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Geriatric Prosthodontics Challenges And Adaptations: A Review

[1]Dr.KEERTHANA. S,[1]Dr. KAYALVIZHI SELVAM, [2]Dr. M. A. ESWARAN, [3]Dr. A. PONSEKAR ABRAHAM,

1-Senior Resident

2-Professor

3-Professor and Head of the Department

Department of Prosthodontics,

Thai Moogambigai Dental College and Hospital-Dr.M.G.R Educational and Research Institute.

Chennai, TamilNadu.

CORRESPONDING AUTHOR:

Dr. KEERTHANA.S

Senior Resident

Department of Prosthodontics,

Thai Moogambigai Dental College and Hospital-Dr.M.G.R Educational and Research Institute.

Chennai, TamilNadu.

Abstract

Geriatric prosthodontics focuses on restoring oral function, esthetics, and quality of life in elderly patients while addressing the unique physiological, psychological, and systemic changes associated with aging. Aging-related factors, including tooth loss, alveolar ridge resorption, thinning mucosa, reduced salivary flow, systemic comorbidities, and polypharmacy, complicate prosthetic rehabilitation. Psychological and social challenges such as cognitive decline, depression, anxiety, sensory deficits, social isolation, and financial constraints further influence treatment acceptance and compliance. Prosthodontic strategies must prioritize simplicity, stability, and durability, utilizing conventional dentures, removable partial dentures, overdentures, implant-supported prostheses, and digital dentures, tailored to the patient's functional capacity and systemic health. Innovations in digital dentistry, CAD/CAM fabrication, biomaterials, and tele-dentistry facilitate precision, ease of use, and rapid duplication, improving adaptation and continuity of care. Multidisciplinary approaches, caregiver involvement, and patient education are essential for successful outcomes, emphasizing holistic, patient-centered care.

Keywords: Geriatric prosthodontics; Elderly patients; Edentulism; Implant-supported prostheses; Digital dentures

Introduction

Gerodontology is the study of the teeth and dental issues that affect aged or aging people. Geriatric prosthodontics is a specialized discipline within dentistry that focuses on the prosthetic rehabilitation and oral healthcare of elderly individuals, addressing the unique needs that arise from the physiological, psychological, and systemic changes associated with aging. Prosthodontic care for geriatric patients necessitates a holistic strategy that accounts for their unique medical, psychological, and social circumstances.[1] Given the intricate health issues common among the elderly, a detailed assessment and customized treatment approach are essential for positive results. With the global population aging, the demand for specialized dental care for this demographic has risen. Older adults frequently encounter challenges such as tooth loss, diminished masticatory efficiency, reduced salivary flow, thinning oral mucosa, compromised bone density, and slower healing capacity, compounded by systemic conditions like diabetes, osteoporosis, and cognitive decline.[2]

These factors, along with socioeconomic barriers such as financial constraints, reduced mobility, and limited access to care, significantly affect their oral health and ability to adapt to prosthetic interventions. Prosthodontic care for geriatric patients necessitates a holistic strategy that accounts for their unique medical, psychological, and social circumstances. With the global population aging, the demand for specialized dental care for this demographic has risen.[3]

Older patients frequently encounter challenges like tooth loss, decreased bone density, dry mouth, and systemic diseases that can complicate standard prosthodontic procedures. Moreover, aging is often linked to both physical and mental decline.[4] These psychological shifts, alongside deteriorating physical health and life changes, can lead to emotional distress in many older adults. Behavioral changes in the elderly may stem from physiological or social adjustments, and psychiatric issues often accompany medical conditions. In this context, prosthodontics plays a pivotal role in enhancing quality of life by restoring function, improving esthetics, supporting adequate nutrition, and promoting psychosocial well-being.[5] This article gives an overview on Geriatric Prosthodontics Challenges and Adaptations.

