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CASE REPORT

Digital copy reference denture: enhancing accuracy and comfort in edentulous geriatric patients: Case report

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ABSTRACT

Prosthodontic rehabilitation in geriatric patients is often complicated by systemic frailty, reduced neuromuscular adaptability, and limited tolerance for prolonged dental procedures. Conventional denture fabrication frequently requires multiple clinical visits and extended chairside time, which may increase treatment burden and compromise patient comfort. Advances in digital dentistry have enabled streamlined workflows that improve efficiency and predictability. The digital copy reference denture technique allows replication of an existing prosthesis while enabling controlled modification of functional and esthetic parameters, thereby facilitating patient adaptation and reducing clinical complexity. A 93-year-old woman presented with poor denture retention and instability, leading to impaired mastication. Clinical examination revealed a maxillary complete denture with a suction cup causing palatal mucosal trauma and a mandibular partial denture retained by wire clasps on extruded teeth 33 and 43. Treatment involved fabrication of a new maxillary complete denture using a digital copy denture workflow while reestablishing vertical dimension and centric relation with a leaf gauge. A mandibular overdenture with magnetic attachments was planned. The digital workflow comprising intraoral scanning, digital design, and 3D printing enabled delivery of the definitive prostheses at the second visit while preserving familiar denture contours to facilitate adaptation. A fully digital copy reference denture workflow represents a predictable and patient-centered treatment strategy for prosthodontic rehabilitation in elderly patients. By reducing clinical visits and improving prosthesis retention, stability, and comfort, this approach offers an effective alternative for managing complex geriatric cases. (IJP 2025;7(1):60-64)

Introduction

Global population aging represents one of the most significant demographic transitions in modern healthcare. The proportion of individuals aged 65 years and older continues to increase worldwide, leading to a higher prevalence of age-related oral health problems, including edentulism. Severe tooth loss remains a major public health concern because it negatively affects mastication, phonetics, facial esthetics, and overall quality of life.[1] In elderly individuals, the absence of teeth may also contribute to nutritional deficiencies and social limitations.[2]

Prosthodontic rehabilitation in geriatric patients presents unique clinical challenges. Age-related physiological changes such as reduced neuromuscular adaptability, decreased salivary flow, thinning oral mucosa, and systemic comorbidities can complicate denture treatment.[3] In addition, elderly patients often exhibit limited tolerance to lengthy clinical procedures and repeated dental appointments. Conventional complete denture fabrication typically requires multiple clinical and laboratory steps, which may increase physical and psychological stress for medically compromised patients.[4]

Recent advances in digital dentistry have introduced alternative workflows that may improve efficiency and accuracy in denture fabrication. Computer-aided design and computer-aided manufacturing (CAD/CAM) technologies allow clinicians to digitally design and manufacture prostheses with improved reproducibility and reduced material distortion.[5] Additive manufacturing techniques such as 3D printing further enhance precision and reduce production time.[6]

The copy denture concept has gained renewed interest with the development of digital workflows. Unlike conventional denture replacement, which often involves significant changes in prosthesis morphology, the copy denture technique replicates the external contours and occlusal relationships of an existing prosthesis while allowing modifications to improve fit, retention, and tissue compatibility.[7] This approach is particularly advantageous for elderly patients because it preserves neuromuscular familiarity and facilitates adaptation.[8]

The purpose of this case report is to describe the clinical application of a fully digital copy reference denture workflow combined with mandibular magnetic overdenture support in the prosthodontic rehabilitation of a 93-year-old patient.

Case Report

A 93-year-old female patient presented with complaints of poor retention and instability of her maxillary denture accompanied by discomfort in the palatal region. The patient reported progressive difficulty in mastication, particularly when consuming solid foods.

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Figure 1. Preoperative intraoral view showing the maxillary complete denture with suction cup and the mandibular removable partial denture.

Although the patient had received a new set of dentures approximately six months prior to the consultation, she continued to experience discomfort and instability, which significantly affected her daily oral function and confidence during eating.

Extraoral examination revealed no significant abnormalities or temporomandibular joint dysfunction. Intraoral examination demonstrated several prosthesis-related problems.

The patient was wearing a maxillary complete denture incorporating a suction cup chamber, an outdated retention mechanism historically used to enhance denture stability figure 1. The palatal mucosa underlying the suction chamber appeared erythematous and inflamed, suggesting chronic irritation caused by prolonged negative pressure on the palatal tissues figure 2.

