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Prosthodontic Treatment Care for Geriatric Patient: A Systematic Review

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ABSTRACT

Objectives:

This comprehensive review explores the diverse landscape of prosthodontic treatment for geriatric patients, focusing on the challenges associated with aging-related oral health issues. The study evaluates conventional complete dentures, overdentures with strategically retained teeth, and implant-supported prosthodontics, offering a spectrum of options for restoring oral function and aesthetics in individuals with complete tooth loss.

Data:

Data for this review is derived from a thorough examination of relevant literature, including research papers, clinical studies, and historical documents. The exploration encompasses meticulous planning and assessment strategies, with a particular emphasis on over dentures and implant-supported options for geriatric patients.

Sources:

Reputable prosthodontic journals serve as primary sources, providing research papers and studies on prosthodontic treatments for geriatric patients. The selection criteria prioritize relevance, quality, and contributions to understanding the multifaceted landscape of prosthodontic care for the elderly.

Conclusion:

The optimal prosthodontic approach must be tailored to individual needs, considering oral health, financial considerations, and overall well-being. Ongoing research aims to refine geriatric prosthodontic care, offering potential improvements in treatment options and outcomes.

Keywords: Prosthodontics, geriatric patients, complete dentures, overdentures, implant-supported prosthodontics, oral health, aging, treatment options, financial constraints, individualized care.

ABSTRACT

Prosthodontic treatment for geriatric patients presents a multifaceted landscape, addressing the unique challenges associated with aging-related oral health issues. Conventional complete dentures, overdentures retaining strategically important teeth, and implant-supported prosthodontics offer a spectrum of options for restoring oral function and aesthetics in individuals with complete tooth loss. Meticulous planning and assessment are essential for successful outcomes, especially in the case of overdentures. The increasing use of implants brings forth enhanced stability, retention, and preservation of alveolar bone, but the complexity and cost of implant-supported options necessitate careful patient selection. Despite the advancements, financial constraints often limit access to these innovative treatments for many elderly individuals. The optimal prosthodontic approach must be tailored to individual needs, considering oral health, financial considerations, and overall well-being. Ongoing research continues to refine geriatric prosthodontic care, offering potential improvements in treatment options and outcomes.

Keywords: Prosthodontics, geriatric patients, complete dentures, overdentures, implant-supported prosthodontics, oral health, aging, and treatment options, financial constraints, individualized care.

I. INTRODUCTION

The global demographic landscape is undergoing a transformative shift with a substantial increase in the elderly population. As life expectancy rises, so does the prevalence of oral health challenges among geriatric individuals, necessitating specialized prosthodontic interventions to enhance their overall quality of life. The aging process is a natural phenomenon, marking a normal and inevitable biological progression. Individuals aged 65 and above, classified as entering old age, commonly encounter health issues as a consequence of this aging trajectory. Recognizing the distinctive challenges that arise in this demographic is crucial, necessitating special attention and consideration. A fundamental aspect of maintaining the well-being and comfort of oral tissues among the elderly is the provision of proper nutrition.[1] Healthy oral tissues,

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in turn, significantly contribute to the potential success of prosthodontic treatments in this population.

For seniors experiencing partial or complete tooth loss, prosthetic therapy emerges as a vital component in preserving or reinstating masticatory function. This underscores the importance of understanding and addressing the specific oral health needs of the elderly, as effective prosthodontic interventions can play a pivotal role in enhancing their overall quality of life.[2]the oral health of geriatric patients is subject to a myriad of changes, ranging from tooth loss and periodontal diseases to alterations in salivary flow and temporomandibular disorders. The repercussions of these challenges extend beyond the oral cavity, influencing the individual's ability to eat, speak, and maintain proper nutrition. Therefore, an in-depth understanding of the distinctive oral health needs of the geriatric population is imperative for prosthodontists and dental care providers.

This review seeks to synthesize current knowledge on prosthodontic treatment options, emphasizing the importance of a comprehensive geriatric assessment before initiating interventions. As we navigate an era where the elderly population becomes increasingly diverse and medically complex, prosthodontics emerges as a vital component of geriatric healthcare. This review not only addresses the existing landscape of prosthodontic care for geriatric patients but also sheds light on potential avenues for future research and innovation.

