

ORAL HEALTH AND IMPLANT THERAPY IN PARKINSON'S PATIENTS: REVIEW

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SUMMARY

Parkinson's Disease (PD) is one of the most frequent neurodegenerative diseases, second only to Alzheimer's disease. It is a progressive disease that inevitably leads the patient to death, in most cases for *pneumonia ab ingestis*. It affects 120 people out of 100,000 and more frequently affects men than women. The main symptoms are divided into motor, non-motor and behavioral ones. The main motor symptoms are tremor, bradykinesia and postural instability. Non-motor symptoms include autonomic nervous dysfunction (orthostatic hypotension, cardiac arrhythmia, sexual dysfunction, excessive sweating due to hypothalamic dysfunction, constipation), insomnia, OSAS, and olfactory dysfunction. Behavioral symptoms are depression, dementia and psychosis. The purpose of this study is to evaluate, through a systematic review of literature, the oral health status of the Parkinson's patient compared with the general population with particular reference to the incidence of caries and periodontal disease, the patient's management during dental interventions and the possibility of rehabilitating the patient with implanted therapy.

Key words: Parkinson's disease, dental management, implant therapy.

Introduction

Parkinson's Disease (PD) is one of the most frequent neurodegenerative diseases, second only to Alzheimer's disease (1). It is a progressive disease that inevitably leads the patient to death, in most cases for *pneumonia ab ingestis*. It afflicts 120 people out of 100,000 and more frequently affects men than women (2). There are 2 forms of PD, the first has a purely hereditary etiology with a very low debut age and represents 5%, while the second idiopathic form has an onset age of 57 years and has a multifactorial etiology. Cardinal symptoms are 4: tremor, bradykinesia, akinesia and postural instability. Idiopathic form has a multifactorial etiology in which a family component and an environmental component predominate. Recent studies state that cigarette smoking is a protective factor for the development of the disease, whereas exposure to some pesticides

may be a cause for female hormones. It is caused by the destruction of the dopaminergic neurons of the substantia nigra of the sommering which is responsible for the control of the movements and their beginning. This creates an imbalance between the amount of dopamine and acetylcholine in favor of the latter. Only when the destruction of 60-70% of dopaminergic neurons begins with symptoms (2). The microscope detects the deposition of alpha-synuclein, called the lewis body, leading to degeneration and death of the neuron. The main symptoms are divided into motor, non-motor and behavioral ones (3). The main motor symptoms, that are found, are tremor that usually manifests at the extremities of the hands then extending to the limbs, tongue and jaw and all the facial musculature. The second symptom is bradykinesia, i.e. slowness in movements, the third is akinesia, or difficulty initiating both voluntary and involuntary movements. The last cardinal symptom is the postural instability

that forces the patient to walk by flexing the head and trunk forward. Non-motor symptoms include autonomic nervous dysfunction (orthostatic hypotension, cardiac arrhythmia, sexual dysfunction, excessive sweating due to hypothalamic dysfunction, constipation), insomnia, OSAS, and olfactory dysfunction. Behavioral symptoms are depression, dementia and psychosis. The PD severity rating is given by the scale of HOEN and YAHR (2) (Table 1).

All these symptoms compromise oral health due to the lesser capacity to carry out voluntary movements such as brushing teeth, opening mouth, eating, swallowing, and also exhibits stiffness of facial muscles that create a masker-like appearance with facial pain and temporomandibular dysfunction due to dental window. Parkinson's patients, considering motor and psychological symptoms, neglect their oral health with lesser visits from the dentist. Very common is the decrease in chewing capacity for the akinesia of chewing muscles and laryngeal muscles resulting in the limitation of mandibular movements and food retention (3). The patient exhibits an important loss of body weight and is assisted with dental erosion due to the presence of gastric juices due to MRI. The individual has difficulty starting a verbal speech and has a constant voice (quite monotonous voice). The most commonly used drugs to relieve symptoms are

levodopa, which can be used in combination with other pharmacological classes such as enolactone, which prevents dopamine levodopa conversion to the systemic circulation. Another drug class used is anticholinergic drugs. These drugs are responsible for some side effects such as xerostomia, bruxism, taste alteration, gingivitis, tongue edema, and orthostatic hypotension. Levodopa penetrates the ematoencephalic barrier and is transformed into dopamine from the cells of the substantia nigra, but after about 10 years of administration the patient becomes partially irresponsible to it, passing over 24 hours to "on" periods when it is not symptomatology present at periods of "off" in which symptomatology is present. All of these side effects can make the Parkinson's patient more responsive to carious processes or fracture of dental elements. For the above reasons, therefore, they need a multidisciplinary team for dental treatment and to carry out the procedures safely. Therefore they need to be included in an oral prevention program. Also, as many dentists tend to avoid long-term procedures such as conservative and fixed prosthesis, these patients exhibit less dental arch elements and therefore a malaise discomfort resulting in accentuation of gastrointestinal symptoms already in the baseline condition. Fixed or mobile prosthetic rehabilitations show some management difficulties, however they are always desir-

Table 1 - Classification of severity level of PD according to modified Hoehn and Yahr scale (Hoehn and Yahr, 1967).

