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Telescopic Overdenture as a Conservative Prosthodontic Approach to the Rehabilitation of a Severely Resorbed Mandibular Ridge: A Case Report

Dr Manish Kumar Bairwa[1], Dr Rajesh Kumar[2], Dr Sunil Kumar M.V[3]

[1]PG Student, Department of Prosthodontics, Jaipur Dental College, Jaipur, Rajasthan, India.
[2]Professor and Head, Department of Prosthodontics, Jaipur Dental College, Jaipur, Rajasthan, India.
[3]Professor, Department of Prosthodontics, Jaipur Dental College, Jaipur, Rajasthan, India.

Abstract

Background: Rehabilitation of a severely resorbed mandibular ridge can be challenging when conventional complete dentures provide inadequate support and stability. Preservation of strategically positioned natural teeth can improve prosthetic support and retention while maintaining proprioceptive feedback. Telescopic overdentures offer a conservative approach by integrating the remaining teeth into a removable prosthesis through primary and secondary coping systems.

Case Presentation: A patient with a severely resorbed mandibular ridge and four strategically positioned mandibular teeth was rehabilitated using a tooth-supported telescopic overdenture. The remaining abutment teeth were clinically and radiographically evaluated and considered suitable for overdenture support. The teeth were prepared to receive primary telescopic copings, and a common path of insertion was established. Cobalt-chromium primary copings and corresponding secondary telescopic components were fabricated and incorporated into the removable prosthesis. Definitive impressions, jaw relation records, and intraoral verification were performed to ensure accurate adaptation and appropriate occlusion. At insertion, the prosthesis was assessed for seating, retention, stability, path of insertion and removal, occlusion, esthetics, phonetics, and patient comfort. Necessary occlusal adjustments were subsequently performed.

Conclusion: The present case demonstrates that a tooth-supported telescopic overdenture can provide a predictable and conservative treatment option for patients with a severely resorbed mandibular ridge and strategically positioned natural teeth. By preserving the remaining dentition and utilizing the retentive and supportive potential of telescopic components, this approach can enhance prosthetic stability while avoiding extraction of teeth with a favorable prognosis. Careful case selection, precise clinical and laboratory procedures, and regular maintenance are essential for long-term success.

Keywords: Telescopic overdenture; tooth-supported overdenture; double crown; telescopic crown; severely resorbed ridge; conservative prosthodontics

Introduction

Progressive tooth loss is accompanied by changes in the residual alveolar ridge and a gradual reduction in the anatomical foundation available for removable prostheses. These changes may become particularly significant in patients with extensive tooth loss, where severe residual ridge resorption can adversely affect denture support and stability.[1,2]

The preservation of strategically positioned natural teeth provides an alternative approach to conventional complete denture rehabilitation. Tooth-supported overdentures utilize the remaining dentition to provide additional support and retention while preserving the periodontal ligament and its associated sensory feedback.[3,4] Retaining suitable natural teeth may therefore provide a conservative treatment option for patients with a reduced dentition when the remaining teeth have a favorable periodontal and restorative prognosis.[3,4]

Telescopic overdentures represent a specialized form of tooth-supported overdenture therapy. They consist of a primary coping or crown attached to the prepared abutment tooth and a corresponding secondary crown incorporated into the removable prosthesis. The interaction between these components establishes a predetermined path of insertion and contributes to prosthesis retention, support, and stability.[5,6]

The double-crown concept has been used for several decades in the rehabilitation of partially edentulous patients. The telescopic mechanism provides guidance during insertion and removal and facilitates controlled transmission of functional forces through the abutment teeth.[5–7] Long-term clinical investigations have demonstrated satisfactory longevity of telescopic crown-retained removable prostheses, although biological complications and prosthetic maintenance remain important considerations.[7–9]

A systematic review and meta-analysis by Oh et al. found no significant difference in abutment-tooth loss between double-crown-retained and clasp-retained removable partial dentures, supporting the continued clinical use of double-crown systems in appropriately selected patients.[10]

The retentive characteristics of telescopic prostheses are influenced by the design, geometry, and materials of the primary and secondary components. Experimental research has demonstrated that different material combinations can produce clinically relevant retentive forces.[11] The introduction of CAD/CAM technology has further expanded the possibilities for fabrication of telescopic prostheses and double-crown frameworks.[12]

Patient satisfaction is another important consideration in removable prosthodontic rehabilitation. Clinical evaluation of telescopic prostheses has demonstrated that prosthesis design and material selection may influence patient-reported outcomes and prosthetic performance.[13]

The present case describes the prosthodontic rehabilitation of a patient with a severely resorbed mandibular ridge and four strategically positioned mandibular teeth using a tooth-supported telescopic overdenture. The treatment involved the fabrication of tapered cobalt-chromium primary copings and corresponding secondary components incorporated into the removable prosthesis.

