

CASE REPORT

A Novel Overdenture Telescopic Prosthesis

¹Hari Krishna Modalavalasa, ²Y Ravi Shankar, ³P Shameen Kumar, ⁴T Satyendra Kumar

ABSTRACT

Preventive prosthodontics emphasizes the importance of any procedure that can delay or eliminate future prosthodontic problems. In the past when patients presented themselves as candidates for a dentures, teeth were extracted but in the overdenture, a complete or partial denture prosthesis constructed over existing teeth or root structure, is not a new concept in a technical approach to a prosthodontic problem, but an old concept. The present article focuses on a novel approach in fabricating overdenture by incorporating partial denture framework along with metal copings.

Keywords: Overdenture, Retained vital teeth, Telescopic copings.

How to cite this article: Modalavalasa HK, Shankar YR, Kumar PS, Kumar TS. A Novel Overdenture Telescopic Prosthesis. *J Orofac Res* 2015;5(2):56-60.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Prevention is better than cure. The overdenture is defined as a removable partial denture or complete denture that covers and rests on one or more remaining natural teeth, the roots of natural teeth and/or dental implants; a prosthesis that covers and is partially supported by natural teeth, natural tooth roots and/or dental implants—GPT: 8.¹

SYNONYMS OF OVERDENTURE

They are also called overlay denture, overlay prosthesis, superimposed prosthesis, coverdenture, onlay denture, hybrid dentures, superimposed dentures, telescoped dentures, biologic dentures, coping prosthesis, crown and sleeve prosthesis.

Classification of Overdentures²

Depending on the status of the patient's dentition at the start of treatment, overdentures are classified into:

^{1,3,4}Senior Lecturer, ²Professor

¹⁻⁴Department of Prosthodontics, GITAM Dental College and Hospital, Visakhapatnam, Andhra Pradesh, India

Corresponding Author: Hari Krishna Modalavalasa, Senior Lecturer, Department of Prosthodontics, GITAM Dental College and Hospital, Visakhapatnam, Andhra Pradesh, India, Phone: 8142000505, e-mail: hari.krishna.mvs@gmail.com

- a. Immediate overdentures
- b. Transitional overdentures
- c. Remote overdentures.

Based on the method of abutment preparation:

- a. Non-coping abutments—base root overdenture
- b. Abutments with copings—telescopic overdenture
- c. Abutments with attachments—attachment overdenture.

Depending on the amount of coverage:

- a. Complete coverage overdenture
- b. Partial coverage overdenture.

Depending on the material used as denture base:

- a. Full resin denture base
- b. Metal combined with resin
- c. Full metal.

The following are the indications of overdenture:

- Poor prognosis for complete dentures, such as high palatal vault, poorly defined sublingual fold space, poor residual ridge in edentulous areas, xerostomia or sialorrhea, loss of a maxilla or partial loss of mandibular ridge and congenital deformities especially the cleft palate.
- Pronounced vertical overlap required to produce a good esthetic result.
- Retained teeth can be reduced and used to support a removable partial denture.
- Teeth with questionable prognosis can be used as abutments for an overdenture and later, if lost, denture base can be relined.
- Unilateral overdentures can be given to provide good support, function and esthetics.
- In arch discrepancies (classes II and III) when majority of remaining teeth are periodontally compromised and few teeth are healthy.

Overdenture treatment cannot be considered in cases like:

- Class III mobility of abutment due to loss of bone that cannot be corrected.
- Soft tissue and osseous defects which cannot be corrected by surgery.
- Uncooperative patients who do not maintain oral hygiene.
- Failure to establish a sufficient zone of attached gingiva by mucogingival or grafting procedures.
- Excessive reduction of the adjacent residual alveolar ridge as a result of elimination of normal architecture.

