



Non-Retentive Overdenture Combination with Cu-Sil for Multiple Tooth Loss Rehabilitation

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Abstract:

Preservation of the remaining alveolar ridge is one of the factors in the success of dentures. Preserving the remaining teeth maintains the integrity of the alveolar ridge and the proprioception of the periodontium. This also has a positive psychological effect on the patient. Overdenture and cu-sil denture can be used as treatment options in cases of patients who have few remaining teeth. This case report aims to describe the use of cu-sil denture and metal coping non-retentive overdenture in terms of improving the retention and stability of removable dentures. A 67-year-old man came to the prosthodontic clinic of Rumah Sakit Gigi dan Mulut Pendidikan Universitas Padjadjaran, having lost many teeth that made it difficult for him to eat and disturbed his appearance. The patient wanted to retain the remaining teeth 14 and 13. Preliminary root canal treatment was performed on tooth 14, which had experienced pulp necrosis. Then, a single cast coping non-retentive overdenture was inserted into tooth 14. Tooth 13 was retained as an abutment, and then the area was perforated for cu-sil denture access. After two months of use, the patient was satisfied with the denture. A removable denture using non-retentive overdenture combined with cu-sil denture can improve retention and stability in cases of multiple tooth loss rehabilitation.

Keywords: Alveolar ridge, Cu-sil denture, Overdenture

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INTRODUCTION

Dentures, whether complete or partial, are frequently employed as prosthetic solutions for edentulous patients. However, they bring about specific issues such as psychological distress, challenges in stability and retention, residual ridge resorption, dissatisfaction with aesthetic appearance, and compromised masticatory function (Kharel et al., 2021). Preservation of the remaining alveolar ridge is one of the factors in the success of denture. Preserving natural teeth and roots offers numerous benefits. Key benefits include the preservation of the underlying alveolar bone, enhanced stability, and improved retention of the denture. Retaining the patient's last teeth has a psychological impact. The presence of a few remaining teeth reduces the loss of alveolar bone.

Additionally, it preserves proprioception by maintaining the crucial periodontal fibers, which play a significant role in the dimensional and textural perception of food. By retaining natural teeth beneath the overdenture, sensory feedback from periodontal receptors is maintained, offering more precise input than that derived solely from oral mucosa. These receptors also contribute significantly to the masticatory-salivary reflex, regulating the nature and extent of chewing movements. Consequently, overdentures offer psychological, functional, and biological advantages for patients (Kinra, 2014; Satyendra et al., 2015; Poštić, 2016; Nassar, 2016; Gunawan et al., 2019). Overdenture and cu-sil denture can be used as treatment options in cases of patients who have few remaining teeth (Elabdouli et al., 2024; Goel et al., 2018).

The definition of an overdenture (OD) is described as any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants (Kharel et al., 2021; Mercouriadis-Howald et al., 2018). Tooth-supported overdentures have been a longstanding component of prosthodontic treatment planning, reflecting the principles of preventive prosthodontics. They gained popularity in the 1970s and early 1980s as a substitute for conventional complete dentures (Chhabra et al., 2019).

In such situations, one possible prosthodontic treatment choice is the utilization of natural tooth-supported overdentures. If further tooth loss occurs, transitioning from tooth-supported overdentures to complete dentures can be accomplished seamlessly. This ensures a gradual adjustment to edentulism, avoiding undue strain on patient's ability to adapt (Mercouriadis-Howald et al., 2018). Overdentures provide numerous advantages compared to traditional full dentures. Although tooth-supported overdenture demands a careful case selection, planning, and execution, it has proven to be a financially viable option compared to implant-supported overdentures (Kharel et al., 2021).

Tooth-supported overdentures are recommended when the existing natural teeth are unsuitable for use as abutment teeth in fixed or clasp-retained partial dentures. This could be due to various factors such as an unfavorable distribution in the dental arch, loss of periodontal attachment, complex functional or aesthetic requirements, or significant attrition. Additionally, they might be considered when placing endosseous implants to support overdentures is not feasible (Mercouriadis-Howald et al., 2018).

Tooth-supported overdenture can be done on shortened abutment teeth that have been restored using materials such as glass ionomer cement, composite resin, or by using metal copings (Kharel et al., 2021; Mercouriadis-Howald et al., 2018). To ensure an adequate abutment height, the tooth needs to undergo endodontic treatment (Gupta et al., 2022). Extracoronary restorations (copings) protect overdenture abutments from infiltration by microorganisms. Nonetheless, both abutment teeth and metal copings occupy space within denture bases and can occasionally serve as the fulcrum for movement of overdentures. Consequently, the acrylic resin surrounding the abutment teeth in overdentures may be thinner compared to conventional dentures in equivalent regions, causing susceptibility to deformation or fracture of greatest strain areas. Clinical research suggests incorporating reinforcements in overdentures to enhance their mechanical strength (Chhabra et al., 2019; Takahashi et al., 2017).

