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Review Article

Clinical reassessment of denture fit and tissue tolerance in aging edentulous patients

Ali Salem Alfaer[1]*, Faris Ahmed Alghamdi[2], Mohammed Dhafer Alqahtani[3], Atheer Ali Alhassan[4], Madawi Faraj AlQahtani[5], Khalid Fahad Alharbi[6], Mohammed Abdullah Alshehri[7], Abdulaziz Abdulsalam Alateeq[6], Muaadh Hasan Alamodi[6], Saleh Mohammed Aldawsari[6], Osamh Fuad Alkhoofy[8]

[1]Department of Prosthodontics, Rabigh General Hospital, Rabigh, Saudi Arabia
[2]Department of Dentistry, Private Clinic, Jeddah, Saudi Arabia
[3]Department of Dentistry, Knaf Dental Clinic, Abha, Saudi Arabia
[4]Department of Dentistry, Saudi Dent Private Hospital, Abha, Saudi Arabia
[5]Department of Dentistry, King Saud University, Riyadh, Saudi Arabia
[6]Department of Dentistry, Prince Sattam bin Abdulaziz, Riyadh, Saudi Arabia
[7]Department of Dentistry, Safwet Almuhaideb Dental, Al-Kharj, Saudi Arabia
[8]Clinical Attachment, King Faisal University, Al-Ahsa, Saudi Arabia

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***Correspondence:**
Dr. Ali Salem Alfaer,
E-mail: dr.alfaer@gmail.com

ABSTRACT

Tooth loss in the elderly remains a widespread concern, with complete edentulism significantly impacting oral function, comfort, and overall quality of life. As individuals age, ongoing anatomical and physiological changes in the oral cavity influence the performance of removable prostheses. Progressive alveolar bone resorption, soft tissue atrophy, and reduced neuromuscular coordination contribute to compromised denture retention and stability. In many cases, patients continue to wear their dentures for extended periods without reassessment, leading to tissue trauma, discomfort, and oral lesions. These problems are often exacerbated by age-related systemic health conditions, such as diabetes and dry mouth, which reduce the tissue's capacity to adapt to mechanical pressure. Biological responses to long-term denture use vary significantly among patients, depending on factors like immune response, mucosal health, and hygiene practices. Tissue tolerance decreases when dentures are ill-fitting, unbalanced, or worn beyond their functional lifespan. Inflammatory conditions such as denture stomatitis and epulis fissuratum frequently emerge due to microbial colonization and sustained mucosal pressure. Clinicians must pay close attention to subtle tissue reactions and identify changes early to prevent chronic complications. Effective reassessment requires a comprehensive clinical approach that includes visual inspection, pressure distribution analysis, evaluation of occlusal function, and patient feedback. Corrective interventions may involve relining, occlusal adjustments, or complete prosthesis replacement. In complex cases, especially where tissue damage is advanced or retention cannot be restored by conventional means, implant-supported solutions may be explored. Continuous monitoring and patient-specific care are essential to ensure denture performance aligns with evolving anatomical and physiological conditions in the elderly. A proactive, structured reassessment strategy enhances comfort, protects soft tissues, and supports functional adaptation over time.

Keywords: Edentulous patients, Denture fit, Tissue tolerance, Prosthodontic assessment, Aging oral anatomy

INTRODUCTION

The global increase in life expectancy has led to a substantial rise in the population of elderly individuals requiring prosthodontic care. Complete edentulism, a condition frequently encountered in aging populations, demands ongoing clinical attention due to its complex interplay with systemic health, oral tissue dynamics, and prosthetic adaptation. As patients age, progressive anatomical and physiological changes, including alveolar bone resorption, decreased salivary flow, and thinning of oral mucosa, influence the fit and function of dentures.[1] These changes can significantly reduce denture retention and stability while increasing mucosal trauma and patient discomfort.

The functional performance of complete dentures depends heavily on their adaptation to the evolving intraoral environment. Over time, the loss of residual ridge volume and support alters the maxillomandibular relationship, which may compromise occlusion, increase tissue pressure, and trigger denture-induced stomatitis or traumatic ulcers. Regular reassessment of prostheses is therefore not only advisable but essential to prevent chronic irritation and long-term tissue damage.[2] Yet, evidence suggests that many edentulous individuals continue to wear ill-fitting dentures for extended periods without seeking adjustments, often due to lack of awareness or limited access to dental services.[3,4] This prolonged use of suboptimal prostheses can negatively impact both nutritional intake and oral health-related quality of life.

