

Tooth-Support over Dentures: An approach to Preventive Prosthodontics

Rajul Vivek^{}, TP Chaturvedi^{**}, Atul Bhatnagar^{***}*

Introduction

Over-denture is a complete or removable partial denture that covers and rests on one or more remaining natural teeth, the root of natural teeth, or dental implants. Over-denture offers many advantages over conventional complete dentures in terms of preservation of the remaining alveolar supporting-bone along with increased stability, etc. The presence of a healthy periodontal ligament maintains alveolar ridge morphology, whereas a diseased periodontal ligament, or its absence, might be associated with variable but inevitable time-dependent reduction in residual ridge dimensions.¹

To avoid this, two or more, coronally modified or restored retained-teeth abutments are frequently endodontically prepared and used as abutments for an over-denture. The objective is to distribute stress concentration between retained abutments and denture-supporting soft tissues.^{2,3}

DeVan's golden statement, "Perpetual preservation of what remains is more important than the meticulous replacement of what is missing," still rings true. Over-denture is one of the most practical measures used in preventive dentistry and as a better option in comparison with removable complete denture prosthesis in many ways. Over-denture is indicated in patients with few remaining retainable teeth in an arch.

It is also preferred in patients with malrelated ridge cases, patients needing single denture, patients with unfavorable tongue positions, muscle attachments, or high palatal vault, which render the stability and retention of the prosthesis difficult. This clinical case report describes method of fabricating a tooth-supported over-denture with metal coaping attachments.

Case Report

A 55-year-old female patient reported to the Department of Prosthodontics, Faculty of Dental Sciences, IMS, BHU, Varanasi, with the chief complaint of difficulty in chewing due to missing teeth. There was no relevant medical history affecting prosthodontic treatment. Extra oral examination showed no gross abnormality. Intraoral examination revealed well-formed maxillary and mandibular ridges relationship.

Only 14, 16, 24, 26 teeth were present in the maxillary arch and 33, 43 teeth were present in mandibular arch (Fig.1a, 1b). Radiographic examination revealed good bone support and long roots. The different treatment options available for this patient's both arches were extraction of the remaining teeth followed by conventional complete denture, implant-supported over-denture and tooth-supported over-denture. The patient rejected the option of an implant-retained prosthesis because of the need for additional surgery, the longer duration of treatment phase and related expenditure.

It was planned to construct a maxillary over-denture and a mandibular over-denture with extra coronal attachments. An orthopantomogram (OPG) and diagnostic casts were made (Fig. 2). Wax rims were fabricated on diagnostic casts to determine the approximate vertical dimension of occlusion. Vertical dimension recordings were determined by phonetics and aesthetics. The diagnostic articulation helped in assessing the available inter-arch space and was found to be adequate. It was found to be sufficient for an over-denture with short coapings but less for a bar-supported over-denture. After intentional root canal of 34 and 44, 14, 16, 24, 26, 33, 43 (Fig. 3), they were prepared with tapered round-end diamond point with chamfer finish line made subgingivally.

^{*} PhD Research Scholar, Faculty of Dental Sciences, Institute of Medical Sciences, Banaras Hindu University, Lanka, Varanasi-221005.

^{**} Professor & Head, Department of Orthodontics, Faculty of Dental Sciences, Institute of Medical Sciences, Banaras Hindu University, Lanka, Varanasi-221005.

^{***} Associate Professor, Department of Prosthodontics, Faculty of Dental Sciences, Institute of Medical Sciences, Banaras Hindu University, Lanka, Varanasi-221005.

Correspondence to: Dr. TP Chaturvedi, Professor & Head, Department of Orthodontics, Faculty of Dental Sciences, Institute of Medical Sciences, Banaras Hindu University, Lanka, Varanasi-221005. **E-mail id:** tpchaturvedi@rediffmail.com



