

Case Report

Tooth Supported Overdenture with Ball Attachments and Copings: A Case Report

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Received - 24 February 2022

Initial Review- 01 March 2022

Accepted -10 March 2022

ABSTRACT

Complete edentulism can mark the beginning of certain unwanted changes of which the most significant is bone resorption. Tooth supported overdenture can enhance bone preservation, maintain proprioception and gratify the patient in terms of retention. In this article, a case report is discussed where tooth supported overdenture with ball attachments and copings are chosen. An overdenture with attachments has been shown to improve the clinical longevity of the retained teeth and thus imparting long term success in these cases.

Key words: Ball Attachments, Copings, Implants, Overdenture.

As the field of implant dentistry is soaring high, there is no doubt that the age-old notion of conventional complete dentures is being replaced by implant supported prostheses. Undoubtedly, the retention and stability offered by implant supported prostheses are far superior to the conventional complete dentures, yet the anatomical, financial, and medical constraints associated with implants can never be overlooked.

DeVan's golden statement: "Perpetual preservation of what remains is more important than the meticulous replacement of what is missing" still holds true. In the quest of preserving the existing dentition, the most often overshadowed treatment modality- Tooth supported overdenture comes to the limelight. The idea of conventional tooth-supported overdentures is a modest and cost-effective treatment when compared to implant overdentures [1] and is definitely a better option to the conventional complete denture in terms of retention and pace of future bone resorption that can occur in completely

edentulous patients. This article describes a case report in which overdenture with ball attachment as well as copings were used to successfully rehabilitate an edentulous mandibular arch.

CASE DESCRIPTION

A 51-year-old female patient visited the Department of Prosthodontics with a chief complaint of difficulty in chewing due to missing teeth. Her medical history revealed that she was diabetic and controlled with medication. Upon careful intraoral examination, it was revealed that maxillary arch had 14,13,12,11,21,22,23 and 24. In the mandibular arch, 33, 35, 43 and 45 were present (Fig. 1 and 2). On subsequent radiographic examination, the teeth present had adequate bone support and no signs of underlying pathosis. Different treatment options such as implant-supported fixed partial denture implant supported overdenture, tooth supported overdenture, and removable partial denture were explained to the patient. Considering the patient's economic status, a mandibular tooth

supported overdenture and maxillary removable partial denture were finalized for the patient.

Preliminary impressions were made with alginate and diagnostic casts were fabricated for further evaluation. Considering the interarch space availability, it was decided to give ball attachments for 33 and 43 whereas metal copings were planned for 35 and 45. In order to obtain a favorable crown root ratio for metallic copings and ball attachments, it was decided to proceed with intentional root canal treatment of 33, 35, 43 and 45. (Fig. 3)

Tooth preparations were carried out in mandibular teeth after the endodontic treatment of the same. Post and core patterns were made with pattern resin, and plastic pattern of ball and socket attachments was attached. Impression of the mandibular arch was made with addition silicone after adequate gingival retraction. The mandibular casts procured were sent to the laboratory for the fabrication of attachments.

After an adequate fit of metal copings and ball attachments were ensured, they were cemented to their respective abutments using GIC luting cement (Fig: 4). Customized special trays were fabricated with self-cure acrylic resin for maxillary and mandibular arch. Border molding was done using low fusing impression compound and final impressions were made with light body addition silicone impression paste to obtain master casts.

Record denture bases were fabricated on the master cast after adequate block out of abutments with wax. Occlusal rims were fabricated and jaw relation was recorded. The obtained maxilla-mandibular relation was transferred onto a semi-adjustable articulator with the help of face bow. The teeth arrangement was done. The centric relation, vertical relation, phonetics and esthetics were evaluated in the patient's mouth (Fig. 5). On satisfaction of the patient, the dentures were fabricated using heat cure acrylic resins. Circumferential clasps were incorporated on 14 and 24 for retention of the maxillary prosthesis.

Post finishing and polishing along with occlusal equilibration was done followed by insertion of the final prosthesis. Post insertion instructions were informed to the patient to improve patient compliance. When the patient was comfortable with both the dentures, space was created in the mandibular denture in 33 and 43 regions to pick up the locator male assemblies in the denture. Locator male

assemblies with black processing caps were placed into cemented female assemblies in 33 and 43 (Fig. 6). These processing caps set up the vertical resiliency needed for the final male assembly. It was verified that the denture is seated perfectly without any interferences due to the locator attachments in 33 and 43.

Auto-polymerizing acrylic resin was mixed with the Locator male assemblies with black processing caps were placed into cemented females in 33 and 43 in the dough stage, and the denture was placed in the mouth and the patient was instructed to close the teeth in centric occlusion. A minimum amount of acrylic resin was used to prevent the excess flow of resin on the tissue surface of the denture. Once the acrylic resin was completely set, excess acrylic was trimmed off. Denture finishing and polishing was done and evaluated in the patient's mouth for the complete seating of the denture and occlusion (Fig. 7-10).



