

## **Neuromuscular Disorder in Relation to Prosthodontics; A Comprehensive Prospective**

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### **ABSTRACT**

Neuromuscular dentistry is dedicated to realigning the jaw to relieve temporomandibular disorders (TMD) and fix malocclusion, also known as a bad bite. Prosthodontic treatment involves the replacement & restoration of teeth by artificial substitutes. Its focus is to restore function, esthetics & comfort. Prosthodontics can offer exceptional satisfaction for both Patient & the Dentist . The present review throws some light on various Neuromuscular conditions commonly seen in Prosthodontic practice and a systematic approach toward their management.

**Key words:** Parkinson's Disease, Huntington's chorea, Cerebral palsy Myasthenia gravis, Epilepsy

### **INTRODUCTION**

Prosthodontics is concerned with the diagnosis ,treatment planning rehabilitation and maintenance of oral function ,comfort appearance and health of patients with clinical conditions associated with missing or deficient teeth and oral and maxillofacial tissues using biocompatible substitutes. To achieve success in this technique exacting & demanding field, there must be meticulous attention to every detail – from the initial patient interview & diagnosis, through the active treatment phase, & to a planned schedule to follow up care. Neuromuscular conditions need to be evaluated before panning for prosthetic treatment .



**FIGURE 1 ; Neuromuscular conditions**

### **DEFINITION**

Neuromuscular disorders means a range of conditions that impair the functioning of the muscle, either directly being the pathologies of the voluntary muscles or indirectly being the pathologies of the peripheral nervous system or neuromuscular junctions.



**FIGURE 2 Neuromuscular Disorder**

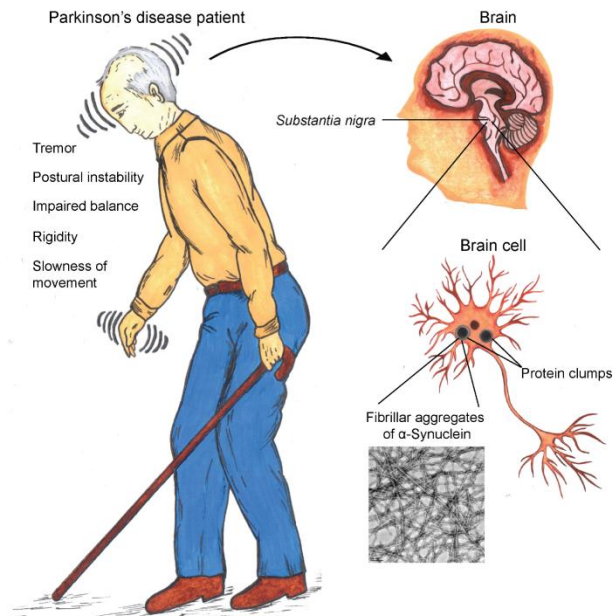
### **MEDICAL HISTORY**

An accurate & current general medical history should include any medication the patient is taking as well as all relevant medical conditions. If necessary the patient's physician can be contacted for clarification

### **PARKINSON'S DISEASE OR PARALYSIS AGITANS**

Parkinson's disease (PD) was first described by Dr. James Parkinson in 1817 as a

“shaking palsy.”<sup>1</sup> The term parkinsonism is a symptom complex used to describe the motor features of PD, which include resting tremor, bradykinesia, and muscular rigidity. PD is the most common cause of parkinsonism, although a number of secondary causes also exist, including diseases that mimic PD and drug-induced causes.<sup>2,3,4</sup> There is progressive degeneration of the pigmented neurons of the substantia nigra (brain stem) leading to the depletion of the neurotransmitter dopamine within the striatum of brain.



**FIGURE 3 ; PARKINSON’S DISEASE**

The main clinical features are slowness of movement, muscular rigidity & tremor. Many of the sign are found in the head & neck. Rigidity of the facial muscles produce a mask like or expression less appearance. The muscle rigidity also causes difficulty in swallowing, resulting in drooling .Mandibular tremors result in masticatory difficulty especially in those with removable dental prosthesis

Advanced and end-stage disease may lead to serious complications, including pneumonia, which are often associated with death.<sup>5,6</sup> Current treatment is focused on symptomatic management.<sup>7,8</sup> Evidence suggests that PD patients may also benefit from a multidisciplinary approach to care that includes movement specialists, social workers, pharmacists, and other health care practitioners.<sup>9,10</sup> There are no definitive tests to confirm the diagnosis of PD; therefore, a clinical diagnosis requires the clinician to review the patient’s history, to assess symptoms, and to rule out alternative diagnoses, such as multiple-system atrophy,

DLB disease, and essential tremor .<sup>11,12,13,14</sup>

### **Prosthetic consideration**



**FIGURE 4 JAW TREMORS**

- The essential element in providing dental treatment to a patient with Parkinson's disease is reassurance before treatment.

