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Case Report

Tooth supported overdentures: Procedure, problems & solutions

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ABSTRACT

Preservation of residual alveolar bone is one of the most challenging tasks in hands of a Prosthodontist. With Preventive Prosthodontics gaining popularity, all attempts are made to preserve the natural tooth structure. Overdentures have been a commonly used treatment option that helps in preservation of bone and maintains the proprioceptive sensory impulses. The treatment option has been widely exercised with implants as implant supported overdentures as well. The treatment modality has some inherent challenges and require proper deliberation and well executed treatment plan to avoid post insertion complications and ensure longevity of prosthesis. The article showcases two cases of tooth supported overdentures, some common problems, and possible solutions.

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1. Introduction

Overdentures are defined 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.¹ They are an integral part of preventive Prosthodontics which aims at perpetual preservation of what is present. Residual Ridge Resorption is an inevitable, continuous phenomenon which progresses with loss of natural teeth. The aim of Prosthodontic practice is not merely restoration of any missing space with implant supported prosthesis. Rather a meticulous evaluation of the clinical condition and sequentially planned treatment is the key to successful rehabilitation and ultimately patient satisfaction and well-being.

Preservation of a natural tooth and presence of stimulus from the periodontal ligament prevents progressive ridge resorption and helps in preservation of residual alveolar bone.² Various anatomic and physical factors favor

retention, stability, and support of a removable prosthesis.^{3,4} In cases where the residual ridge resorption is more, dental implants placed in various combinations in the anterior region of mandible aid in retention to the prosthesis.⁵

This case report highlights fabrication of Overdentures by utilizing the remaining natural teeth, some common problems encountered during fabrication of overdenture prosthesis and the methods to avoid them.

2. Case 1

A 72 years old male reported with chief complaint of difficulty in chewing, altered speech and poor esthetics due to missing of multiple teeth in both upper and lower arch. Extraoral examination revealed, collapsed lower one third of face with reduced vertical dimension, unsupported lips, deep nasolabial fold and mentolabial sulcus. On clinical examination, it was found that multiple teeth had been extracted or lost and the remaining natural teeth were 16,23,26 and 36,33,43.(Figure 1a,b) The teeth showed severe attrition facets and a restoration in 23. A diagnosis

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Fig. 1: a,b: Pre-treatment intra-oral; c,d: Tooth preparation for short copings