Case Presentation

A 72 -year-old female patient reported to the Department of Prosthodontics with the chief complaint of difficulty in mastication. The patient desired a definitive prosthetic rehabilitation that would improve mastication, comfort and esthetics.

A comprehensive medical and dental history was obtained. Extraoral examination revealed no significant abnormality. Intraoral examination demonstrated a severely resorbed mandibular residual ridge with four strategically positioned mandibular teeth—**33, 35, 43, and 44**. The remaining teeth were evaluated clinically and radiographically for periodontal support, mobility, caries, pulpal status, crown-root ratio, and their suitability as overdenture abutments. The mandibular abutment teeth demonstrated favorable periodontal support and were considered suitable for incorporation into the proposed telescopic overdenture. The maxillary arch was completely edentulous and exhibited an anterior flabby ridge.

Considering the limited denture-bearing area of the mandibular arch and the favorable prognosis of the remaining teeth, a **tooth-supported telescopic overdenture** was selected as the treatment option. The presence of multiple strategically distributed abutments provides a broader basis for support and retention, while the number and distribution of abutment teeth may influence the biological and technical prognosis of telescopic overdentures.[5,7–9]. Preservation of the remaining teeth provided the possibility of additional support and retention while avoiding extraction of teeth with a favorable prognosis.[3,4]

Figure I: Intra oral Frontal view

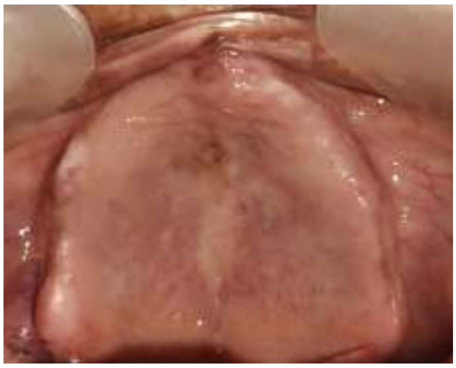

Figure 2: Maxilla intra oral view

Figure 3: Preoperative OPG

Treatment plan

A mandibular telescopic overdenture supported by tapered primary copings on teeth 33, 35, 43 and 44 was planned. A maxillary conventional complete denture was planned with management of the anterior flabby tissue. Cobalt-chromium was selected for primary copings for strength and precision; Glass ionomer

cement was selected for definitive cementation of the primary copings, with consideration given to the potential need for future removal or maintenance.
The treatment plan was explained to the patient, including the advantages, limitations, maintenance requirements, and alternative treatment options. Written informed consent was obtained before commencement of treatment.

Abutment preparation
Root canal treatment was done prior to tooth preparation for primary telescopic coping. Minimally invasive preparation of teeth 33, 35, 43 and 44 was performed to create a tapered axial form (approximately 6° convergence;determinant of retention)[5] with smooth, rounded line angles. The preparations were designed with adequate interocclusal clearance and a common path of insertion. The preparation geometry was selected to provide appropriate space for both the primary and secondary telescopic components. The principles of the telescopic double-crown concept require accurate parallelism and controlled geometry to achieve predictable retention and prosthetic stability.[5,6]


Figure 4: Prepared Abutment for primary telescopic coping (intra oral view)


Figure 5: Elastomeric impression of prepared abutments using two stage technique

Two stage impression technique is used for elastomeric impression of prepared abutments using stock tray. The impression was inspected to ensure accurate reproduction of the prepared abutments and surrounding tissues

Fabrication of primary copings
The master cast was surveyed and the path of insertion was established. Primary copings were fabricated for teeth 33, 35, 43, and 44 using cobalt-chromium alloy. The primary copings were designed with a controlled taper 6 degree and a common path of insertion. Their internal surfaces were adapted accurately to the prepared abutments, while the external surfaces were designed to interact with the corresponding secondary components. The primary copings were clinically evaluated for marginal adaptation, seating, path of insertion, interocclusal and occlusal relationships.

