opening and closing a door, oven, microwave, or refrigerator
 - Do not stand directly in front of the door. Stand sideways at a right angle to the door. This will keep you from stepping backward.
 - Keep feet wide apart.
 - Place one hand on counter or wall (a vertical grab bar can be installed here).
 - Shift your weight from front to back to help pull the door open. Shift weight from back to front to close.
 3. Reaching forward into a closet or for an object

- Do not reach forward while walking.
 - Stand as close to the clothing or object as possible before reaching.
 - Keep feet wide apart and one foot slightly forward.
 - Steady yourself with one hand on the wall (a vertical grab bar can be installed here). If you have to lean forward or move up onto your toes, you are not close enough and/or the clothing/object is too high.
 - Move commonly needed objects to lower and easier to reach places.
 - Lower the clothing bar and/or move it forward.
 - Keep floor of closet free of clutter.
4. Picking up objects from the floor or out of low cabinets
- Use a reacher.
 - Move commonly used items to an easy to reach area.
 - Steady yourself with one hand on the counter or steady furniture.
5. Dressing
- 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.
- Transfers and bed mobility - With disease progression, transfers and bed mobility become increasingly challenging. This is due in part to bradykinesia, a lack of trunk flexibility, and difficulty performing fluid sequential motor activities. Teaching patients to break down complex activities like bed mobility into a series of small steps often makes the task much easier to perform. Below is an example of this technique.

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.

No issue in PD is more vexed or mired in controversy than when to start treatment and which drug to start with. No consensus exists amongst movement disorder specialists. It is common practice to start medication only when the patient is functionally disabled by their symptoms (Edwards et al, 2008). Levodopa is recognized as the most effective drug for the treatment of motor symptoms in PD. De novo, agonist monotherapy, by delaying introduction of levodopa, delays levodopa-induced fluctuations and dyskinesias.

There are a number of physiotherapy interventions that have been used in patients with PD at different stages of the condition.

Patients with PD have many treatment options to help them deal with their symptoms. Physical therapy is one option that can assist patients throughout the course of the disease. Referring patients to physical and occupational therapy should occur soon after the diagnosis of PD is made. An early physical assessment, along with treatment and education, can help patients feel more in control and may help limit motor decline.

With disease progression, therapists can make activities like walking and bathing easier and safer by using strategies such as adaptive equipment and mobility training. Even in the end stages of PD, there are many rehabilitation strategies that can assist both patients and care partners in improving mobility.

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. They bring together many of the aspects of history taking and examination discussed above. We use four stages: UK Parkinson's Disease Brain Bank Clinical Criteria, UPDRS, MDS-UPDRS and modified Hoehn and Yahr.
3. The MDS - UPDRS was designed to be more comprehensive than the original UPDRS, with new items devoted to several non-motor elements of PD.
4. The mean Hoehn and Yahr score 2.2 was indicative of a mild to moderately impaired PD participants.
5. Symptomatic pharmacological treatment should begin when the patient shows functional disability related to PD symptoms, using dopamine agonists for the first time.
6. Therapy with Levodopa should be introduced in the later stages of the disease, considering the occurrence of the motor fluctuations and dyskinesia.
7. Physical therapy cannot influence the disease evolution but it can improve the mobility under the current pathologic conditions.
8. Rehabilitation therapy/ physical therapy enhances the lives people learn movement strategies.
9. 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.
10. Referring patients to physical and occupational therapy should occur soon after the diagnosis of PD is made.

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