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Tooth supported overdenture retained with short metal copings and attachments: A case report

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Abstract
Overdenture is one of the favored treatment modality for elderly patients with few remaining teeth. Roots maintained under the denture preserve the alveolar ridge, provide sensory feedback and improve the stability of the dentures. Furthermore, the use of copings and attachments on the remaining teeth enhances the retention of the denture. This clinical report describes a novel method of fabricating a tooth supported overdenture retained with short pmetal copings and ball attachments.

Keywords: tooth supported over-denture, metal copings, ball attachment

Introduction

The presence of a healthy periodontal ligament maintains alveolar ridge morphology, whereas a diseased periodontal ligament, or its absence, is associated with variable but inevitable time-dependent reduction in residual ridge dimensions [1].

An overdenture is a complete denture supported by both soft tissue and a few remaining natural teeth. In tooth supported overdenture, natural teeth are altered to permit the denture to fit over them. The objective of overdenture is to distribute the stresses between retained teeth and denture-supporting soft tissues [1].

Retained healthy roots provide retention, stability, and support of the overdenture, preserves residual ridge height, and maintains proprioceptive stimulus through periodontal membrane, and has economical and psychological benefits [2].

The overdenture technique can be used in three ways: short-coping method, long-coping method, and attachment-coping method [3].

An overdenture requires careful assessment of the inter-occlusal distance. There must be sufficient space for roots, metal copings and possible attachments, together with an adequate thickness of the denture base material and artificial teeth, all without jeopardizing the strength of the denture [4].

General considerations to be addressed during diagnosis and treatment planning are: - [5]

- **Periodontal consideration**: An important periodontal requisite with over denture abutment is adequate zone of attached gingiva. Therefore periodontal inflammation, pocket formation, bony defect and poor zone of attached gingiva must be eliminated before starting treatment.
- **Endodontic consideration:** caries involvement must be considered and should be minimal in prospective abutments. Carious lesions must be restorable. Endodontic treatment should be performed as it resulte in crown root ratio which is more favorable and moreover clinical crown reduction provides interocclusal clearance for placement of artificial teeth.
- **Selection of abutment teeth:** two cuspid and two second molar abutments typify an optimal abutment distribution for one arch. The rectangular distribution provides for maximum stability and support of the restoration. Mandibular cuspids are most often utilized since they are usually the last teeth to be lost.

This clinical case report describes an overdenture with short metal copings and overdenture with prefabricated CEKA Preci-Clix attachment, while providing optimum aesthetics and function.

Case Report

A 72-year-old male patient reported to the Department of Prosthodontics, J.N. Kapoor D.A.V (C) Dental College with the chief complaint of difficulty in chewing due to missing teeth. There was no relevant medical history affecting prosthodontic treatment. Intraoral examination revealed well-formed maxillary and mandibular ridges in class I ridge relationship (Fig.1). Only 31,32,33 and 41,43 teeth were present in the mandibular arch and radiographic examination revealed good bone support and long roots wrt 33 and 43 and average root support wrt 31,32 and 41.

The different treatment options available for this patient's mandibular arch were extraction of the remaining teeth followed by conventional complete denture, implant supported overdenture and tooth supported overdenture. The patient rejected the option of an implant retained prosthesis because of the need for additional surgery, the longer duration of treatment phase and related expenditure.

It was planned to construct a maxillary complete denture and a mandibular tooth supported overdenture with extra coronal ball attachments wrt 33 and 34 and copings wrt 31, 32 and 41. An orthopantomogram (OPG) and diagnostic casts were made. Wax rims were fabricated on diagnostic casts to determine the approximate vertical dimension of occlusion. Vertical dimension recordings were determined by phonetics and esthetics.

The diagnostic articulation helped in assessing the available inter-arch space and was found to be adequate (Fig.2). Proposed abutment teeth were prepared on the diagnostic cast, and the ability to accommodate abutment copings and ball attachments was assessed.

The treatment plan was presented to the patient and his consent was obtained. Elective endodontics was carried out with teeth 31, 32, 33 and 41, 43 and they were prepared in a dome-shaped contour and hemi spherically rounded in all dimensions with approximately 2-3 mm projecting just above the gingival.