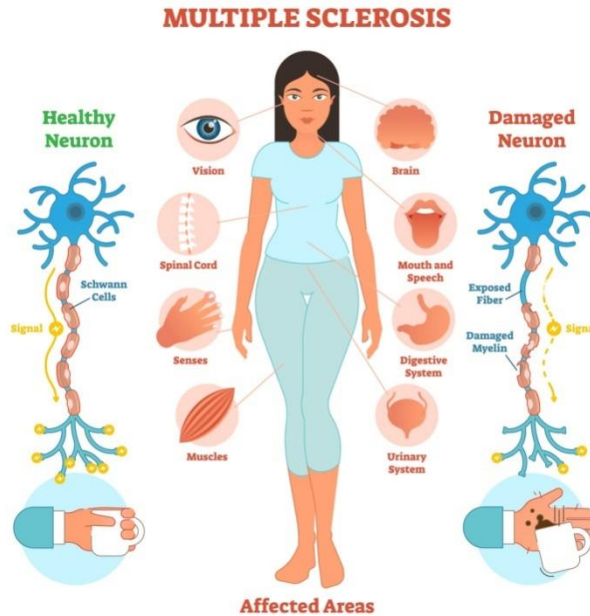


**FIGURE 5 REASSURANCE TO PATIENT**

- As anxiety increases with tremors & muscle rigidity, pretreatment sedation with diazepam is often given.
- When Prosthetic treatment is finished, the patient should be warned to take care when changing from a supine to standing position, sine levodopa has a significant orthostatic hypotensive effect

## MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is a chronic autoimmune, inflammatory neurological disease of the central nervous system (CNS).<sup>15,16</sup>

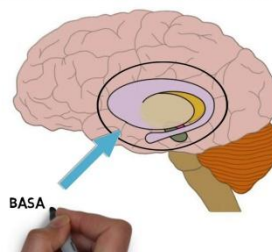


**FIGURE 6 MULTIPLE SCLEROSIS**

The most common symptoms include impairment of vision, muscular in coordination & bladder dysfunction. The goals of therapy with disease-modifying agents in patients with MS include shortening the duration of acute exacerbations, decreasing their frequency, and providing symptomatic relief.<sup>17</sup> It is common practice to treat acute relapses of MS with a short course (typically 3 to 5 days) of a corticosteroid that has a rapid onset of action and that produces few adverse drug effects (AEs), such as intravenous (IV) methylprednisolone or dexamethasone.<sup>18,19</sup>

## HUNTINGTON'S CHOREA

HUNTINGTON'S DISEASE IS A NEURODEGENERATIVE DISEASE



**FIGURE 7 HUNTINGTON'S CHOREA**

Huntington disease (HD) is an autosomal dominant, neurodegenerative disorder with a primary etiology of corticostriatal pathology.<sup>20</sup> It is a progressive hereditary disorder characterized by involuntary movements & changes in behavior & dementia. The main clinical manifestation is progressively worsening movement observed in face, tongue & head. With time hyperkinesia becomes aggravated & movements become violent with difficulty of speech

### **Prosthetic consideration**

Prosthetic treatment sedation with diazepam should be considered. Whenever possible dentures should be avoided because of danger of fracture or accidental swallowing

### **CEREBRAL PALSY**

Cerebral palsy (CP) is primarily a neuromotor disorder that affects the development of movement, muscle tone and posture.<sup>21,22</sup> Congenital infections such as toxoplasmosis, rubella, , herpes simplex, syphilis & influenza have been associated with cerebral palsy



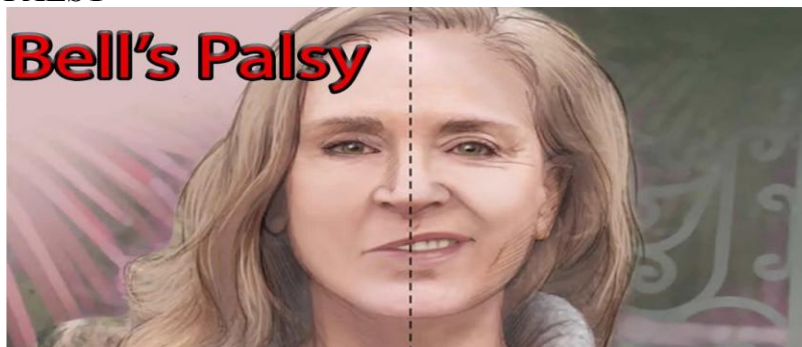
**FIGURE 8 CEREBRAL PALSY**

Speaking problems are prevalent with dysarthria, chewing, & swallowing difficulties Drooling is both a functional & esthetic inconvenience Head movements & facial grimacing are characteristic.