Figure 6 mandibular arch after cementation of primary telescopic copings

Definitive impression

Following tooth preparation, custom tray was fabricated with adequate wax spacer. Border moulding was performed and then definitive impression was made. After clinical verification of the primary copings, they were temporarily positioned and definitive impression is made using an elastomeric impression material (medium body poly viny siloxane impression material) to accurately record the relationship between the abutments, copings, and denture-bearing tissues. This approach was particularly useful because accurate transfer of the spatial relationship between the primary copings and residual ridge is essential for the passive seating and function of the completed telescopic overdenture.

Figure 7: Primary Cast mandibular arch

Figure 8: Spacer design mandibular arch

Figure 9: Border moulding mandibular arch

Figure 10: Secondary Impression Mandibular arch

"The maxillary definitive impression was made using a sectional tray technique to manage the anterior flabby ridge. A double spacer was provided over the flabby tissue to minimize tissue displacement. The posterior denture-bearing tissues were recorded using zinc oxide eugenol impression paste, while the anterior flabby tissue was recorded with a light-body polyvinyl siloxane material under minimal pressure. This differential impression approach was selected to minimize displacement of the mobile tissue while adequately recording the more firmly attached denture-bearing tissues.[20–22]"

Figure 11: Primary cast maxilla

Figure 12: Spacer design for maxillary arch

Figure 12: Sectional tray for maxillary arch

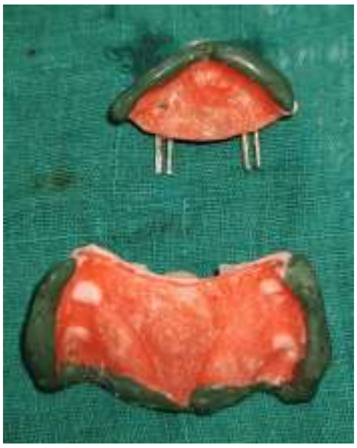

Figure 13: Border moulding for maxillary arch

Figure 14 : Posterior Sectional impression using zinc oxide eugenol impression paste

Figure 15: Secondary impression using Sectional tray for maxillary arch

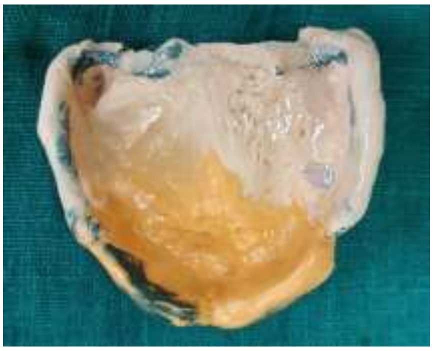

Figure 16: Secondary Impression maxillary arch

Jaw relation and tooth arrangement

The maxillary and mandibular record bases were fabricated on the definitive casts. Vertical dimension and centric relation were recorded using conventional prosthodontic procedures.

Figure 17: Occlusal Plane Analysis

Figure 18: Facebow record

Figure 19: Facebow Transfer

Figure 20: Gothic Arch Tracing

The orientation jaw relation was recorded using a Hanau Spring Facebow (Hanau Engineering Co., Buffalo, NY, USA), and the maxillary cast was transferred to a Hanau Wide-Vue semi-adjustable articulator. Centric relation was initially recorded with a wax interocclusal record and subsequently verified using the extraoral graphic tracing (gothic arch tracing) technique with a Hanau Height Tracer. The apex of the gothic arch tracing was accepted as the definitive centric relation position, following which the mandibular cast was mounted on the articulator using the verified interocclusal record.

Figure 21: Try in of Complete Denture

The artificial teeth were arranged in balance occlusal scheme considering patient's facial characteristics, available interarch space, ridge relationship, and esthetic requirements. The arrangement was evaluated intraorally for lip support, phonetics, esthetics, occlusal plane, and centric relation. After satisfactory clinical verification, the trial dentures were processed.

Fabrication of secondary telescopic components

The secondary telescopic components were fabricated to correspond with the primary copings. The secondary components were incorporated into mandibular denture base while denture fabrication.