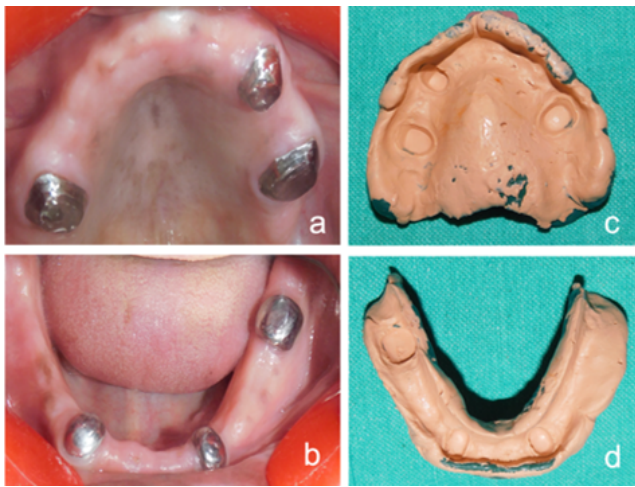


Fig. 2: a,b: Copings luted in-situ; c,d: Final impression

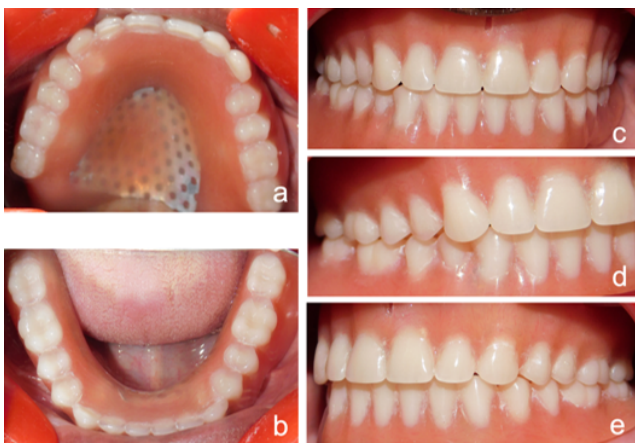


Fig. 3: a,b: Definitive prosthesis reinforced with mesh in-situ; c-e: Maximum intercuspation.



Fig. 4: a,b: Pre-treatment extraoral; c,d : Post-treatment extraoral

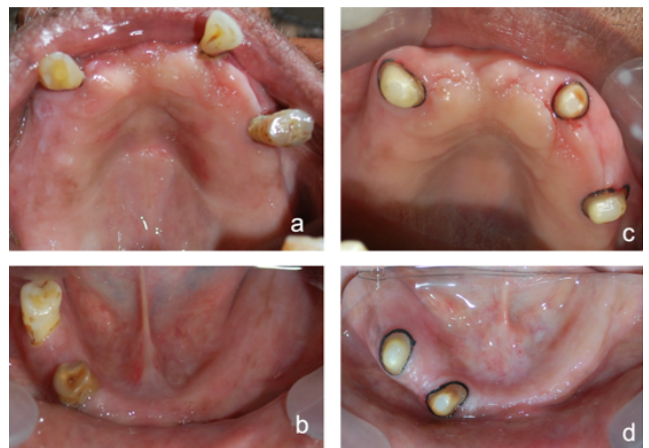


Fig. 5: a,b: Pre-treatment Intra oral ; c,d: Tooth preparation for primary copings

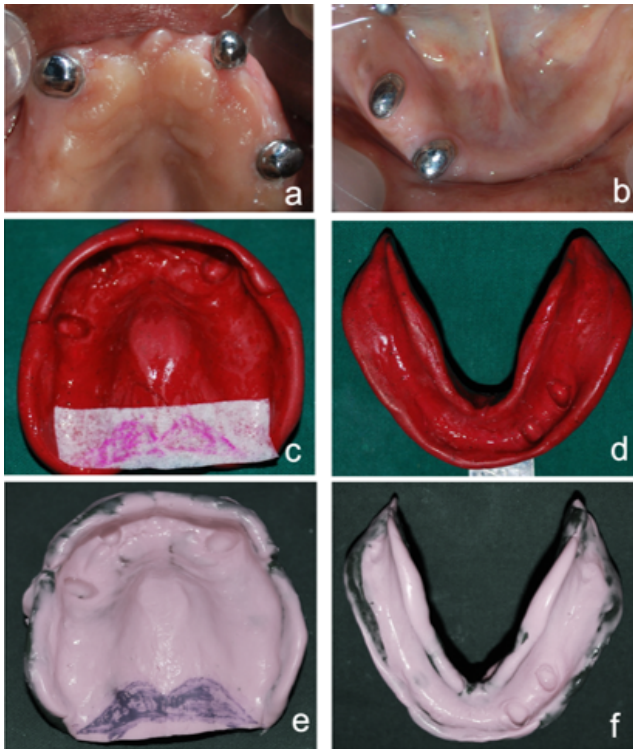


Fig. 6: a,b: Primary copings in-situ; c,d: Primary Impression; e,f: Final Impression

