

Case Report

Aesthetic Enhancement in Conventional Removable Partial Dentures through Teeth Characterization: A Case Report

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Abstract.

Prosthodontic rehabilitation in partially edentulous elderly patients aims to restore function, esthetics, and psychosocial well-being. Cost-effective treatment options remain essential for patients who are unable to undergo advanced prosthetic procedures. The objective is to evaluate the esthetic and functional outcomes of an acrylic removable partial denture (RPD) incorporating characterized acrylic teeth in an elderly patient. A 77-year-old male patient presented with esthetic concerns and multiple missing mandibular teeth resulting from chronic periodontal disease and dental caries. Based on clinical evaluation and patient preference, an acrylic removable partial denture with characterized acrylic teeth was fabricated and delivered. The prosthesis was assessed clinically for esthetics, function, and comfort over a one-month follow-up period. The patient demonstrated improved facial esthetics, satisfactory masticatory function, and high self-reported satisfaction with the prosthesis. Acrylic removable partial dentures with individualized tooth characterization offer a simple, economical, and effective solution for enhancing esthetic outcomes and patient satisfaction in elderly individuals requiring prosthodontic rehabilitation.

Keywords: Acrylic teeth, tooth characterization, removable prosthesis, aesthetic rehabilitation, elderly patients, color stability.

1. Introduction

Teeth are crucial for maintaining the stability of the dentition. A healthy stomatognathic system is established through the coordinated relationship between the teeth, soft tissues, and temporomandibular joint (TMJ). The dentition plays a key role in both esthetics and mastication.¹ Tooth loss can greatly reduce a patient's ability to chew and perform other oral functions, negatively impacting both oral health and overall quality of life. The primary reasons for missing teeth are periodontal disease and dental caries, while other causes may include congenital absence or trauma-related loss.² The immediate effects of tooth loss on a patient may involve difficulties in speech, reduced chewing efficiency, diminished self-confidence, appearance-related concerns, and emotional distress. Over time, additional consequences can include tooth drifting, extrusion, facial asymmetry, bone resorption, decreased chewing capacity, aesthetic deterioration, and psychological distress.³ Therefore, individuals with tooth loss require prosthodontic intervention to restore both function and appearance through options such as implants, bridges, removable dentures, or overdentures. The selection of treatment and patient preferences depends upon their level of education and awareness of available tooth replacement methods.⁴

While fixed dental prostheses and implant-supported restorations provide superior function and esthetics, their application may be limited in elderly patients due to inadequate bone volume, systemic conditions, surgical contraindications, or economic constraints.⁵ In contrast, RPDs continue to serve as a practical and cost-effective treatment option for partially edentulous patients.⁶ However, conventional acrylic RPDs are often criticized for their compromised esthetic outcomes, largely attributable to the artificial appearance of stock denture teeth and limited individualization.

With increasing patient awareness and rising esthetic expectations, particularly among partially edentulous individuals, prosthodontic treatment is no longer evaluated solely on functional success but also on natural appearance and patient satisfaction.⁷ Acrylic resins such as polymethyl methacrylate (PMMA) remain widely used due to their affordability, ease of manipulation, and acceptable esthetic properties.⁸ Nevertheless, prefabricated acrylic teeth often exhibit uniform shade, surface texture, and morphology, which may fail to replicate the natural dentition and result in patient dissatisfaction. Aesthetic dentistry has seen a significant rise in popularity, fueled by changing societal beauty standards and the growing availability of advanced dental technologies. As patients become more knowledgeable and selective, their expectations for cosmetic restorative treatments have become increasingly refined and sophisticated.⁹

To overcome these limitations, tooth characterization techniques have been introduced to enhance the lifelike appearance of acrylic denture teeth through modifications in contour, surface texture, and intrinsic or extrinsic coloration.¹⁰ Despite their simplicity and cost-effectiveness, these techniques are infrequently emphasized in clinical literature, particularly in the context of acrylic removable partial dentures for elderly patients. Most published reports continue to focus on advanced prosthetic solutions, leaving a gap in evidence supporting esthetic optimization within conventional treatment modalities.