- When a patient cannot accept anything other than a complete denture psychologically.
- Contraindications for endodontic treatment, such as vertical fracture of root or roots, mechanical perforation of root, internal resorption, broken instrument in root canal and horizontal fracture below bony crest. Ideal requisites for an overdenture treatment are:
 1. The health of the underlying tooth structure should be maintained. The overdenture should not cause carious or periodontal breakdown of abutment teeth. They should also prevent injury to supporting soft tissues.
 2. A reduction in crown/root ratio can be achieved, thereby improving the prognosis of the abutment teeth. Any tooth mobility present will also be decreased.
 3. A well-fitting denture base should be constructed and forces should be transferred optimally to all supporting tissues.
 4. The appliance should be easy to construct and maintain.
 5. The base should be easily manipulated by the patient. Use of certain retaining devices will cause difficulty in insertion and removal of prosthesis. Unwanted forces during insertion and removal of prosthesis on abutment would affect the prognosis of abutment teeth, which should be avoided.

Over dentures have an advantage of being effective or superior method of treatment and simple in construction. The procedures in constructing an overdenture are essentially the same as complete/partial denture fabrication with additional procedures like root canal treatment for the abutment teeth and cast metal coping fabrication. Retaining the teeth helps in preservation of the alveolar bone surrounding it.

Overdentures provide a certain degree of proprioception which cannot be expected from complete/partial dentures. The natural tooth stops provide for stable and static base.

Patients with congenital defects, such as cleft palate, partial anodontia, microdontia, amelogenesis imperfecta, etc. can be successfully treated with an overdenture.

Adequate retention is easily attained by overlaying the teeth. Stability attained is greater than the conventional removable dentures. Easy maintenance of the periodontium can be done as the overlay prosthesis can be removed. Patient acceptance is also greater as few teeth are retained and overdenture results in better proprioception, retention, stability and support. Convertibility—Overdentures are designed in such a way that even though the abutment teeth may be lost, the overdenture can be transformed into a conventional denture by rebasing or relining. With retained teeth, jaw relation

records can be made more accurately as the abutment teeth will help in more stable denture bases.

Known disadvantages of overdenture are costlier due to the endodontic therapy required and the subsequent restoration of these teeth with copings or attachments.

1. *Bony undercuts*: Due to the retained teeth, there are limited paths of insertion. This will lead to the blocking out of undercuts resulting in denture flange spaced away from the tissue, creating a food trap.
2. *Caries susceptibility*: If proper maintenance of the abutment teeth is not done, the roots will undergo either carious or periodontal breakdown resulting in the loss of the tooth.
3. Sometimes because of the undercuts, the denture will be over contoured resulting in excessive fullness of the lips. At other times, the denture flanges will be under contoured for it to fall into place. Therefore, proper patient selection is required.
4. Sufficient inter-ridge space is essential.
5. An over contoured flange which disturbs the natural fullness of lip can cause compromised esthetics. This over contoured flange would be the result of blocking out of anterior undercuts which would interfere with the placement of the denture. If the problem is severe enough it may contraindicate an overdenture.
6. Many patients are apprehensive about wearing anything that is removable, and hence may not accept overdenture treatment completely.

CASE REPORT

A 50 years old female patient reported to the Department of Prosthodontics at GITAM Dental College with the chief complaint of replacement of missing teeth and inability to chew food (Fig. 1). On examination, teeth missing were 11, 12, 14, 15, 16, 17, 21, 22, 24, 25, 26, 27, 31, 32, 34, 36, 37, 41, 42, 44, 46 and 47 (Fig. 2). Radiographs and clinical examination revealed abutment teeth 13, 23, 33, 35, 43 and 45 are periodontally sound and vital and there was



Fig. 1: Pretreatment facial and profile photographs

an adequate inter arch space. Patient was explained the condition of her dentition and an overdenture treatment plan was explained. Patient was presented with the option of telescopic copings over the 33, 35, 43, 45 without endodontic intervention as the teeth were vital and also patient had been advised with intentional root canal therapy to 13 and 23. After completion of endodontic treatment, diagnostic impressions were made using irreversible hydrocolloid and special tray fabricated with autopolymerizing resin.

Teeth 33, 35, 43, 45 were prepared to receive telescopic copings. Final impressions were made using heavy bodied and light bodied PVS impression material (single stage) and cast was poured with die stone. Wax patterns were milled using a dental surveyor for parallelism and proper path of insertion.

