

### **Case Report**

# Personalized Denture Characterization in Tooth-Supported Overdentures: Aesthetic and Functional Considerations

Aspasia Pachiou<sup>1\*</sup>, Ilia Roussou<sup>1</sup>, Stefanos Kourtis<sup>1</sup>

<sup>1</sup>Department of Prosthodontics, School of Dentistry, University of Athens, Athens, Greece.

**\*E-mail** ⊠ aspapachiou@gmail.com

Received: 12 September 2023; Revised: 23 November 2023; Accepted: 03 December 2023

## ABSTRACT

Accidents, gum disease, and increased dental caries can all lead to tooth loss. A person's appearance, grin, and chewing efficiency may all be impacted by this. This problem can be addressed by using an artificial denture to replace the teeth. One option for those with relatively few teeth is an overdenture. Therefore, maintaining the root beneath the denture will uphold denture stability; sustain the alveolar ridge by halting residual ridge erosion, and preserve proprioception. Even if dental implantology has advanced, the preservation of the original root structure and the positioning of the overdenture over it remain genuine. This helps to distribute occlusal force along the long axis of the tooth and prevents denture dislodgement. This clinical report details the creation of a defined overdenture that retains the maxillary central incisors. A synthetic denture can be shaped and specified to provide a more attractive, lifelike look. People with only a few teeth can be repaired with a defined overdenture to increase the favorable influence on patient self-assurance and self-worth.

Keywords: Overdenture, Characterization, Coping, Artificial teeth

**How to Cite This Article:** Pachiou A, Roussou I, Kourtis S. Personalized Denture Characterization in Tooth-Supported Overdentures: Aesthetic and Functional Considerations. Asian J Periodontics Orthod. 2023;3:30-4. https://doi.org/10.51847/R1HyRQhVpF

## Introduction

After a sequence of unfavorable tooth loss events, like caries, trauma, periodontal issues, and various extractions, a natural dentition (dentate) turns into a synthetic dentition (edentulous). These events have several consequences, such as a gradual loss of normal bone anatomy, a decline in distinct tooth equilibrium, overloading of the oral mucosa from the masticatory forces transmitted from the teeth, and, most painfully, a loss of a person's self-confidence [1]. There are several treatment options accessible to people in this modern era to replace a lost tooth. Factors like mastication, speech, and esthetics are highly significant and given utmost care when a dental prosthesis or surgery is prepared to obtain the highest efficiency for the results of medical care [2]. When a tooth is preserved, the bone is protected, which prevents future problems with missing tooth rehabilitation. In preventative prosthodontics, an overdenture supported by the tooth is essential for maintaining the natural teeth that are already present while also minimizing bone loss [3]. Chewing capacity is increased, denturebearing regions are maintained, and bone degeneration is slowed by prompt, planned treatment. Instead of removing the teeth surgically, a dentist will keep and safeguard the remaining robust teeth to support prostheses, which have several benefits, including providing support, preserving balance, boosting confidence, and being reasonably priced [4-6]. When teeth or retained roots are absent, bone starts to naturally break down; hence, maintaining teeth is closely related to maintaining bone [7, 8]. A precise assessment of the gap between the ridges is required for tooth-supported overdentures. For this reason, the denture base, copings, attachments, coronal tooth structure, and artificial teeth must all have adequate volume without compromising the denture's strength [9].

This clinical report details the creation of a defined overdenture that retains the maxillary central incisors.

### Case report

A 78-year-old guy presented to the Prosthodontics department at SRM Dental College and Hospital in Chennai with the major issue of losing several teeth in both the upper and lower arches, which was causing him difficulty chewing. Following a clinical examination, the patient was diagnosed with an edentulous mandibular arch and a partly edentulous maxillary arch, with just the central incisors remaining. The upper arch had Kennedy's class I partly edentulous state (**Figure 1**).



Figure 1. Preoperative photograph

The many therapy options suggested for this patient are shown below.

- 1. Removal of the central incisors and traditional full dentures that are detachable in both arches.
- 2. Extraction of both the central incisors and implantsupported overdenture in both arches.
- 3. In the mandibular arch, a tooth-supported maxillary detachable overdenture is in opposition to a removable full denture.

