

# A SIMPLE APPROACH TO REHABILITATION OF PARTIALLY EDENTULOUS MANDIBLE USING RETAINED CANINES AS THE SUPPORT

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## ABSTRACT

Partially edentulous mandible with a few remaining teeth can be successfully managed by rehabilitation with tooth-supported overdenture. Healthy, retained teeth can be used underneath the denture to preserve the neuro-muscular proprioception and improve retention and support. This is a cost-effective treatment modality for individuals where fixed prosthesis remains beyond the scope of affordability, especially for the geriatrics. In the following case report, attempts have been made to rehabilitate the mandibular arch of an elderly individual with tooth-supported overdenture. Retained mandibular canines were endodontically treated and restored with cast metal copings and used beneath the prosthesis. Mandibular canines with the abundance of alveolar bone are strategically important teeth that can be used to support overdentures and need to be retained whenever possible. The final results were satisfactory with respect to masticatory efficiency and aesthetic outcome. Clinical and radiographic follow-ups along with maintenance of hygiene are the key components for successful overdenture therapy and should be undertaken inevitably for interception of complications that may develop at a later date.

## KEY WORDS

**proprioception; overdenture; abutments; overlay denture; dental prosthesis**

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## INTRODUCTION

Aging population comprises a considerable portion of the population of any society and they are also the ones suffering from partial or complete edentulousness. In a country like India, where advanced dental treatment remains a far cry in terms of affordability, removable prosthodontics plays a crucial role in restoring the masticatory ability in the elderly.<sup>1</sup> Overdenture prosthesis is a rational treatment modality in patients where healthy teeth, retained at strategic positions, can be utilized to improve support for the prosthesis.<sup>2</sup> Studies by various authors have shown that tooth-supported overdenture contribute sufficiently to improve retention, stability and support of dentures, apart from the important functions of preventing residual alveolar bone loss and preservation of proprioception.<sup>3-8</sup> This is particularly true in case of anterior mandible, which undergoes resorption eight times more in complete denture wearers than those with tooth-supported overdentures.<sup>5</sup>

To improve the retention, cement-retained cast metal copings have often been employed over the abutment teeth.<sup>9,10</sup> They also help in prevention of caries.<sup>2</sup> Apart from being cost effective and conservative, this procedure makes tooth-supported overdenture an inexpensive rehabilitation option for edentulous ridges retaining two or more healthy teeth.<sup>6</sup>

With this background of scientific knowledge, the following case had been undertaken, where an edentulous mandible with existing canine was successfully rehabilitated with a tooth-supported overdenture opposing natural teeth in maxilla.

## CASE REPORT

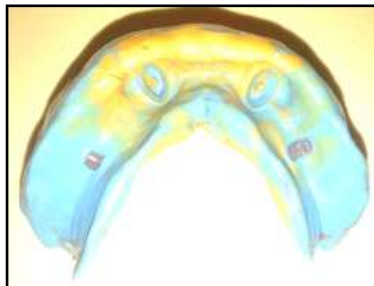
A 65-year-old male reported to the department with complaint of inability to chew food due to losing of previous denture [Figure 1]. He presented with missing 16, 26 and 27 in the maxillary arch. Partially edentulous mandibular arch exhibited with only existing 33 and 43. History of presenting illness revealed that most of the teeth in upper and lower jaw were lost due to periodontal ailment. The oral hygiene, however, was fairly satisfactory. He



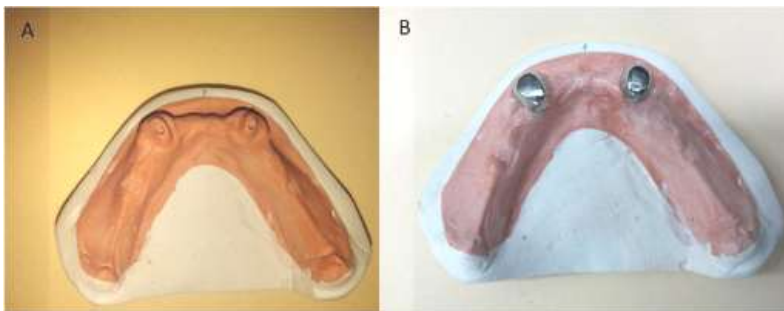
**Figure 1: Pre-operative view of the retained mandibular 33 and 43 with the available inter-arch space**