Classification of Geriatrics (Ettinger and Beck, 1984)
I. Categorization Based on Psychologic Reactions to the Aging Process
A. Realistic Group
B. Resentment Group
C. Resigned Group
II. Segmentation According to Functional Criteria
A. Functionally Independent Elderly
B. Frail Elderly
C. Functionally Dependent Elderly
III. Classification According to Winkler
A. The Hardy Elderly
B. The Senile Aged Syndromes
C. In-Between Groups
Aspects of Aging:
IV.Aging can be delineated across various dimensions:
A.Physiologic
B. Psychologic
C.Pathologic

ORAL HEALTH CHALLENGES IN GERIATRIC PATIENTS

The geriatric population faces a range of distinctive oral health challenges as a result of the natural aging process. These challenges can significantly impact the overall well-being of older individuals, affecting their ability to eat, speak, and maintain proper nutrition. One prevalent issue is tooth loss, often resulting from factors such as decay, periodontal disease, and general wear and tear over the years. The consequences include reduced masticatory function and compromised aesthetics, leading to potential dietary limitations and decreased quality of life. Xerostomia, or dry mouth, is another common concern among the elderly. Age-related changes in salivary gland function and the side effects of medications commonly taken by older individuals contribute to dry mouth. This condition increases susceptibility to dental caries, difficulty in swallowing, altered taste perception, and compromised oral comfort.[3]Periodontal diseases, characterized by chronic inflammatory conditions affecting the gums, are often exacerbated by factors such as poor oral hygiene and systemic health issues.

The impact includes gingival recession, tooth mobility, and, in severe cases, tooth loss, which may contribute to systemic health concerns. Denture-related issues can arise from ill-fitting or poorly maintained dentures, leading to discomfort, ulcers, and difficulty in speaking and eating. The impaired function of the prosthetic appliance can result in dissatisfaction and diminished overall oral health. Age-related changes in the temporomandibular joint (TMJ) and associated structures can lead to Temporomandibular Disorders (TMD).[4] This may manifest as pain, restricted jaw movement, and difficulty in performing oral functions, affecting both oral health and overall quality of life.Furthermore, the increased susceptibility to oral cancer among the elderly is attributed to cumulative exposure to risk factors such as tobacco and alcohol over a lifetime. Late-stage diagnosis complicates treatment and reduces survival rates.

Understanding and addressing these oral health challenges in geriatric patients are essential for maintaining their oral function, comfort, and overall health. Proactive and comprehensive dental care, including regular assessments, preventive measures, and tailored prosthodontic interventions, can significantly contribute to mitigating these challenges and improving the oral health outcomes in the elderly population.[5]

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CHALLENGES IN PROVIDING PROSTHODONTIC TREATMENT FOR ELDERLY INDIVIDUALS

Figure1: partially edentulous in geriatric patient

Figure2: completely edentulous in geriatric patient

In older individuals, the loss of teeth earlier in life often leads to disruptions in the dental arch, manifesting as drifting, tipping, and supraeruption over time. These changes introduce prosthodontic challenges, including hygiene difficulties, periodontal issues, nonparallel abutments, prolonged preparations, and potential food traps. Consequently, the design and execution of prostheses must carefully consider these factors. Elderly individuals exhibit both the greatest need for prosthodontic services and the highest degree of complicating dental, medical, and behavioural factors. Advanced age should not be considered a contraindication to complex prosthodontic treatment, as patients in this demographic appreciate the aesthetic and functional advantages it can provide. Dental planning for prosthodontic treatment in older individuals should focus on the integrity of individual teeth and their potential contributions to the masticatory system. Anticipating restorative, occlusal, and functional challenges is crucial in the course of treatment.

Successful execution of prosthodontic treatment necessitates attention to altered pulpal size, changes in dentinal properties, and any periodontal changes in the patient's history. Removable prosthodontics, whether complete or partial dentures, require precision in procedures to address occlusal, dental, mucosal, and esthetical relationships that may develop over a lifetime. For partially or completely edentulous patients [FIG1&2], traditional removable prostheses may not fully restore normal function, esthetic comfort, or speech. Studies have shown that implant-supported prostheses can significantly improve oral function due to enhanced stability and retention, addressing factors such as loss of teeth, the condition of edentulous ridges, inadequate performance of removable prostheses, psychological needs, and the predictability of long-term results.[6] A new generation of older adults, characterized by higher education, health consciousness, and economic independence, presents unique opportunities and challenges to fixed prosthodontics.

