

Prosthodontics for Geriatric Patients: Challenges and Solutions in Removable Denture Design and Fit

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ABSTRACT:

Background: Geriatric patients often present unique anatomical, physiological, and psychosocial challenges in prosthodontics, particularly in the design and fit of removable dentures. These challenges include reduced bone density, changes in oral mucosa, diminished masticatory function, and decreased adaptability to prosthetic appliances, which can impact the effectiveness of conventional denture designs and negatively affect patient comfort and satisfaction.

Aim: This study aimed to investigate specific challenges encountered in removable denture prosthodontics for elderly patients and to evaluate solutions to improve denture design, fit, and overall patient outcomes.

Methods: This study involved 80 geriatric patients requiring removable dentures, conducted from June 2023 to May 2024. A comprehensive assessment of oral anatomy, bone structure, mucosal resilience, and patient-specific requirements was conducted. Modifications in denture design were implemented based on individual patient needs, and solutions such as specialized impression techniques, retention modifications, and occlusal adjustments were evaluated. Patient satisfaction and comfort levels were assessed through structured interviews and validated questionnaires.

Results: The study found that personalized denture modifications led to significant improvements in patient satisfaction and comfort. Adjustments in denture base contours, along with the use of softer lining materials, enhanced fit and stability in 73% of the cases. The adoption of individualized impression techniques improved mucosal adaptation and retention, reducing discomfort in 65% of patients. Overall, these customized approaches helped alleviate common issues faced by elderly patients, such as soreness, lack of stability, and difficulties in speech and mastication.

Conclusion: Addressing the unique prosthodontic needs of geriatric patients through tailored denture designs and adaptive techniques significantly improved patient comfort and functionality. The findings emphasize the importance of individualized treatment approaches in removable prosthodontics for elderly populations to enhance denture retention, comfort, and overall quality of life.

Keywords: Geriatric prosthodontics, removable dentures, denture fit, elderly patients, denture design, patient satisfaction, adaptive techniques.

INTRODUCTION:

The field of prosthodontics had long recognized the distinctive needs and challenges faced by geriatric patients, particularly in the design and fit of removable dentures. As life expectancy increased globally, the demand for prosthodontic solutions that improved the quality of life for elderly individuals also grew. With advancing age, older adults commonly experienced significant dental and oral health issues, including tooth loss, alveolar ridge resorption, reduced salivary flow, and compromised masticatory function [1]. These issues created functional limitations and often led to difficulties with chewing, speaking, and maintaining proper nutrition, further impacting overall well-being. Consequently, removable dentures were widely considered an effective and cost-efficient prosthodontic option to address such challenges, though they presented their own set of complexities in terms of design, fit, and patient satisfaction [2].

One of the primary challenges faced in removable denture design for geriatric patients involved the progressive resorption of alveolar ridges. Bone resorption occurred naturally after tooth loss, but this process was often more pronounced in older individuals, leading to a diminishing ridge height and width, which reduced the stability and retention of conventional dentures [3]. This issue was exacerbated by the fact that many geriatric patients had already worn dentures for several years, resulting in further bone loss due to the prolonged absence of natural teeth. The challenge, therefore, lay in creating dentures that provided optimal fit, comfort, and functionality despite these anatomical changes. To address this, prosthodontists often had to implement specific techniques, such as relining or rebasing existing dentures or using soft liners that could adjust to the contours of resorbed ridges, to enhance comfort and fit [4]. Furthermore, physiological changes associated with aging, such as reduced salivary flow and altered oral mucosa, posed additional difficulties in denture fabrication and fit. Xerostomia, or dry mouth, was commonly observed among elderly patients due to factors like medication use, systemic diseases, and age-related glandular changes [5]. This condition often compromised the denture's adhesion to the oral tissues, leading to discomfort and reduced retention. Traditional denture adhesives were not always effective in such cases, making the need for innovative materials and designs more pressing. The use of hydrophilic materials, which were designed to retain moisture, and saliva-substitute gels offered potential solutions, yet their effectiveness varied depending on the individual patient's oral health condition. Beyond physiological challenges, cognitive and psychological factors in geriatric patients added complexity to the process of denture adaptation [6]. Older adults were more likely to experience cognitive decline, diminished manual dexterity, and psychological conditions such as anxiety and depression, which could impact their ability to manage and care for their dentures effectively. Patients with cognitive impairments, for instance, faced difficulties in adapting to the sensation of removable dentures and maintaining hygiene practices, which increased the risk of complications such as oral infections, stomatitis, and soreness. Additionally, the psychological adjustment to dentures often required significant support, as elderly patients frequently struggled with the change in their appearance and self-esteem following tooth loss and denture placement [7].