Another treatment option for patients with very few remaining natural teeth is Cu-Sil denture. Cu-sil denture is a transitional denture that offers clinicians an alternative treatment option for patients who want to replace their missing teeth while keeping their remaining few teeth intact (Jain, 2017; Shah et al., 2016; Vinayagavel, 2014; Melisa et al., 2022; Arora et al., 2017; Jain et al., 2015; Goel et al., 2018). It is particularly suitable for patients who prefer not to undergo the extraction of their remaining natural teeth due to its potentially negative impact on their psychological well-being. Cu-Sil denture is categorized as a full denture with holes that permit the remaining natural teeth to emerge through the denture. The holes are surrounded

by a silicone rubber gasket that clasps the neck of the natural teeth, thus allowing natural suction to form under the denture (Zarb et al., 1990; Dange et al., 2022).

The fabrication of Cu-sil dentures doesn't necessitate any tooth preparation or additional laboratory steps. If the remaining teeth are lost in the future, the existing denture can be adjusted to accommodate the missing teeth (Goel et al., 2018). Cu-sil dentures are indicated for patients who want to preserve their remaining teeth but are not suitable candidates for fixed or other types of removable partial dentures. They are also indicated for patients with limited remaining teeth, where the condition of their oral mucosa, supporting bone, or overall health indicates a poor prognosis for complete dentures. Additionally, Cu-sil dentures are suitable for patients with natural upper teeth opposing a lower complete denture. Contraindications include patients with too many remaining teeth, those with inadequate oral hygiene and plaque management, and individuals with teeth displaying unfavorable undercuts that interfere with denture fabrication and fitting (Arora et al., 2017; Goel et al., 2018).

The results of the research are expected to make a theoretical contribution to the development of community empowerment and ecotourism literature, as well as practical benefits in the formulation of local potential-based empowerment policies that support sustainable development.

RESEARCH METHOD

A 67-year-old man came to the Prosthodontic Clinic of the Rumah Sakit Gigi dan Mulut Pendidikan Universitas Padjadjaran, complaining of difficulty chewing food due to the loss of many teeth. The patient had previously used dentures but found them unstable and uncomfortable, so he did not wear them. The patient wanted dentures that were more retentive and stable for speaking and chewing functions. Upon intraoral examination, teeth 14, 13, and 48 remained, with tooth 14 showing pulp necrosis.

The primary impression was taken with alginate to obtain diagnostic models. A preliminary jaw relation of the diagnostic casts was performed to evaluate the inter-arch space. It was found to be adequate for an overdenture with short copings. Following root canal treatment of tooth 14, the tooth was prepared with a tapered round-end diamond point with a subgingival chamfer finish line (Figure 2a). Preparation for the post was carried out with a passo reamer and gates glidden drill, leaving it 4 mm short of the apical length. Root canal impressions for the post were taken using putty impression material and elastomeric light body (Nobilium, USA) (Figure 2b). Custom 3D post fabrication was performed using CAD/CAM (Figure 2c), printed cast coping overdenture (Figure 2d), followed by the insertion of the metal post into tooth 14.

(a)

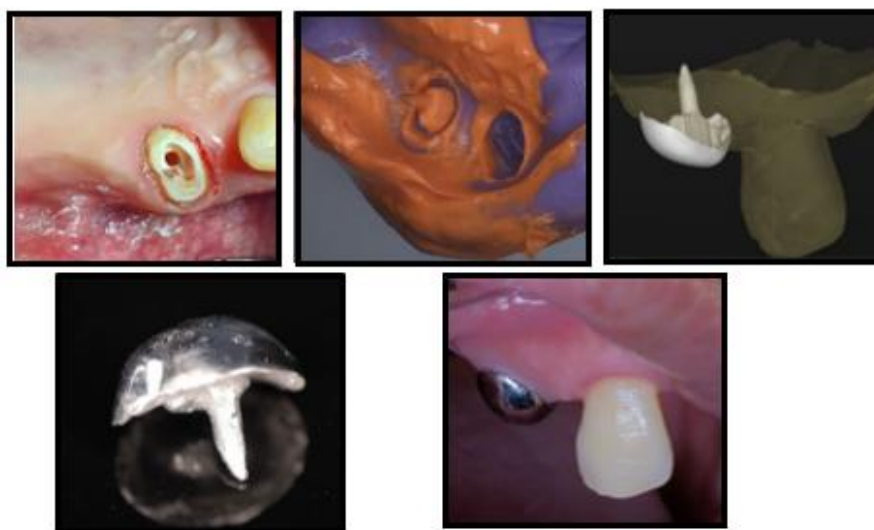


Figure 1 (a) Preparation tooth 14 for custom post core; (b) elastomeric impression for metal coping overdenture; (c) 3D design of metal coping overdenture; (d) cast coping overdenture before cemented; (e) insertion of the metal post into tooth 14

