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THE USE OF IMPLANT O-RING ATTACHMENT TO ENHANCE RETENTION OF TOOTH SUPPORTED OVERDENTURE- A CASE REPORT

Prosthodontics

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ABSTRACT

Retaining teeth for overdenture is an old concept and a viable treatment modality. Overdentures provide better function than conventional complete dentures through a variety of factors, such as improved biting force, chewing efficiency and increased speed of controlled mandibular movement. Use of attachment and adherence to basic principles of complete denture design can improve both retention and stability of overdenture. The use of attachments can redirect occlusal forces away from weak supporting abutments and onto soft tissues, or redirect occlusal forces toward stronger abutments and away from soft tissues. This clinical case report describes use of metal runner bar framework and O- ring resilient stud attachment for retaining tooth supported overdenture.

KEYWORDS

Overdenture, O-ring attachment, Bar, Retention.

CASE REPORT

A 62 year old male patient reported to Department of Prosthodontics for replacement of his missing teeth. Patient's detailed medical history revealed he had no systemic disease. The dental history revealed that the teeth were extracted due to periodontal disease around 4 months back. Intraoral examination revealed that the maxillary arch was completely edentulous and in mandibular arch both canines i.e. 33 and 43 were remaining.

The maxillary residual ridge was favorable with adequate bone height and width, and favorable palatal form, while mandibular ridge was moderately resorbed. Interarch space was adequate. After clinical and radiographic evaluation a treatment plan was formulated to preserve both mandibular canines i.e. 33 and 43 and fabricate tooth supported overdenture using implant O- ring attachment to enhance retention. Conventional complete denture was planned for maxillary edentulous ridge. Treatment plan was explained to the patient and informed consent was obtained.

TECHNIQUE

1. Elective endodontic and periodontal treatment was carried out with both the mandibular canines i.e. 33 and 43.
2. 33 and 43 were prepared in a dome shaped contour and hemispherically rounded in all dimensions. The height of the abutment teeth was 3-4 mm projecting just above the gingiva and the exposed dentin of the abutment was polished and treated with fluoride varnish.
3. Rubber base impression (Virtual, Ivoclar vivadent, Germany) was made and the cast was fabricated for wax pattern fabrication for the stud attachments.
4. The O-ring system (Adin, Gmbh Germany) which is used in implant overdenture was selected. The male component of the stud attachment was duplicated and pattern resin laboratory analog posts were fabricated. The metal housing with the silicone O-ring fitted well to the duplicated pattern resin laboratory analog post.
5. The wax copings for the abutment teeth were connected using a connector and the duplicated pattern resin laboratory analog posts were attached on the runner bar. Three stud attachments were placed. One stud attachment was placed distal to 33 and another was placed distal to 43, remaining one stud attachment was placed between 33 and 43 equidistantly. The studs were placed parallel to each other and perpendicular to occlusal plane. Casting of the framework was done in Co-Cr alloy (Colado CC, Ivoclar Vivadent, Germany) following standard technique.
6. After finishing and polishing of the metal framework, it was luted to the abutment teeth using resin cement (Multilink N, Ivoclar Vivadent, Germany) (figure 1).

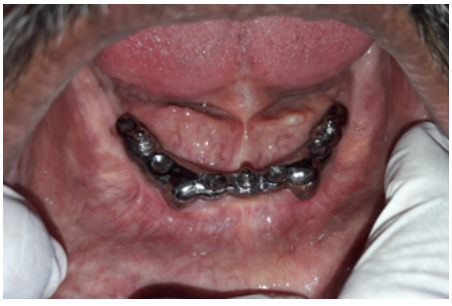

Fig. 1: Metal framework was luted to the abutment.

