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Rehabilitation of Partially Edentulous Patients with Over Dentures: Case Reports

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Abstract
Introduction*: The most popular therapy for older patients who still have two or more teeth in their arch is over-dentures. Compared to traditional complete dentures, the root of the remaining teeth maintains the alveolar ridge, offers sensory perception, and enhances the stability and retention of the denture when coping or attachment is used over the remaining portion of the tooth. The rehabilitation of partially edentulous male patients, ages 58 and 72, is described in these reports. The patients' main complaints were poor appearance and chewing difficulties brought on by 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 and telescopic overdenture was chosen as a favourable treatment option since it overcomes many of the problems posed by conventional complete dentures.*
Result: *Evaluation of occlusion, esthetics, phonetics and comfort after 24 hours, 1 week and 1 month, 6 months of treatment showed that the patients were satisfied with the prosthesis.*
Conclusion*: Both tooth-supported and telescopic overdentures increase the stability and retention of the denture. This course of treatment reduces remaining ridge resorption and improves patient comfort and chewing efficiency.*
Clinical Significance*: A tooth-supported overdenture used for prosthetic rehabilitation preserves the remaining alveolar ridge, increases bone support, and aids in the preservation of sensory input by promoting improved occlusal awareness, biting force, and neuromuscular control from the periodontal tissue.*
Keywords: Overdenture, Telescopic overdenture, Primary copings, Secondary copings, Partially edentulous mandible.

I. Introduction

In India, 2021 report from the National Statistical Office (NSO) projects that the number of people in India who are 60 years of age or older would rise from 138 million in 2021 to 194 million in 2031, a 41 percent increase in just ten years. A wide range of oral health issues accompany the aging population. In the past, many people did not usually think about replacing missing teeth since they believed that tooth loss was a normal part of aging. Many chose to completely take the few remaining teeth and install a detachable prosthesis when replacement was an option. The removal of teeth leads to rapid resorption of the residual alveolar ridges, affecting the retention and stability of the complete dentures, especially in the mandibular arches. Additionally, lack of periodontal fibers lead to a loss of proprioception in the jaws. Maintaining the few natural teeth reduces treatment time, and prevents additional procedures, with emphasis on the psychological aspect of the patients. In individuals with few remaining teeth, prosthetic rehabilitation using overdentures is advocated as it results in better retention of dentures, provides load transmission, and maintains the alveolar ridges while retaining some of the proprioceptive qualities and sensory feedback. A removable partial or full denture that covers and rests on one or more of the natural teeth, roots, and/or dental implants that are still present is called an overdenture.[1] A small number of nations in Eastern Asia and Europe use telescopic overdentures extensively. Telescopic crown-retained dentures are more stable, have superior retention, and shield the alveolar ridges and the few remaining natural teeth. It makes it simple to maintain dental hygiene around the teeth that are abutted.

Telescopic attachments or double crown systems are a better choice compared to conventional attachments. It consists of a primary coping on the tooth which protects the tooth structure from caries and a secondary coping on the denture which attaches to the primary copings and serves as an anchor. The primary copings can be shaped in the form of the natural tooth or can have some degree of taper. Excess taper reduces the retention of the denture. The walls of the abutment should be kept as parallel as possible, or the taper should be kept at 2-5 degrees.[2] In periodontally weak teeth, reducing the crown-root ratio after scaling, root planning, and placement of a primary coping significantly improves the health of the tooth and reduces mobility if present due to a reduction in the forces on the tooth.

Case Report 1

A 58-year-old male patient reported to the Department of Prosthodontics and crown & bridge Indira Gandhi Govt. Dental College Jammu, J&K with a chief complaint of inability to chew food. The patient provided history of periodontal disease and subsequent extraction of mobile teeth. Intraoral examination revealed a completely edentulous maxillary arch and a partially edentulous mandibular arch. The remaining natural teeth were mandibular right canine (43) and left first premolar (34) (Figure 1). The patient had poor oral hygiene, showing large deposits of plaque. The mandibular left premolar revealed arrested caries. The radiographic examination revealed horizontal bone loss around the remaining natural teeth about 2mm. Thorough oral prophylaxis and root planning were carried out and the patient was counselled on the importance of oral hygiene maintenance. The patient was informed regarding the various treatment options available, like complete dentures, implant or tooth-supported overdentures, and implant- supported fixed prostheses. Considering the health of the remaining natural teeth, the economic conditions of the patient, and the benefits, it was decided to fabricate a tooth-supported overdenture for the mandibular arch and a conventional complete denture for the maxillary arch.