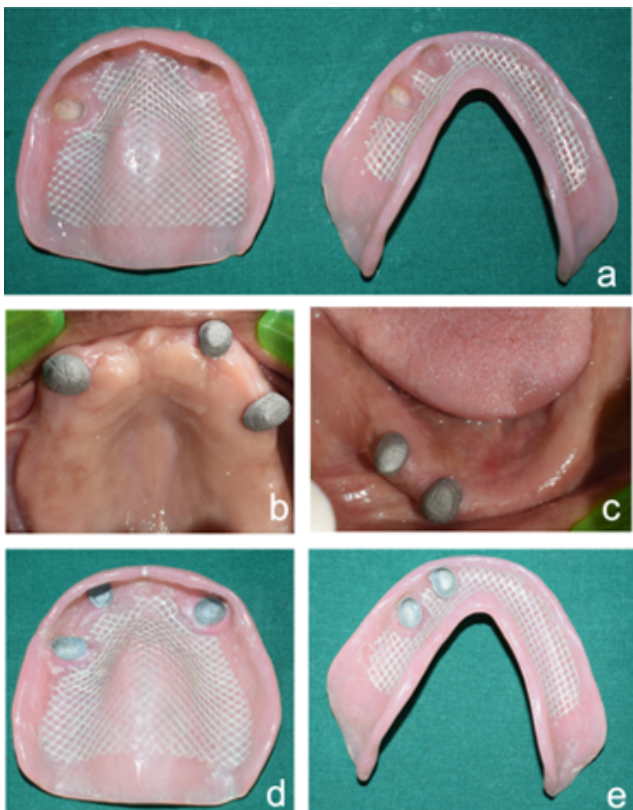


Fig. 7: a-e: Steps in pick-up of secondary copings



Fig. 8: a,b: Pre-treatment; c,d: Post-treatment

Table 1: Common problems and solutions

S.No.	Common Problems	Possible Solutions
01.	Mobility in teeth which are recommended for use as abutments	It is important to consider the etiology If mobility is due to bone loss causing reverse crown- root ratio, thorough periodontal evaluation, oral prophylaxis must be carried out. Clinical reduction of crown length, help to restore desired crown root ratio and changes the force dynamics, thereby reducing mobility.
02.	Severe undercut in the abutment	Surgical alveoplasty or choice of different tooth as an abutment
03.	Frequent fracture of dentures	Evaluation of occlusion, reinforced denture base material, position of abutments
04.	Fracture of abutment	Proper restoration of the post-endodontically treated tooth Metal coping (single or telescopic)
05.	Increased vertical dimension	Short copings, meticulous evaluation of Vertical dimension of occlusion and Vertical dimension at rest with adequate freeway space.
06.	Severely compromised abutments	Evaluate for possibility of radicular support along with coping.

of partially edentulous maxillary and mandibular arch was made. The treatment options were to either use the remaining natural teeth as abutments for tooth supported overdenture or extraction of remaining teeth followed by implant supported prosthesis. To use natural teeth as abutments, endodontic treatment for remaining teeth were done. After completion of endodontic therapy, tooth preparation was done and the abutments were reduced to short copings with a chamfer margin.(Figure 1c,d) Copings were cast in Nickel chromium base metal alloy (Bellabond plus, Bego, Germany) of 0.5mm thickness and luted on the abutments using GIC type 1 luting agent (GC Fuji, GC, US).(Figure 2a,b) Subsequently the steps for fabrication of complete denture prosthesis were followed including primary impression, secondary impression,(Figure 2c,d), fabrication of master cast, maxillomandibular relation record and mounting on semiadjustable articulator (UTS 200 facebow and Stratos 200 Semiadjustable articulator), teeth selection, teeth arrangement, trial, acrylization, finishing and polishing. During acrylization of the prosthesis, prefabricated metal mesh was incorporated in the denture to provide additional strength to the denture base. To enhance strength of prosthesis, high strength Polymethyl Methacrylate (lucitone, Dentsply Sirona, USA) was used. The denture was finished and inserted in the patient's mouth.(Figure 3a-e) The patient was satisfied with the prosthesis and the esthetics and function improved drastically.(Figure 4a-d) The patient was recalled after 24 hrs, 03 days, 01 week and 01 month.