This case report aims to address this gap by demonstrating the clinical application of characterized acrylic teeth in an acrylic removable partial denture as an esthetically acceptable and functionally effective alternative for patients who are unsuitable for advanced prosthetic or surgical

rehabilitation. The present report highlights a simple, time-efficient, and economical approach that enhances denture esthetics while maintaining function, thereby improving patient satisfaction and acceptance.

By emphasizing individualized tooth characterization within conventional acrylic RPDs, this report underscores the importance of personalized prosthodontic care, particularly in resource-limited settings and high-volume clinical practices. It also provides practical guidance for clinicians and postgraduate trainees seeking to improve esthetic outcomes without increasing treatment complexity or cost.

2. Case Report

A male patient, aged 77 years, reported to the Prosthodontic Outpatient Department with complaints of compromised esthetics, difficulty in mastication, and missing mandibular teeth. The patient expressed concern regarding facial appearance and reduced chewing efficiency. On eliciting the dental history, it was revealed that the maxillary posterior teeth on the left side had been extracted approximately 20 years earlier, while the mandibular teeth were lost progressively over the past 5 to 6 months due to chronic periodontal disease and dental caries. The mandibular anterior teeth were extracted one month prior to presentation.

The patient's medical history was non-contributory, with no known systemic illness or ongoing medication. Family history revealed diabetes mellitus in the patient's father. The patient reported no known allergies to drugs, metals, or environmental factors.

Extraoral examination did not reveal any facial asymmetry or temporomandibular joint abnormality. Intraoral examination revealed a partially edentulous mandibular arch with missing anterior and posterior teeth. Retained roots were present in the regions of teeth no.18, 28, 38, and #48. The maxillary arch exhibited a Kennedy Class III partially edentulous condition, whereas the mandibular arch demonstrated a Kennedy Class IV edentulous span, figure 1 and 2. The residual mandibular anterior ridge was irregular, compromising denture support. The remaining teeth were periodontally weak but exhibited no clinical mobility. Tooth numbering was recorded using the Fédération Dentaire Internationale (FDI) tooth-numbering system.



Figure 1. A) Frontal view, B) maxillary occlusal view and C) mandibular occlusal view.

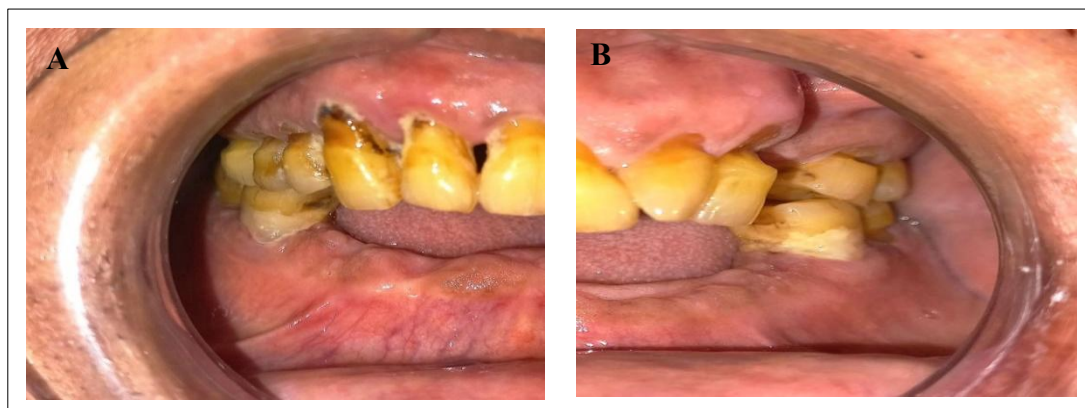


Figure 2. A) Right lateral view. B) left lateral view.