Then, wax patterns were casted using Co-Cr alloy and final trimming, finishing and polishing of obtained 0.5 mm copings were done.

At next clinical appointment copings were cemented in the patients mouth using type 1 GIC (Fuji I). On the same appointment tooth no. 13 and 23 were prepared by reducing the occlusal height leaving 2 mm of tooth structure. Equigingival shoulder finish line was made. After preparing the teeth, post space was done using piezoreamers and gates glidden drills leaving 6 mm length of gutta-percha from the apex in the root canal. Remaining coronal structure acted as ferrule to aid in retention of copings.

Impressions of post space and coping were made by direct technique. A castable pattern is produced by placing a preformed plastic 'burnout' post into the post space using pattern resin which is used to build up the coping of proper dimensions.

These copings were casted using Co-Cr alloy and final trimming, finishing and polishing of copings were done followed by cementation using type 1 GIC (Fig. 3).



Fig. 2: Intraoral picture showing remaining teeth

For maxillary and mandibular arches impressions were made with irreversible hydrocolloid and special tray fabricated with autopolymerizing resin.

Border moulding of the edentulous region was done using green stick tracing compound and final impression was made with light body PVS material and cast was poured.

Mandibular cast was blocked out following adaptation of spacer on the ridge with stoppers and duplication was done using Agar-Agar (reversible hydrocolloid) to obtain a refractory cast.

Cast hardening treatment was done. Wax framework for Cast partial denture was designed. Care was taken to achieve coverage of the 33, 35, 43 and 45 overdenture abutments. Wax framework was extended over the mandibular ridge area using bego prefabricated wax pattern with retention holes to aid in mechanical interlocking of acrylic resin (Fig. 4). Framework was casted using ceramic compatible Co-Cr alloy (Fig. 5). After trimming and polishing fit was checked on to the master cast. Framework try-in in patients mouth was done. Denture base and occlusal rims were fabricated. Jaw relations were recorded (Fig. 6), facebow transfer was done and mounted on semi-adjustable articulator.

Extraoral hights tracers were attached and gothing tracing was done. Centric and protrusive records were made and the articulator was programmed.

Ceramic crowns were fabricated on 33, 35, 43 and 45. After Bisque trial glazing was done.

After teeth arrangement, try-in was done in the patients mouth and patients approval taken. During processing of acrylic resin care was taken not to damage the ceramic crowns by covering them with plaster. Acrylisation was done using high impact heat cure acrylic resin (Trevlon) (Fig. 7).

Lab remounting of the denture was done upper single denture and lower overdenture were delivered to the



Fig. 3: Image showing thimble copings irt maxillary arch and telescopic copings i.r.t mandibular arch



Fig. 4: Spruing of the mandibular wax framework



Fig. 5: Framework



Fig. 6: Tentative jaw relations



Fig. 7: Insertion of final prosthesis



Fig. 8: Pre- and post-treatment images of the patient

patient. Patient reported with satisfactory fit and ease of use (Fig. 8).

DISCUSSION

Rationale for an overdenture: From a physiologic view point, the roots not only provide periodontal ligament to support the teeth but also directional sensitivity, tactile sensitivity to load, dimensional discrimination and canine response.

Sensory innervation is as important to the periodontal ligament as to the other components of mastication. The periodontal receptors are related to the activity of masticatory muscles. The sensory input from the receptor helps in increased coordination of muscular contraction, and thereby greater co-ordination mandibular movement. Studies have indicated that bone loss in complete denture wearers were at least 8 times more when compared to overdenture wearers. Better bone preservation in overdentures resulted in better masticatory function and less loss of overall facial height.

*Periodontal consideration in overdenture treatment:*⁶ The periodontal basis for the overdenture is based on the sound physiologic contention that the presence of healthy teeth is essential for maintaining the alveolar ridge. If the functional forces are shared between the teeth and the bone, there appears to be a physiologic stimulus to maintain the bone height. The anatomic basis of the overdenture is the differentiation between basal and alveolar bone. In the absence of teeth, the alveolar bone resorbs, whereas the basal bone is stable. The alveolar bone

requires the stimulation by occlusal function through the Sharpey's fibers to maintain the alveolar crest.