Classification of Geriatrics (Ettinger and Beck, 1984)[3]
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:
Aging can be delineated across various dimensions:
- Physiologic
- Psychologic
- Pathologic
Janet Yellowitz and Michele J Saunders classification
1. Well elderly
2. Frail elderly
3. Functionally dependent elderly
4. Severely disabled, medically compromised elderly

WHO CLASSIFICATION OF AGE
Children (0-14)
Youth (15-24)
Young Adults (25-44)
Middle Age (45-59)
Elderly (60-74)
Senior (75+)

Review of Literature

Lloyd (1994) emphasized that the evolving expectations and heightened demands of modern elderly patients are reshaping traditional prosthodontic practices, necessitating continuous innovation and adaptability in clinical approaches.[6]

Allen et al. (2011) highlighted the importance of preserving natural dentition through the strategic use of overdentures, which can significantly enhance functional outcomes, comfort, and psychological satisfaction among elderly individuals.[7]

R Buser (2018) earlier proposed the concept of incremental treatment planning, advocating gradual modifications to existing dentures rather than complete replacements to better accommodate the adaptability limitations often observed in geriatric patients.[4]

Deshmukh et al. (2022) underscored the value of holistic management in geriatric prosthodontics by integrating nutritional, medical, and psychosocial dimensions into treatment planning to improve adherence and overall well-being.[8]

Shinde et al. (2022) discussed common denture-related complications such as stomatitis and pressure sores, emphasizing the necessity of proper fitting, hygiene maintenance, and patient education for long-term prosthesis success.[9]

Alfaer et al. (2025) reported that xerostomia, often medication-induced, increases caries susceptibility and can be effectively managed through saliva substitutes and hydration strategies; they also noted that periodontal disease in elderly patients is frequently exacerbated by systemic comorbidities such as diabetes, necessitating regular debridement and reinforced oral hygiene education.[2]

Cheng et al. (2025) further advanced the concept of age-friendly functional restoration, emphasizing the integration of systemic health factors and assistive technologies to tailor prosthodontic interventions for geriatric patients.[10]

Demographic and Biological Considerations in Geriatric Prosthodontics

The global population of older adults is increasing at an unprecedented rate, with approximately 1.1 billion people aged 60 years and above in 2023, projected to reach 1.4 billion by 2030 and more than 2.1 billion by 2050, meaning that by 2030 one in six people worldwide will be over 60. [2] Alongside demographic shifts, biological changes in the oral cavity contribute to the complexity of geriatric prosthodontics: alveolar bone density decreases with age, and tooth loss accelerates ridge resorption, compromising support for dentures and implants; the oral mucosa becomes thinner, less elastic, and more fragile, with reduced vascularity and cellularity leading to delayed healing and greater susceptibility to infections; salivary flow often declines, resulting in xerostomia that impairs lubrication, increases caries risk, and affects digestion; and neuromuscular coordination diminishes, reducing chewing efficiency and clarity of speech.[3]

Systemic conditions common in the elderly, such as diabetes, osteoporosis, and cardiovascular diseases, further complicate oral health management by impairing periodontal health, bone integrity, and wound healing, while multimorbidity amplifies vulnerability to oral deterioration. In addition, polypharmacy commonly defined as the use of five or more medications is widespread in older populations and exerts profound effects on oral health, with many drugs causing xerostomia, increased susceptibility to

candidiasis, plaque accumulation, and caries.[7] These interlinked demographic, biological, and systemic factors highlight the necessity for prosthodontists to adapt their approaches through individualized treatment planning, careful risk assessment, and ongoing management strategies tailored to the elderly.[5]

Psychological and Social Challenges in Geriatric Prosthodontics

Elderly patients often present with complex psychological and social factors that significantly influence their attitudes toward prosthodontic treatment and overall oral healthcare. Acceptance of prostheses may be hindered by fear, anxiety, previous negative dental experiences, or a lack of understanding, while motivation to pursue and maintain treatment can be reduced by physical discomfort, cognitive decline, or social withdrawal. Aesthetic expectations also play a vital role, as many older adults, particularly women, may have specific cosmetic concerns regarding artificial teeth, linking changes in their appearance to aging or past dental interventions.[8] Sensory deficits such as impaired vision, hearing, or taste further exacerbate psychological distress, leading to isolation, personality changes, and resentment, especially in societies that emphasize youth and vitality.