The biomechanical goals of fixed prosthodontics for older adults include enhancing tooth structure integrity, eliminating discontinuities at the dentino-enamel junction, developing a straight peridental emergence profile, re-establishing proximal contact morphology, stabilizing tooth positions and occlusal relationships, and creating aesthetic harmony. However, certain conditions contraindicate fixed prosthodontics in older adults, such as pulpal stenosis, extensively restored tooth surfaces, root exposure from gingival recession, incisal attrition penetrating enamel, cervical caries/erosion/abrasion, uncompensated posterior tooth loss, modified salivary gland function, and compromised oral hygiene skills.[7] Removable partial dentures remain a versatile option for many patients, offering aesthetic and non-invasive features.

They are particularly indicated when remaining teeth are questionable, and adjustments to the design can be made for prostheses with a compromised dentition. For implant-supported prostheses, clinical studies indicate that neither advanced age nor diminished oral hygiene alone should be considered a contraindication to long-term implant survival.[8]

TREATMENT PLANNING FOR COMPLETELY EDENTULOUS PATIENTS

Despite a decrease in the prevalence of edentulousness, there remains a need for prosthodontic solutions for many elderly patients who have lost all their natural teeth. Providing successful complete dentures, even for those with prior experience wearing prostheses, can be challenging due to resorbed alveolar ridges and altered postural jaw relationships. Nevertheless,

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applying fundamental prosthodontic principles allows for the effective management of many patients using conventional complete replacement dentures. Attention should be given to ensuring well-extended dentures, especially in the mandible, to capitalize on retention from the retromolar pads, and achieving balanced articulation. Patients with existing complete dentures that have proven successful may be suitable candidates for copy dentures or the incorporation of successful features into new conventional dentures.[9]

FIGURE 3: OVERDENTURES IN GERIATRIC PATIENT

Supplying an older individual with their initial complete replacement denture can present challenges for both the clinician and the patient. An alternative to complete tooth loss is the retention of strategically important teeth, utilizing overdentures, a method proven to be especially successful, particularly in the mandible where bone resorption can compromise denture stability and retention significantly.[10] As the oral health of older adults improves, the acceptance of tooth loss as an inevitable part of aging diminishes. Retaining a portion of natural dentition becomes increasingly beneficial. Overdentures offer utility in cases where partial denture construction faces challenges, such as unsuitable abutment teeth or conflicting paths of insertion in saddles. Successful outcomes with overdentures extend to hypodontia cases, cleft palate or surgical defect situations, and cases of non-carious tooth surface loss, an issue prevalent among older patients. Careful assessment of potential abutment teeth is crucial in planning for overdentures [FIG 3].[11]

The prognosis for retained teeth should be favorable, and they should be considered restorable. Preserving natural teeth can provide substantial psychological benefits to the patient, contributing to a more secure feeling denture. Retained roots help maintain sensory feedback and proprioception, enhancing awareness of jaw-space relationships and improving chewing efficiency. Overdentures significantly enhance denture support by utilizing teeth to retain the prosthesis, preserving alveolar bone and reducing the loss of vertical dimension and lip support. Patients for whom overdentures may be indicated are often not ideal dental patients, having lost teeth due to a combination of disease susceptibility and neglect. Vigilance is essential, requiring a program of intensive maintenance.[12] Common problems associated with overdenture abutments include caries and periodontal disease. In cases of compromised retention, precision attachments can be considered to enhance denture retention.

Precision attachments, interlocking devices fixed to abutments and incorporated into a denture or bridge, can be particularly useful in patients receiving a complete denture for the first time or those with poor muscular control, such as individuals with Parkinson's disease or post-cerebrovascular accident.[13]

Figure 4: implants in geriatric patients

The increasing reliability of osseointegration has led to a significant shift toward the routine incorporation of implants [FIG 4] to stabilize complete removable prostheses. This shift is driven by the capacity of implants to address various functional, psychological, and physiological consequences of edentulousness. Implants play a crucial role in preserving alveolar bone, and they contribute to an increased bite force compared to conventional complete dentures. This enhanced bite force may enable patients to chew food with higher nutritional value, positively impacting their general health.[14] However, the provision of implant-supported prosthodontics involves more intricate and time-consuming treatment procedures than conventional care.