Figure 1(a).Intra oral view – Front



Figure 1(b).Intra oral view Maxillary arch



Figure 1(c).Intra oral view Mandibular arch

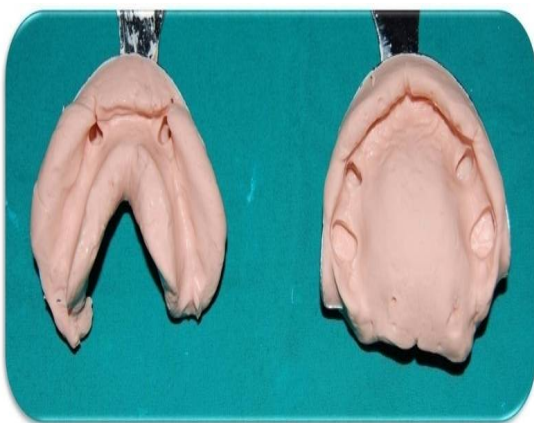


Figure 2.Diagnostic Impression



Figure 3.RCT Treated teeth

Preparation for the post was done 4 mm short of the apical length (Fig. 4a, 4b). Custom post was prepared with the help of a trimmed matchstick with pattern resin (Duralay inlay pattern resin). The coappings were dome-shaped and extra pattern resin was trimmed off. Care was taken to see if there was complete penetration into the prepared canal and no bubbles were present.

These were then sprued and finally casted in base metal alloy (Hera P, Heraeniumat cobalt chromium alloys, Heraeus Kulzer). The coappings obtained were checked for fit in the patient's mouth and finally cemented with glass ionomer cement (Fig. 5). The thickness of the coappings should not be more than 1 mm.



Figure 4(a).Post Space made for metal cooping in maxillary arch



Figure 4(b).Post Space made for metal cooping in mandibular arch



Figure 5.Check for metal cooping

Primary impression for the maxillary and mandibular arch was made with alginate (vignette). The impressions were poured and special trays were fabricated with self-cure acrylic resin. Border molding was done for both the arches with a low-fusing compound (Fig. 6a, 6b). Final impression for both arches was made with a regular body elastomer (Aquasil™ Ultra Monophase DECA, Regular Set-Dentsply, Germany) (Fig. 7). Master casts were prepared by pouring the impressions in Type-IV gypsum (Ultrarock, Kalabhai Karson Pvt. Ltd.) Coappings on the master cast were covered with wax and record

base fabricated after applying separating media. Placement of wax over abutments prevents the fracture of the cast during removal of the temporary record base at the time of dewaxing. Occlusal rims were fabricated; maxillomandibular relations recorded and transferred onto the semi-adjustable articulator with the help of a face-bow. Teeth-setting was done, evaluated in the patient's mouth for phonetics, vertical and centric relation and finally aesthetics. Vertical dimension was verified and centric and eccentric contacts checked (Fig. 8).

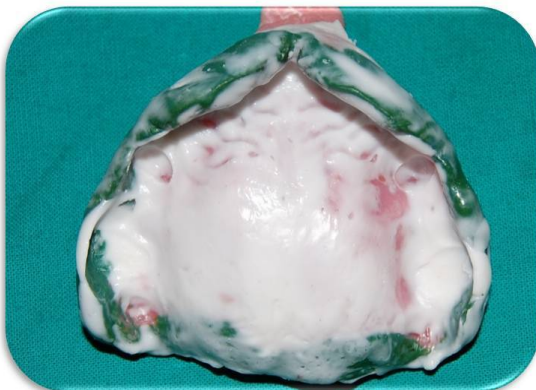


Figure 6(a).Final wash impression maxillary arch



Figure 6(b).Final wash impression mandibular arch



Figure 7. Final Impression

Patient's approval was taken, and the curing of the final denture was done in heat-cure acrylic resin (Lucitone199 denture base material, Dentsply, Germany) (Fig. 9). The denture was delivered (Fig. 10)

and the patient was given instructions about insertion and removal, eating and speaking as well as maintenance of the denture. Periodic follow-up was carried out.



Figure 8. Denture Try-in

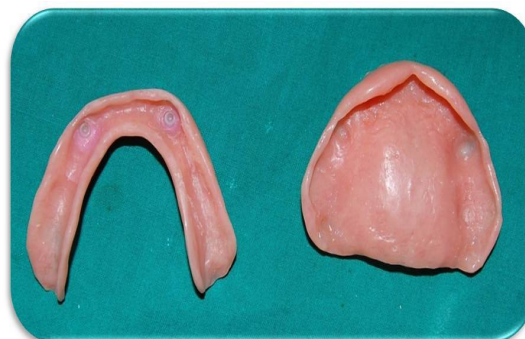


Figure 9. Final prosthesis



Figure 10. Final denture in patient mouth

Discussion

Preventive prosthodontics emphasizes the importance of any procedure that can delay or eliminate future prosthodontic problems and over-denture is an

important part as the preventive treatment modality. Fabrication of tooth-supported over-denture is a step in the direction of preventive prosthodontics.⁴ According to Zarb et al., the advantages of over-dentures include retention and stability, especially the mandibular