7. The final impression was made with elastomeric impression material (Aquasil Monophase, Densply) and the laboratory analog placed in the impression and cast was poured in dental stone (Gold stone, Asian chemicals, Rajkot, India).
8. On the casts, metal housing with the silicone O-ring was placed on the laboratory analog, necessary relief block-out was done around the attachment for easy removal and temporary record base and occlusal rims were fabricated and jaw relations were recorded using conventional techniques and teeth arrangement was done.
9. After satisfactory trial, the trial dentures were invested and de-waxing was carried out. The O-rings were retrived from temporary base and were placed on abutment analog and blockout was performed beneath the O-ring (fig. 2). Heat cure acrylic resin (DPI, Mumbai) was packed and curing was done. Finishing and polishing of dentures was carried out in standard manner. Relief was provided around the O-ring and runner bar framework area (fig. 3).

Fig. 2. Block-out of master cast

Fig. 3. Tissue surface of the denture fabrication.

10. Finally the dentures were inserted in patient mouth and the patient was instructed regarding insertion, removal and hygiene and maintenance regimen.

DISCUSSION

"It is more important to preserve what that already exists than to replace what is missing" as stated by MM Devan (1952) has never been challenged or disapproved. Extraction of all natural mandibular dentition and subsequent replacement with a complete mandibular denture is not the most desirable treatment option. Tooth supported overdentures provide better function than conventional complete dentures through a variety of factors, such as improved biting force, chewing efficiency by 20% as compared to conventional complete denture[1], The increased speed of controlled mandibular movement and strongly strengthen the psychological factors of patient[2]. Nadira Saba et al[3] stated that there are two physiologic tenets related to overdenture therapy: the first concerns the continued preservation of alveolar bone around the retained teeth while the second related to the continuing presence of periodontal sensory mechanism that guide and monitor gnathodynamic functions. Bone maintenance is the most significant advantage of a tooth-borne mandibular complete overdenture treatment because the maintenance of bone volume and vertical height can produce improved prosthesis retention and stability[4].

Many factors such as proper border extensions, adhesion, neuromuscular control, etc. contribute to the retention of overdenture; still overdenture attachments play a important role[5]. Advantages of attachments are that they can redirect occlusal forces away from weak supporting abutments and onto soft tissue, or redirect occlusal forces toward stronger abutments and away from soft tissues. Attachments may also be classified as resilient and nonresilient attachment[6]. Among the resilient stud attachments, most commonly used attachment system is O-ring attachment system which comprises of a male post, silicone O-rings and a metal housing[7,8,9] . O-rings are elastomeric retentive attachments, usually made of silicone and shaped like the inner tube of a tire. They are held within metallic retaining rings with undercut grooves. The O-ring is used to increase retention of implant complete and partial overdenture prostheses[10]. They possess a number of advantages, including ease of use and maintenance, low cost, and possible elimination of a superstructure bar. Few disadvantage of O – rings are that they fail due to the combined adverse effects of stress and environmental factors (friction, heat, and swelling). O-rings generally last from 6 to 9 months, depending on the complexity of the prosthesis, the chewing and dietary habits of the patient, and the ease of insertion and removal of the prosthesis[10].

In the present case report, a runner bar and O-ring retained mandibular overdenture was fabricated to enhance denture retention. A runner bar attachment stabilizes and strengthen the abutment teeth by providing a splinting mechanism and dissipate the occlusal forces evenly to the underlying abutment teeth and residual ridge. The metal runner bar also provides cross arch stabilization and has adequate flexural and torsion strength to prevent the lateral forces transmission to the abutment teeth. In this case report, three O-ring studs were placed equidistantly on the metal bar. One was placed distal 33 and another was placed distal to 43 and reaming one O- ring stud was placed exactly between 33 and 43. This design gave additional retention in anterior and posterior region and improved biomechanics of prosthesis. This design also relieved the abutment teeth from the overload by redirected occlusal forces away abutment teeth and thus improving the periodontal health of abutment teeth and long term prognosis of treatment.

CONCLUSION

Lack of retention of mandibular dentures is the common complaint of completely edentulous patients. Tooth borne mandibular complete denture has many advantages like preservation of alveolar bone and improved retention and stability of the denture. Incorporation of attachments in overdenture like O-ring studs another dimension in dental treatment planning and patient satisfaction.

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