Intentional root canal treatment was carried out on the teeth. Each tooth was prepared in a conical form with a 6-degree axial taper[3,4] and a chamfer finish line. The height of the tooth was maintained at 4 mm.[3,4] This is a modification of the previous system and was developed by K. H. Korber as mentioned by Langer, Hulten, Shiba, and Behr.

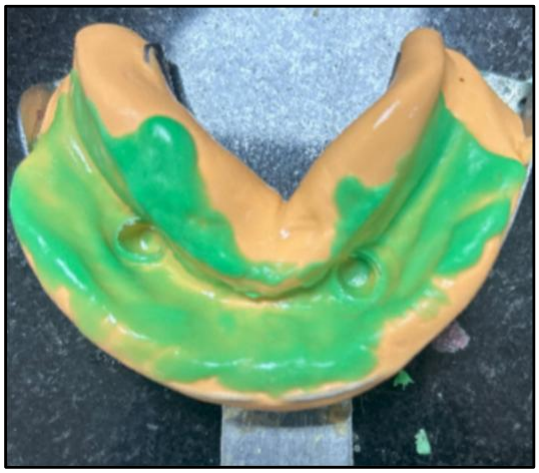

Figure 1: Pre-operative intraoral image showing mandibular right canine, and Left first premolar.
Figure 2: Tooth preparation done to receive primary copings and impression was made in putty light body.

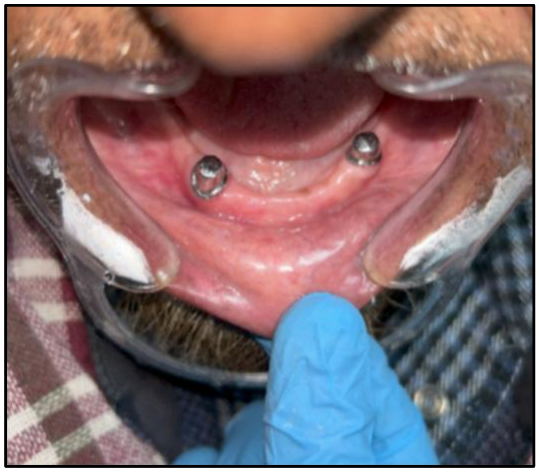

Figure 3: Surveying was done and wax pattern on the abutments were fabricated.
Figure 4: Intra-oral view showing primary copings after cementation.

Figure 5: Picture showing secondary coping.

Figure 6: Intra oral photograph of finished and polished denture.

Figure 7: Intaglio surface of finished and polished denture.

Figure 8: Post-Operative photograph.

The diagnostic impressions were made in reversible hydrocolloid (DPI Algitex) for the mandibular arch and in impression compound (Pyrax Impression Compound) for the maxillary arch. The mandibular model was surveyed for undercuts on the preparation, and the necessary adjustments were made to the tooth accordingly.

Modeling wax (DPI Modelling Wax) double spacer was adapted on the mandibular cast and a complete spacer was adapted on the maxillary cast. Custom trays were fabricated using auto-polymerizing acrylic resin (DPI- RR Cold Cure). Border moulding was done for both the maxillary and mandibular arches, and wash impression was taken using light- body polyvinyl siloxane impression material The master cast was poured with Type 4 dental stone (Goldstone). The mandibular master cast was used to prepare the primary copings using Cobalt-Chromium (Co-Cr) alloy. The copings were tried in the patient's mouth for their fit and then placed back onto the master cast (Figure 4). The master cast with the copings was then duplicated using addition silicone impression material for making a second master model on which the metal framework for the mandibular denture for the secondary copings. The secondary copings were cast in Co-Cr alloy and tried in the patients for fit.

