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Parkinson's Disease Effects on Orofacial Functions: A Prosthodontic Review

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Abstract: ***Parkinson's disease (PD) is a chronic, progressive and associated with aging neurodegenerative disease. Most Parkinson's patients are old and are less likely to opt for dental treatments except for emergencies. Oral health is contingent upon oral hygiene, which requires a series of simple and complex hand movements. Oral health problems among patients with Parkinson's are complex and requires the involvement of physicians, dentists, patients and also their caregivers.***

Keywords: Parkinson disease, bruxism, sialorrhea, xerostomia, dysphagia

1. Introduction

Parkinson's disease, also known as paralysis agitans, was initially described by James Parkinson in 1817 and is the most common of the extra pyramidal disorders.

PD is a chronic, progressive central nervous system disease that results from dopamine deficiency in the brain due to the death of dopaminergic neurons in the substantia nigra.

Dopamine is a chemical that helps in transmitting messages between cells. The symptoms generally come on slowly over time. This is due to the progressive degeneration of nerve cells in the brain resulting in a decrease in dopamine levels.

The area of the substantia nigra is responsible for the beginning and control of movements. As a result, the balance between the neurotransmitters in the brain is disturbed. Symptoms appear when 60-70% of dopaminergic neurons are destroyed and can be divided on motor, non-motor and behavioural.

The disease is characterized by three cardinal signs:

Bradykinesia (slowness in movements), tremor at rest, and rigidity, particularly in the neck and trunk.

There are three etiologic categories.

- The first and classical category is the primary or idiopathic variety of Parkinson's disease.
- The second category is acquired or secondary parkinsonism and occurs as a result of drug toxicity, encephalitis, trauma, or vascular impairment.
- The third category, "Parkinson plus" syndromes, have additional neurologic finding. [10]

According to Hoehn & Yahr[8], the disease has been divided into 5 stages.

Stage 1: only one side of the body is affected, usually with minimal or no functional impairment

Stage 2: both sides of the body are affected, but posture and balance remain normal

Stage 3: both sides of the body are affected and there is mild imbalance when standing or walking); and advanced disease

Stage 4: both sides of the body are affected and there is disabling instability while standing or walking, i.e. the person requires substantial help and cannot live alone

Stage 5: severe, fully developed disease is present, i.e. the person is often cachectic and restricted to bed or a wheelchair unless aided

Clinically, Parkinson's is multifaceted, and may begin with bradykinesia (slowing of in one limb, and gradually the stiffening spreads to the opposite side. There may be a grace period or "honeymoon" for 3 to 5 years during the initial and often successful treatment process. [10]

They result in a lack of facial expression with a characteristic mask-like face, reduced blinking rate, drooling, a quiet monotone voice, slurring of speech, dysphagia, resting tremor, slow reactions and responses, short shuffling steps, and gait instability. Additionally, there is an increased incidence of depression and cognitive impairment related to the disease[8]

These disorders include increased prevalence of gingivitis and dental diseases, diurnal and nocturnal sialorrhea and drooling, xerostomia, orofacial pain, the burning mouth syndrome, and bruxism[2]

When voluntary and involuntary muscle control of the oro-facial-pharyngeal muscles are compromised, difficulty in mastication, dysphasia, and tremor of the mouth and chin may be encountered.

2. Prevalence

Parkinson's disease (PD) is a chronic, progressive and associated with aging neurodegenerative disease. The

disease usually begins after the age of 40, its prevalence among people above 60 years is estimated at 1.6%. An increased risk of developing PD is observed in people above70 years, after a stroke or a mechanical brain injury, and those diagnosed with hypertension. Parkinson's disease occurs 1.5 times more often among men than women.[1]

Clinical Features:

Parkinson's disease (PD) was generally considered a primary movement disorder for a long time, a majority, if not all, PD patients also suffer from nonmotor symptoms adding to the overall burden of the disease. [2]

Early in the disease, the most obvious are shaking, rigidity, slowness of movement and difficulty with walking, thinking. Dementia becomes common in the advanced stages of the disease. Depression and anxiety are also common occurring in more than a third of people with Parkinson's disease. Other symptoms include sensory, sleep and emotional problems. The main motor symptoms are collectively called parkinsonian syndrome. The cause of Parkinson's disease is generally unknown but believed to involve both genetic and environmental factors.

The resulting motor symptoms include postural instability, hand and facial tremors, muscular rigidity, impaired balance, and bradykinesia. Common postural instabilities seen among patients with PD include cervical spine flexion, thoracic hyperkinesis, scoliosis, abduction of the shoulders, and flexion of the arms. [4,5]

Reduced fine motor skills, malnutrition, and osteoporosis are characteristics of Parkinson's disease (PD).