Stage	Signs and symptoms
0	No signs or disease.
1	Unilateral symptoms only.
1,5	Unilateral and axial involvement.
2	Bilateral symptoms. No impairment of balance.
2,5	Mild bilateral disease with recovery un pull test.
3	Balance impairment. Mild to moderate disease. Physically independent.
4	Severe disability, but still able to walk or stand unassisted.
5	Needing a wheelchair or bedridden unless assisted.

able to increase the general health of the patient. The mobile prosthesis is a problem for the Parkinson's patient as some conditions such as muscle rigidity, xerostomia and lack of motion control diminish retention. The purpose of this study is to evaluate, through a systematic review of literature, the oral health status of the Parkinson's patient compared with the general population with particular reference to the incidence of caries and periodontal disease, the patient's management during dental interventions and the possibility of rehabilitating the patient with implanted therapy (2).

Materials and methods

A bibliographic search on medline was performed by inserting as keywords Parkinson disease, dental management on the search engine. The search engine selected 50 articles, of which only 15 actually deal with the oral health of the Parkinson's patient, with particular reference to the possibility of performing an implant therapy and how to handle the patient affected by the disease. Only articles published since 2000 have been considered. As previously mentioned, the search engine selected articles that were not relevant to the topic and were therefore discarded.

Results

Of the 15 selected articles, 1 is the management of the Parkinson's patient, 8 of oral health, with particular reference to the DMFT index and the severity of periodontal disease, compared to the rest of the healthy population and 6 of the possible implant-prosthetic treatment of the patient. According to Friedlander (2), dental procedures directed to the Parkinson's patient should take about 60 minutes before levodopa administration and possibly in the morning. The patient's position in the armchair must be 45° to allow swallowing. In addition, it is advisable to moni-

tor vital parameters during each procedure. It is advised not to use epinephrine because it may interfere with levodopa and create a dangerous increase in pressure. However, some Authors recommend the use of epinephrine at much lower doses, i.e. not more than 0.05 mg. It is not recommended in patients taking entactone, for treating pathology, ampicillin and erythromycin since both are excreted through the bile and may have adverse effects. The inhibitors of mao like selegiline are metabolised in the first liver passage. In l-methamphetamine and l-amphetamine may enhance the effect of adrenaline causing a dangerous elevation in blood pressure. Parkinson's patients are also more susceptible to periodontal disease and have a greater number of streptococcal mutans. For the aforementioned reasons, the Author recommends the execution of surgical interventions, especially with the use of sedation or operating room. Haralur (4) also agrees to treat the patient, placing it at 45 degrees to prevent excessive loss of saliva and allow swallowing. Numerous articles deal with the oral condition of the parkinsonian patient although with different visions. Einarsdottir (1) performed a clinical trial of 67 Parkinson's patients, without distinction in staging disease, and compared it with 55 control group people. The present study has shown that Parkinsons have less dental elements in the oral cavity than the control group and consequently a higher DMFT and worse hygiene (Table 2).

Pocket depth measurements were performed and were higher in Parkinson's (4.15 *versus* 3.81 mm). At the end of the study the salivary flow between the two groups was compared and it was similar, but the streptococcus mutans count is greater in the parkinsonian patient. Fukayo (5), based on Persson's (6) studies in 1992, came to the conclusion that the Parkinson's patient has a DMFT lower than the rest of the population. Parkinson's patients were further divided by age and risk factors. In fact, the study found that the Parkinson's patient with a mild state of symptoms has a better oral hygiene with a higher brushing rate than normal and, similarly to other studies, a preserved salivary flow. At this point,

Table 2 - List of different articles that compare the dmft index and severity of periodontal disease between Parkinson's and the general population.