Diagnostic study casts were fabricated using alginate (Zhermack Hydrogum, Italy) poured immediately in dental stone for anatomical and occlusal evaluation. An orthopantomogram (OPG) was advised to assess alveolar bone status, confirm the presence of retained roots, and evaluate surrounding anatomical structures shown in figure 3. Radiographic examination demonstrated a partially edentulous mandibular arch with loss of both anterior and posterior teeth. The OPG confirmed the presence of retained root fragments in the regions corresponding to teeth #18, #28, #38, and #48. Dental caries was identified in teeth no. 36 and 46. The residual anterior mandibular ridge appeared irregular and resorbed, potentially compromising denture support. The remaining natural teeth no.11, 12, 13, 14, 15, 16, 21, 22, 23, 26, 27, 36, 37, 46 and #47 exhibited reduced periodontal support, although no clinical mobility was detected.

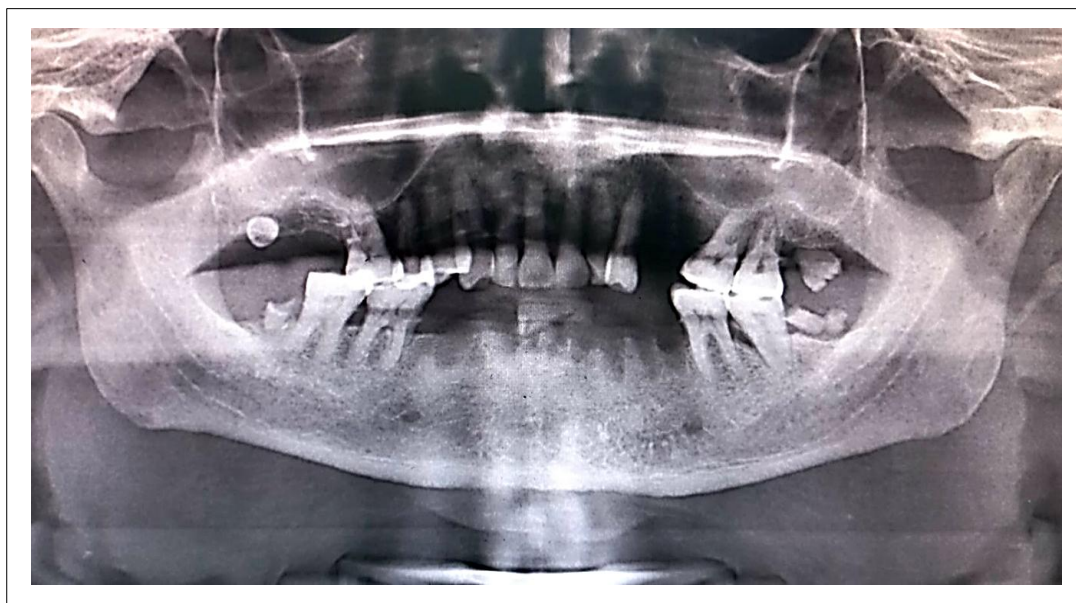


Figure 3. Orthopantomogram.

The patient was referred to the Oral Surgery Department for extraction of the retained roots of teeth 18, 28, 38, and 48 and alveoloplasty of the irregular mandibular anterior ridge. Restorative treatment of carious lesions in teeth 36 and 46 was completed prior to prosthodontic rehabilitation.

After evaluating various treatment options, including implant-supported prostheses, cast partial dentures, and acrylic removable partial dentures (RPDs), the patient opted for an acrylic RPD due to financial limitations and the need for a time-efficient treatment, as he planned to relocate abroad. Replacement of the maxillary missing teeth was discussed but deferred because of time constraints.

Primary impressions of the maxillary and mandibular arches were made using alginate (Zhermack Hydrogum, Italy) in metal stock trays. Custom trays were fabricated using self-cure polymethyl methacrylate resin, and final impressions were recorded with addition silicone (Zhermack Hydrorise, Italy) as shown in figure 4, to obtain optimal tissue detail. The impressions were poured in Type III dental stone (Zhermack, Italy) to obtain master casts. Occlusal rims were fabricated, and jaw relations were recorded to establish an appropriate vertical dimension and centric relation.