Since there was no indication of movement and both central incisors had adequate periodontal support, extraction was not recommended. A maxillary tooth-retained detachable overdenture and а mandibular full denture were the final treatment options suggested for the patient. A diagnostic impression, diagnostic castings, and an evaluation of the inter-occlusal space to construct an overdenture were performed at his initial appointment. After that, the incisors had endodontic treatment, and the tooth was reduced to cement the metal copings. The process involved making a permanent impression, pouring castings, fabricating, investing, and casting the wax pattern for the copings, and then sandblasting, trimming, and polishing the metal copings. During the subsequent appointment, the metal copings were assessed intraorally and cemented in connection with the upper arch's right and left central incisors (Figure 2). The patient was called a day later to use the customized tray constructed from the diagnostic castings to take the final imprint. Following articulation and tooth arrangement, we used bite rims on the denture foundation composed of autopolymerizing acrylic resin to register the jaw connections. A try-in was done during the next visit. Following waxing up, flasking was done up to the first pour, and then putty was applied over the denture foundation that had been waxed before the second pour. Clear acrylic and colors were combined with monomer after dewaxing. To identify the interdental papilla, marginal gingiva, connected gingiva, root section, and denture base region, four distinct color pigments-brown, red, melanin, and yellow-were combined with heat-cured acrylic monomer (Figure 3). Heat-cured acrylic resin was used for packing after this was put in layers in the appropriate areas of the mold space and frequently wetted with monomer. The dentures were trimmed, polished, and completed once denture production was finished. They were then assessed intraorally for comfort, occlusion, retention, aesthetics, and any sharp edges or abnormalities (Figure 4). The dentures were finally delivered, along with instructions about how to keep them in good condition. After a day, a week, and a month, the patient was examined (Figure 5).



Figure 2. Cementation of metal copings



Figure 3. Characterisation pigments



Figure 4. Characterised overdenture after processing



Figure 5. Postoperative photograph

## **Results and Discussion**

The alveolar procedure's height decreases as a result of surgical tooth extraction [8]. Therefore, to prevent alveolar bone loss, conventional tooth-retained overdentures should be frequently chosen over the excision of remaining natural teeth [10]. Maintaining homeostasis, preventing bone loss, and offering emotional support are all benefits of keeping the existing permanent tooth, which tends to improve denture stability and sufficiency [2, 11]. Even though the arch only had two teeth, they significantly improved the prosthesis's results. Therefore, the decision to protect the current incisors in favor of overlay dentures was made. When teeth are kept, their periodontal membrane is also conserved, which additionally safeguards proprioceptive impulses, improves neuromuscular coordination, and allows for finer chewing and a greater appreciation of sensation [12, 13]. By including a variety of attachment structures that are easily available according to each person's unique needs and circumstances, auxiliary retentivity might be achieved [5, 14, 15]. The placement and the abutment teeth had to be taken into account, and these attachments were costly. The abutment tooth has a greater likelihood of breaching in

overdentures without coping. Therefore, in this instance, we chose to use rather cost-effective metal copings that were cemented over the central incisors.

Alveolar bone is a living tissue that breaks down quickly when teeth are missing. An external force acting on bone enhances bone deposition. This occurs as a result of these pressures being transferred to the underlying bone via the teeth's periodontal fibers, which preserve balance and protect the alveolar bone [16]. As a result, overdentures may be better than traditional full dentures [17].

- Following GPT 9, any detachable dental prosthesis that covers and rests on dental implants, natural tooth roots, or one or more surviving natural teeth;
- Other names for this are overlaid prosthesis, overlay denture, and overlay prosthesis [18].

## The basis for overdenture

- It is unethical to remove all of the existing teeth surgically and then replace them with a full denture.
- Prosthodontic problems are avoided with preventive treatment sessions.
- To postpone the transition from partial to total edentulism, overdentures may be used [19-22].

## Indications

- People who need a single denture with a high palatal vault;
- Patients with abnormal tongue placements and muscle attachments;
- People with fewer existing teeth;
- Misrelated ridge instances
- Patients who are adults
- Instances of extreme attrition
- Cases of cleft palate
- Impairments in dentinogenesis and amelogenesis
- Patients with maxillofacial injuries who needed dentures;
- Patients with partial anodontia and microodontia [10, 23].