Article	Dmft	Periodontal disease
Einarsottir et al.	greater	greater
Fukayo et al.	lower	not available
Nakayama et al.	greater	greater
Hanaoke et al.	greater	greater
Bakke et al.	greater	greater
Pradeep et al.	greater	greater
Batista et al.	greater	greater
De Bowes et al.	not available	greater

Fukayo investigated whether Parkinson's is a protective factor for the pathogenesis of the disease but ultimately concluded that Parkinson's is not protected from carious disease but has more accurate hygiene in his mouth. With the advancement of age a decrease in salivary flow occurs, since the 70-year-old patient group has a significantly higher DMFT than the corresponding control population. The study, always Japanese made by Nakayama (7), revealed that Parkinson's patients with serious symptoms have less teeth than the general population and have no dexterity in the use of dental floss. They have more difficulty in wearing prosthetic furniture due to the decrease in salivary flow for antiParkinsonian drugs. De Bowes (8) deals with the management of the oral hygiene of the parkinsonian patient through a review. The study states that they should be treated in the morning with the 45° sloped armchair and must have taken at least 60 minutes before the appropriate therapy. Additionally, the patient is more predisposed to burning mouth syndrome due to xerostomia, present in 55% of Parkinson's population. Other risk factors for burning mouth syndrome are parafunctions, iron deficiency and vitamin deficiency. Bakke's (9) study evaluated the facial changes of the Parkinson's patient both in terms of oral health and chewing capacity. In fact, it measured in a group of 15 patients the

chewing ability through the loss of substance of a chewing gum and the ability of stereognosia. At the end of the study it emerged that the Parkinson's patient decreases the chewing ability with the progression of the disease, which however remains smaller than the control group, but the stereogenicity remains almost the same. They have a worse oral situation both in terms of hygiene and greater predisposition to periodontal disease and caries. The use of stannous fluoride is recommended (16). Also using electric toothbrush and dental floss, hygiene is always lower than the general population. This finding shows that Parkinson's does not have the manual ability to obtain appropriate oral health. In his article Pradeep (10) wants to show that Parkinson's have worse oral health than the general population compared to the general population in terms of periodontal treatment index and an increased depth of pocket. A population of 45 patients with Parkinson's disease was divided into five classes according to the severity of their disease (Hoehn and Yahr stage) and were compared with a control group. The study showed that both groups brush at most once a day, and level of clinical attack (Cal) and probing depth (Pd) values increased in the Parkinson's disease group in a statistically significant way. It should be noted that the values of Cal and Pd increase with the advancement of the staging

of the potato because of the inability to perform accurate hygiene. The results of the study are confirmed by previous studies including Schwartz (17), Einarsdottir (1) and Hanaoka (11).

The article on the Journal of Clinical Neuroscience (11) compares the health status of 89 Parkinson's patients to 128 patients in the control group who were affected by mild neurologic disorders. The study has shown that the Parkinson's patient has less dental arches, a greater depth of poll and a greater incidence of caries. Also Batista affirms that the oral health of the Parkinson patients are worse than that the general population (16). Haralur's (4) case report provides advice on how to perform a mobile prosthetic rehabilitation in the Parkinson's patient. Due to the presence of xerostomia and muscle stiffness, the stability of the article could be affected. Many studies state that the presence of a well-made mobile prosthesis in an edentulous patient can lead to an improvement in psycho-physical conditions. This study shows the clinical phases to perform a mobile prosthesis in a 65-year-old patient with Parkinson's disease. The Author recommends doing the appointments in the morning and at least 1 hour before taking levodopa. In order to record the vertical dimension, the bilateral manipulation technique was used. The teeth were mounted with little accentuated cusp to reduce interference during the involuntary movements of this category of patients. In addition, the Author recommends using lower teeth as they increase feedback with chewing muscle by decreasing bruxism. Lingualized occlusion increases the stability of the mobile prosthesis. Heckman (12) suggested and implemented the implant solution on Parkinson's patients. 3 patients belong to Hoehn and Yahr class 3 have been implanted with telescopic prosthesis on the prostheses that allow more favorable insertion for the patient. In addition, the Author used the 25 degree arbitrary value as a vertical dimension due to muscular rigidity. Static patients followed by follow ups during which it was noted that perimplantary hygiene was good enough and patients were satisfied with chewing. Everyone states that prosthetic insertion is

