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Tooth Supported Overdenture with Unilateral Metal Coping:A Novel Case Series

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Abstract:- Overdentures are removable dental prostheses that cover and rest on one or more remaining natural teeth, tooth roots, and/or dental implants. Retaining tooth roots offers several benefits, including preservation of alveolar bone, improved prosthesis support, enhanced proprioceptive feedback, better aesthetics, and psychological advantages. Overdentures are commonly utilized for elderly patients with two or more remaining teeth in an arch, aligning with the principles of preventive prosthodontics. Despite advancements in dental implantology, preserving existing root structures and attaching overdentures to them remains a valid and effective approach. This case series presents instances where utilizing the few unilateral remaining teeth with metal copings addressed numerous challenges associated with conventional complete and removable partial dentures, demonstrating that unilateral abutments with metal copings can offer effective support, esthetics, and patient satisfaction in cases where bilateral retention is not feasible.

Keywords*: overdenture, retention, prosthesis, aesthetics, prosthodontics, coping.*

1. Introduction

The loss of teeth significantly impacts an individual's mastication, aesthetics, and phonation, leading to functional, psychological, social, and cosmetic challenges. Traditional removable prostheses, such as complete dentures, often result in patient dissatisfaction due to prosthesis instability, particularly in the mandibular arch where denture movement over soft tissue is common. Preserving tooth roots is an effective strategy to enhance denture retention and improve patient satisfaction [1].

Preventive prosthodontics emphasizes procedures that mitigate or eliminate potential Prosthodontic complications. One such preventive approach is the use of overdentures.[2] Complete edentulism leads to the loss of individual tooth proprioception and progressive bone resorption, transferring masticatory loads directly onto the oral mucosa. Patients frequently experience a lack of confidence as a result of this procedure. Overdentures can reduce the bone resorption, enhance the denture's foundation area, and improve masticatory efficiency. [3,4]

Overdentures achieve support and retention by utilizing one or more teeth or roots located above the denture's basal surface. In fabricating an overdenture, mechanical retainers may be employed on a substructure. Alternatively, remaining roots can be covered with metal copings, such as telescopic crowns, short or long copings, or attachments, depending on the specific root coverage technique. [5]

This case series explores the application of overdentures in patients with unilateral remaining teeth, utilizing metal copings to enhance prosthesis stability and patient satisfaction. While the benefits of overdentures are well-documented in literature, most studies emphasize bilateral abutment support as the standard design. However, in certain clinical scenarios, only unilateral teeth may be available or deemed viable for retention. Despite this, the literature addressing the functional outcomes, design considerations, and long-term success of unilateral

overdentures remains sparse. This gap highlights the need for clinical documentation of such cases to assess their practicality, success, and relevance in contemporary prosthodontic rehabilitation. The present case series aims to contribute to this underexplored area by showcasing the outcomes of overdentures supported exclusively by unilateral abutments.

2. Case series

In this case series, we present three instances of unilateral overdentures supported by metal copings. Each case involves patients with remaining teeth on one side of the arch, where metal copings were utilized to enhance prosthesis retention and stability. Initially, there were concerns regarding the stability of unilateral abutments compared to bilateral support. However, all three cases demonstrated promising postoperative results, indicating that even unilateral abutments can provide sufficient support for overdentures.

This approach not only preserves the residual alveolar bone but also offers improved proprioceptive feedback, contributing to overall patient satisfaction. Furthermore, considering the patients' reluctance toward total extraction, utilizing the existing unilateral teeth as abutments proved to be a viable and effective alternative. Through these cases, we aim to illustrate the practical application and benefits of unilateral tooth-supported overdentures in contemporary Prosthodontic practice.

Case Report-1:

A 60-year-old female patient presented with partially edentulous maxillary and mandibular arches, expressing concerns about difficulty in eating and aesthetic issues. She had no prior experience with removable partial dentures and requested tooth replacement with minimal extractions. **(Figure 1.1).** A preoperative orthopantomogram (OPG) revealed that all existing teeth were periodontally compromised, except for teeth 12, 13, 32, 33, 34, and 36, which were clinically firm with no mobility.

