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Dr. Savitha Dandekeri
Professor, Yenepoya Dental
College, Department of
Prosthodontics, Mangalore,
Karnataka, India

Dr. Fahad Mohammad
Reader, Yenepoya Dental
College, Department of
Prosthodontics, Mangalore,
Karnataka, India

Dr. Tanya
Final Year Post Graduate
Student, Yenepoya Dental
College, Department of
Prosthodontics, Mangalore,
Karnataka, India

Dr. Sanath Shetty
Professor and HOD, Yenepoya
Dental College, Department of
Prosthodontics, Mangalore,
Karnataka, India

Dr. Nilina Dilip
Final Year Post Graduate
Student, Yenepoya Dental
College, Department of
Prosthodontics, Mangalore,
Karnataka, India

Corresponding Author:
Dr. Tanya
Final Year Post Graduate
Student, Yenepoya Dental
College, Department of
Prosthodontics, Mangalore,
Karnataka, India

A case report on tooth-supported overdenture with an extra-radicular attachment

Dr. Savitha Dandekeri, Dr. Fahad Mohammad, Dr. Tanya, Dr. Sanath Shetty and Dr. Nilina Dilip

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Abstract

Introduction: Over-dentures are the most commonly used treatment for elderly patients who still have two or more teeth in their arch. When using coping or attachment over the remaining part of the tooth, the root of the remaining teeth preserves the alveolar ridge, provides sensory sense, and improves the stability and retention of the denture when compared to conventional complete dentures. This report presents a case of rehabilitation of partially edentulous 55 year old male patient who had a chief complaint of poor esthetics and difficulty in chewing due to missing teeth.

Method: Considering the age of the patient and the cost involved, implant supported prosthesis was ruled out as a treatment option for the patient. A tooth supported overdenture was chosen as a favorable treatment option since it overcomes many of the problems posed by conventional complete dentures. Extra- radicular attachments were used to improve the retention and stability.

Result: Evaluation of occlusion, esthetics, phonetics and comfort after 24 hours, 1 week and 1 month, 6 months of treatment showed that the patient was satisfied with the prosthesis.

Conclusion: The denture's stability and retention are improved on using tooth-supported over-denture retained with extra-radicular attachment. This treatment option provides improved chewing efficiency, patient comfort and reduce the residual ridge resorption.

Clinical Significance: Prosthetic rehabilitation by means of tooth supported overdenture maintains the integrity of residual alveolar ridge, provides more bone support and helps in preservation of sensory input by facilitating enhanced occlusal awareness, biting force and neuromuscular control from the periodontal tissue.

Keywords: Attachment, tooth-supported over-denture, resorbed ridge, extra-radicular, conventional complete denture, retention, stability

Introduction

Preventive Prosthodontics emphasises the importance of any procedure that can postpone or eliminate future prosthodontic problems, and over dentures play an important role as a preventive treatment modality. A complete denture patient experiences a chain of events that includes loss of discrete tooth proprioception, progressive loss of alveolar bone, transfer of all occlusal forces from the teeth to the oral mucosa, and the most depressing sequel, loss of self-confidence [1].

Overdentures are recommended for patients who have few remaining retainable teeth in an arch. It is also preferred in patients with mal related ridge cases, patients who require a single denture, and patients who have unfavourable tongue positions, muscle attachments, and a high palatal vault, which make prosthesis stability and retention difficult [2-5].

An over-denture slows the resorption process, increases denture foundation area, and improves masticatory efficiency. An overdenture is unquestionably a better option than a removable complete denture prosthesis, which certainly has drawbacks. Renner et al. discovered that 50 percent of the roots used as over-denture abutments remained immobile [6] after a four-year study. In overdenture treatment, the teeth are included as part of the residual ridge. An important periodontal requisite with over denture abutment is adequate zone of attached gingiva [3, 7, 8]. Tooth-supported overdenture treatment options are boundless and there are innumerable options to choose from for different cases.