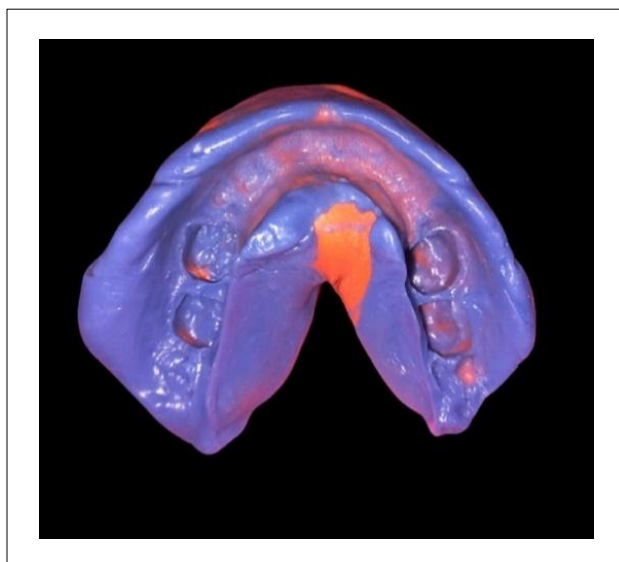


Figure 4. Secondary impression.

The mandibular acrylic RPD was designed to maximize tissue support and distribute occlusal forces evenly. Occlusal contacts were established in harmony with the existing maxillary dentition, ensuring stable centric contacts and avoiding premature eccentric interferences. Acrylic was chosen over metal to allow rapid fabrication and ease of modification during follow-up. Retention was achieved using circumferential clasp assemblies on abutment teeth #36 and #46, while stability was enhanced through broad denture base extension. Acrylic teeth (WELBITE, China) were arranged following functional and esthetic principles, and characterization was performed by modifying tooth morphology and surface texture to simulate natural dentition as shown in figure 5. The prosthesis was processed using heat-cured polymethyl methacrylate resin.

At insertion (figure 6), the denture was evaluated for its fitting, retention, stability, occlusion, phonetics, and esthetics. Minor occlusal adjustments were carried out. The patient was educated regarding denture insertion and removal, hygiene maintenance, and wear schedule.

Written informed consent was obtained from the patient for treatment and for publication of anonymized clinical data and images. Confidentiality of patient information was strictly maintained.



Figure 5. Trial denture.



Figure 6. Final denture with cervical characterization of acrylic.

2.1 Outcome and Follow-up

The patient was reviewed after 24 hours, one week, and three weeks to identify and relieve any sore spots or pressure areas. Subsequent follow-up visits were scheduled for 1 month, 3 months, and up to 6 months to evaluate tissue adaptation and prosthesis performance. The patient reported satisfactory improvement in mastication, speech, and facial esthetics. The characterized acrylic teeth significantly enhanced the natural appearance of the denture, resulting in improved confidence and overall patient satisfaction.

3. Discussion

Removable partial dentures remain a preferred solution for replacing missing teeth, particularly in patients with anatomical limitations or financial constraints that make dental implants unsuitable¹¹. They are intended to improve masticatory efficiency, protect the remaining natural teeth, and reestablish the oral cavity's structural integrity.¹² Patient satisfaction with removable

partial dentures (RPDs) is affected by multiple factors, such as the individual's age, personality traits, previous denture experiences, personal expectations, aesthetic outcomes, the condition of the residual ridge, the quality and construction of the denture, the dentist's skill level, and the strength of the dentist-patient relationship.¹³ As patients grow more conscious of the aesthetic aspects of their prosthetic restorations, the demand for prostheses that not only restore function but also improve appearance is rising. The emphasis on visually pleasing results is intensifying, prompting dental professionals to adopt advanced techniques and materials that ensure a more natural and harmonious integration with natural oral tissues.¹⁴ The present case demonstrates the use of tooth characterization as an adjunct to a conventional acrylic RPD to improve esthetic integration in an elderly patient. Unlike stock acrylic teeth, which are uniform in shade and morphology, characterized teeth allow modification of surface texture, contour, and coloration to better simulate natural dentition. This approach aligns with patient-centered prosthodontic principles, particularly in elderly individuals who seek acceptable esthetics but are unable or unwilling to undergo advanced prosthetic procedures.