The preliminary impression is used to create individual custom trays (special trays) from self-cure acrylic resin. Physiological impressions are taken using individual custom trays for both jaws. Border molding is performed with green stick compound, and the final impression is taken using elastomeric light body material. Subsequently, beading and boxing are carried out on the impression (Figure 3). Occlusal rims are then fabricated, maxillomandibular relations are recorded, and transferred onto the semi-adjustable articulator with the assistance of a face-bow (Bio-Art A7, Brazil).

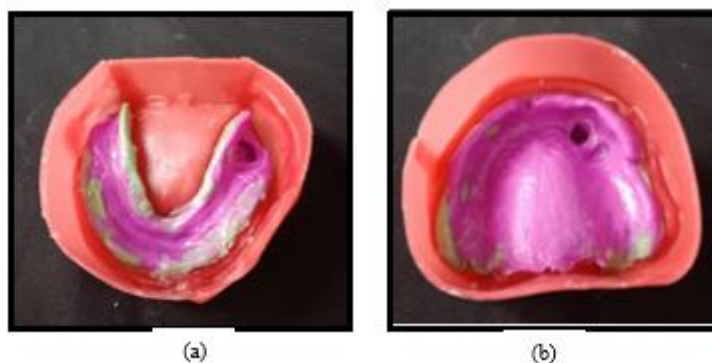


Figure 2 (a) Beading and boxing on the lower jaw impression; (b) Beading and boxing on the upper jaw impression

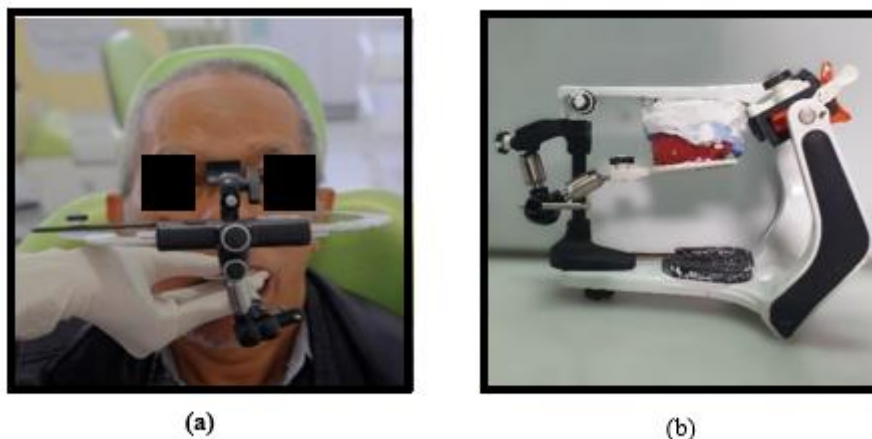


Figure 3 (a) Facebow transfer in patient; (b) mounted in the semi-adjustable articulator

Teeth arrangement was done and evaluated in the patient's mouth for phonetics, vertical and centric relation, and esthetics (Figure 5). Vertical dimension was verified and also centric and eccentric contacts were checked. Patient's approval was taken and then the trial denture was finally processed in the laboratory. After the laboratory process was completed, the maxillary cu-sil denture chairside was fabricated. Relief space at tooth 13 region, then apply silane (Tokuyama, Japan) around the relief area where acrylic-based soft liners (Tokuyama, Japan) will be placed. Spray the area with an airway syringe and apply acrylic-based soft liners around the relief area on the denture (Figure 6). After relining, denture was inserted in the patient's mouth and held in position until the final setting of the material (Figure 7). Denture was removed and excess was trimmed. Insertion of the final maxillary Cu-sil denture and mandibular complete denture was performed and the denture was examined for retention, stability, support, phonetics and aesthetics.