dentures.⁵ The maxillary over-denture is of great value when it opposes remaining mandibular anterior teeth, because it aids in conserving the ridge against resorption from masticatory stress. Various techniques used in the treatment of teeth to serve as abutment for over-denture ranges from simple tooth modification and reduction, tooth preparation with cast-cooping to endodontic therapy with amalgam plug or cast-cooping utilizing some form of attachments.⁶ Root canal therapy is a necessary phase of preparation for the selected teeth; single-rooted or double-rooted teeth with readily accessible canals are preferred. Teeth that are mobile because of bone loss can become acceptable for over-denture support when the clinical crown is reduced to near ridge height. The main objective in using tooth-supported over-denture is to preserve the remaining supporting tissue and to restore missing structures in such a way as to provide maximum service for maximum amount of time. A major premise of tooth-supported over-denture treatment is to transfer occlusal forces along the long axis of the supporting tooth, to minimize the horizontal torque and to allow for a more optimum situation for periodontal ligaments.⁷ Rissin et al. in 1978 compared masticatory performance in patients with natural dentition, complete denture and over-denture. They found that the over-denture patients had a chewing efficiency one-third higher than the complete-denture patients.⁸ In case of over-denture prosthesis, proprioception is maintained,⁹ there is the presence of directional sensitivity; dimensional discrimination; canine response and tactile sensitivity.¹⁰ The average threshold of sensitivity to a load was found to be 10 times as great in denture wearers as in dentulous patients.^{11,12} In routine clinical practice, over-denture should also be considered as a treatment modality for a patient who has few teeth left in the oral cavity. Thus it can be said that the application of over-denture is unlimited and its success depends on the dentist's judgment and skill and patient's motivation to maintain good oral hygiene.

Conclusion

Over-denture supported by natural teeth is one of the best treatments available for edentulous condition. In the case report, use of root abutment as an aid to support complete denture is presented. Use of over-dentures has been favored often because of mechanical advantages. Even though the retained teeth may be periodontally compromised, they still may provide sufficient support for the transmission of masticatory pressure and periodontal ligament receptors to initiate

a jaw-opening reflex. A tooth-supported over-denture is very much at the forefront as the treatment modality incorporating preventive prosthodontics concepts is at the core. Let us not forget our basics, rather reinvigorate them and make them a regular part of our clinical practice. To obtain successful over-denture rehabilitation, the dentists must be careful during case selection and abutment preparation and a proper periodic follow-up.

Conflict of Interest: None

References

1. Burns DR. Mandibular implant overdenture treatment: consensus and controversy. *J Prosthodont* 2000; 9: 37-46.
2. Zarb GA, Hobrick J, Eckert S et al. Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-Supported Prosthodontics. 13th Edn. St. Louis: Elsevier, 2012: 290-95.
3. Winkler S. Essentials of Complete Denture Prosthodontics. 2nd Edn. St. Louis: Ishiyaku Euro America, 1996: 384-401.
4. Frantz WR. The use of natural teeth in overlay dentures. *JPD* 1975; 34: 135-40.
5. Dixit S, Acharya S. Benefits of overdentures. *Journal of Nepal Dental Association* 2010; 11: 97-100.
6. Henking JP. Overdentures. *JPD* 1982; 10: 217-25.
7. Warren AB, Caputo AA. Load transfer to alveolar bone as influenced by abutment design for tooth-supported dentures. *JPD* 1975; 33: 137-48.
8. Rissin L, House JE, Manly RS et al. Clinical comparison of masticatory performance and electromyographic activity of patients with complete dentures, overdentures, and natural teeth. *J Prosthet Dent* 1978; 39: 508-11.
9. Thayer HH. Overdentures and the periodontium. *Dent Clin North Am* 1980; 24: 369-77.
10. Manly RS, Pfaffman C, Lathrop DD et al. Oral sensory thresholds of persons with natural and artificial dentitions. *J Dent Res* 1952; 31: 305-12.
11. Loiselle RJ, Crum RJ, Rooney GE Jr et al. The physiologic basis for the overlay denture. *J Prosthet Dent* 1972; 28: 4-12.
12. Pacer RJ, Bowman DC. Occlusal force discrimination by denture patients. *J Prosthet Dent* 1975; 33: 602-609.

Date of Submission: 11th Feb. 2016

Date of Acceptance: 11th Feb. 2016