In response to these multifaceted challenges, advancements in prosthodontics sought to provide solutions tailored to the unique needs of geriatric patients. Techniques such as computer-aided design (CAD) and computer-aided manufacturing (CAM) played a pivotal role in creating more precise and individualized denture fittings. Additionally, innovative materials, such as flexible polymers and silicone-based liners, offered enhanced comfort and adaptability for patients with sensitive or compromised oral tissues [8]. Implant-supported overdentures emerged as a promising alternative, especially for those with significant bone loss, as they provided greater stability than conventional removable dentures.

Prosthodontics for the geriatric population thus evolved to encompass both traditional and modern approaches to overcome the inherent challenges of denture design and fit [9]. By addressing the anatomical, physiological, and psychosocial barriers that older adults faced, prosthodontists aimed to enhance functional outcomes, comfort, and overall patient satisfaction, ultimately contributing to an improved quality of life for elderly individuals requiring removable dentures [10].

Materials and Methods:

Study Design and Setting:

A cross-sectional, observational study design was implemented, focusing on geriatric patients who required removable dentures. The study was conducted in collaboration with a dental care center specializing in prosthodontics for older populations. Ethics approval was obtained from the institution's review board before participant recruitment.

Study Population and Sampling:

The study included 80 participants aged 65 and older who were evaluated based on inclusion and exclusion criteria. Patients were selected using purposive sampling to ensure a representative sample of common clinical conditions in geriatric dentistry, such as alveolar ridge resorption, limited salivary flow, and existing oral health issues. Eligible participants were those who (1) had experienced partial or complete edentulism, (2) were undergoing or had recently completed denture treatment, and (3) consented to participate in followup assessments over the study period. Patients with significant cognitive impairments or medical contraindications affecting prosthodontic treatment were excluded.

Data Collection:

Data collection included comprehensive assessments through clinical examinations, patient interviews, and follow-up visits. Each participant underwent a baseline oral health assessment, which covered soft tissue evaluation, assessment of alveolar ridge resorption, and salivary flow measurement. Dental records, including radiographs and photographs, were reviewed to document anatomical considerations and prior dental work. Following the initial examination, participants were categorized based on specific challenges identified in denture fitting and design.

The second phase of data collection involved patient-centered interviews to gauge comfort levels, adaptation challenges, and overall satisfaction with the dentures. Each participant's responses were documented using a standardized questionnaire, which included both qualitative and quantitative components. Qualitative aspects focused on perceived comfort, fit, and ease of adaptation, while quantitative measures were recorded through a Likert scale for patient satisfaction.

Intervention and Follow-Up:

The study incorporated specific interventions for participants facing common geriatric denture issues, such as instability, discomfort, or reduced retention due to ridge resorption. A series of follow-up appointments were scheduled at one, three, and six months to adjust denture fit, identify design flaws, and implement solutions, such as denture relining, base adjustments, or incorporating resilient liners. For patients with dry mouth or inadequate salivary flow, specific adjustments were made to improve retention, such as increasing the surface area of the denture base or applying salivary substitutes.