Endodontic considerations: Endodontics may be performed prior to or at the time of the operative appointment. When from teeth remain it is best when prosthodontic therapy is completed prior to endodontic treatment. In conventional root canal therapy, the operator creates the smallest hole so as to conserve tooth structure. In an overdenture obtinent such conservation is not necessary as the abutment teeth are going to undergo reduction. If multiple teeth are to be treated, it is best to treat the teeth of an arch at the same appointment. Endodontic implants may be used to stabilize periodontally weak teeth or teeth with small roots. These implants should not be confused with a prosthodontic implant. The endodontic implant is completely submerged in the tooth and bone.

Problems with overdenture: Certain complications may occur after delivery of the overdenture. The overdenture, itself is not immune to problems. Faulty diagnosis, inadequate examination procedures and poorly executed clinical and laboratory procedures gives dissatisfactory results. The problems usually associated with overdentures are loss of abutment, associated periodontal disease, caries, etc. The clinical problems include inadequate abutment retention, routine use of copings, inadequate follow-up, care and inadequate nutritional guidance.

Overdenture Maintenance

Failure to instruct the patient in the proper care, use and maintenance of the overdenture appliance will increase the chances of breakage of the prosthesis or attachment, or even failure of the entire treatment.

The path of insertion of some attachment fixation prosthesis is critical when there are soft tissue and bony undercuts. The patient should be instructed to nerve bite the prosthesis into position, but to carefully feel it into the position around the undercuts. Similar care should be exercised in removal of the prosthesis also. Make the patient aware that the prosthesis will be seen bulky at first and there is no room for the tongue. This is only a temporary discomfort and that the tongue will adjust. There will be a speech problem at first but it will improve with time and practice.

As with any new prosthesis, the patient can expect a few sore spots. These can be adjusted on the denture. Each patient should be placed on a regular recall program. The patient should also be instructed to keep the prosthesis clean, to brush it daily as well as his retained teeth. A proper technique should also be taught to the patient for proper brushing and cleaning of the prosthesis.

Oral hygiene instructions for substructure and abutment: The tooth brush is one of the main tools for plaque control. Each stud or bar attachment should be brushed in addition to the abutments and copings. Although the tooth brush may clean most areas, some interproximal or other areas of attachment assembly may need the use of floss or interproximal brushes. A soft balsa wood pick called 'strudent' is excellent for removal of plaque around abutment roots. Fluorides, such as stannous fluoride, or acidulated phosphate fluoride can be used by themselves or in combination to protect the abutment teeth from undergoing carious breakdown. Shamon and Cromin have recommended the use of a stable water free 0.4% Su F2 gel for use at bedtime. After a thorough brushing, the gel is brushed on the abutments for 30 seconds. After the gel remains in the patient's mouth for 2 minutes, the patient expectorates but does not rinse. The overdenture should be left out of the mouth in a cleaning solution overnight.

CONCLUSION

Although the overdenture is not a panacea, if fabricated well with good clinical and laboratory expertise, maintained with excellent care, then each overdenture treatment can be a successful one.

REFERENCES

1. Glossary of prosthodontic terms. J Prosthet Dent 2005;94(1): 10-92.
2. Brewer AA, Morrow RM. Overdentures. Made easy. 2nd ed. St Louis: The CV Mosby Co; 1980.
3. Rahn A, Heartwell C. Textbook of Complete Dentures. 5th Ed. Philadelphia: WB Saunders Co; 1993.
4. Preiskel. Overdentures Made Easy. Chapter 2. Quintessence Publications; 1996. p. 21-43.
5. Morrow RM, Rudd K, Eismann HF. Dental Laboratory Procedures, Removable Partial Dentures. 2nd ed. St Louis: CV Mosby Co; 1986. p. 2.
6. Tooth supported overdenture: A concept overshadowed but not yet forgotten. J Oral Res Rev 2015;7:16-21.