Given the patient's desire for improved retention and support in the final prosthesis, an overdenture was considered the optimal treatment. This approach involved retaining the firm teeth to provide periodontal support, rather than extracting them. This strategy aligns with DeVan's principle that retained tooth abutments can enhance retention, stability, and support for an overdenture, while also preserving proprioception that would otherwise be lost with conventional denture treatment. [2]

Prior to fabricating the overdenture, the abutment teeth were root canal treatment, followed by tooth preparation for coping fabrication. The tooth structure was reduced to a height of 3-4 mm from the marginal gingiva (Figure 1.2). Impressions were then made using irreversible hydrocolloid impression material (alginate; Tropicalgin, Zhermack) to facilitate the creation of metal copings. After the copings were fabricated, they were cemented onto the abutments **(Figure 1.3).**

Diagnostic impressions of the edentulous maxillary and partially edentulous mandibular arches were taken using alginate. Custom trays were fabricated from these diagnostic cast using auto-polymerizing resin. Final impressions were recorded after border molding with low-fusing impression compound, followed by a light-body wash to create master casts **(Figure 1.4).**

A diagnostic jaw relation was established, and a trial denture was created on a three-point articulator to assess the space available for the metal copings, as overdentures are space-sensitive. After verifying the try-in, the maxillary and mandibular overdenture were processed. Laboratory remounting was performed, and the dentures were finished and polished **(Figure 1.5).**

Upon delivery, the dentures immediately enhanced aesthetics by providing proper lip support **(Figure 1.6).** Necessary occlusal adjustments were made. At the recall visit, the overdenture was removed, and the tissues were thoroughly examined for any signs of redness or ulceration. The patient was provided with instructions regarding eating, speaking, and denture maintenance. At a 2-month review, the patient reported good adaptation, satisfactory mastication, and no soft tissue irritation. The abutments remained firm and hygienic.

Case Report-2:

A 41-year-old male patient presented with complaints of difficulty in eating and speaking, along with concerns about facial aesthetics due to sunken cheeks and lips. Clinical examination revealed significant tooth mobility, gingival recession, and halitosis **(Figure 2.1).** A panoramic radiograph indicated generalized severe bone loss, suggesting the need for total extraction **(Figure 2.2).** However, the patient expressed a strong desire to retain some teeth for physiological reasons.

Pre-prosthetic procedures included performing root canal therapy on the selected abutment teeth intended for retention to eliminate any potential endodontic issues. We then extracted the compromised teeth using atraumatic techniques to preserve the surrounding bone and soft tissue. An appropriate healing period of 4–6 weeks was allowed post-extraction to ensure proper soft tissue healing before proceeding with further prosthetic steps [10].

For the abutment tooth preparation, the clinical crowns of the retained abutment teeth were reduced approximately 3–4 mm above the gingival margin, creating a dome-shaped preparation to facilitate metal coping placement. The preparations were made smooth and rounded to prevent stress concentrations and to promote optimal coping fit. Impressions of the prepared abutment teeth were made using an irreversible hydrocolloid material (alginate) to capture accurate details. These impressions were promptly poured to create working casts for the fabrication of the metal copings.

In the laboratory, metal copings were fabricated to fit precisely over the prepared abutment teeth. We tried in the metal copings intraorally to verify the fit and made necessary adjustments. The copings were then cemented onto the abutment teeth using a suitable luting agent, ensuring complete seating and removal of excess cement **(Figure 2.3).** Primary impressions of both arches were made after coping cementation using irreversible hydrocolloid material to create diagnostic casts. Custom impression trays were constructed on these diagnostic casts using auto-polymerizing resin, ensuring proper extension and relief to accommodate border molding materials. Final impressions were then made using a light-body elastomeric material to obtain detailed and accurate master casts.