**Figure 2: Primary impression of the maxillary and mandibular arch prior to any intervention**



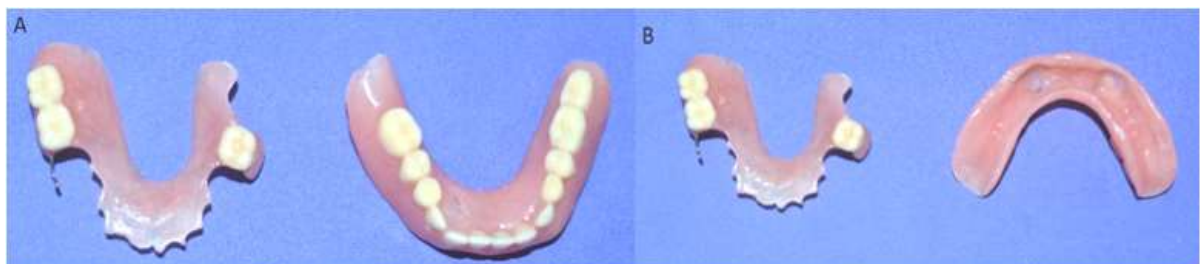
**Figure 3: Border moulding and final impression of the mandibular arch along with the prepared abutments with putty and light body.**



**Figure 4: Retrieved mandibular mastercast. A, mastercast with prepared abutment and post-space for the copings. B, mastercast with cast Co-Cr alloy copings on the abutments**



**Figure 5: Co-Cr alloy copings cemented on the natural abutments**



**Figure 6: Processed dentures. A, Maxillary RPD and occlusal view of the mandibular overdenture. B, Intaglio surface of the mandibular overdenture showing the space for receiving the metal copings**



**Figure 6: Processed dentures. A, Maxillary RPD and occlusal view of the mandibular overdenture. B, Intaglio surface of the mandibular overdenture showing the space for receiving the metal copings**

wanted a new prosthesis which would provide retention better than his previous dentures. An implant-supported prosthesis was not considered owing to the cost factor. Radiograph showed excellent bone support of the retained mandibular canines. An informed decision thus was made to fabricate a tooth-supported mandibular overdenture with metal copings on 33 and 43 as abutment.

### Technique of overdenture fabrication

Preliminary impressions (Soft putty, 3M ESPE, USA) of both arches were made and special tray for mandible was prepared [Figure 2]. Both 33 and 43 were root canal treated. Restoration of access cavities were done with GIC (**GC Fuji II, GC, USA**) and the teeth were ready to be used as abutments. Dome-shaped tooth preparations of the abutments were done to achieve a crown height no more than 2 mm from the gingival margin.<sup>3</sup> Supragingival chamfer margins were kept for easy cleansing. This also prevented violation of the biological width by the encroaching restoration margins, preserving the long-term health of the abutments.<sup>11</sup> A dowel space (4-5mm) was prepared intra-coronally in each of the abutment teeth. Final impression with light body-putty (Express XtVps Impression Material-Refills, 3M ESPE, USA) for the trial denture and tooth preparation was performed simultaneously [Figure 3]. Cast metal copings (Co-Cr) were fabricated and subsequently cemented onto the abutments. (**GIC, GC Fuji II, GC, USA**) [Figure 4A,4B & Figure 5]. Jaw relation was recorded. The final prostheses were processed, inserted and assessed [Figure 6A,6B & Figure 7]. Occlusal adjustments were done immediately and 24 hours after insertion. He was instructed to chew on both the sides simultaneously. Patient was recalled after 7 days and 1 month following denture delivery. Any soft tissue injury due to denture insertion and usage were taken care of. After 1 month, the patient reported with satisfactory aesthetics, functional efficiency with considerable improvement in retention and stability of the new denture.

