Bar splinted tooth supported mandibular overdenture – A case report

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ABSTRACT

Maintenance of the bone anatomy requires a certain amount of daily stress/strain stimulus. Loss of teeth leads to alveolar ridge resorption, inefficient mastication, altered speech, and lowered confidence. When few firm teeth are present in an otherwise compromised dentition, they can be retained and used as abutments for overdenture fabrication. This helps improve the retention and stability of the final prosthesis significantly. The concept of conventional tooth-retained overdentures is a simple and cost-effective treatment than the implant overdentures. Conventionally, complete denture was the treatment of choice. Preventive prosthodontics aims at avoiding complete edentulism. Advances in technology have introduced attachment retained overdenture which act as stress redirector and shock absorber and also offers several advantages over complete denture such as superior retention, support, stability, psychological benefits, and proprioception. This article presents a case report that describes the steps involved in a bar splinted cast copings tooth supported mandibular overdenture with a 1-year follow up.

KEY WORDS: Attachment, Bar splinted, Cast copings, Overdenture, Preventive prosthodontics

INTRODUCTION

Alveolar ridge resorption is the usual consequence of tooth loss. The fundamental principle of bone physiology is the adaptation of the bone mass and structure according to the levels of strain. The maintenance of the bone anatomy requires a certain amount of daily stress/strain stimulus.[1] Loss of teeth also leads to ineffective mastication, altered speech, and lowered self-confidence.[2] Resorbed ridge poses a challenge to dentists. Conventionally, complete denture was the choice of treatment. However, patients frequently complain about the retention and stability of the prosthesis.[3] Extraction of the few remaining natural teeth and replacement with complete dentures create a new situation for the patient to adapt.[4] Prothero in 1916 mentioned that “oftentimes two or three widely separated roots or teeth can be utilized for supporting a denture.”[5] Preventive prosthodontics emphasizes on procedures that either delay or eliminate inevitable problems. Preventive prosthodontics aims at avoiding complete edentulism. It projects overdenture as one of its treatment modality.[3,5] Moreover, many patients who seek denture treatment, present with two or more remaining natural teeth in the oral cavity. Overdenture utilizes abutment tooth for support, stability, and retention. Uses of attachment in abutment tooth are an advancement in overdenture treatment.[5] The choice of attachment is based on the number and location of the remaining natural tooth and also the clinicians’ experience.[5,6] According to GPT 8, overdenture is a removable partial or complete denture that covers and rests on one or more remaining natural teeth, roots, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, tooth roots, and/or dental implants. It is also called as overlay denture, overlay prosthesis, and superimposed prosthesis.

Advantages of Overdenture with Attachment[7]

- Redirect occlusal force toward stronger abutment
- Acts as a shock absorber
- Stress redirection
- Superior retention
- Stability
- Support
- Preservation of the alveolar ridge
- Proprioceptive stimulus
• Economical
• Psychological benefits.

In this case, bar splinted cast copings were used in the overdenture. In addition to providing retention, bars also splint the abutment tooth spanning the edentulous ridge.

CASE REPORT

A male patient with the age of 55 years reported to our clinic with a chief complaint of inability to chew due to missing teeth in upper front and back tooth region of jaw. On clinical examination, the mandibular arch had only five remaining teeth (41, 42, 31, 32, and 33), and maxillary arch had only two remaining teeth 11, 12 which were periodontally weak and were extracted [Figure 1]. After diagnosis, the following treatment options were explained to the patient for replacing the missing teeth:
1. Extraction of remaining teeth followed by complete denture
2. Tooth supported overdenture
3. Implant supported overdenture.

The patient was not willing for the extraction of the remaining teeth in the mandibular arch since he wanted to retain his natural teeth. Hence, the patient chose tooth supported overdenture in mandibular arch and conventional complete denture in maxillary arch as the treatment since it allowed the retention of natural teeth and was also economically feasible.