### Contraindicated

- Patients with inadequate inter-arch distance;
- Those with medically challenged conditions;
- Those with poor dental hygiene.
- Patients who are not interested
- People with physical and mental disabilities
- Patients who are unable to pay [24, 25].

# Endodontic consideration

The benefits of treating the abutment teeth endodontically include

- 1. An improved crown root ratio
- 2. Interocclusal clearance for the placement of prosthetic teeth and denture bases is facilitated by a clinical crown decrease.
- 3. To acquire accessories.

## Types of overdentures

One form of overdenture designed to be inserted right after the native dentition is extracted is called an instantaneous overdenture.

An existing removable partial denture is converted into an overdenture to create a transitional overdenture [26]. According to Heartwell, overdentures are divided into four categories according to how the abutment was prepared: overdentures with coping, overdentures with attachments, overdentures with easier tooth alteration without coping, and overdentures with roots that are submerged in the alveolar bone.

## Coping

- Short coping 2-3 mm long and require endodontic therapy
- Long coping 5-8 mm long [18, 27]

Attachments are connected to the abutment by a cast coping. The main aim is to intensify the retentiveness of dentures [27-29].

## Clinical procedure

- 1. Teeth extraction surgery with a terminal prognosis
- 2. Therapy for periodontal disease
- 3. Crown reduction of abutments
- 4. Endodontic treatment of abutment teeth
- 5. Applying fluoride to prepared teeth
- 6. The impressions and actions that follow are comparable to those of traditional full dentures.
- 7. To prevent impingement, areas next to the gingival edge must be cut on the intaglio surface before using a robust liner [30, 31].

## Advantages

- Bone preservation;
- An affordable therapeutic alternative.
- Enhanced stability and retentiveness of the denture;
- Offers additional support for the prosthesis.
- The maintenance of the vertical part of the face;
- Safeguarding of oral proprioception with its tooth structure;
- Use in individuals with congenital missing six or more teeth;
- Recommendation for patients with Class III occlusion, cleft palate, and cleidocranial dysostosis;
- Potential conversion to a traditional complete denture in the future [25].

# Disadvantages

- It is crucial to practice careful oral hygiene.
- Voluminous and overly sculpted.
- The inter-arch distance is being invaded.

### Conclusion

In comparison to other costly treatment choices like implant-supported overdentures, the use of standard overdentures while preserving natural teeth may be a simple and cost-effective procedure. The teeth that are solid and are often kept as abutments for backing an overdenture are those that are left in an arch when there are only one or two teeth left. The firmness and retention of the finished prosthesis are significantly strengthened by it. An overdenture could be regarded as a therapy technique in routine clinical practice for patients with limited tooth presence in the oral cavity. With the preservation of the natural bone structure, this design aids in preventing a patient who is just partially edentulous from becoming fully edentulous. Ultimately, it convinces the patient to restore both the original dentition and the lost teeth.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

#### References

- Renner RP, Gomes BC, Shakun ML, Baer PN, Davis RK, Camp P. Four-year longitudinal study of the periodontal health status of overdenture patients. J Prosthet Dent. 1984;51(5):593-8.
- Prakash VS, Shivaprakash G, Hegde S. Four and two tooth supported-conventional over denture: two case reports. Int J Oral Health Sci. 2013;3(1):61.
- Morrow RM, Feldmann EE, Rudd KD, Trovillion HM. Tooth-supported complete dentures: an approach to preventive prosthodontics. J Prosthet Dent. 1969;21(5):513-22.
- 4. Morrow RM. Handbook of immediate overdentures. St. Louis: Mosby; 1978. 48 p.
- 5. Raja Mohd N, Ahmad SF, Etajuri EA. An alternative technique for fabrication of a tooth-supported removable partial overdenture: a case report. J Int Oral Health. 2021;13(5):514-8.