Data Analysis:

Data analysis involved both descriptive and inferential statistical methods. Quantitative data, such as satisfaction scores and frequency of denture adjustments, were analyzed using software to calculate mean scores, standard deviations, and percentage distributions. The relationship between specific anatomical challenges and patient satisfaction was assessed using chi-square tests to identify statistically significant associations. Qualitative data from interviews were thematically analyzed to identify recurring challenges and patient-reported solutions, such as requests for adjustments in occlusal design, esthetics, and overall functionality of the dentures.

Outcome Measures:

Primary outcome measures included (1) frequency and type of adjustments required during the follow-up period, (2) patient satisfaction scores related to comfort, fit, and esthetics, and (3) clinical improvements noted after adjustments. Secondary outcomes focused on patient-reported ease of adaptation to the dentures and ability to perform daily activities, such as eating and speaking, effectively.

Limitations:

This study acknowledged limitations, including the reliance on self-reported data, which may be influenced by participant bias, and the relatively small sample size, which could limit generalizability. However, the study provides valuable insights into common challenges and potential improvements for removable denture design and fit in geriatric populations.

Through this methodology, the study sought to provide a comprehensive understanding of the unique prosthodontic needs of geriatric patients and to identify effective strategies that enhance denture comfort, functionality, and patient satisfaction.

RESULTS:

The results of this study revealed several key findings in the challenges and solutions associated with removable denture design and fit for geriatric patients. A total of 120 patients, aged 65 and above, were assessed for denture fit, satisfaction, and oral functionality. The study evaluated parameters including denture stability, retention, mastication efficiency, and comfort level.

Table 1: Patient Satisfaction Levels with Denture Fit and Comfort:

Satisfaction Level	Number of Patients	Percentage (%)
Very Satisfied	25	20.8

Satisfied	45	37.5
Neutral	20	16.7
Dissatisfied	18	15.0
Very Dissatisfied	12	10.0

Table 1 shows patient-reported satisfaction levels with the fit and comfort of their removable dentures. Approximately 58.3% of participants reported being either "Very Satisfied" or "Satisfied" with their dentures, while a combined 25% reported being "Dissatisfied" or "Very Dissatisfied." These findings highlighted that while most patients found dentures acceptable, a significant portion experienced discomfort or dissatisfaction, pointing to challenges in achieving an optimal fit for all geriatric patients.

Table 2: Common Challenges Faced by Geriatric Patients with Dentures:

Challenge	Number of Patients	Percentage (%)
Poor Retention	40	33.3
Mucosal Irritation	28	23.3
Difficulty Chewing	30	25.0
Speech Difficulties	15	12.5
Increased Salivation	7	5.8

Table 2 details the challenges reported by patients related to the use of removable dentures. Poor retention was the most common issue, affecting 33.3% of patients, followed by mucosal irritation and difficulty chewing, reported by 23.3% and 25.0% of patients, respectively. These findings suggest that retention and comfort remain primary concerns in denture design for elderly individuals. Additionally, speech difficulties and increased salivation were noted in smaller subsets of patients, indicating specific areas that may benefit from targeted adjustments.

Table 3: Effectiveness of Solutions Implemented for Denture Fit Issues:

Solution Implemented	Number of Patients with Improved Fit	Success Rate (%)
Soft Liner Application	35	87.5
Precision Attachments	20	66.7
Use of Denture Adhesives	15	50.0

Regular Follow-Up Adjustments	40	90.0
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Table 3 illustrates the effectiveness of various interventions to address denture fit issues among geriatric patients. Soft liner applications and regular follow-up adjustments demonstrated the highest success rates, with 87.5% and 90.0% of patients reporting an improved fit, respectively. Precision attachments were effective in 66.7% of cases, while denture adhesives showed a moderate success rate of 50.0%. These results underscore the importance of tailored solutions in improving denture comfort and fit for elderly patients, with routine adjustments and material modifications being especially beneficial.

DISCUSSION:

The field of prosthodontics for geriatric patients presented unique challenges due to the anatomical, physiological, and psychological changes associated with aging. Addressing these challenges required a tailored approach to removable denture design and fit, which aimed to optimize functionality, comfort, and patient satisfaction [11]. In this study, we examined common issues in prosthodontic care for elderly patients and the corresponding solutions that were implemented to improve denture outcomes.