Treatment Course

Intentional root canal therapy was performed on the abutment teeth: 31, 32, 33, 41, and 42. Tooth preparation was carried out on all abutment teeth with a heavy chamfer finish line. Thus, optimal crown root ratio was obtained along with adequate clearance for the overdenture prosthesis [Figure 2]. Custom tray was prepared and border molding done using green stick compound. Impression was made with two-step putty wash technique using addition silicone. (Aquasil Lv Ultra, Smart Wetting Impression Material, Dentsply, Detrey Gmbh, Konstanz, Germany). After beading and boxing, the cast was poured in die stone (Ultrarock, Kalabhai Karson Pvt. Ltd., Mumbai, India). Inlay wax pattern coping was fabricated on the abutment teeth with a prefabricated plastic bar of 2 mm thickness. Casting of the inlay coping and bar was done, and it was finished and polished [Figure 3]. The metal bar and copings were initially tried on the patient. Passive fit was verified [Figure 4]. After metal try-in, the undersurface of the bar was blocked and the whole assembly was duplicated using rubber base impression material (Aquasil soft putty, Dentsply, Mumbai, India). Cast was poured. After this, the metal copings were luted with glass ionomer cement (Dentsply Aquacem, York) to their respective tooth preparations [Figure 4]. The remaining steps up to try-in were followed similar to complete denture. In the laboratory, metal superstructure was placed on the duplicated master cast and the undersurface blocked to avoid resin flow. The complete prosthesis incorporated with super metal structure was fabricated.
The bar splinted tooth supported prosthesis was inserted [Figure 5]. The patient was trained to insert and remove the prosthesis. Post-insertion instructions were given. Denture hygiene protocol was discussed with the patient. A 1 week, 3 months, 6 months, and 1-year follow-up revealed well functional and retentive denture. The patient was satisfied with the function, esthetics, and retention.

DISCUSSION

Overdenture treatment is focused under preventive prosthodontics. Retaining the remaining natural tooth/tooth root prevents the ridge resorption. Tensile stimulation of the periodontal ligament fibers allows bone deposition, and hence chances of abutment tooth mobility are lowered. On comparison with complete dentures, overdenture provides better chewing efficiency, increased biting force, and controlled movement. Technical advancements and expanding knowledge have introduced attachment retained overdenture. Attachments act as stress redirector and shock absorber. In this case, bar splinted cast copings were used. Bar attachments not only provide retention but also splints the abutment teeth. Stud attachments are more time consuming and relatively expensive. They also undergo rapid wear and damage. Attachment selected for retention and oral hygiene determines the success of the procedure. For this case, there was sufficient interarch space, so the use of the customized bar joint with cast copings offers increased stability and retention. It has been proved that reducing abutment to 1.5–2 mm above gingival margin reduces the crown-root ratio and thus reducing mobility by 40%. As the bar is close to the alveolar bone, forces of mastication exert much less leverage to the teeth. The bar joint offers slight vertical and rotational movement of the denture as well as a stress breaker action. Bar exhibits more cross-arch involvement and allows occlusal forces to be shared between the abutments. Since there was adequate interarch space, so the thickness of the acrylic denture over the copings and bar assembly was not compromised. Customized bar assembly calls for perfection both at the dentist and technician level, so it is challenging to execute, but the results are worth the effort. The following are to be considered during overdenture treatment: (a) Vertical space assessment—sufficient space should be available for the coping, denture base, and denture teeth, (b) oral hygiene status of the abutment teeth, and (c) periodontal status of the remaining teeth. Overdenture obtains the dual support of both residual alveolar ridge and abutment teeth. Mechanoreceptors of the periodontal ligament influences bone deposition and masticatory muscles. Hence, conservation of the remaining natural teeth is valid.

CONCLUSION

The success of the tooth supported overdenture treatment depends on the proper selection for the particular case. Tooth supported overdenture is advisable over complete denture since it offers several advantages such as superior retention, stability, and proprioception. However, the choice of attachment and the oral hygiene status of the patient determine the outcome. Overdenture requires regular follow-up and maintenance. Patient education on oral hygiene plays a key role. Thus, retention of remaining natural teeth can either delay or eliminate complete edentulism.

REFERENCES