### DISCUSSION

Tooth-supported overdenture forms an integral part of preventive prosthodontics, especially in the aging population. Although, with increase in dental implant practice, this treatment choice has been overshadowed, it is far from being forgotten.<sup>5</sup> Conservation of the remaining healthy teeth prevents resorption of alveolar bone and preserves periodontal ligament around the abutment teeth.<sup>2</sup> Anterior mandible, which is most susceptible to the bone loss following complete teeth extraction, contributes much to the retention and stability of the denture. Crum and Rooney<sup>5</sup> have shown that overdenture wearers incur eight times less reduction in anterior

height of mandible than complete denture wearers. Thus, denture retention, stability and support are seen to increased manifold with the use of overdenture prosthesis.

Periodontal ligaments, that are retained around the abutment teeth provide proprioception which helps in better perception of food particle size during chewing.<sup>4</sup> This also allows patients with overdentures to masticate more efficiently. Chewing efficiency of patients with overdentures has been measured at 79% and patients with complete dentures at 59%.<sup>9</sup>

Mandibular canines with long roots, greater root surface area (268mm<sup>2</sup>) and abundant surrounding bone, are placed strategically at the corner of jaw. These are the areas of maximum occlusal force and higher ridge resorption potential. Mandibular canines are also the last teeth to be lost from the oral cavity.<sup>6</sup> Preserving these teeth prevents alveolar bone loss in anterior mandible and also form excellent support for overdenture prosthesis.<sup>3,6</sup> Stewart has shown that periodontal ligaments of canine teeth are richly innervated.<sup>12</sup> This allows them to respond to harmful forces that acts on the overdenture and directs them towards the long axes of the tooth, preventing denture dislodgement and damage to the periodontal ligament.<sup>6</sup>

The crown of the mandibular canines, in this case, were long(>5mm), which reduced the interridge distance. Hence, endodontic therapy was performed, to decrease the coronal height effectively. This also decreased the mobility (Grade II) and allowed the dowel space for retention of the cast copings.<sup>3</sup> 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%.<sup>13</sup>

The metal copings were cast in cobalt-chromium alloy. This alloy is relatively inexpensive and show less incidence of sensitivity than other base metal alloys (Ni-Cr).<sup>2,14</sup> They are easy to fabricate and require minimal technical skills. Cast copings for overdenture abutments have shown to decrease the possibility of future carious incidence and wear between tooth and denture.<sup>15</sup> The nearly parallel walls of the coping were used for added retention of the overdenture in this case.<sup>3</sup>

Although cost-effective and easy to fabricate, tooth-supported overdenture with cast metal copings are not without complications. Studies documented that gingival inflammation and root caries develop due to poor oral hygiene and loss of metal copings, followed by overdenture base fracture over abutment teeth as the most commonly encountered adversities.<sup>7,8,9,10</sup> Therefore meticulous oral cleanliness, abutment and denture hygiene maintenance constitute an indispensable part of an overdenture therapy. Studies have time and again shown that fluoridated toothpaste decrease incidence of caries.<sup>16</sup> Their usage, in overdenture patients thus can effectively reduce secondary caries of the

abutment teeth. In order to reduce the incidence of documentation, cast copings can be bonded with a resin cement.<sup>15</sup>

Overdenture fracture is a critical complication and should be considered during the treatment planning phase. Studies have documented that fracture (34%) most commonly occurs in the abutment region where denture thickness is less.<sup>9</sup> This can be prevented by increasing interridge distance, decreasing abutment crown height, incorporation of metal framework or metal mesh in the denture base.<sup>9</sup> In this case, sufficient interridge distance was obtained to increase denture thickness, hence added measures were not needed.

Although a simple approach, tooth-supported overdenture therapy should always be followed by regular clinical and radiological evaluations to intercept any complication that may develop with regular usage.

## CONCLUSION

Tooth-supported overdenture is an inexpensive treatment modality which can be used to rehabilitate edentulous mandible with minimal requirement of a few healthy teeth, especially in elderly individual. Over many decades they have proved themselves as affordable yet simple prosthetic design which provides improved retention, stability and masticatory efficiency as well as meeting the aesthetic expectation of the patient.

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