Several authors have reported the benefits of characterization techniques in complete denture fabrication. Parakh et al. described improved patient satisfaction following intrinsic and extrinsic tooth characterization in complete dentures, emphasizing enhanced realism and psychological acceptance.¹⁵ Similarly, Pachiou et al. reported long-term patient satisfaction using multilayered characterization techniques, including pink esthetics, over a two-year follow-up period.¹⁶ However, most published reports focus on complete dentures, whereas literature describing characterization in acrylic removable partial dentures particularly in elderly patients is limited. This distinction highlights the clinical relevance and relative uniqueness of the present case.

Despite its esthetic advantages, tooth characterization is not without limitations. The durability of extrinsic stains and surface modifications may be affected by oral hygiene practices, dietary habits, and material wear over time. Color stability of characterized acrylic teeth can be compromised by exposure to staining agents, abrasion during cleaning, and long-term use. Additionally, the success of characterization is technique-sensitive and relies heavily on the clinician's artistic skill, potentially limiting reproducibility across operators.

Clinical challenges associated with characterized acrylic dentures include maintaining surface finish, preventing discoloration, and ensuring patient compliance with maintenance protocols. Patients must be instructed to avoid abrasive cleansers and staining agents, as improper care may accelerate surface wear and color degradation. In contrast, digitally fabricated prostheses offer improved standardization and material consistency¹⁷, however, they may not always be accessible or affordable, particularly in resource-limited settings.

Unlike previous reports, this case illustrates the successful application of tooth characterization within a simplified, low-cost acrylic RPD protocol, emphasizing that esthetic improvement does not necessarily require complex or digitally driven workflows when conventional materials are appropriately customized.

Future recommendations include conducting controlled studies comparing conventional acrylic dentures and characterized prostheses in terms of patient satisfaction, functional efficiency, and long-term wear. While digital technologies are transforming prosthesis fabrication, manual tooth

characterization remains relevant. Reviews demonstrate that denture aesthetics and material performance are evolving through CAD/CAM and 3D printing innovations. Integrating digital technologies such as CAD/CAM and 3D printing with characterization may also standardize and streamline the aesthetic outcomes of acrylic prostheses. Overall, this case underscores the potential of using artistic enhancement in denture fabrication to deliver patient-specific, cost-effective, and aesthetically superior prosthodontic care.

4. Conclusion

This report demonstrates that tooth characterization can be incorporated into conventional acrylic removable partial dentures to improve esthetic integration while maintaining functional adequacy. In the present patient, individualized modification of acrylic teeth contributed to a more natural appearance and satisfactory patient-reported outcomes without altering the basic prosthodontic workflow. However, the findings of this report are limited by its nature as a single clinical case, the absence of objective esthetic or functional assessment tools, and a relatively short follow-up period. Therefore, the observed outcomes should be interpreted with caution and cannot be generalized to all patient populations.

From a clinical perspective, tooth characterization may be considered as an adjunctive technique for enhancing esthetics in acrylic RPDs, particularly in patients for whom advanced prosthetic options are contraindicated or impractical. Future studies involving larger patient cohorts, standardized outcome measures, and longer follow-up durations are required to objectively evaluate the esthetic, functional, and patient-centered benefits of characterized acrylic dentures

Abbreviation	Full Form
TMJ	Temporomandibular Joint
RPD/RPDs	Removable Partial Denture / Removable Partial Dentures
PMMA	Polymethy Methacrylate
FDI	Federation Dentaire Internationale
OPG	Orthopantomogram
CAD/CAM	Computer-Aided Design / Computer-Aided Manufacturing

Declarations:

Supplementary Materials: Not applicable.

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