Figure 22: Mandibular denture intaglio surface with Secondary telescopic coping

Figure 23: Mandibular denture

Figure 24: Maxillary Denture reinforced with metal mesh

The completed prosthesis was processed using conventional laboratory procedures. Maxillary denture was reinforced with metal mesh. The internal surfaces of the secondary telescopic components were evaluated to ensure that they did not interfere with complete seating of the prosthesis.

Insertion and follow-up

At the time of insertion, the telescopic overdenture was evaluated for complete seating, proper path of insertion and removal, retention, stability, occlusion, border extension, phonetics, esthetics, and patient comfort, and necessary occlusal adjustments were subsequently performed to achieve optimal prosthetic function.

Figure 25: Intra oral lateral profile right site

Figure 26:Frontal view

Figure 27:Intra oral latera profile

Figure 28: Balance occlusion (a) latertrussive movement toward right side

(b) protrussive movement

(a) latertrussive movement toward left side

Figure 29: Pre treatment Frontal view

Figure 30: Post treatment frontal view

Retention and stability of the mandibular telescopic overdenture were clinically excellent. The patient was instructed regarding insertion and removal of the prosthesis, oral hygiene, cleaning of the telescopic components, and maintenance of the abutment teeth. Follow-up reviews were scheduled at 1 week, 1 month, and then every 6 months to monitor periodontal health, prosthesis fit, and occlusion. Long-term success of telescopic prostheses depends not only on mechanical retention but also on maintenance of the periodontal health of the abutment teeth.[7–10]

Discussion

Rehabilitation of a severely resorbed mandibular ridge presents a significant prosthodontic challenge because reduction of the denture-bearing area may compromise the support, stability, and retention of a conventional complete denture. In such circumstances, preservation of strategically positioned natural teeth can provide an additional source of support and contribute to improved prosthetic stability.[3,4]

In the present case, four mandibular teeth—33, 35, 43, and 44—were available and demonstrated favorable periodontal support. Their strategic preservation allowed them to be incorporated into the telescopic overdenture rather than being extracted and replaced by a conventional complete denture. This approach reflects the conservative principle of preserving natural teeth whenever their biological prognosis permits.[3,4]

The principal feature of the telescopic concept is the relationship between the primary and secondary components. The primary coping is cemented onto the prepared abutment tooth, while the corresponding secondary component is incorporated into the removable prosthesis. This arrangement provides guidance during insertion and removal and contributes to retention and stability.[5,6]

The Marburg double-crown system represents one of the established approaches to telescopic crown-retained removable prosthodontic rehabilitation.[6] Long-term clinical evaluation has demonstrated favorable longevity of removable partial dentures retained by telescopic crowns.[7] Wöstmann et al. similarly reported long-term survival of telescopic crown-retained removable partial dentures, although prosthetic and biological maintenance remained necessary during the observation period.[8]

Szentpétery et al. also evaluated the longevity of frictional telescopic crowns in patients with severely reduced dentitions and demonstrated the clinical applicability of the concept over longitudinal follow-up.[9] These findings support the use of telescopic systems as a viable treatment option in selected patients with a reduced number of strategically positioned teeth.

The systematic review and meta-analysis by Oh et al. is particularly relevant to the present case because it evaluated the loss of abutment teeth in double-crown-retained removable partial dentures compared with clasp-retained prostheses. The authors found no significant difference in abutment-tooth loss between the two treatment modalities.[10] This suggests that the use of a double-crown system does not inherently result in poorer abutment prognosis when appropriate clinical selection and maintenance are provided.

In the present case, careful evaluation of the four mandibular abutments was therefore an important component of treatment planning. Periodontal support, tooth mobility, crown-root relationship, endodontic status, and the distribution of the remaining teeth were considered before selecting them as telescopic abutments.

The retentive behavior of telescopic prostheses is influenced by the geometry and materials of the interacting components. Tasaka et al. evaluated the retentive force of telescopic crowns combining fiber-reinforced composite and zirconia and demonstrated that material combination and aging can influence retention.[11] Although the present case used cobalt-chromium primary copings, the study highlights the importance of material selection and component design when predictable retention is desired.

