

SEEING THE UNSEEN : PREVENTIVE PROSTHODONTICS : USE OF OVERLAY REMOVABLE DENTAL PROSTHESIS

* Kalpana.C **Vamsi Prasad.K.

**Professor , Department of prosthodontics, St. Joseph Dental College, Eluru, Andhrapradesh, India*

***Professor, Department of Periodontics, St. Joseph Dental College, Eluru, Andhrapradesh, India*

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 denture with teeth that were badly broken down with periodontal involvement or without the ability to financially support an extensive restorative treatment, those teeth were extracted that could have been retained under more favourable conditions. Retention of the roots of one or more teeth for overdenture offers the patient a lot of advantages like better stability, proprioception, support among a few. The following case report focuses on the merits of using anterior teeth as overdenture abutments to aid in increasing stability of the long span kennedy class IV design removable dental prosthesis.

KEYWORDS: Overdenture, overlay denture, preventive prosthodontics

INTRODUCTION

Preventive prosthodontics emphasizes the importance of any procedure that can delay or eliminate future prosthodontic problems. Retention of the roots of one or more teeth for overdenture offers the patient a lot of advantages like better stability, proprioception, support among a few. The procedure, however is not without its disadvantages. The time and expense incurred are also to be considered. However, overall, the advantages outweigh the disadvantages. When no teeth are available implants offer the same advantages for overdenture support and retention.

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 implants¹ – GPT : 7.

They are also called overlay denture, overlay prosthesis or superimposed prosthesis.

Indications^{2,3,4}

1. Overdentures are indicated when the result of the treatment would be equal to or superior to another line of treatment.
2. Few remaining healthy teeth is also another indication for overdentures.

3. Other indications would be 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.
4. Pronounced vertical overlap required to produce a good esthetic result
5. Retained teeth can be reduced and used to support a removable partial denture
6. Teeth with questionable prognosis can be used as abutments for an overdenture and later, if lost, denture base can be relined.
7. Unilateral overdentures can be given to provide good support, function and esthetics.

Contraindications^{2,3,4}

1. Class III mobility of abutment due to loss of bone that cannot be corrected.
2. Soft tissue and osseous defects which cannot be corrected by surgery
3. Unco-operative patients who do not maintain oral hygiene.
4. Failure to establish a sufficient zone of attached gingiva by mucogingival or grafting procedures.

5. Excessive reduction of the adjacent residual alveolar ridge as a result of elimination of normal architecture.
6. When a patient cannot accept anything other than a complete denture psychologically.
7. 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

Requirements of an overdenture^{2,3,4}:

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.

Advantages^{2,3,4}

1. It is an equally effective or superior method of treatment
2. Simplicity 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.
3. Retaining the teeth helps in preservation of the alveolar bone surrounding it.
4. Overdentures provide a certain degree of proprioception which cannot be expected from complete / partial dentures.
5. The natural tooth stops provide for stable and static base.

6. Patients with congenital defects, such as, left palate, partial anodontia, microdontia, amelogenesis imperfecta etc. can be successfully treatment with an overdenture.
7. Adequate retention is easily attained by overlaying the teeth.
8. Stability attained is greater than the conventional removable dentures.
9. Easy maintenance of the periodontium can be done as the overlay prosthesis can be removed.
6. Patient acceptance is also greater as few teeth are retained and overdenture results in better proprioception, retention, stability and support.
7. Convertibility – Overdentures are designed in such a way that even though the abutment teeth maybe lost, the overdenture can be transformed into a conventional Denture by rebasing or relining.
8. With retained teeth, jaw relation records can be made more accurately as the abutment teeth will help in more stable denture bases.

Disadvantages^{2,3,4}

1. The construction of an overdentures is costlier due to the endodontic therapy required and the subsequent restoration of there teeth with alloys or gold copings.
2. 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.
3. 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.
4. Sometimes because of the undercuts, the denture will be overcontoured resulting in excessive fullness of the lips. At other times the denture flanges will be undercontoured for it to fall into place. Therefore proper patient selection is required.
5. Sufficient inter ridge space is essential
6. An overcontoured flange which disturbs the natural fullness of lip can cause compromised esthetics. This overcontoured 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.

7. Many patients are apprehensive about wearing anything that is removable and hence may not accept overdenture treatment completely.

case report:

A fifty year old male patient reported to the department of prosthodontics with the chief complaint of dislodged fixed prosthesis and inability to chew food. On examination there were missing 31 32 34 35 36 41 42 44 45 46 abutment teeth 33 43 were supporting dislodged acrylic fused to metal fixed dental prosthesis 31 32 33 41 42 43. Radiographs and clinical examination revealed abutment teeth 33 and 43 to be periodontally sound and vital (Fig.1). Remaining teeth 37 38 47 exhibited attrition. Patient wanted restoration of his dentition with minimal intervention. Patient was presented with the option of long copings over the right and left canines without endodontic intervention as the teeth were vital. Full metal crowns were planned for teeth 37 and 47 as they had undergone attrition as they were primary abutments for overdenture support. The following protocol of the treatment was given