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Careful planning is essential before implant placement, necessitating an assessment of the width and height of the existing alveolar ridge.[15]if insufficient bone levels are present to support the implants, bone augmentation may be required before implant surgery. Patients with conditions that prevent minor oral surgical procedures, such as poorly controlled diabetes mellitus, blood dyscrasia, or compromised immunity, would not be suitable candidates for implant placement. Among elderly patients, special attention should be given to any history of head and neck radiotherapy and the use of bisphosphonate medications. While not universally considered an absolute contraindication, patients who smoke should be informed that the failure of implants and postoperative complications are more prevalent in smokers than non-smokers.[16]additionally, similar to other prosthodontic treatment options, implant-retained dentures demand careful maintenance from both the patient and the clinician.

Implant-retained prostheses represent a significant advancement in the treatment of patients facing challenges with denture-wearing, offering the potential to overcome many issues associated with conventional replacement dentures.[17] Evidence suggests that implant-retained mandibular overdentures should be prioritized as the first-choice treatment for edentulous patients. However, for many elderly individuals who could benefit the most from implant-retained prosthodontics, cost considerations often make them financially impractical.[18]

FIGURE 5: NUTRITION IN GERIATRIC PATIENTS

Vitamin deficiencies in the elderly population are often subclinical, but anybody stress can lead to detectable symptoms. Individuals with low calorie intakes, those ingesting multiple drugs, or those with disease states causing malabsorption face a higher risk of hypervitaminosis.[19] Free-living older individuals frequently report low dietary intakes of vitamin D, vitamin E, folic acid, calcium, and magnesium[FIG5]. Malnutrition-related oral symptoms typically result from deficiencies in the vitamin B complex, vitamin C, iron, or protein. In the realm of prosthodontics and geriatric care, it has been noted that measurements of serum metabolites of vitamin B12 reveal a high prevalence of undiagnosed vitamin B12 deficiency among the elderly, which may contribute to dementia. Folic acid, crucial for cell division and red blood cell formation, plays a pivotal role, and its deficiency can lead to anaemia.

Various drugs and alcohol can affect folic acid absorption and metabolism. Ascorbic acid (vitamin C) is essential for wound healing due to its role in collagen synthesis. Individuals with high aspirin intake, heavy smokers, or alcohol abusers have an increased daily requirement for ascorbic acid. Denture-wearing patients are encouraged to consume foods rich in vitamin C regularly.[20] Vitamin E acts as an antioxidant in cell membranes, scavenging free radicals and preventing the oxidation of unsaturated cell phospholipids. Therefore, it is crucial for elderly patients to regularly incorporate foods rich in vitamin E into their diets. Magnesium, a component of the body skeleton, plays a vital role in neuromuscular transmission.[21]According to Himanshu Arpanet al[21] when handling geriatric edentulous patients, one must differentiate between the complaints based on deficient tissue tolerance and those due to mental and emotional stimuli.A comprehensive understanding of the family constellation, daily diet, and daily activities of prosthetic patients is essential for successful geriatric patient management. Nutrient deficiencies reported in denture-wearing patients may warrant the prescription of low-dose multivitamin-mineral supplements for certain individuals, even in the absence of clinical signs of nutrient deficiencies. For denture-receiving patients, a generic one-a-day vitamin tablet containing vitamins, folic acid, and vitamin B12 may be recommended.[22]

II. CONCLUSION

In conclusion, the field of prosthodontic treatment for geriatric patients encompasses a range of considerations, from conventional complete dentures to more advanced implant-supported options. While conventional dentures remain a viable option, especially when carefully designed and executed, the advent of osseointegrated implants has revolutionized the possibilities for enhancing stability, functionality, and overall

quality of life in older individuals with complete tooth loss. According to Ina nitschke et al[20]planning prosthetic treatment in geriatric patients, OFC should be assessed as a basic instrument to identify the individual treatment options and any decision for prosthetic treatment should rest upon a participatory decision-making process.Advances in prosthodontic techniques and technologies continue to offer new possibilities for improving the oral health and quality of life of older individuals, and ongoing research in this field will likely contribute to further refinements in geriatric prosthodontic care.

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