Age-related factors such as cognitive decline, diminished manual dexterity, and comorbid conditions (e.g., diabetes, osteoporosis) further complicate the management of edentulous patients. These elements influence both tissue tolerance and the patient's ability to maintain hygiene or report discomfort effectively. Additionally, systemic diseases may alter mucosal healing capacity, necessitating individualized care plans. Therefore, periodic reassessment of denture fit and tissue response must be considered a routine component of geriatric dental care rather than a reactive measure to visible symptoms or complaints.[5]

REVIEW

Denture fit in elderly edentulous patients is affected by continuous changes in the oral cavity, including ridge resorption, soft tissue atrophy, and altered muscular function. These anatomical alterations can compromise the stability and retention of existing dentures, often leading to mucosal trauma, soreness, and reduced masticatory efficiency. In many cases, patients do not seek reassessment until discomfort becomes significant, by which time the soft tissues may already be inflamed or deformed. Timely clinical evaluations allow for interventions such as relining or occlusal adjustments, which can restore prosthesis function and improve tissue tolerance. It is also essential to consider that the psychological adaptation to dentures may deteriorate with age due to factors like decreased cognitive function or reduced neuromuscular control. Clinicians must be vigilant in detecting subtle signs of maladaptation, especially in patients with limited communication abilities. Moreover, as tissue tolerance varies individually, a one-size-fits-all approach cannot be applied. Denture materials, surface finishes, and the use of soft liners may influence tissue reactions and overall comfort. Incorporating patient feedback and clinical findings into ongoing prosthetic maintenance is vital for long-term success.[6,7]

ANATOMICAL ALTERATIONS AFFECTING DENTURE FIT IN THE ELDERLY

Aging triggers continuous and often irreversible changes in the oral cavity that influence the way dentures fit and function. These anatomical transformations involve not only the hard tissues but also the surrounding soft structures. One of the most prominent issues is residual ridge resorption. After tooth loss, the alveolar bone undergoes progressive remodeling, leading to a reduction in both height and width of the ridge. This process is accelerated in edentulous patients who lack functional stimulation of the bone, and the rate of resorption may be influenced by factors such as systemic health, nutritional status, and past prosthetic history.[8] As the ridge flattens, denture retention becomes compromised, making it increasingly difficult to maintain stability during function. The mucosa covering the edentulous ridge also undergoes significant transformation. With age, this tissue often becomes thinner and more fragile. The epithelium may lose keratinization, and the underlying connective tissue may show reduced vascularity, decreasing its tolerance to mechanical pressure. Consequently, what may have been an acceptable fit years ago becomes a source of irritation or even ulceration. Ill-fitting dentures distribute force unevenly, concentrating stress on particular areas, which can lead to denture stomatitis or traumatic ulcers if not regularly evaluated and adjusted.[9]

The tongue and floor of the mouth may also shift in position over time. In some elderly patients, the tongue appears larger due to reduced intraoral space caused by ridge loss, which can disturb the seal and stability of mandibular dentures. Moreover, the tone and coordination of orofacial muscles decrease with age, affecting the patient's ability to control the prosthesis during speech and mastication. These muscular factors interact with anatomical changes to further destabilize the prosthesis. As denture movement increases, patients may unconsciously develop parafunctional habits such as clenching or shifting, which in turn worsen tissue irritation and adaptation. Salivary flow is another variable that often declines in the elderly due to medications or systemic diseases like Sjögren's syndrome. Reduced saliva alters the mucosal interface and adhesion mechanism of the denture, particularly in the maxilla,

where suction plays a crucial role. A dry oral environment leads to increased friction and discomfort, making the patient more prone to mucosal injury. Furthermore, the palatal vault may lose its natural contour due to remodeling, diminishing the anatomical retention needed for maxillary stability.[10]

Complicating these factors is the increased variability in how patients respond to these anatomical changes. Some individuals adapt remarkably well despite extensive resorption, while others experience discomfort with minimal structural alterations. Genetic predisposition, past oral health, and previous denture experiences influence this adaptability. Clinical assessments must, therefore, go beyond simple visual inspections. Evaluating pressure distribution, retention zones, and the dynamic movement of soft tissues during function provides essential information for modifying or replacing the prosthesis. The relationship between the maxilla and mandible often shifts with ridge loss, altering the vertical dimension of occlusion and centric relation. These discrepancies can cause neuromuscular imbalance, altered chewing patterns, and changes in facial appearance, all of which affect prosthetic harmony. Correcting these discrepancies without causing further stress to compromised tissues is a delicate process that requires both anatomical understanding and clinical sensitivity.[11]

BIOLOGICAL RESPONSES AND TISSUE TOLERANCE OVER TIME

Soft tissue resilience in edentulous patients often determines the long-term success of removable prosthodontics. As mucosal surfaces adapt to mechanical stimuli from denture bases, their tolerance either improves through gradual conditioning or deteriorates due to chronic pressure and microtrauma. The trajectory is not uniform across individuals and frequently shifts with age, systemic health, and prosthesis quality. Continuous mechanical contact from a denture may initially be well-tolerated, but over time, it can provoke histological changes such as epithelial thinning, inflammation, and vascular compromise, especially when combined with a declining immune response or impaired healing capacity.[12]