Conditions such as dementia and depression impair communication, comprehension, and adherence to oral hygiene routines, making caregiver involvement essential to support treatment success. Social isolation, measured through reduced social contact rather than subjective loneliness, has been strongly associated with accelerated tooth loss, diminished oral health, and decreased motivation to seek dental care, which in turn lowers prosthodontic treatment compliance. In addition, financial barriers including limited pensions, lack of dental insurance, and high treatment costs restrict access to timely care, worsening edentulism and its associated nutritional and psychosocial consequences.[9] [10]

Clinical Challenges in Geriatric Prosthodontics

Edentulism, whether partial or complete, remains highly prevalent in the elderly and has far-reaching implications on function, esthetics, nutrition, and overall quality of life, as tooth loss often triggers drifting, tipping, and supraeruption of remaining teeth, complicating rehabilitation and accelerating alveolar ridge resorption that compromises prosthetic retention. Aging further introduces a spectrum of intraoral changes, including enamel erosion, tooth wear, reduced pulp chamber size, dentinal sclerosis, diminished sensitivity, poor periodontal health, thinning oral mucosa, loss of taste sensation, residual ridge resorption, and xerostomia due to declining salivary function all of which impair prosthetic performance and increase the risk of mucosal irritation, candidiasis, and malnutrition.[11]

Ill-fitting dentures may exacerbate inflammation and trauma, while systemic deficiencies and comorbidities can manifest in oral changes such as depapillation of the tongue, palatal swelling, or discoloration linked to cardiovascular and nutritional disorders. Prosthodontic management is further challenged by disrupted dental arches from early tooth loss, non-parallel abutments, food traps, and hygiene difficulties, necessitating careful planning to preserve remaining teeth, restore occlusion, and balance function with esthetics.[12]

While removable prostheses remain common, limitations in stability and performance often make implant-supported options more desirable, particularly as awareness of their predictable long-term outcomes grows among elderly patients; however, these require careful assessment of systemic health, ridge anatomy, and surgical tolerance. Fixed prosthodontics may stabilize teeth and improve harmony but can be contraindicated in cases of pulpal stenosis, extensive restorations, or poor oral hygiene.[13] Beyond restorative challenges, nutritional considerations are critical, as older adults require fewer calories but greater protein, hydration, and micronutrient intake to prevent sarcopenia, osteoporosis, and ridge resorption, with dietary modifications tailored to chewing ability. From a procedural standpoint, impression making is complicated by flabby or resorbed ridges that distort under pressure, while reduced adaptability, diminished neuromuscular coordination, and psychological factors such as anxiety or depression often hinder acceptance of new prostheses.[14]

Salivary gland hypofunction compromises denture retention and comfort, necessitating saliva substitutes and meticulous hygiene, while fragile oral mucosa predisposes patients to stomatitis, ulcers, and trauma

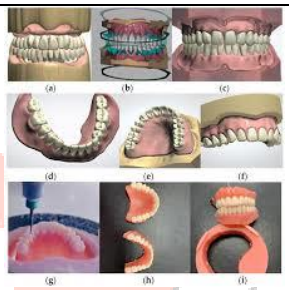
requiring close monitoring.[15] Finally, systemic illnesses such as diabetes, cardiovascular disease, and osteoporosis, combined with polypharmacy, elevate medical risks during dental procedures, making thorough medical assessment, careful drug consideration, and interdisciplinary collaboration essential for safe and effective prosthodontic care in the elderly.[16]

Prosthodontic Treatment Options and Adaptations in the Elderly

Conventional complete dentures remain widely used, though special impression techniques for flabby or resorbed ridges, neutral zone recording, and lightweight denture bases are often necessary to improve fit and comfort. Removable partial dentures should be designed for ease of use, stability, and hygiene, with modifications such as smooth surfaces, polished bases, and simplified anatomy to reduce bacterial and plaque accumulation that may lead to stomatitis, periodontal disease, or even systemic complications like pneumonia in institutionalized elderly.[17] Practical features, including grooves, buttons, or labeling, can aid patients with cognitive or motor impairments, while caregiver training remains essential for proper hygiene maintenance.[18] Overdentures, supported by natural roots or implants, provide improved retention and stability, especially in the mandible where bone resorption is severe, and may be combined with precision attachments for patients with poor muscular control or neuromuscular disorders, ensuring functional and psychological benefits.[19]