The incorporation of CAD/CAM technology has further expanded the fabrication options for telescopic prostheses. Herpel et al. evaluated removable partial dentures retained by hybrid CAD/CAM cobalt-chromium double crowns and demonstrated the clinical application of digitally fabricated double-crown systems.[12] Such technologies may improve manufacturing consistency and provide alternative approaches for producing accurately fitting telescopic components.

Patient satisfaction is another important consideration. Mohsen et al. investigated patient satisfaction with different telescopic prosthetic designs and demonstrated that the characteristics of the prosthesis can influence patient-reported outcomes.[13] Although the patient population in that study differed from the present case, the findings emphasize that prosthetic treatment should be evaluated not only according to technical parameters but also according to comfort, function, retention, and patient satisfaction.

The alloy used for telescopic components may also influence long-term clinical performance. Zierden et al. compared precious and nonprecious alloy telescopic crown-retained removable partial dentures and evaluated their survival and maintenance requirements.[14] The findings are relevant to the present case because cobalt-chromium was selected for the primary copings, providing a practical nonprecious alloy option for the telescopic components.

Preservation of the remaining dentition is an important component of overdenture therapy. Shankar et al. described the use of vital and nonvital submerged roots as a conservative approach for maintaining supporting structures following tooth loss.[15] Although the technique differs from the telescopic approach used in the present case, the underlying philosophy of preserving useful dental structures is relevant to the treatment rationale.

Other forms of tooth-supported overdenture therapy have also demonstrated the potential benefits of retaining natural teeth. Kumar et al. described a tooth-supported overdenture approach intended to address problems associated with overcontouring and limited interocclusal space.[16] Shah et al. compared conventional complete dentures with tooth- and implant-supported overdentures and evaluated changes in vertical dimension and muscle activity.[17] These studies demonstrate the broader clinical relevance of tooth-supported overdenture treatment, although they do not specifically evaluate telescopic crown systems.

The present case also involved a completely edentulous maxillary arch with an anterior flabby ridge. Management of a flabby ridge requires careful impression procedures because displacement of mobile tissues during impression making can adversely affect denture adaptation and stability[20–22glass] –. Therefore, the maxillary and mandibular prostheses required different clinical considerations despite being fabricated as part of the same rehabilitation.

An important advantage of the telescopic approach is that the removable component can be removed by the patient for cleaning and can potentially be modified if the status of an abutment tooth changes. However, this should not be interpreted as eliminating the possibility of biological complications. Regular periodontal evaluation, oral hygiene instruction, caries prevention, and assessment of the telescopic components are essential for long-term maintenance.[7–10]

Recent tooth-supported overdenture literature also emphasizes the preservation of the residual ridge and remaining natural teeth as important treatment objectives.[18,19] These concepts support the conservative philosophy adopted in the present case, although the specific attachment systems described in these studies differ from the telescopic mechanism used here.

The present case should therefore not be interpreted as demonstrating superiority of telescopic overdentures over implant-supported or conventional prosthetic alternatives. Rather, it illustrates how a telescopic overdenture can provide an individualized treatment option when strategically positioned natural teeth are available and the residual ridge provides limited support.

Conclusion

Telescopic overdenture therapy provides a useful treatment option for selected patients with a severely compromised residual ridge and a limited number of strategically positioned natural teeth. The present case demonstrates how four periodontally favorable mandibular teeth could be preserved and incorporated into a telescopic overdenture to provide additional prosthetic retention, support, and stability.[3,4]

Clinical studies have demonstrated favorable longevity of telescopic crown-retained removable prostheses, although biological complications, abutment tooth loss, prosthetic maintenance, and patient compliance remain important determinants of long-term treatment success.[7–10]

Successful telescopic overdenture treatment depends on appropriate patient selection, careful assessment of the remaining abutment teeth, accurate preparation and fabrication of the primary and secondary components, precise impression procedures, and establishment of a favorable occlusal relationship.[5–8]

Material selection and component geometry are also important because they influence the retention and long-term performance of the telescopic system.[11–14]

The present case highlights the value of a conservative prosthodontic philosophy in which strategically useful natural teeth are preserved whenever their prognosis permits. Rather than relying exclusively on a severely resorbed residual ridge, the telescopic overdenture incorporates the remaining dentition into the prosthetic design and provides an individualized approach to functional rehabilitation.[3,4]

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