Figure 1: Pre-operative extraoral view



Figure 2: Preoperative intraoral view showing vertical stop



Figure 3: Intentional RCT done for coping.



Figure 4: Ball attachments cemented onto 33 and 43 and metal copings cemented onto 35 and 45



Figure 5: Try in of dentures



Figure 6: Black processing caps placed on the ball attachments



Figure 7: Post operative intra-oral view



Figure 8: Lateral occlusion view



Figure 9: Insertion of the final prosthesis



Figure 10: Protrusive view

DISCUSSION

Complete edentulism can be gruesome for a patient as it brings down one's self-esteem and is a silent indicator of senescence. Apart from that, alveolar bone resorption accompanies complete edentulism throughout the life of edentulous patients, thereby deteriorating the quality of life in the future. [2]

Overdentures can be a viable option to prevent complete edentulism and its associated outcomes. For instance, a 5-year study conducted by Crum and Rooney concluded that an average loss of 0.6mm of bone loss was revealed in the anterior part of mandible of overdenture patients as opposed to 5.2mm of bone loss in complete denture patients. [3] These results substantiated the studies conducted by Tallgren [4] and Miller [5] which advocated

the advantage of retaining teeth in the anterior part of the mandible for the preservation of the alveolar process.

Another added benefit of overdenture prosthesis is the maintenance of proprioception [6]. The presence of directional sensitivity, dimensional discrimination, and tactile sensitivity can also be witnessed [7]. Pacer and Bowman studied the perception of occlusal loads in overdenture patients. They found that at load levels above 2,000 gm the overdenture patients could discriminate loads better than patients with complete dentures. They reasoned that this was probably due to the fact that the overdenture patients had more discriminatory ability due to the discrete sensory ability of the supporting teeth [8].

Overdenture also showcases enhanced masticatory efficiency. Rissin et al [9] compared the masticatory performance in patients with natural dentition, complete denture and overdenture wearers. In the masticatory performance tests performed, the patients with natural teeth had the highest score (90%), followed by the overdenture patients (79%), and the complete denture patients (59%). The chewing efficiency of overdenture patients was one-third higher than patients with complete dentures.

However, overdentures also present their own set of challenges. Some of them are periodontally compromised teeth, presence of undercuts, restoring vertical dimension, satisfying the patient's aesthetic desires, along with fulfilling occlusal and functional parameters which are mandatory for long-term success [10].

Hence in most cases, a multidisciplinary approach is needed to fulfill the patient's need with the most suitable modality of treatment. In overdentures, the abutment teeth need to be modified and retained for biomechanical and psychological advantages [3].

Various techniques are used in the treatment of teeth ranging from simple tooth modification and reduction, tooth preparation with cast coping to endodontic therapy, or utilizing some form of attachments. Superior retention can be obtained when planning overdenture with attachments as they can redirect occlusal forces away from weak supporting abutments and onto a soft tissue or redirect occlusal forces toward stronger abutments [11]. Attachments are often used in overdenture construction by either connecting the attachments to cast abutment copings

or intra-radically. Mandatory assessment of vertical space is crucial while planning for overdentures. There must be sufficient space for the attachments, together with an adequate thickness of denture base material and artificial teeth, all this without compromising the strength of the denture [12].

In this case report, the mandibular canines were given ball attachment and the premolars were given only metal copings due to diminished vertical space. The ball and socket attachment allow rotation of the denture attachment. Small head of the attachment limits the amount of material that has to be removed from the denture and thus the strength of the denture is not compromised. The technical work can be carried out easily at the chairside. [13] The amount of retentive force provided by the ball attachments is not likely to be detrimental to the abutments and at the same time provides a sufficient amount of retention to the denture. The use of short-copings was planned in order to reduce the vertical height and thus will reduce the possibility of fracture of the overdenture base and preserve alveolar bone as they are projected to less amount of axial stresses.

With the emergence of dental implants, implant supported prostheses are being increasingly used for edentulous cases. But, anatomical, medical and financial constraints often prevent patients from opting implant supported prostheses. Implant prostheses do not have as much occlusal awareness as natural teeth. [14] They cannot fully compensate for the loss of periodontal sensory mechanisms that guide and monitor gnathodynamic functions. Hence, overdentures have been successfully used for rehabilitation of patients with severe tooth wear and/or few remaining teeth as they provide psychological, functional as well as biological benefits to the patients.

CONCLUSION

An overdenture is, therefore, a practical option to complete denture as it reduces the residual ridge resorption, enhances proprioception and improves masticatory efficiency. Overdentures with attachments can improve the clinical longevity of the retained teeth and thus imparts long term success. Meticulous planning and careful selection of abutment teeth are of paramount importance. Hence, a multidisciplinary approach along with patient compliance is necessary for a better outcome of tooth supported overdentures.

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How to cite this article: Paulose A, Baby M, Joy B, Babu H. Tooth Supported Overdenture with Ball Attachments and Copings: A Case Report. *J Orofac Res*. 2022; 11(1):13-17.

Funding: None; Conflict of Interest: None Stated.