Advances in digital dentistry and CAD/CAM technologies now allow fabrication of high-quality, biofilm-resistant digital dentures, with reduced appointments, cost efficiency, and easy replication in cases of loss or damage an advantage for cognitively impaired patients.[20] Implant-supported prostheses are increasingly accepted among the elderly, as osseointegration can be maintained despite aging, providing enhanced chewing efficiency, structural preservation, and functional stability; however, surgical risk, systemic comorbidities, medication interactions, and financial constraints must be carefully evaluated.[21] Minimally invasive implant protocols, including mini dental implants (MDIs), offer promising survival rates, especially in the mandible, though challenges remain in the maxilla and in managing fixed designs in patients with limited tolerance.[22],[23]

Treatment Option	Adaptations / Strategies	Special Considerations for Elderly	Image
Conventional Complete Dentures	• Special impression techniques for flabby/resorbed ridges • Neutral zone technique for better stability • Lightweight denture bases	• Copy denture technique for successful old dentures • Digital duplication using CAD/CAM • Low-cost duplicates for dementia patients prone to losing dentures	
Removable Partial Dentures (RPDs)	• Simple, stable, and solid (g-3-S principle) • Designs prioritizing comfort and easy handling • Grooves/buttons for better grip	• Should minimize plaque buildup and fractures • Labeling for institutionalized patients • Caregiver training for hygiene and handling	

Overdentures	• Tooth- or implant-supported overdentures • Precision attachments to enhance retention	• Useful in cases with few abutments, poor distribution, or mandibular resorption • Beneficial in hypodontia, cleft palate, or surgical defects • Risk of fracture due to insufficient acrylic thickness	
Implant-Supported Prostheses	• Osseointegrated implants and mini dental implants (MDIs) • Minimally invasive surgical techniques	• Age not a contraindication, but surgical risks must be considered • Regular recall for hygiene and preventive care • Costs and surgical fear often limit acceptance • Mandibular implants show better outcomes than maxillary	
Digital Dentures (CAD/CAM)	• Faster fabrication with fewer appointments • High-quality, hygienic materials reducing biofilm	• Beneficial for medically compromised patients • Easy replication in case of loss/damage • Cost-effective duplicates can be made for high-risk groups	

Maintenance, and Future Perspectives in Geriatric Prosthodontics

Effective prosthodontic care for elderly patients necessitates a range of adaptations in clinical practice, tailored to their physiological tolerance, cognitive capacity, and oral functional status.[24] Treatment plans should prioritize simplicity, stability, and durability to minimize complications and facilitate ease of use, while appointment scheduling must be shorter and more frequent to accommodate limited stamina and attention span. [25]

Maintenance and aftercare are equally critical: patients and caregivers must receive education on oral hygiene, prosthesis care, and its impact on systemic health; regular follow-up visits every six to twelve months should monitor prosthesis fit, mucosal health, hygiene, and disease progression; denture hygiene must be emphasized to prevent microbial colonization and conditions such as denture stomatitis, including daily cleaning routines and overnight removal.[26] Nutritional counseling supports balanced diets compatible with chewing ability, while caregiver involvement remains indispensable for patients with cognitive or physical limitations.[27]

Looking ahead, advancements in biomaterials such as soft liners and resilient, biocompatible materials improve prosthesis comfort and tissue protection, particularly for thin or flabby oral tissues, while digital workflows including CAD/CAM fabrication and tele-dentistry enhance precision, reduce chair-time, and increase accessibility.[28] Polyetheretherketone (PEEK) has emerged as a promising biomaterial in geriatric prosthodontics due to its superior biocompatibility, lightweight nature, and excellent mechanical resilience. Its shock-absorbing properties reduce stress on underlying tissues, making it particularly suitable for elderly patients with resorbed ridges or thin mucosa. PEEK frameworks provide a metal-free alternative with favorable esthetics and minimal allergic potential, while their low plaque affinity enhances hygiene maintenance. Artificial intelligence further augments care by facilitating personalized treatment planning, risk assessment, and early detection of complications. Policy initiatives and healthcare

reforms increasingly recognize the oral health needs of older adults, promoting integration of dental and medical services and improving access to care.[29,30]

Conclusion

In Conclusion, encouraging regular dental visits and educating patients on denture maintenance further supports treatment acceptance and long-term success. Ultimately, the aim of geriatric prosthodontics is to enhance quality of life by restoring oral function, esthetics, and comfort, while recognizing that medical complexities and societal perceptions can significantly influence the treatment journey and patient experience.

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