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Denture Management in Patients with Parkinson's Disease: A Narrative Review

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ABSTRACT

Parkinson's disease (PD) predominantly affects older adults and is associated with tooth loss and a need for prosthetic replacement. Dentures remain widely used in this group because they can be taken out for cleaning, including by caregivers, but their treatment prognosis depends on daily handling and aftercare, which PD-related motor and non-motor impairments may affect since they interfere with inserting, removing, and cleaning dentures. Existing prosthodontic literature in PD has mainly addressed rehabilitation outcomes, and information on post-insertion aftercare is scattered across case reports. This narrative review summarizes available evidence on denture management in patients with PD, including hygiene, handling, caregiver involvement, adaptation, maintenance, and follow-up. Only a small number of sources addressed denture wearers with PD directly, and most were small observational studies or case reports. In a clinical study, verbal instruction with positive reinforcement was followed by a reduction in prosthesis biofilm over 30 days, and the initial difference from controls was no longer evident. In a Japanese survey, most denture-wearing patients with PD reported inserting and removing their dentures themselves, whereas a minority could do neither. Another study shows that patients with PD often need more support with oral hygiene. Case reports describe simplified designs, delivery adjustments, caregiver instruction, and scheduled follow-up, none of which has been compared with an alternative. Direct evidence evaluating denture-handling ability remains very limited. No study assessed denture-handling ability with an objective, standardized method, and none measured the effect of caregiver training. Findings should be interpreted cautiously.

Keywords: Parkinson's disease; denture; denture management; denture hygiene; medicine

INTRODUCTION

Parkinson's Disease (PD) is a neurodegenerative disorder characterized by neuronal loss in specific brain areas, which causes motor and non-motor dysfunction [1]. Its motor symptoms include bradykinesia, tremor, rigidity, and imbalance [2], while its non-motor symptoms include cognitive impairment, reduced attention, and sensory disturbances [3]. The disease usually occurs in older people, PD affects 1-4% of adults older than 60 years old, and its incidence increases with age [1]. The global prevalence of PD increased by 274%, from 3.15 million cases in 1990 to 11.77 million in 2021 [4].

PD affects the oral cavity, patients with PD are more likely to have oral health problems than healthy individuals [5]. It enhances the risk of xerostomia, sialorrhea, burning mouth, periodontal disease, caries, and problems with their dentures [6]. A systematic review of 43 studies found a higher prevalence of dental biofilm, gingival bleeding, deep periodontal pockets, tooth mobility, and caries in patients with PD, and poorer oral health was associated with disease severity [1]. These problems may contribute to tooth loss. In an analysis by the National Health and Nutrition Examination Survey (NHANES) on 214 participants with PD, 23.8% had severe tooth loss, and 18.2% were completely edentulous [7]. Tooth loss is linked with systemic health and may affect general health by impairing mastication and nutritional intake, which could increase the risk of death [8]. Prosthodontic rehabilitation aims to restore oral function, especially masticatory function, which improves nutrition and quality of life [9, 10]. Many patients with PD therefore need prosthetic restorations.

Missing teeth can be replaced with fixed prostheses, such as implant-supported or tooth-supported restorations, or with removable prostheses, such as complete dentures, removable partial dentures, and implant overdentures [11, 12]. The choice depends

on the patient's clinical condition, functional needs, economic condition, and ability to maintain oral hygiene [13]. Fixed prostheses can provide good stability and masticatory function but requires complex maintenance, while removable prostheses are widely used because they tend to be more affordable and easier to clean [11]. Removable dentures can be removed for cleaning, however patients must be able to insert, remove, and clean them regularly or receive assistance. As PD progresses, motor impairment may cause further limitations and increase the need of assistance with oral hygiene as the disease advances [2, 14].

Motor symptoms and cognitive impairment may affect daily oral care, but their effects on denture-handling ability have not been adequately studied [3, 15]. A removable denture does not depend on the patient alone, it can be taken out and cleaned by a caregiver when the patient is unable to do so, which may be harder with a fixed prosthesis. In a case report of a patient with advanced PD under nursing care, fixed implant-supported prostheses were replaced with a removable overdenture to make oral care easier for caregivers [16]. This single case does not establish which dentures are the best option for patients with PD. This review therefore focuses on denture management in patients with PD, particularly denture hygiene, insertion and removal, adaptation, maintenance, follow-up, and caregiver involvement.