Maxillomandibular relationships were recorded using wax rims fabricated on the master casts, ensuring proper vertical dimension and centric relation. Appropriate tooth molds and shades were selected in consultation with the patient to achieve the desired aesthetics. Teeth arrangement were done with the selected artificial teeth on the trial denture bases and evaluated intraorally for aesthetics, phonetics, and occlusion. Necessary adjustments were made based on patient feedback and clinical observations. After completion of trial, the overdenture was processed with heat-cured acrylic resin, ensuring proper incorporation of the metal copings within the denture base. The overdenture was then finished and polished to achieve a smooth and esthetic appearance **(Figure 2.4).**

Upon delivery, we checked the final overdenture for proper fit, occlusion, and aesthetics **(Figure 2.5).** We provided thorough instructions on denture hygiene, insertion and removal techniques, and maintenance of the abutment teeth and surrounding tissues. Follow-up appointments were scheduled to monitor the patient's adaptation to the prosthesis and to make any necessary adjustments. The patient was followed up at 1 month and again at 3 months. The prosthesis remained stable, with no signs of tissue inflammation or discomfort. The patient expressed high satisfaction with both function and appearance.

Case Report -3:

A 48-year-old male patient presented with the chief complaint of difficulty in chewing due to multiple missing teeth. He had been edentulous in the maxillary arch for three months, following extractions due to extensive caries and periodontal issues. The mandibular arch was partially edentulous, retaining only the left premolars (teeth 34 and 35), which were firm and free from mobility (Figure 3.1). The patient had no prior experience with dentures and expressed a desire to restore both function and aesthetics. After discussing treatment options, we decided to proceed with an overdenture utilizing teeth 34 and 35 as abutments.

We began by performing root canal therapy on the abutment teeth to ensure their long-term viability. Following endodontic treatment, we reduced the clinical crowns to sufficient height above the gingival margin and contoured

them into a dome shape to accommodate metal copings **(Figure 3.2).** Impressions of the prepared abutments were made using irreversible hydrocolloid material and sent to the laboratory for fabrication of the metal copings.

Once the copings were fabricated, we cemented them onto the abutment teeth using a resin-cement as luting agent **(Figure 3.3).** We then made preliminary impressions of both arches to create diagnostic casts. Custom trays were fabricated, and border molding was performed to capture the functional peripheries. Final impressions were taken using a light-body elastomeric material to obtain accurate master casts.

Jaw relations were recorded using wax occlusion rims, and a trial denture setup was evaluated for aesthetics, phonetics, and occlusion. After the patient's satisfaction, the overdenture was processed, finished, and polished **(Figure 3.4).** Upon delivery, the overdenture demonstrated excellent retention and stability, significantly improving the patient's ability to chew and enhancing facial aesthetics **(Figure 3.5).** The patient was provided with instructions on denture maintenance and scheduled for follow-up visits to monitor the prosthesis and the health of the abutment teeth. At the 1.5-month follow-up, the overdenture was functioning well. The patient demonstrated good hygiene maintenance and reported significant improvement in chewing efficiency. This approach not only preserves the residual alveolar bone but also offers improved proprioceptive feedback, contributing to overall patient satisfaction. These cases illustrate the practical application and benefits of unilateral tooth-supported overdentures in contemporary prosthodontic practice.

These three cases demonstrate that even in situations with limited abutment availability, specifically unilateral tooth support, a well-planned and meticulously executed overdenture can yield favorable clinical outcomes. Through thoughtful selection of abutment teeth, precise coping fabrication, and patient-specific prosthetic design, the challenges of asymmetrical support can be effectively managed. These cases underscore the feasibility of unilateral overdenture treatment in select patients, paving the way for more individualized and conservative prosthodontic approaches.

3. Discussion

Overdentures involve the use of retained teeth, tooth roots, or dental implants over which a removable complete denture prosthesis is placed. Rissin et al in 1978 found that overdenture patients had a higher chewing efficiency than complete denture patients in their study that compared the masticatory performance in patients with natural dentition, complete denture and over denture. Crum and Rooney (1978) found that retention of mandibular canine for over denture were the most effective teeth that helped in the preservation of the alveolar bone [6,7].

This is not a new concept and practitioners have been successfully using existing tooth structures or retained roots to assist with complete denture treatment for more than a century. The situation we face here is the position of the abutment teeth, we have contralateral abutments present with opposing edentulous ridge on either side of these abutments. Thus, this is an unconventional overdenture scenario with unsupported opposing denture segment resting on edentulous mucosa.

The three case reports collectively highlight the adaptability and effectiveness of overdenture therapy in Prosthodontic rehabilitation, particularly in managing partial edentulism with varying clinical presentations. Overdentures, which involve the use of retained teeth, tooth roots, or dental implants beneath a removable prosthesis, offer significant advantages in terms of function, esthetics, and preservation of oral structures.