Oral Features associated With PD:

Oral health is contingent upon oral hygiene, which requires a series of simple and complex hand movements. The neuromuscular and cognitive deficits associated with PD enhance the progression of dental disease, impair home care regimens, and encumber in-office dental treatment. In addition, both dentists and patients with PD may be reluctant to embark upon complex dental procedures.[6]

The pathogenesis of the disturbances in PD may be multifactorial: some disorders occur due to general motor impairment and hypokinesia (dental and periodontal diseases due to difficulties in maintaining oral hygiene); others may be a manifestation of involuntary movements (facial dyskinesias/ dystonia), due to medication (xerostomia), as a part of sensory dysfunction (taste impairment), or in relation to depressive symptoms (burning mouth syndrome, orofacial pain).[2]

Impaired fine motor performance, which limits tooth brushing abilities, is considered a primary risk factor for the deteriorated oral health found in the patients with PD. Cognitive disturbances, such as dementia or apathy, altered motor behaviour (e.g., tremor), and particularly motor fluctuations may influence the quality and frequency of daily oral hygiene care by patients with PD. [11]

Alterations in the amount of saliva produced may represent a further risk factor for poor oral health. Swallowing dysfunctions and changes in salivary flow rates may also affect the oral self-cleaning mechanisms in patients with PD.[11]

Management

Oral health problems among patients with Parkinson's are complex and requires the involvement of physicians, patients and also their caregivers.

Most Parkinson's patients are old and are less likely to opt for dental treatments except for emergencies. Medication used to treat parkinsonism causes xerostomia which leads to increase in the risk of caries and fungal infections. Oral rehabilitation of the edentulous mandible in patients with symptomatic Parkinson's disease is particularly challenging to the clinician when the orofacial musculature is unable to stabilize the prosthesis.

Removable partial dentures tend to be dislodged or swallowed while complete dentures fall out more often. They can even break following sudden jerky movements. If the person is a complete denture wearer, then it becomes difficult to wear them, as the disease gets worse.

Tremors caused by Parkinson's disease can make dental appointments a challenge. These patients have a hard time opening their mouth for longer time. Anxiety increases the Parkinson's symptoms. It is important that patient should remain calm during dental treatment. It is essential to make the environment stress free as possible.

Prosthodontists should be aware of PD patients' vulnerability and special needs in order to implement strategies that may ensure a caring and effective treatment. It is preferable to schedule the patient with PD 60–90 min after their medications have been taken, as medications tend to be most effective in that time period, rendering improved treatment conditions.

Treatment options for sialorrhea in PD include pharmacological and nonpharmacological strategies. Agents such as ipratropium bromide and glycopyrrolate are possibly helpful, at least for the short-term treatment of sialorrhea in PD. Botulinum toxins A and B are considered efficacious for the treatment of sialorrhea in PD. Surgical treatment options for sialorrhea include neurectomy (sectioning of the chorda tympani nerves), salivary gland excision, salivary duct ligation, and salivary duct relocation.

Xerostomia can be tackled with nonpharmacological strategies which include sipping water frequently, utilizing sugar-free hard candies, frequently chewing sugar-free, xylitol-containing gum, or using various salivary substitutes. Pharmacological options for alleviating xerostomia include cholinergic agonists such as pilocarpine HCl tablets (5 mg) or cevimeline HCl and ubiquinol (CoQ10) 100 mg/ day was shown to significantly improve salivary secretion (up to 80%) in dry mouth non-Parkinsonian patients.

BMS symptoms can be treated through drug therapy with capsaicin, alpha-lipoic acid, clonazepam, Pramipexole and antidepressants may provide relief of oral burning or pain

symptom. In addition, psychotherapy and behavioural feedback.

Masticatory functions depend on the maintenance of a reasonable number of healthy natural teeth. It helps to obtain and secure masticatory efficiency, dental disease and decay. It diminishes and compensates for the impairment in the control of masticatory and tongue muscles

Bruxism can be managed with Botulinum toxin injections and mechanical devices such as oral. Other options include benzodiazepines, dopaminergic drugs, anticonvulsants, antidepressants, and sympatholytic drugs like clonidine.

These disorders are frequently neglected by the patients, their caregivers, and their treating physicians. Most of these disorders have not been fully addressed and further studies are needed in order to understand their pathophysiology and to offer optimal treatment.

Preventive dentistry may be the most important aspect of dental treatment for patients with PD. We suggest that patients with PD should regularly visit a dentist at least once every four months. Oral status should be examined and should also consider the number of natural teeth, crowns, and dental bridges or the existence of partial or complete dentures, or a combination of these dental therapeutic strategies. Pathologic conditions should be diagnosed and treated as early as possible. Oral health parameters, including salivary flow, gingival health (bleeding, plaque, calculus), periodontal health (pocket depth, recession, loss of attachment), and dental conditions (number of decayed, missed, and filled teeth) should be measured at baseline after diagnosis of PD and then again at each follow-up visit. It is important to recognize the limitations of both patients with PD and their dentists in performing oral care. Patients with PD should receive oral care in the safest manner and most appropriate setting possible. Dentists and their staff members should be encouraged to assume a greater share in the total care of patients with PD in cooperation with neurologists.

3. Conclusion

The psychological and behavioural pattern associated Parkinson’s disease can cause major difficulties during the fabrication of a dental prosthesis. The success of the prosthesis will depend on the careful approach with diligent handling of the patient during the entire therapy. Educating the patient and his family regarding the post insertion care of the prosthesis is essential for the long-term success of the treatment

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