- Diagnostic impressions were made using irreversible hydrocolloid and special tray fabricated with autopolymerising resin.
- Teeth 33 43 were prepared to receive copings and 37 47 were prepared to receive full metal crowns (Fig.2). Final impressions were made using heavy bodied and light bodied addition silicone impression material.
- Centric jaw relation record was made and casts mounted on an arbitrary articulator. Wax patterns were milled using a dental surveyor and rest seats incorporated in to the design. The metal crowns were cast using co-cr and returned to the surveyor to be resurveyed for final path of insertion.
- The master cast was blocked out with the crowns and copings in place. Long copings 33, 43 were left uncovered. After duplication refractory cast was obtained. Cast partial framework was waxed up. Care was taken to achieve coverage of the canine overdenture abutments (Fig 3 and 4). Framework was cast in co cr alloy. After trimming and polishing it was fitted on to the master cast. (Fig.5)
- At the next clinical appointment the crowns and copings were cemented in the patients mouth using type 1 glass ionomer cement. The

framework was tried in the patient's mouth for final fit. (Fig 6)

- Temporary denture base was fabricated on the framework. Border moulding of the edentulous region was done using green stick tracing compound. And final impression made with light bodied addition silicone impression material. A pickup impression was made with irreversible hydrocolloid to obtain an altered cast. Jaw relation record was made with occlusal rims on the framework⁵. (Fig. 7)
- The altered casts were mounted on an articulator. Wax try in was done in the patients mouth and patients approval taken. Acrylisation of the cast partial denture was done using heat cure acrylic resin.
- Lab Remounting of the denture was done and removable partial denture was delivered to the patient. Patient reported with satisfactory fit and ease of use. (Fig.8 and Fig.9.)

Discussion:

Rationale for an overdenture^{3,4}: 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 co-ordination 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 as much as bone loss in overdenture wearers. Better bone preservation in overdentures resulted in better masticatory function and less loss of overall facial height.

Classification of overdentures²

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

- 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

Removable partial overdenture: A superior removable partial overdenture can be made for many patients by reducing some of the teeth coronally so that the teeth can be fabricated over them. There are several advantages to this method. The crown root ratio is improved. Teeth with minimal bone support may be retained indefinitely. Endodontic procedures are not always required. In the presence of a furcation involvement in a posterior tooth, section can be done and one or two roots can be maintained.

Periodontal consideration in overdenture treatment⁶: 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 fibres 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 endodontic 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 abutment 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.

Applications of overdenture

Besides complete denture therapy, the overdenture has application in treatment of other defects or conditions. They are:

1. Congenital and acquired defects like cleft palate, amelogenesis imperfect, dentinogenesis imperfect, partial anodontia, etc.,
2. Partial overdenture : The use of an overlaid tooth that might otherwise be extracted to give support to a distal extension base or provide support to other anterior part of a denture renders obvious support advantage.
3. Immediate and interim dentures: The use of copings increases the support to the immediate or interim overdentures. It also makes the transition from the dentulous to the edentulous state with greater ease.
4. Implant supported overdentures : A wide variety of implants are in use these days and overdentures are used in combination to offer a better treatment experience to the patient. Although implants are more often used with the fixed type of prosthesis, on occasion, single or double fixtures are used on either side of the midline to retain a prosthesis.

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 unsatisfactory 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 removable 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



Fig.1. periodontally healthy abutments



Fig.2. Coronal preparation of abutments



Fig.3. Blocked out master cast with the crowns and copings in place



Fig.4 .waxing up of Cast partial framework



Fig.5. Cast partial framework



Fig.6. Try-in of framework



Fig.7. Final impression.



Fig.8. Initial Try-in



Fig.9. initial placement



Fig.10. Delivery to the patient



Fig.11.Overdenture undersurface



Fig.12. Overdenture occlusal surface

issue 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 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. There 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 crushing 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 patients mouth for two 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. *Journal of Prosthetic Dentistry*, Volume 94, Issue 1, Pages 10-92
2. **Brewer A.A. and Morrow R.M. Overdentures**.made easy, 2nd Ed, The C. V. Mosby Co, St. Louis, 1980
3. Rahn A, Heartwell C. *Textbook of Complete Dentures*, 5th Ed. WB Saunders Co., Philadelphia, 1993,
4. Preiskel. *Overdentures Made Easy*. Chapter 2 Chapter 3, pp. 21-43, , pp.45-65.
5. Morrow RM, Rudd K, Eismann HF: *Dental Laboratory Procedures*, Vol. 2: *Removable Partial Dentures*, 2nd Ed. St. Louis: CV Mosby Co, 1986;
6. *Periodontal reactions related to removable partial dentures*. Bergman B A Literature Review. *J Prosthet Dent* 1987;58:454-458.

Corresponding Author:

Dr. K. Vamsi Prasad

Professor of Periodontics

vamsi Dental hospital,

Agraz plaza, R.R. peta,

Eluru, Andhrapradesh

.E-mail:kancherlavamsi@yahoo.com