Dentures must be inserted, removed, and cleaned daily. Patients may also require adjustment after insertion, followed by regular checking during control [17]. These depends on their visual acuity, manual dexterity, mental state, handgrip strength, and salivary flow [18]. Successful denture wearing depends not only on the fabrication of a well-fitting prosthesis, but also on the patient's ability to insert, remove, clean, and maintain denture on daily basis. Existing evidence on prosthodontic management in PD has mostly addressed rehabilitation outcomes, such as the effectiveness of prosthodontic intervention [19], quality of life and mastication after new removable prostheses [20], and oral healthcare for patients with special healthcare needs generally [21]. Information on what happens after the dentures are done is scattered. A few studies examined prosthesis hygiene [22] and denture-related complaints [23], and case reports describe patient and caregiver instruction, follow-up, and individualized management [16, 24, 25]. Objective assessment on how well patients can insert, remove, and clean dentures, and evaluation of the assistance that caregivers provide is still not available, making it difficult to give evidence-based advice on aftercare.

Oral Hygiene in Parkinson's Disease

Maintaining oral hygiene remains important in denture wearers, as wearing a prosthesis does not eliminate the need to clean the remaining natural teeth. Patients with PD have more difficulty maintaining oral hygiene than healthy individual, there are more dental biofilm, gingival bleeding, deep pockets, tooth mobility, and caries than healthy controls [2, 5, 6]. A systematic review reported greater plaque accumulation and less use of interdental cleaning devices in PD patients [26]. Among elderly prosthesis wearers with PD, visible plaque on the remaining teeth was high but did not differ significantly from healthy controls [27], which indicates that the importance of maintaining oral hygiene in denture wearers with PD, rather than focusing on prosthesis cleaning only.

Oral hygiene includes toothbrushing, interdental cleaning, and cleaning the tongue. These activities require different level of manual dexterity and coordination. Visual acuity, manual dexterity, and handgrip strength have been reported to influence oral and denture hygiene ability in non-frail older adults [18]. No study has directly compared brushing, flossing, or tongue cleaning methods among denture wearers, so findings come from practical guidance and not from trials. Electric toothbrush with enlarged handles is suggested to facilitate gripping, and water flosser or interdental brush can be used as an alternative when conventional flossing is difficult [5]. If cleaning the remaining natural teeth is already challenging for patients with PD, cleaning their denture adds another task to their daily routine. The extent to which patients can perform these tasks independently may also vary according to their functional abilities and disease severity.

Functional Limitations and Disease Stage

Denture management consists of several tasks that depend on different functional abilities, which may be associated with motor symptoms, non-motor symptoms, and medication effects. Patients with PD may also experience greater difficulty performing oral hygiene than healthy individuals [5]. The extent of functional impairment varies with disease severity, which can be described using the five Hoehn and Yahr (H&Y) stages [28, 29]. Stage 1 is characterized by unilateral involvement with minimal or no functional disability. Stage 2 is characterized by bilateral involvement without impaired balance. Stage 3 involves postural instability, although patients remain physically independent. Stage 4 is characterized by severe disability, although patients can still walk or stand unassisted, and in stage 5 the patient is wheelchair-bound or bedridden unless aided [29]. Based on these H&Y stages, patients in earlier stages may be more independent in their daily activities, while those in more advanced stages may increasingly require assistance [2].

These stages may have different implications for denture management, although these implications have not been directly established in studies of denture wearers with PD. In earlier stages, patients may still preserve their dexterity to insert, remove, and clean their dentures independently, although these activities may become slower or less precise as the motor symptoms develop. On stage 3, postural instability may make standing more difficult, potentially requiring additional time or occasional assistance.

In stages 4 and 5, more severe motor impairment and reduced mobility may make independent denture handling and cleaning increasingly difficult, with greater assistance from caregivers potentially required. These considerations are inferred from the clinical characteristics of each H&Y stages, as studies of denture wearers rarely report disease stage [27]. Two findings are consistent with this reasoning. In a case-control study, higher H&Y stages were associated with more oral hygiene support [2]. Meanwhile, the denture hygiene study enrolled only participants who were able to clean their prostheses independently [22]. Therefore, the findings may not fully represent patients with more advanced functional limitations.