In the mandibular arch, the patient used a removable partial denture retained by wire clasps on teeth #33 and #43. Clinical examination revealed that both mandibular canines were extruded, contributing to occlusal disharmony and compromised denture stability figure 3. In addition, evaluation of the occlusion indicated a reduced vertical dimension of occlusion (VDO), which likely contributed to impaired masticatory efficiency and decreased prosthesis retention.

Based on these findings, the patient was diagnosed with an ill-fitting maxillary complete denture associated with palatal mucosal trauma and a functionally compromised mandibular removable prosthesis.

Considering the patient's advanced age and limited neuromuscular adaptability, a treatment strategy that preserved familiar denture morphology while improving biological compatibility and retention was selected. A digital copy reference denture workflow was planned for the maxillary arch to maintain the external contours of the existing prosthesis while correcting its internal deficiencies.

As part of the clinical procedure, the patient's existing maxillary denture was utilized as a custom impression tray. A functional impression was made using elastomeric impression material while the patient performed functional movements such as swallowing, lip movement, and tongue positioning. This functional impression technique allowed accurate recording of the dynamic anatomy of the denture-bearing area while maintaining the familiar external morphology of the prosthesis.

Following the impression procedure, the denture and impression were digitized using an intraoral scanner to generate a digital reference model. This step preserved the original tooth arrangement and polished surface contours, which were considered acceptable from a functional standpoint. Jaw relation records were then obtained. The vertical dimension of occlusion and centric relation were re-established using a leaf gauge technique, allowing controlled mandibular positioning and minimizing abrupt occlusal alterations that could compromise patient adaptation figure 4.

During the digital design phase, the denture base was modified to eliminate the suction chamber and improve tissue support while maintaining the external contours of the prosthesis. The intaglio surface was refined digitally to enhance adaptation to the palatal tissues.

The definitive maxillary denture was fabricated using additive manufacturing (3D printing) technology, which offers high dimensional accuracy and reduces polymerization distortion commonly associated with conventional processing methods figure 5.

For the mandibular arch, a mandibular overdenture supported by magnetic attachments was planned to improve prosthesis retention and stability figure 6 and figure 7. Magnetic attachments were selected because of their self-aligning properties, passive retention, and simplified insertion, which are advantageous for elderly patients with limited manual dexterity. The use of a fully digital workflow significantly streamlined the treatment process, enabling fabrication and delivery of the definitive prostheses within two clinical visits. Preservation of the familiar denture contours facilitated rapid neuromuscular adaptation, while elimination of the suction chamber resolved the source of palatal mucosal irritation and improved overall prosthesis comfort and stability.

Figure 2. Palatal mucosal inflammation associated with the suction chamber of the maxillary denture

Discussion

The rehabilitation of edentulous geriatric patients requires a treatment approach that balances biological preservation, functional restoration, and procedural efficiency. Aging is associated with reduced neuromus-

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Figure 3. Panoramic radiograph showing remaining teeth.

Figure 4. Reline the old upper denture using impression material; Find the ideal DVO using a leaf gauge; Make temporary occlusal stop using composite.

cular plasticity, decreased salivary flow, and compromised mucosal resilience, all of which may impair adaptation to newly fabricated dentures. Therefore, maintaining prosthetic familiarity becomes a critical consideration in elderly patients.[9]

The digital copy reference denture workflow implemented in this case aligns with contemporary prosthodontic principles emphasizing minimally disruptive treatment. Unlike conventional denture replacement, which often introduces significant changes in contour and occlusal relationships, the copy denture approach preserves previously established neuromuscular patterns. This preservation reduces the adaptation period and enhances patient acceptance, particularly in advanced-age individuals.[10]

Recent systematic reviews have demonstrated that CAD/CAM dentures exhibit improved intaglio surface accuracy compared to conventionally processed dentures. The reduction of polymerization shrinkage and human error during laboratory procedures contributes to better tissue adaptation and retention.[11] In addition, digital workflows allow standardized reproduction of denture morphology, which is essential when the original prosthesis has functionally acceptable features.[12]

The presence of a suction cup chamber in the patient's existing maxillary denture represented a biologically unfavorable design. Although historically used to enhance retention, suction cups have been strongly associated with chronic palatal inflammation and underlying bone resorption.[13] Eliminating this feature during digital redesign allowed preservation of familiar external contours while improving internal tissue compatibility.