Maxillary and mandibular dentures were acrylized using compression molding techniques. The prostheses were then tried in the patient's mouth and verified for occlusion, function, esthetics, and phonetics (Figure 6,7). Post insertion and denture hygiene instructions were given. Follow up review was conducted after 24 hours, after one week, and after six months of use.

Case Report 2

A 72-year-old male patient reported to the Department of Prosthodontics and crown & bridge Indira Gandhi Govt. Dental College Jammu, J&K with a chief complaint of inability to chew food. The patient provided history of periodontal disease and subsequent extraction of mobile teeth. Intraoral examination revealed a completely edentulous maxillary arch and a partially edentulous mandibular arch. The remaining natural teeth

were mandibular right canine (43) and right first premolar (44), mandibular left canine (33) and first premolar (34) (Figure 9). So mandibular overdenture was planned.

Various treatment options has been discussed with patient and he agreed upon mandibular tooth supported overdenture without attachments. Intentional RCT for 33, 34 and 43,44 was done.(Figure 11). After the RCT, dome shaped tooth preparation was done on 33, 34, 43, and 44 with a chamfer finish line. Post space preparation was done and impression was made with additional silicone for the fabrication of copings. The copings obtained were checked for fit in the patient's mouth and finally cemented with glass ionomer cement. The thickness of the copings was 1mm (Figure 13).

Primary impressions for the maxillary and mandibular arches were made with alginate (Figure10). The impressions were poured using type II gypsum products and a mandibular special tray was fabricated with self-cure acrylic resin. Border moulding was done for mandibular arch with green stick impression compound. Final impressions for the mandibular arch were made with light body addition silicones (Figure 12). Master casts were prepared by pouring the impressions in Type IV gypsum products.

Occlusal rims were fabricated; maxillomandibular relations recorded and transferred onto non-adjustable articulator. Teeth setting was done, evaluated in the patient's mouth for phonetics, vertical and centric relation and finally esthetics. Vertical dimension was verified and centric and eccentric contacts checked. Patient's approval was taken, and the curing of the final denture was done in heat-cure acrylic resin. Denture were polishes and delivered to the patient (Figure 15).

Figure 9: Pre-operative intraoral image showing mandibular right canine and first premolar and left canine and first premolar.

Figure 10: Primary Impressions in Alginate.

Figure 11: Tooth preparation after RCT.

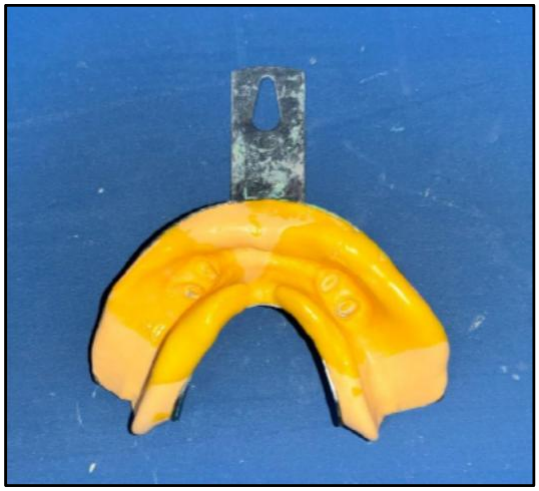

Figure 12: Final impression in putty light body.

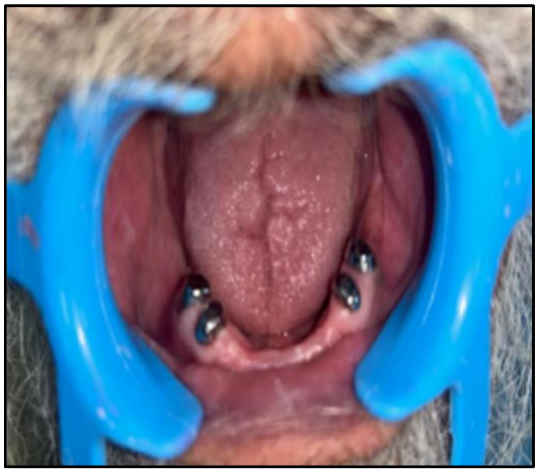

Figure 13: Intra-oral view showing metal copings after cementation.