The H&Y scale is weighted toward postural instability and does not capture non-motor features such as cognition [29], so stage alone does not predict denture use. Cognition matters for denture management because it depends on understanding and remembering instructions. Difficulty understanding instructions was reported in a woman with advanced PD [24], impaired cognition in a 74-year-old man [25], and dementia in a man under nursing care [16]. In older adults in long-term care without PD, the support needed for oral hygiene was related to both physical and cognitive function [30]. Salivary function may also influence denture use, although it is not represented in the H&Y stage. Reduced saliva may influence the retention of certain removable prostheses and necessitate individualized management [14], while medication-induced xerostomia was reported in an elderly woman with advanced PD [24]. Studies of denture wearers show that denture problems occur in PD. In a Japanese survey of 104 patients with PD and 191 healthy individuals, patients with PD had more complaints of chewing difficulty and denture discomfort [23]. The survey does not show which function was responsible. The following sections therefore take the aftercare tasks in order, beginning with the first weeks after delivery.

Denture Adaptation

Adaptation is the adjustment period when a patient gets used to wearing their new oral prosthesis comfortably in their daily activity. It includes mucosal tolerance, control of retention and stability with the tongue, cheeks, lips, and gradual adjustment of speech and mastication [31]. In PD, this period may be more challenging, because successful denture control depends on adequate orofacial muscle coordination. Denture retention and control in patient with PD may be further compromised by thick saliva, xerostomia, and rigid muscles [32]. Patients with PD have also been reported to face considerable challenges in adjusting to complete dentures [33].

In an 82-year-old patient who was dissatisfied with the retention of a mandibular complete denture and had difficulty adapting to it, areas of excessive pressure were identified and relieved to improve acceptance and comfort, and the author reported patient satisfaction with retention, stability, and comfort [34]. In an observational study, new prostheses with improved comfort were associated with improved oral health-related quality of life [20], although this outcome reflects the overall treatment result rather than the adaptation process. Adaptation is an early phase of denture management, since a patient who cannot adapt to a denture will not reach the stage of handling and cleaning it. The difference in duration of adaptation in geriatric patients with PD and without PD has not been studied.

Denture Handling, Insertion, and Removal

Denture handling refers to the physical manipulation of the denture in daily routine. Denture handling is the least studied link. Clinical reports describe denture wearing, but none measured how independently patients could insert, remove, or clean their dentures. The closest report comes from a man with PD (H&Y stage III) and dementia under nursing care who gradually became unable to wear his dentures. Another report describes a patient with tremor, limb stiffness, and limited mobility in both hands [pinto], which describes his condition and not how he independently handled his denture.

Motor capacity needs to be distinguished from actual denture-handling performance. In the framework of the International Classification of Functioning, Disability, and Health (ICF), capacity is what a person can do in a standardized environment without contextual influence, while performance is what a person actually does in their usual environment [35]. Applied to denture, capacity is what a patient can do in a controlled situation, such as gripping or moving the fingers, while performance is what the patient does with a denture in daily life, which also depends on cognition, habits, the shape and retention of the denture, and available help. Tremor, bradykinesia, rigidity, and reduced dexterity are the reasonable symptoms of PD which could lead to difficulty [14, 27], but impaired capacity does not automatically mean impaired performance.

Disease stage, cognition, and hand use further affect how handling should be interpreted. In the patient under nursing care, handling was lost gradually over time [16], which suggests that ability may change within one patient as PD and cognition progress, although this is a single case. Although functional limitations may vary across disease stages, studies of elderly denture wearers with PD have not reported outcomes according to H&Y stage [27], so the stage at which handling begins to be affected is unknown. Inserting, removing, and cleaning a denture also typically use both hands, for example, one to hold the denture and the other to brush or guide it. If hand function is limited on both sides, as in one reported patient [25], tasks that need bilateral coordination may be harder, but whether this occurred in practice was not reported.

Denture Hygiene and Cleaning

The most direct evidence comes from a study of 17 elderly removable prosthesis wearers with PD and 20 controls that evaluated changes in prosthesis hygiene after verbal instruction and positive reinforcement.