Post space was prepared and custom post patterns were fabricated directly in the root canal with autopolymerizing resin wrt 31, 32 and 41 and a pick-up impression was made using rubber base impression (Fig.3). The impression was poured with die stone. The fabrication of the post coping patterns was completed in the laboratory and cemented on to 31, 32 and 41 (Fig.4). 33 and 43 were reduced to the gingival level and canals were prepared for receiving the prefabricated ball attachments, after preparing the canal, attachments were tried in the patient's mouth and the radiographs were taken. Following which, they were luted to the abutment teeth using GIC luting cement (Fig.5).

A primary impression of the lower arch was made with alginate and a special tray was fabricated on the primary cast after block out. Using conventional techniques border moulding was done and secondary impression was made with medium viscosity rubber base material (Fig.6). Record rims were made and the jaw relationship was recorded. Teeth arrangement was done and a try-in was accomplished (Fig.7). After a satisfactory try-in, the waxed up denture was processed using heat cure acrylic.

Once the denture was ready, space was created on the tissue surface of the mandibular denture for the attachments (Fig.8). Metal housing with elastic sleeve was kept on the ball attachment and block out was done with modeling wax (Fig.9). The metal housings were picked up by adding autopolymerizing acrylic resin in the space while maintaining upper and lower dentures in occlusion. The lower denture was removed once the acrylic got set (Fig.10). The excess self-cure acrylic was trimmed re-polishing was done.

The denture was delivered (Fig.11) and the patient was given instructions about insertion and removal, eating and speaking as well as maintenance of the denture. Periodic follow-up was carried out.

Fig 1: Pre-operative intra-oral view

Fig 2: Diagnostic articulation to check inter-arch space.

Fig 3: Pick up impression for short copings.

Fig 4: Short copings cementaion.

Fig 5: Luted attachments on 33 and 43.

Fig 6: Mandibular arch secondary impression.

Fig 7: Try-in

Fig 8: Relieved denture over attachments.

Fig 9: Block-out around attachments.

Fig 10: Retentive component picked up.

Fig 11: Final prosthesis delivered.

Discussion

Despite recent development in dental implantology, the conservative approach of root preservation is still valid. Greater emphasis must be given on proper case selection, diagnosis, and treatment planning. Tooth or root supported overdentures are indicated in patients with few remaining natural teeth in an arch [3].

The use of overdentures is therefore, a practical alternative that provides a relatively quick, easy and cost-effective solution to the functional and esthetic oral rehabilitation in patients with pronounced edentulism and/or severe wear. Various challenges presented to the operating dentist include periodontally compromised teeth, presence of undercuts, restoring vertical dimension, satisfy the patient's aesthetic desires, while also fulfilling occlusal and functional parameters that are essential for long-term success. Hence, a multidisciplinary approach is necessary to fulfil the patient's need with most suitable modality of treatment [6].

The findings indicate that the use of the mandibular overdenture helps preserve alveolar bone in the mandible. The reduction in the height of the anterior part of the mandible in those patients wearing complete upper and lower dentures amounted to 5.2 mm, as compared with 0.6 mm for the overdenture patients. This represents eight times more loss in the patients with complete dentures [7].

Jain *et al*. (2017) [8] did oral rehabilitation of mandibular ridge with tooth-supported overdenture using a metal coping and mesh of metal to prevent fracture of denture and metal reinforced maxillary denture. The short coping design showed least amount of stress than any of the other design like tapered coping design & tapered coping with occlusal bearing design. This design minimizes horizontal torque on the roots and provides ease of maintenance of oral hygiene. In this case report short coping design was used for 31, 32 and 41 to adjunct the ball attachment in retention.

The attachments can be classified in three groups: those placed on top of the root, those placed within the root, and those retained by means of a bar joining the remaining roots. The ball attachment is an example of an attachment that is placed on the root. This attachment consists of two components, a male which is fixed to the tooth, and a female which is incorporated into the denture base. The ball attachment was given on the roots of 33 and 34 teeth in this case report. The round shape of this attachment permits the denture to move anteroposteriorly as well as mesiodistally without twisting the abutment tooth [2] compared to bar attachment which shows no movement between the bar and sleeve thus transmitting all the occlusal forces on the abutment teeth. Moreover ball attachment is cost effective, easy to clean, its replacement components are identical so easy to replace in case of failure and less prosthodontic maintenance required.

Conclusion

Greater satisfaction is achieved by tooth supported overdenture. This therapy presents a realistic substitute to the patients who are not willing to extract remaining natural teeth. The technical simplicity, the usefulness for geriatric patients, the increased control of jaw function through the maintained periodontal ligament are arguments for the use of overdenture [9]. Tooth supported overdenture is psychologically beneficial as the patient had not undergone extraction.

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