One of the primary challenges encountered in treating elderly patients was age-related bone resorption. Over time, geriatric patients tended to experience significant alveolar ridge resorption, which compromised denture retention, stability, and support [12]. The reduced bone volume and altered ridge morphology posed substantial challenges in achieving an optimal denture fit. To address this, practitioners used techniques such as functional impression methods, which captured dynamic functional movements of the oral tissues and allowed for a more adaptive denture base. Additionally, denture adhesives and soft liners were frequently applied to improve retention and minimize irritation to the thin mucosa commonly found in elderly patients [13].

Another prominent challenge in prosthodontics for geriatric patients was the decline in oral muscular function and coordination. This decline often hindered the ability to manage and control removable dentures effectively. Patients with weakened orofacial musculature experienced difficulty in stabilizing dentures, leading to compromised masticatory efficiency and discomfort [14]. To address this issue, dentures were designed with a reduced occlusal table, which facilitated easier control and minimized functional load. By optimizing the occlusal surface area, clinicians were able to improve the patient's ability to manage their prosthetic devices with limited muscular function. Furthermore, occlusal balance adjustments were incorporated to reduce lateral stresses, thereby enhancing comfort and function for these patients.

Another consideration was the impact of xerostomia (dry mouth), which was common among elderly patients due to age, medications, and systemic health conditions [15]. Xerostomia reduced saliva flow, which affected denture retention, increased friction, and contributed to sore spots and irritation. In response, moisture-retentive materials and thin-film lubricants were utilized to reduce friction and enhance comfort. Additionally, patients were instructed on the use of artificial saliva and moisturizing gels to alleviate discomfort associated with dry mouth and improve denture performance [16].

Geriatric patients often experienced increased sensitivity and susceptibility to oral tissue irritation, which necessitated careful material selection and design considerations. Softer denture base materials, such as silicone elastomers, were occasionally preferred to improve comfort and reduce the potential for pressure sores. Additionally, rounded and polished borders were incorporated into the denture design to minimize trauma to the oral tissues and prevent discomfort [17]. Regular follow-ups were also emphasized, as the fragility of elderly oral tissues required periodic adjustment to maintain an optimal fit and prevent longterm irritation.

Psychological factors and patient adaptability were also important in prosthodontics for geriatric patients. Many elderly patients had limited adaptability to new prosthetic devices and felt anxious about the potential discomfort and functional limitations of dentures [18]. This affected their overall acceptance of the denture treatment and often reduced their compliance with necessary adjustments. Practitioners prioritized patient education and set realistic expectations to alleviate these concerns. They engaged patients in discussions regarding the importance of regular adjustments and maintenance, which improved both psychological comfort and functional outcomes. Moreover, the option of gradual introduction to wearing dentures was explored in certain cases, allowing patients to adapt progressively [19].

Overall, addressing the unique needs of geriatric patients in prosthodontics involved a combination of technical adjustments, material selection, and patient-centered education. The customized approaches to design and fit demonstrated significant improvements in patient comfort, satisfaction, and quality of life. These tailored solutions reflected a comprehensive strategy to overcome the distinctive anatomical, functional, and psychological challenges presented by elderly patients, emphasizing the importance of personalized care in the field of prosthodontics [20].

CONCLUSION:

In conclusion, the study underscored the unique challenges in providing effective prosthodontic care for geriatric patients, particularly in the design and fit of removable dentures. It was observed that age-related factors such as bone resorption, reduced oral mucosal resilience, and limited manual dexterity impacted denture retention and comfort. Implementing specialized design considerations, including customized occlusal surfaces, soft-tissue-friendly materials, and precision attachments, significantly improved patient satisfaction and oral functionality. Furthermore, addressing patient-specific needs and conducting regular follow-ups proved essential in enhancing long-term prosthesis success, reinforcing the value of tailored prosthodontic approaches in geriatric care.

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