Case Report

A 55 year old male patient reported to the Department of Prosthodontics with the chief complaint of missing teeth in the upper and lower front and back teeth region since 6 months. The patient gave a history of several decayed teeth for which he had undergone uneventful extractions in the last 2 years. He had difficulty in mastication and was concerned about his esthetics and wanted his teeth to be replaced.

Intra-oral examination revealed that the maxillary arch was totally edentulous and the mandibular arch was partially edentulous (Kennedy Class I Modification 1) (figure 1). The remaining teeth were mandibular canines and premolars (33, 34, 35, 43, 44) with normal alveolar ridge mucosa. The maxillary residual ridge was favorable with adequate bone height, width, and favorable palatal form, while mandibular ridge was moderately resorbed.

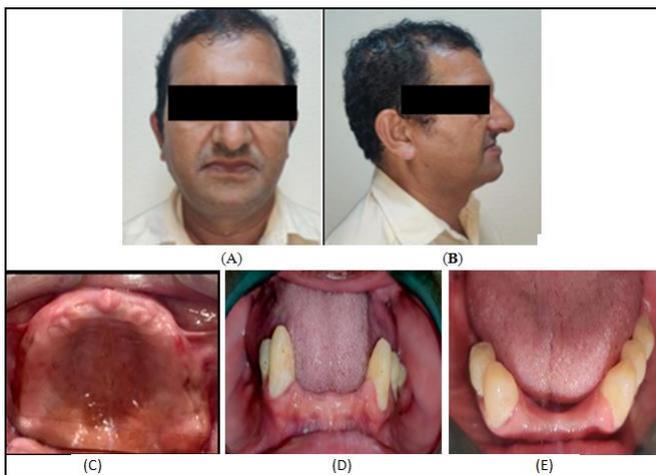


Fig 1: Pretreatment Photographs: Facial Profile (A) Front, (B) Side. Intraoral Photographs (C) Maxillary Arch, (D) Mandibular Arch, (E) Remaining natural Teeth.

After thorough evaluation; clinical and radiographic, (figure 2) it was decided to retain the mandibular teeth (33, 35, 43, 44), following patient concern, tooth supported overdenture for mandibular arch and conventional complete denture for maxillary arch.



Fig 2: Orthopantomogram Radiograph

Diagnostic impressions were recorded using irreversible hydrocolloid impression material; alginate (tropicalgin; Zermack) for the edentulous maxillary and partially edentulous mandibular arches. Custom tray was fabricated on the diagnostic model using auto polymerizing resin for the maxillary arch. Final impression of the maxillary arch was recorded after border molding using low fusing impression compound by ZNO-Eugenol.

The mandibular canines and premolars were already endodontically treated and obturated. One size drill was used to prepare the radicular space for the ball attachment after removal of the gutta-percha from the root leaving one-third of the material in the apical portion, for the placement of the ball attachment within the root surface. Once adequate post space on mandibular canines and premolars were created, final impression of the mandibular arch was made and copings with ball attachments were fabricated (figure 3).



Fig 3: Fabrication of Wax pattern with ball attachment attached to the pattern.

These ball attachments were then inserted individually into each canal for evaluating the fit and cemented by resin cement (figure 4).



Fig 4: (A) Metal Copings with ball attachment, (B) Cementation of Ball attachments.

Temporary record bases and occlusal rims were fabricated for recording the maxilla- mandibular relations. After face bow transfer the established records were transferred to semi adjustable articulator (figure 5), and arrangement of teeth was done with the biomechanical principles to achieve bilateral balanced occlusion. After try-in verification (figure 6), maxillary and mandibular dentures were processed using the conventional methods of processing.