At baseline, patients with PD had more biofilm on maxillary prostheses than controls, whereas no group difference was evident at 30 days, and the authors concluded that instruction and reinforcement can improve prosthesis hygiene in elders with and without PD [22]. The result shows that hygiene in this group could be modified by simple instruction, and the baseline difference suggests that patients with PD may need more guidance than other elderly. The study only measured prosthesis biofilm, and the intervention combined instruction, feedback on staining, and repeated cleaning instruction, so the effect of each component cannot be separated. Repeated assessment and feedback may also have contributed to the observed improvement. The study did not report disease severity using a standardized PD staging system, limiting assessment of whether the findings apply similarly across stages of PD. Follow-up lasted only for 30 days, so durability of the improvement beyond this period is unknown, and the sample was small. Participants were required to perform daily prosthesis hygiene independently, and individuals with cognitive disturbance were excluded. Therefore, the findings may not extend to patients who require caregiver or have cognitive impairment.

Other sources describe denture hygiene, with different designs. In a survey, fewer patients with PD cleaned their denture everyday [23]. Another case report describes cleansing tablets, emphasis on prosthesis hygiene, and removal of the denture during sleep [32]. These accounts show what clinicians did but cannot show that any method works. In practice, instruction with positive reinforcement and rechecking cleanliness at follow-up are reasonable steps for patients who can follow instructions and clean their own dentures, while patients with greater impairment may need assisted cleaning.

Caregiver Involvement in Denture Management

When patients can no longer perform the tasks above, they need help from someone else. Caregiver involvement has been described in several clinical reports. The amount of assistance varies between cases, from providing instruction and support to directly helping with denture insertion, removal, and cleaning. Population data show that support needs rise with disease stage [2] and that 15-29% of patients with PD needed help with oral care [26]. The reports identify several caregivers. A wife helped a man under nursing care [16], and a couple acted as caregivers for a 74-year-old man [25]. Professionals appear as well, since the man under nursing care also received professional oral care and denture repair during home visits [16].

Caregivers help at different points of denture management. They repeated instructions on insertion and removal, and helped them with wearing, removing, and cleaning the denture [16], learned denture wearing, use, and cleaning from training [24, 25]; and helped improve the patient's confidence, interpretation of the patient's speech, and supported the patient's social interaction [25, 32]. These reports show that caregivers may be involved in both learning and performing denture-related tasks, particularly when patients have cognitive or functional limitations.

Caregiver involvement does not necessarily resolve all difficulties with denture management. In the nursing care case, cleaning remained difficult for a non-professional caregiver despite instruction, and the patient's fixed implant-supported prostheses were replaced with an implant overdenture to facilitate oral care [5]. This case suggests that the success rate of management depends not only on the patient's functional abilities but also on the caregiver's ability to perform the required tasks and on the design of the prosthesis. Although several reports describe caregiver education and assistance [5, 23, 25, 26], none of the indentified studies directly evaluated caregiver training as an intervention. Caregiver burden, the time required for denture care, the frequency and intensity of assistance, and the effectiveness of structured training were not assessed. A systematic review recommended that oral hygiene instructions should be personalized and easy for caregivers to deliver [26]. These findings support the involvement of caregivers in oral care, but they do not establish that caregiver training improves denture hygiene or other denture-related outcomes.

Maintenance and Follow-up

Maintenance involves more than routine cleaning, as it also requires periodic assessment of prosthesis, patient comfort, and the need for adjustments. These considerations may be influenced by the denture design. A design that is easier to remove and clean may facilitate caregiver assistance, while adequate retention and stability remain important for function. Clinical reports describe several approaches, including the neutral zone concept [14, 34], the use of denture adhesive to improve the patient's confidence even though the denture was adequately retentive [32], and an implant-supported overdenture in an older patient with PD [33]. The long-term case explains this consideration, fixed implant-supported prostheses were replaced with a removable overdenture to ease oral management by caregivers, and the retention of the attachments was adjusted as the patient's condition improved [16].