In the first case, a 41-year-old male patient presented with compromised dentition, including tooth mobility, gingival recession, and halitosis, with radiographic evidence of severe bone loss suggesting the need for total extraction. Respecting the patient's desire to retain certain teeth for physiological reasons, only the clinically firm teeth (tooth numbers 24 and 35) were preserved. A unilateral overdenture with metal coping was fabricated, resulting in a stable and esthetically pleasing outcome. This case underscores the importance of individualized treatment planning and demonstrates how overdenture therapy can be tailored to accommodate patient preferences while addressing complex clinical scenarios [8].

The second case involved a 48-year-old male patient who experienced difficulty chewing due to multiple missing teeth. The maxillary arch was completely edentulous, and the mandibular arch retained only the left premolars

(teeth 34 and 35). An overdenture utilizing these premolars as abutments was planned and executed. This approach preserved alveolar bone and provided proprioceptive feedback, enhancing masticatory efficiency. The patient's lack of prior denture experience was also a critical consideration, as the overdenture facilitated a more natural transition to prosthetic rehabilitation. This case highlights the role of overdentures in restoring function and esthetics, particularly in patients new to denture use.

The third case presented an unconventional scenario with contralateral abutments and opposing edentulous ridges, leading to unsupported denture segments resting on the edentulous mucosa. Despite initial concerns about potential prosthesis imbalance due to differential masticatory loads, the overdenture functioned effectively without issues during mastication. The patient reported no tissue soreness or discomfort, and the prosthesis provided improved esthetics, retention, and support. This case illustrates the successful application of overdenture therapy in atypical clinical situations, emphasizing the importance of careful treatment planning and execution.

Collectively, these cases demonstrate the versatility of overdenture therapy in addressing diverse clinical challenges. By preserving natural teeth as abutments, overdentures offer advantages in alveolar bone preservation, proprioception, and patient comfort [9,10]. The significance of personalized treatment planning and the consideration of patient preferences in achieving successful prosthodontic outcomes.

Thus, this case report is an unusual scenario of overdenture abutment choice planned and was successful in function satisfying the requirements and patient needs. Even an unconventional situation can be made in a favorable way as we can see in this case report with successful unconventional overdenture prosthesis. Good patient awareness about maintenance of proper oral hygiene is very important if the treatment has to remain satisfactory for a long period of time.

4. Conclusion

Based on the current understanding of biomechanics, we initially expected the prosthesis to become unbalanced during function due to the higher masticatory load in the abutment region compared to the unsupported mucosa. However, the overdenture functioned effectively without any issues during mastication, and the patient experienced no tissue soreness or discomfort. Additionally, the overall esthetics, retention, and support were significantly improved.

Conflict Of Interest Statement:

No conflict of interest

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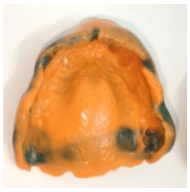
Figures and legends


Fig·1


Fig·1


Fig·1


Fig·1


Fig·1



Fig·1


Fig·1

FIGURE- 1

Fig:1.1-(preoperative Image), Fig: 1.2- (Tooth Preparation Done For Abutment Teeth), Fig:1.3- (Metal Coping Cemented Over The Abutment Teeth), Fig:1.4- (Final Impression Made Using Putty Wash Technique), Fig:1.5-(finishing And Polishing Of Overdenture), Fig:1.6- (Postoperative Image Of


Fig: 2.1


Fig: 2.3


Fig:2.2


Fig:2.4

Fig:2.5

FIGURE: 2

Fig:2.1-(preoperative image showing intraoral findings), fig:2.2-(OPG indicating compromised dentition), fig:2.3-(metal coping cementation after preparation of abutment teeth), fig:2.4-(processed overdenture ready for insertion), fig:2.5-(postoperative image of patient after insertion

Fig:3.

Fig:3.

Fig:3.

Fig:3.

Fig:3.5

FIGURE: 3

Fig:3.1-(preoperative image with mandibular remaining natural teeth), fig:3.2-(abutment tooth prepared), fig:3.3-(metal coping cementation after preparation of abutment teeth), fig:3.4-