3. Case 2

A 63 yrs old male reported with a chief complaint of difficulty in mastication and poor esthetics due to missing teeth in upper and lower front and back tooth region since 04 years. History revealed that patient developed mobility in teeth and infection of gums following which they had to be extracted. Intraoral examination revealed partially edentulous maxillary and mandibular arch with 13, 22, 25, 43 & 45 teeth (as per FDI notation) present. The teeth which were present showed recession and cervical abrasions.(Figure 5 a,b) The treatment options were as in case 1. The plan was to utilize the remaining teeth as overdenture abutments for fabrication of a telescopic crowns and a metal mesh reinforced over denture prosthesis. Endodontic treatment was done, and the abutments were prepared as short copings.(Figure 5 c,d) Impression was made and metal copings were fabricated over the prepared abutments. Primary copings were fabricated and luted in-situ.(Figure 6a,b) Once the primary copings were luted, impression was made for fabrication of secondary copings. Conventional steps for fabrication of complete denture prosthesis were followed.(Figure 6c-f) Hanau wide vuesemi adjustable articulator with hanau springbow were used in this case. The metal mesh was incorporated while

acrylization of the prosthesis. The prosthesis was then tried in the patient's mouth. The denture base was trimmed to accommodate the secondary coping and the coping was picked up using the complete denture prosthesis.(Figure 7 a-f) The coping was secured in the denture using self acrylized PMMA (DPI, India). The prosthesis was then inserted in the patient's mouth and patient was kept on a regular follow up. The post treatment outcome showed drastic improvement in esthetics and appearance of the patient along with improved function.(Figure 8a-d)

4. Discussion

After extraction of tooth, the alveolar bone remodels and reorganizes itself to a rounded ridge like structure called residual alveolar ridge. Residual ridge resorption is a chronic, progressive cumulative, irreversible and inevitable sequelae of tooth extraction.⁶ According to Tallgren, maxillary and mandibular alveolar ridge resorption in completely edentulous patients over a period of 07 years is approximately 1:4.⁷ Crum and Rooney in a 05 year study concluded that the amount of bone resorption in mandibular anterior region was 0.6mm in patients using tooth supported overdenture prosthesis in comparison to 5.2mm in patients rehabilitated using conventional tissue supported complete denture prosthesis. According to them, the sensory feedback input of tooth in tooth supported overdentures may contribute to alveolar bone preservation.⁸

According to Morrow and Brewer, the treatment planning must include careful examination of existing condition. The factors to be considered include:

Abutment selection, periodontal status of the abutment, location and number of abutments, integrity of tooth structure, suitability of endodontic treatment, interarch space, size and shape of abutment tooth. Short copings are preferred over long copings as they allow more thickness of denture base material providing strength to the prosthesis and reducing chance of fractures.⁹

Proper selection of abutment to achieve a quadrilateral or a tripod configuration based on location of abutments is recommended. Practically it is important to consider the height of abutment as long copings would mean less thickness of denture base material at that site, making it more prone to fracture. Canines are favorable abutments due to their rich innervation and long triangular roots.¹⁰ Keeping in mind the frequent fractures of overdentures, various type of reinforced PMMA have been tried for use in such cases. Short copings and reinforced denture base materials ensures structural integrity and enhanced treatment outcome. Prefabricated metallic mesh has been commonly used successfully by various authors.¹¹ These mesh are easily available, easy to modify and adapt to the cast, allows slight modifications if required during denture delivery.

5. Conclusion

Overdentures are a viable treatment option that must be considered before recommending complete mouth extractions in compromised conditions. Common problems frequently encountered and possible solutions for these are highlighted in Table 1. Strategic location of abutments, evaluation of undercuts associated with them, interocclusal space and reinforced PMMA denture base are key considerations in treatment planning in tooth supported overdentures.

6. Conflict of Interest

None.

7. Source of Funding

None.

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