Other reports describe attempts to simplify prosthodontic treatment and accommodate individual limitations. A simple denture design with modified tooth arrangement was used in a patient with advanced PD [24]. Another report described a simplified complete denture technique involving fewer clinical sessions, followed by three weekly follow-up visits [25]. Reinforcement of the denture base was described for patients considered at risk of falling [14, 32]. These approaches were individual clinical decisions in single patients and were not compared with different designs or techniques, so their advantages and disadvantages for denture management in PD patients cannot be determined. Xerostomia may further complicate denture comfort

and retention. A report described training the patient in salivary gland massage [24], but its effect was not measured. This shows the importance of considering oral symptoms along with prosthesis-related factors when evaluating post-insertion difficulties.

Follow-up provides an opportunity to reassess adaptation, comfort, retention, stability, and need for adjustments. The reports describe scheduled recall visits [32], three weekly visits after delivery [25], and visits at 24 hours, 3 days, 1 week, 1 month, 3 months, and 6 months [33]. In the long-term nursing-care case, oral care and denture maintenance continued as the patient's condition changed [16]. Dentists have also reported the need to adapt treatment duration and preventive care for patients with PD [6]. However, the optimal frequency of follow-up for geriatric patients with PD remain undetermined due to the limited literature.

Residual ridges continue to resorb over the years [12], dentures may become loose, and relining or rebasing are maintenance procedures that restore fit, function, and comfort as the underlying tissue changes [36]. In patients with PD, a loose denture has a higher risk, as impaired muscle control makes it difficult to keep the denture in place [32] and difficulty with adhesives or handling could make a poorly fitting denture harder to manage. Denture safety appears only in isolated reports of a swallowed denture in a patient with PD and dementia [37] and anesthetic management for retrieval of an aspirated denture in patient with PD [38]. These reports cannot determine the incidence and specific risk factor of denture loss or ingestion. However, they highlight the importance of considering swallowing difficulties and cognitive impairment when evaluating denture safety.

Clinical Considerations

The available literature is limited to one small study on denture hygiene [22], case reports [14, 16, 24, 25, 32, 33, 34], general data on PD [1, 2, 23, 26, 27], and studies on older adults or denture wearers without PD [18, 30], the following considerations should be interpreted cautiously rather than as evidence-based recommendations. During denture delivery and follow-up, dentists may observe whether the patient can independently insert, remove, and clean their dentures, whether assistance is available, and whether cognitive limitations affect their ability to understand and follow instructions. This assessment is relevant because the need for assistance increases with disease stage [2, 26], and denture-handling ability may change over time [16]. However, there are no validated assessment tool for denture-handling ability in patients with PD, so this would rely on the dentists' clinical judgement.

Denture hygiene instruction may be modified to the patient's functional and cognitive abilities. Verbal instruction along with positive reinforcement was associated with improved prosthesis hygiene [22]. Rechecking denture cleanliness during follow-up may help dentists determine whether the patient can maintain adequate oral hygiene independently or requires additional caregiver assistance. When caregivers are involved in patients' oral health care, they may also be included in instructions on denture insertion, removal, and cleaning [16, 24, 25]. Although a review recommended personalized oral hygiene instructions that caregiver can directly follow [26], the outcomes has not been shown, and the practicality of cleaning for the caregiver may need to be considered [16].

Regular follow-up is needed to evaluate denture adaptation, identify areas of discomfort, adjust denture retention and stability, and reassess the patient's ability to manage their prosthesis as PD progresses. Individualized follow-up schedules and denture adjustments have been described in clinical reports [16, 25, 32, 33, 34], although the optimal recall interval has not been established. Prosthesis design may also be considered according to patient's functional abilities, cognitive status, living situation, and available caregiver support. Clinical decisions regarding denture management should consider the patient's ability to use and maintain their denture, including their disease stage, cognition, living situation, and available caregiver support.

CONCLUSION

Evidence on denture management in patients with PD is limited. It comes from a small number of observational studies and case reports. One small clinical study found that verbal instruction with positive reinforcement and repeated feedback was followed by a fall in prosthesis biofilm. A survey suggests that most patients with PD who wear dentures insert and remove them by themselves, and that cleaning is the harder task. Patients with PD often need more help with oral hygiene, and case reports describe simplified designs, delivery adjustments, caregiver instruction and scheduled follow-up. No study has objectively assessed denture-handling ability or tested the effect of caregiver training. Until prospective studies address these gaps, denture management is best planned as an ongoing process adjusted to the individual patient rather than a single instruction given at delivery.

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