Inflammatory lesions like epulis fissuratum and denture stomatitis often result from prolonged mechanical irritation and microbial colonization. Candida albicans, frequently isolated from inflamed denture-bearing tissues, thrives in areas with poor saliva circulation and minimal oxygen exchange. These biological conditions are common in elderly patients with xerostomia or reduced neuromuscular control. The persistence of fungal biofilms beneath the denture base can perpetuate inflammation even in the absence of visible trauma. Once the mucosal barrier is compromised, the tissue's threshold for mechanical tolerance significantly decreases, requiring adjustments in denture base design and hygiene protocols.[13]The material properties of the denture base also influence tissue response. Polymethyl methacrylate (PMMA), the most widely used acrylic resin in complete denture fabrication, exhibits favorable characteristics but is not inert. Residual monomer release, surface roughness, and porosity all contribute to the biological environment under the prosthesis. Poorly polished or degraded surfaces increase microbial adherence and mechanical abrasion. Over time, these micro-irritations accumulate, especially in tissues already weakened by aging, nutritional deficiencies, or systemic disease. Some studies suggest that the use of soft liners or resilient materials may temporarily alleviate mucosal stress by distributing forces more evenly, but their long-term effectiveness depends heavily on maintenance and periodic replacement.[14]

Patient-specific tissue responses also reflect the interaction between prosthetic loading and underlying bone metabolism. Areas of mobile or unsupported mucosa, such as the posterior mandible, are particularly vulnerable to pressure-induced atrophy. Repeated episodes of inflammation or ulceration in these zones often indicate that the tissue's adaptive capacity has been exceeded. Adjusting occlusal schemes or load-bearing areas to accommodate tissue mobility becomes critical when tolerance thresholds are low. Furthermore, systemic health issues, such as diabetes or autoimmune conditions, amplify the inflammatory cascade and delay tissue repair. These factors collectively reduce the durability of soft tissue support and increase the risk of prosthesis-related complications.[15]

CLINICAL APPROACHES TO REASSESSING DENTURE FUNCTION AND COMFORT

Periodic clinical reassessment is a foundational element in managing edentulous patients with existing prostheses. The process extends beyond mere inspection of the denture base or occlusion; it requires a systematic evaluation of retention, stability, occlusal balance, mucosal health, and patient-reported functionality. Even in the absence of acute complaints, changes in jaw relationships or neuromuscular control may subtly reduce denture performance. Patients often adapt to suboptimal prosthesis behavior, masking the underlying deterioration of fit or function. This adaptation is particularly evident in long-term wearers who adjust their chewing habits or speech without recognizing progressive instability or discomfort.[16]

Visual and tactile inspection must be complemented by functional assessments. Tasks such as speaking, swallowing, and chewing under clinical observation offer critical insight into denture behavior during actual use. Mandibular dentures often present greater challenges due to limited support area and higher mobility of surrounding tissues. Evaluating midline shift, occlusal wear, and border seal disruption during dynamic activity helps uncover problems not immediately visible in static examination. The application of pressure-indicating paste

or silicone disclosing media allows clinicians to visualize pressure hotspots and confirm uniform contact. These tools are especially useful when tissue soreness has no clear visible cause or when residual ridges have resorbed unevenly, creating complex load distribution patterns.[17]

Soft tissue response also provides valuable clues about denture adequacy. Chronic hyperplasia, redness, or ulceration in localized areas points to instability or excessive pressure. Gentle palpation reveals tenderness or fibrosis, while blanching during denture placement may signal excessive compression. Clinical response should not be limited to symptom relief; it should involve a structural correction of the offending features. Relining, selective grinding, or total replacement may be indicated depending on the extent of the problem and the prognosis of tissue recovery. Furthermore, many patients unknowingly accept decreased retention or altered speech as part of aging, which reinforces the need for targeted clinical questioning and testing during reassessments.[18]

The vertical dimension of occlusion (VDO) is another frequent source of dysfunction, especially in long-term wearers. Reduced VDO may manifest through angular cheilitis, muscle fatigue, or decreased masticatory efficiency. During clinical reassessment, the use of phonetics, esthetics, and facial support cues helps determine whether the occlusal vertical relationship still meets the patient's functional and anatomical requirements. If reduced, a stepwise increase in vertical dimension through interim liners or diagnostic wax-ups can facilitate gradual adaptation before definitive correction. Occlusal relationships must also be checked for interferences, particularly during lateral and protrusive movements, which can destabilize dentures and irritate underlying tissue.[19]

CONCLUSION

Regular reassessment of denture fit and tissue response is essential for maintaining oral function and patient comfort in aging edentulous individuals. Clinical attention to anatomical changes, biological tolerance, and functional performance supports better long-term outcomes. Personalized prosthetic care reduces complications linked to poor adaptation and tissue trauma. A structured evaluation protocol ensures dentures continue to meet the evolving needs of elderly patients.

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