### **Prosthodontic consideration:**

Patients with cerebral palsy show an increased incidence of enamel defects, the cause of which is not clear. Due to absence of orofacial & neck muscle coordination there is sialorrhea & drooling experienced by these patients

### **BELL'S PALSY**



**FIGURE 9 BELL'S PALSY**

Bell's palsy, also called idiopathic facial paralysis, is defined as an acute-onset, isolated, unilateral, lower motor neuron facial weakness. The reported annual incidence varies in different parts of the world with estimates varying between 11 and 40 per 100 000 people. Bell's palsy is recognized as a unilateral dysfunction of the facial nerve.<sup>23</sup> It is more common in people with diabetes.<sup>24</sup> Several causes have been implicated including trauma & herpes simplex infections, but most cases are idiopathic. Bell's palsy begins with light pain around one ear, followed by an abrupt paralysis of the muscles on that side of the face. The corner of the mouth droops, & there is drooling. As a result of buccinator weakness food is retained in both upper & lower buccal & labial folds. The creases of the forehead are flattened. Corneal ulcerations & loss of taste sensation on the anterior two-thirds of the tongue & reduced salivary secretions. Drug treatment is controversial, given that over 70% of patients will eventually recover normal facial function without treatment. Early treatment with prednisolone can hasten recovery and reduce long-term sequelae. Although the quality of evidence is low to moderate, there may be some benefit in adding antiviral drugs to prednisolone.<sup>25</sup>

### **MYASTHENIA GRAVIS**

Myasthenia gravis (MG) is the prototypical autoimmune disorder caused by specific autoantibodies at the neuromuscular junction. Broad-based immunotherapies, such as corticosteroids, azathioprine, mycophenolate, tacrolimus, and cyclosporine, have been effective in controlling symptoms of myasthenia.<sup>26</sup> Myasthenia gravis is a disease characterized by easy fatigability of striated muscle secondary to a disorder at the neuromuscular junction.



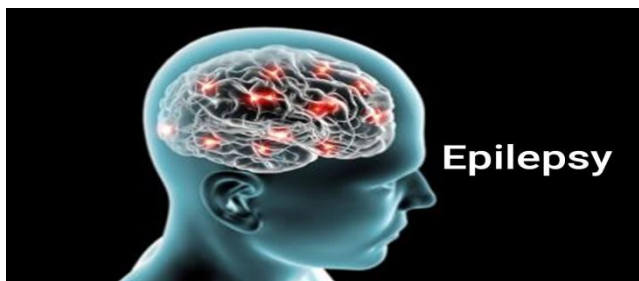
**FIGURE 10 MYASTHENIA GRAVIS**

The mechanisms of action of immunosuppressive agents include activating or suppressing target genes and thereby causing a multitude of changes including suppression of antigen production and reducing circulating T cells (corticosteroids), interfering with T and B cell proliferation by cell cycle arrest (azathioprine, methotrexate, and mycophenolate), inhibition of T cell activation (cyclosporine, tacrolimus), inhibition of antigen presenting cell interaction with T cells and Fc receptor blockade among other actions (IVIG) .<sup>27,28</sup>

### **Prosthetic considerations**

When known myasthenia gravis patient, the dentist must be aware that a respiratory crisis may develop from the disease itself or from over medication. Therefore the dental treatment must be performed in the hospital where endotracheal intubation can be performed. The airway must be kept clear, use of a rubber dam & suction to avoid aspiration must be considered. We should avoid prescribing drugs that may affect the neuromuscular junctions such as, narcotics, tranquilizers & barbiturates. Certain antibiotics including tetracycline, streptomycin, sulfonamides, & clindamycin may reduce neuromuscular activity & should be avoided

### **EPILEPSY**



**FIGURE 11 EPILEPSY**

Epilepsy consists of chronic neurologic disorders characterized by intermittent abnormal electrical discharges in the brain. These aberrant discharges in the brain may cause episodes of sensory & motor abnormalities as well as loss of consciousness. The 'treatment gap' (the proportion of people with epilepsy who require treatment, but either do not receive or receive inadequate treatment) varies from 10 per cent in developed countries to 75 per cent in low-income countries<sup>29</sup>. The ketogenic diet has been used for refractory epilepsy for many years. Recently, there have been new versions of diets with better compliance and tolerability<sup>30</sup>.

### **Prosthodontic Considerations:**

Patients taking anticonvulsant drugs are subject to gingival hyperplasia, which is associated with Phenytoin intake. Routine prosthetic treatment for well-controlled epileptics may be performed with no change in normal treatment. These can be expected to modify the patient's response to prosthetic treatment & may affect prognosis.

### **CONCLUSION**

Neuromuscular disorders affect the treatment plan. These can be expected to modify the patient's response to prosthetic treatment and may affect the prognosis. Therefore, the patient needs to be consulted by a physician before prosthetic treatment.

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