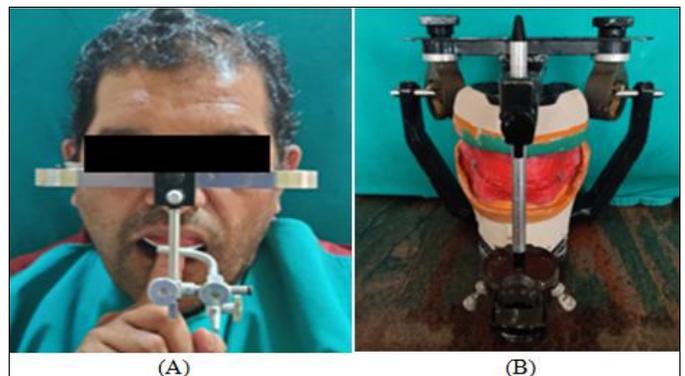


Fig 5: (A) Facebow Transfer, (B) Semiadjustable. Articulator



Fig 6: Try- In Verification

Bilaterally, the intaglio surface of the mandibular denture were marked by indelible pencil in the area of ball attachment in canine and premolar and relieved by using carbide burs to incorporate the female component (nylon housing). The female component was attached to the mandibular dentures after picking them up from the male components in the corresponding relieved areas (figure 7).

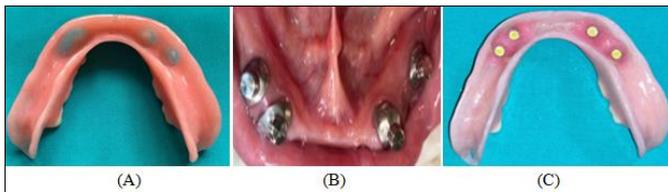


Fig 7: (A) Recess created in the region of overdenture abutments, (B) Female component placed over Abutments, (C) Female components picked up and incorporated in the denture.

Excess resins from the intaglio surface were trimmed, finished, and polished dentures were then inserted in the patient's mouth providing support and proprioception. (Figure 8).



Fig 8: Post treatment Photographs: Intraoral (A) Frontal, (B) Left Lateral, (C) Right Lateral, Extraoral (D) Frontal, (E) Smile.

Patient was recalled after 24 hours and evaluation of denture was done to evaluate esthetics, phonetics, function and comfort of patient. Patient had recall appointments after 1 week, 1month and every 6 months with the satisfactory clinical outcome.

Discussion

The prospect of losing all the teeth can be very disturbing for a patient, bringing down patient's morale as it is an in direct reminder for being dependent on others and losing senescence. In such conditions, overdenture option as preventive prosthodontic treatment modality should be regularly imbibed in our dental practices because of its innumerable advantages. Crum and Rooney [1] graphically demonstrated in a 5 years study that an average loss of 0.6 mm of vertical bone in the anterior part of the mandible of overdenture patients through cephalometric radiographs as opposed to 5.2 mm loss in complete denture patients.

Overdenture helps reduce shrinkage of surrounding bone, reduces pressure on the alveolar ridge and proprioception is

maintained [9]. There is the presence of directional sensitivity; dimensional discrimination; canine response and tactile sensitivity [4]. The average threshold of sensitivity to a load was found to be 10 times as great in denture wearers as in dentulous patients [5, 6]. 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 [7]. Overdenture with attachments can redirect occlusal forces away from weak supporting abutments and onto a soft tissue or redirect occlusal forces toward stronger abutments thereby resulting in superior retention [8-9].

Overdenture attachments are classified either as studs, which connect the prosthesis to the individual tooth or as bars which connect the prosthesis to the splinted abutment teeth. They are further classified as rigid or resilient. However, since edentulous ridges and the remaining roots are often compromised, the prosthesis that relies on resilient attachments is better able to divert occlusal forces away from weak abutment teeth.

Conclusion

Although there are additional costs and appointments associated with this technique, tooth supported over dentures provide a better prognosis than a conventional complete denture. Removable over dentures with extra-radicular attachments improve retention, stability, support, stable occlusion, and proprioception, which improves chewing efficiency and phonetics. It also reduces the rate of residual ridge resorption by converting compressive forces to tensile forces and improving stress distribution. Despite the increased use of implants for overdenture therapy, tooth/root supported over dentures continue to be an excellent treatment option.

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