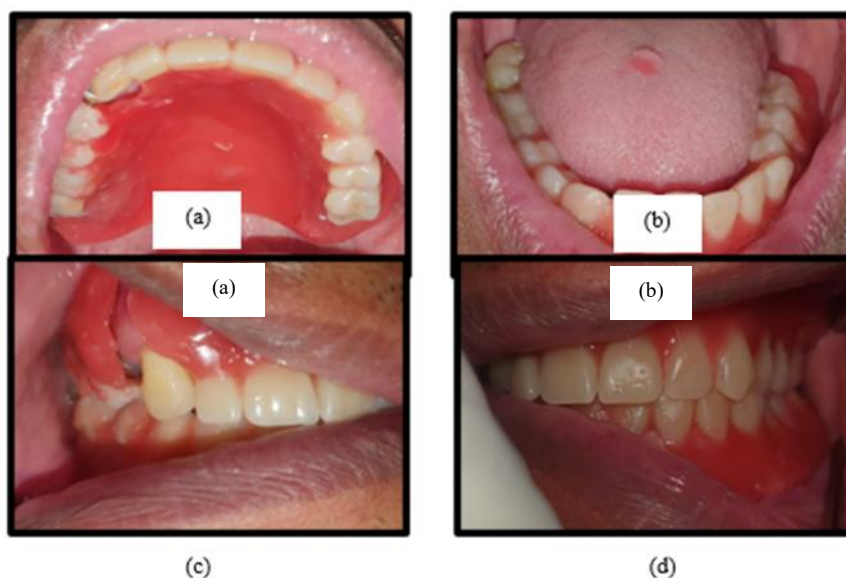


Figure 5 (a) Try-in teeth arrangement in the upper jaw of the patient's mouth; (b) Try-in teeth arrangement in the lower jaw of the patient's mouth; (c) Checked centric contacts on the right side; (d) Checked centric contacts on the left side

Figure 6 (a) soft silicon relining material; (b) apply silane around the relief area where acrylic-based soft liners will be placed; (c) Spray the area with an airway syringe; (d) apply acrylic-based soft liners around the relief area on the denture (e) denture was inserted in the patient's mouth; (f) held in position until the final setting of the material

The patient was given instruction about insertion and removal as well as maintenance of the dentures. The post operative appearance is shown in Figure 7. Periodic follow-up was carried out. After 1 month of use, the patient felt comfortable and satisfied with the denture.

RESULTH AND DISCUSSION

The utilization of over dentures as a treatment modality represents a practical implementation of the concept of preventive prosthodontics. This approach aids in the preservation and maintain the existing natural teeth and their supporting structures (Gupta et al., 2022). Healthy teeth with compromised periodontal health can be adapted and retained to offer both biomechanical and psychological benefits. This preventive strategy can be accomplished through the use of overdentures (Kinra, 2014). As highlighted by Zarb et al. (1990), overdentures offer advantages such as enhanced retention and stability. Particularly in cases where a maxillary overdenture opposes the remaining mandibular anterior teeth, it plays a significant role in preserving the ridge against resorption resulting from masticatory forces.

Root canal therapy becomes an essential step in preparing selected teeth for overdenture support, with preference given to single-rooted or double-rooted teeth with easily accessible canals. Teeth that exhibit mobility due to bone loss can become viable candidates for overdenture support by reducing the clinical crown to near ridge height. Among various coping designs, the short coping design demonstrates the least amount of stress compared to alternatives such as the tapered coping design or tapered coping with occlusal bearing design. This design effectively minimizes horizontal torque on the roots and facilitates oral hygiene maintenance (Kinra, 2014). In this particular case, cast copings were produced because the clinical condition exhibited a tendency for recurrent decay, aiming to prevent any potential treatment plan failure.

Another treatment option that can give better retention and stability is cu-sil denture. The Cu-sil denture provides retention and stability by utilizing the adjacent teeth to resist lateral displacement, while an elastomeric gasket securely holds the neck of the teeth, forming a seal similar to that of a complete denture. This seal helps flush food away from the denture surface. One benefit of this approach is the preservation of the vertical dimension, proprioception, aesthetic requirements (eliminating metal clasps), and the psychological well-being of the patient. However, there are drawbacks, including the need for frequent adjustments and the tendency for plaque accumulation due to covering the entire cervical region of the tooth (Jain, 2017; Dange et al., 2022).

CONCLUSION

Overdentures and *cu-sil* dentures provide an effective alternative for patients with few remaining teeth, improving denture retention and stability while preserving the vertical dimension without requiring attachment devices; they also support tooth retention to maintain

alveolar ridge integrity and periodontal proprioception, offering psychological benefits. These options are particularly favorable for patients reluctant to extract their remaining natural teeth, making them a preferred conservative treatment choice. Future research could explore long-term clinical outcomes, such as ridge resorption rates and patient satisfaction over 5–10 years, through randomized controlled trials comparing non-retentive overdentures with *cu-sil* combinations against conventional complete dentures.

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