Figure 14: Intra oral photograph of Try in.

Figure 15: Post operative view.

II. Discussion

The ability to keep more teeth throughout life is one of the most significant indicators of dental health. Complete tooth loss, or edentulism, is common in older adults worldwide5. Previous research has demonstrated that edentulism has an impact on older adults' general health and quality of life. Patients who are edentulous experience alveolar bone resorption throughout their lives, which is regarded as an oral disease.[7]

However complete edentulism affect the quality of life. With advancements in dental implant science, implant supported prostheses are being increasingly used for treating patients. However, anatomical, medical and financial constraints often prevent patients from opting for the best possible treatment8. Implant prostheses cannot fully compensate the loss of periodontal sensory mechanisms that guide and monitor gnathodynamic functions.[9] 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 advantages to the patients.[10] Retaining natural teeth as root retention aids in preservation of the residual ridge, retention, support and stabilization for the denture base, proprioceptive feedback and psychological benefit to the patient.[11,12]

The forces are transmitted along the long axis of the tooth and retention of the proprioceptive properties of the periodontal ligament[5] preserves some of the neuromuscular feedback mechanism and the jaw movements, which in turn improves the masticatory efficiency of the complete denture patient. This also prevents occlusal overload preventing rapid, progressive and irreversible residual ridge resorption which is inevitable after extraction of natural teeth.[5] For fixed prosthesis and implant prosthesis, strict oral hygiene protocols are necessary for the success. In overdentures, the margins of the remaining teeth are easily accessible for prophylaxis and hygiene of the removable prosthesis can be effortlessly maintained by the patient. It is more esthetic compared to removable partial dentures.

Telescopic overdentures provide stability and retention, which are the main criteria for the success of a removable complete denture.[6] A telescopic overdenture has the advantages of good retentive and stabilizing properties, rigid splinting action, and better distribution of stresses.[7] The splinting action of telescopic restorations occurs when the fixed inner telescopic crowns engage with the multiple outer crowns in situ.[2] For a favourable stress pattern, a minimum of two abutment teeth have to be splinted when attachment prosthesis is used.[8] In the present case, the periodontal condition of the remaining natural teeth as well as the cost were the factors that weighed in for eliminating the options of implant- fixed and removable prosthesis. After assessing the location and the condition of remaining natural teeth, it was determined that a telescopic overdenture in the mandibular arch and a conventional removable complete denture in the maxillary arch was the best treatment option for the patient. It provided the patient a retentive prosthesis with a better prognosis in the mandibular arch. High noble alloys can be considered as the ideal option for the fabrication of copings due to their higher precision and retentive properties, but are technique-sensitive and expensive. Base metal alloys (Co-Cr) have low thermal conductivity and are economical.[9] In conventional designs, Co-Cr alloys show better rigidity compared to titanium alloys.[10] For the success of telescopic overdentures, adequate inter-arch space should be present to accommodate both primary and secondary copings along with the denture base and artificial teeth. A minimum of 10 mm of inter-arch space should be present to accommodate the copings, denture base, artificial teeth, as well as to ensure adequate closest speaking space.[11]

Since losing all of your teeth is frequently viewed as traumatic and linked to aging and a decline in energy, it can be tough to accept.[13] The loss of a tooth has an emotional impact on patients who physically adjust to wearing full dentures.[14, 15] Therefore, older patients benefit immensely from having at least a few of their original teeth retained and having overdentures made, which helps them meet the majority of their needs.

III. Conclusion

Due to their enhanced stability, retention, and proprioceptive feedback mechanisms, tooth- supported overdentures are a superior option to traditional complete dentures. They also improve chewing efficiency and lower the rate of residual ridge resorption because they better distribute masticatory forces. When arranging therapy for older patients who are getting their first prosthesis and have few natural teeth left, telescopic overdentures should be taken into account.

Conflict of Interest

None

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