Pachiou *et al.*, Personalized Denture Characterization in Tooth-Supported Overdentures: Aesthetic and Functional Considerations

- Castleberry DJ. Philosophies and principles of removable partial overdentures. Dent Clin North Am 1990;34(4):589-92.
- Rissin L, House JE, Manly RS, Kapur KK. Clinical comparison of masticatory performance and electromyographic activity of patients with complete dentures, overdentures, and natural teeth. J Prosthet Dent 1978;39(5):508-11.
- Del Rio CE, Fielden JE, Grandich RA. Clinical appointment. III. Endodontics. In: Morrow RM, ed. Handbook of immediate overdentures. St. Louis: Mosby; 1978:48.
- Zarb GA, Bolender CL, Carlsson GE. Boucher's prosthodontic treatment for edentulous patients. 11th ed. St Louis: Mosby Company; 2003.
- Brewer AA, Morrow RM. Overdentures. 2nd ed. St. Louis: Mosby; 1980.
- Crum RJ, Rooney GE. Alveolar bone loss in overdentures: a 5 year longitudinal study. J Prosthet Dent. 1978;40(6):610e613.
- Samra RK, Bhide SV, Goyal C, Kaur T. Tooth supported overdenture: a concept overshadowed but not yet forgotten! J Oral Res Rev. 2015;7(1):16-21.
- Verma P, Kalra NM, Kalra S, Garg S. Conventional tooth supported overdentures -case report: solutions for challenging situations. Indian J Dent Sci. 2014;5(6):61-3.
- Dhir RC. Clinical assessment of overdenture therapy. J Indian Prosthodont Soc. 2005;5(4):187-92.
- Kharel B, Rai A, Suwal P, Parajuli P, Limbu I, Basnet B. Conventional tooth supported overdenture: a case report. J Nep Prosthodon Soc. 2021;4(1):53-6.
- Ferro KJ, Morgano SM, Driscoll CF, Freilich MA, Guckes AD, Knoernschild KL, et al. The glossary of prosthodontic terms. J Prosthet Dent. 2017;117(55).
- Mehta SS. Prosthodontic rehabilitation of a case of partial anodontia - a case report. J Indian Prosthodont Soc. 2001;1:3-5.
- Wakure P, Alam M, Rathee M, Malik S. Rehabilitation of partial edentulous patient with tooth supported over denture retained with metal coping-a case report. IP Int J Maxillofac Imaging. 2021;7(4):191-4.

- Dodge CA. Prevention of complete denture problems by use of "overdentures". J Prosthet Dent. 1973;30(4):403-11.
- Morrow RM, Rudd KD, Birmingham FD, Larkin JD. Immediate interim tooth-supported complete dentures. J Prosthet Dent. 1973;30(4 Pt 2):695-700.
- Hartwell CM Jr, Rahn AO. Syllabus of complete denture. 4th ed. Philadelphia: Lee and Febiger; 1986.
- 22. Prieskel HW. Precision attachments in prosthodontics over denture and telescopic prosthesis. Vol. 2. Chicago: Quintessence International; 1985.
- 23. Drashti G, Rajesh S. Tooth supported overdenture: imperative treatment modality: root to basics. Int J Appl Dent Sci. 2019;5(4):16-21.
- 24. DeFranco LR. Overdentures. In, Winkler S, ed., essentials of complete denture prosthodontics, 2ndedition. USA, Inc Publishers, 2004;384-402.
- 25. Thayer HH. Overdentures and the periodontium. Dent Clin North Am. 1980;24(2):369-77.
- Muhammad N, Sarfraz Z, Zafar MS, Liaqat S, Rahim A, Ahmad P, et al. Characterization of various acrylate based artificial teeth for denture fabrication. J Mater Sci Mater Med. 2022;33(2):17.
- Raj N, Ahmed S, Nandini VV, Lathief J, Kumar D, Surya R. Aesthetic perception of patients and dentists on conventional and characterized complete dentures. J Pharm Bioall Sci. 2022;14(5):611-5.
- 28. Singh RK, Chetan MD, Shah R. My dentures, my character. Int J Oral Health Sci. 2019;9(1):36-9.
- 29. Shenoy PB. A survey on the denture esthetics and the denture base characterization questionnaire based study. J Pharm Sci Res. 2018;10(4):956-7.
- Khurshid AM, Sarvar S. Characterizing single complete denture opposing natural teeth and partial denture – case report. J Dent Sci. 2017;2(4):1-3.
- 31. Muthuvignesh N, Jei JB, Balasubramaniam MK. Materialistic meets realistic on denture characterization – a case report. Arch Pharm Pract. 2022;13(3):1-4.