Re-establishing vertical dimension in geriatric patients must be approached cautiously to avoid temporomandibular discomfort or functional instability. The digital workflow facilitated controlled modification without altering the patient's accustomed occlusal scheme excessively.[14]

Magnetic overdenture attachments were selected for the mandibular arch due to their clinical advantages in elderly populations. Compared to mechanical retention systems, magnetic attachments offer passive seating, reduced need for precise alignment and simplified insertion mechanics.[15]

These characteristics are particularly beneficial for patients with limited manual dexterity or cognitive decline. From a broader clinical perspective, digital denture workflows significantly reduce the number of patient visits. Conventional denture fabrication typically requires four to six appointments, whereas digital protocols may enable delivery within two visits.[16] This reduction is especially valuable in geriatric patients with limited mobility, systemic frailty, or dependence on caregivers.

Emerging literature from 2023–2025 supports the clinical reliability of digital dentures, reporting comparable or improved patient satisfaction and retention relative to conventional prostheses.[17] Furthermore, digital data storage allows future reproduction or modification without restarting the entire fabrication process.[18]

However, certain limitations should be acknowledged. Digital denture fabrication requires access to specialized equipment and technical expertise, which may not be universally available. Additionally, initial setup costs may be higher compared to conventional methods.[19] Nevertheless, the long-term benefits in precision, efficiency, and patient comfort may

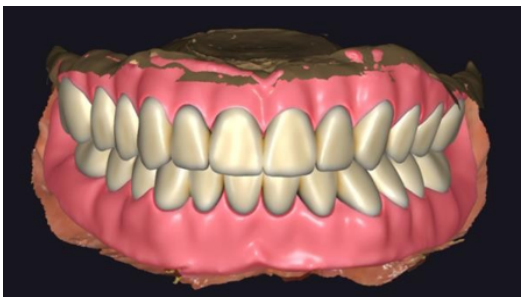

Figure 5. Digital denture design

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Figure 6. Decaputation and preparation of lower overdenture abutments.

Figure 7. Overdenture coping and magnet insersion.

justify these investments.

Overall, this case supports the growing body of evidence suggesting that digital copy denture workflows represent a biologically respectful and patient-centered approach for geriatric prosthodontic rehabilitation.[20]

Conclusion

This case highlights the clinical value of a fully digital copy reference denture workflow for prosthodontic rehabilitation in geriatric patients. By utilizing the existing denture as a reference and custom tray for functional impression, established denture morphology and neuromuscular familiarity were preserved while correcting biological and mechanical deficiencies. The integration of digital scanning, CAD design, and additive manufacturing enabled accurate denture fabrication with reduced clinical visits and chairside time. Combined with magnetic overdenture support, this approach provided improved prosthesis stability, tissue compatibility, and patient comfort, demonstrating a predictable and patient-centered strategy for managing complex elderly patients.

Based on the clinical outcomes observed in this case, several practical considerations may be proposed for prosthodontic rehabilitation in geriatric patients. Treatment planning for elderly individuals should prioritize approaches that minimize physiological stress while preserving prosthetic familiarity. Maintaining the external morphology of an existing denture through a copy denture technique may facilitate neuromuscular adaptation and improve patient acceptance, particularly in individuals with reduced adaptive capacity.

The use of the patient's existing denture as a custom tray for functional impression may also provide an effective method for accurately capturing the functional anatomy of the denture-bearing tissues while preserving established polished surface contours. This approach allows clinicians to improve the internal fit of the prosthesis without drastically altering the patient's accustomed denture form.

Furthermore, digital denture workflows incorporating intraoral scanning, computeraided design, and additive manufacturing can significantly reduce clinical chairside time and the number of patient visits. Such efficiency is particularly beneficial for geriatric patients with limited mobility, systemic comorbidities, or dependence on caregivers.

In addition, the use of simplified retention systems such as magnetic overdenture attachments may enhance prosthesis stability while facilitating easier insertion and removal for elderly patients with reduced manual dexterity. Future clinical studies with larger patient populations are recommended to further evaluate the long-term clinical performance and patient satisfaction associated with digital copy reference denture workflows in geriatric prosthodontic rehabilitation.

Figure 5. Insertion of digital copy reference denture

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