simple and easy. They were also subjected to a quiz to evaluate gastrointestinal symptoms before and after implantation and as expected, the results were satisfactory in the sense that patients improved gastrointestinal symptoms. Chu (13) showed a case report of a 83-year-old patient with overdenture on 4 implants with magnetic midazolam endovenous sedation. The Author has reviewed the various overdenture attack systems, claiming that the bar, the ball and telescopic attack are more difficult to enter for the Parkinson's patient. It is also stated that the magnetic attack is one that creates more complications, including the most important is the loss of attraction strength due to corrosion. The need for a prosthetic product supported by Parkinson's patient facilities is repeatedly emphasized. Packer (14) carried out a study by inserting implants on 9 patients using either fixed prosthesis or overdenture. The Parkinson's patient, as stated in all previous studies, has difficulty in wearing the prosthesis mobile due to xerostomia. Therefore, the ability to regain chewing capacity is of primary importance. The Author studied the improvement of the quality of life of the Parkinson's patient after implant insertion and gastrointestinal symptoms. The 12-month implant survival rate in the general population is 90-95% in the maxillary bone and 80-85% in the jaw. The study evaluated the percentage of successful of dental implant after 3-6-12 months and the improvement in life. In the end, it emerged that the percentage of implant survival in the Parkinson's patient is 82% more specifically 85% in the maxillary bone and 81% in the jaw, against the 90% share of the general population. Most implant failures occurred in the second surgical phase, while in the prosthetic phase is 100% successful. The patients interviewed complained of the difficulty of inserting the prosthesis onto the bar, the wear of the opposite tooth, the breakdown of the overdenture, and the hyperplasia of the gums around the bar. Therefore the Author advises to insert ball attacks because of the easiest hygiene. In all cases, the questionnaire showed an improvement in the psycho-physical condition of the patient, giving him an easy

chewing ability and a better living standard. It is recommended to provide implant therapy in the early stages of the disease. Kubo's (18) article describes the management of the patient who has to undergo implant therapy. It through its case report describes the need for surgery using intravenous midazolam to avoid involuntary movements of the patient and decrease the stress of the procedure. A final article describes the clinical phases and the prosthetic management of an implanted patient who has to undergo overdenture on the bar.

Discussion

Parkinson's patient management is well described by many articles with particular reference to Friedler's. The prevalence of caries and periodontal disease shows discordant results. There are two articles in the literature, one of Persson's 1992 and Fukayo's (5), cited in this review, showing a DMFT lower than the general population. The rest of the articles have a higher DMFT, a depth of pocket and a prevalence of periodontal disease increased compared to the rest of the population. Fukayo's study was objected by the rest because the patients were not randomly selected but turned to the clinic, therefore aware and willing to maintain good oral hygiene. In addition, patients in this study are only part of the first classes of severity of the disease. In fact, as all the aforementioned studies agree, progression of the disease worsens the oral health conditions for DMFT indexes and periodontal disease. From most studies it can be seen how the Parkinson's patient is more prone to caries and periodontal disease due to lack of manual care to carry out accurate oral hygiene, drugs induced xerostomia, and the greater presence of streptococcus mutans. Fukayo with his study states that Parkinson's may be protected from caries due to hypersalivation. As far as periodontal disease is concerned, all studies, starting with Schwartz in 1992, are in favor of a worsening of all periodontal indexes. In our opinion, Fukayo's study

is affected by the fact that they are patients with mild symptoms of periodontal disease and are therefore not affected by depression, very common in advanced degree of pathology, and are all aware of the importance of accurate oral hygiene. It is true that they all turned their spontaneous will to the dental clinic. An electric toothbrush and toothpaste based on stannous fluoride is recommended. Very important is a health policy also directed to the care of these categories of patients. All studies state that Parkinson's patients have less teeth in the archway than the general population for which the problem arises of how to rehabilitate them. Parkinson's also suffer from gastrointestinal symptoms due to lack of proper chewing, so it is important to move or support prosthetic prosthesis. All studies agree that a mobile prosthesis improves the quality of the Parkinson's patient and improves gastrointestinal symptoms. Implant therapy in support of the movable prosthetic product, unstable due to xerostomia and stiffness of movements, is therefore always desirable. One very important study states that the Parkinson's implant survival is 82%. From this percentage it can be seen that implant therapy has a lower survival rate than the general population, however, given the enormous benefits mentioned above, it is a viable therapy in Parkinson's patients. Also, regarding the type of prosthetic overdenture attack, a wide discussion is opened. However, lack of literature studies makes this choice difficult. In these articles the telescopic, magnetic or ball attack is recommended, while a bar is more complex to handle. In conclusion we look forward to further studies to confirm the most appropriate attack. In conclusion we can advise the operator or the ball or telescopic attack. This review gives some insights into the treatment of this category of patients and how implant therapy is important despite lower survival.

Conclusion

The Parkinson's patient needs constant care and a dental care protocol as oral health is also re-

flected in the psychological one. This category needs to take some care in their treatment. In addition, implant therapy is of particular importance for increasing the quality of life.

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