



3-D PRINTED TELESCOPIC OVERDENTURE : A CASE REPORT

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ABSTRACT-

The case report shows the benefits of preserving the remaining teeth and fabricating telescopic dentures which also prevents residual ridge resorption and is an alternative for complete denture fabrication. Telescopic overdentures or double crowns were introduced in the 20th century and have been an integral part of removable prosthodontics since then. Overdentures have many advantages like better stability, retention, prevents residual ridge resorption, etc. Telescopic overdentures show good retention, stability, improved chewing efficacy and comfort of the patient. This article puts forward that 3-D printed overdentures is a viable treatment option that should be considered.

Keywords: Telescopic, overdenture, primary coping.

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INTRODUCTION

Teeth are most commonly lost due to caries, periodontal disease or trauma[1]. It is important to preserve what is already present, hence, preserving the remaining teeth is of utmost importance. When some natural teeth are remaining, the treatment plan could be implants, conventional fixed prosthesis or tooth or tissue supported dentures.[2]

Implants are often expensive and depending on the quality of bone may or may not require bone grafting. Dentures often are less satisfactory for patients due to lack of retention or soft tissue coverage. In some

cases, there are not enough abutments to support a fixed prosthesis. Telescopic dentures thus help to overcome all these challenges and is thus an excellent alternative.[3]

According to GPT, a telescopic denture is also called as an overdenture, which is defined as any removable dental prosthesis that covers and rests on one or more of the remaining natural teeth, on the roots of the natural teeth, and/or on the dental implants.[4]

The telescopic overdenture concept was got from that of an optical microscope. The working is based on movement between two parallel cylinders.[5]



Miller (1958) was one of the first dentists to use overdentures. He said that the maxillae and mandible were designed to house teeth and not to support artificial dentures. He believed that no support for occlusal forces was as adequate as the roots of natural teeth.[5]

The primary copings are cemented to the abutment teeth while the final crowns fit on the primary coping. [5] They transmit forces directly along the long axes of the abutment which prevents the prosthesis from getting dislodged as well as increases retentiveness and support .

It is also known as overlay prosthesis, overlay denture and superimposed prosthesis.[6]

MANAGEMENT

A 67 year old male patient reported to the Department of Prosthodontics, Crown and Bridge, Dr D.Y. Patil University , School of Dentistry, Navi Mumbai with a chief complaint of replacement of missing teeth and difficulty in eating.

Intraoral examination revealed the maxillary arch is completely edentulous and in the mandibular arch 48,43,42,41,31,33 and 34 are present. No mobility of the teeth was seen and they were all root canal treated.(Figure 1) All the treatment plans possible were discussed with the patient including implants, fixed partial dentures and conventional removable prosthesis. The patient wanted to preserve his remaining teeth . All the factors involved were studied and it was decided to go for a traditional complete denture for the maxillary arch and a telescopic overdenture for the mandibular arch.

Primary impressions of the maxillary and mandibular arch were made with impression compound (Y Dents Impression Compound) and irreversible hydrocolloid impression material (ZhermackTropicalgin)respectively. Diagnostic casts were poured in Type III Gypsum (KalabhaiKalrock)and fabrication of a special tray was carried out for the maxillary arch. This was followed by border moulding and secondary impression for final impression

which was made using low fusing impression compound(DPI Pinnacle Tracing Sticks) and light body wash (ZhermackZetaplus)respectively.(Figure 2)

A diagnostic jaw relation was carried out prior to tooth preparation. This helped to determine the vertical dimension as well as the occlusal plane. The vertical dimension is 12mm, hence, telescopic overdenture was chosen.(Figure 3)

Tooth preparation along with post space preparation to 7mm was done for 48,31 and 33 to receive the primary copings with radicular extensions as the crown height was less than 4mm and 43,42,41 and 34 were filled with Glass Ionomer cement and submerged as it was periodontally compromised. The occlusal rims guided during tooth preparation. A final impression was made using polyvinyl siloxane elastomeric impression material(putty and light body)(ZhermackZetaplus) using two step technique. Primary copings were fabricated in cobalt-chromium alloy indirectly. The fit of the crowns were tried and assessed intraorally. The primary copings were cemented using Glass Ionomer Cement (GC Gold Label Glass Ionomer Luting and Lining Cement) (Figure 4)

The mandibular framework was designed using the Exocad designing software to digitally design the framework and it was 3D printed, followed by final impression. (Figure 5) The framework which consisted of the final crown was tried and evaluated in the patient's mouth. (Figure 6)

Maxillomandibular relation was recorded. This was done using occlusal rims on temporary denture bases that were fabricated on the maxillary cast and mandibular metal framework. (Figure 7)

Try in was carried out after teeth arrangement was completed and evaluation of phonetics, occlusion and esthetics was carried out. Fabrication of the dentures was carried out. (Figure 8)



Polishing of the prosthesis was done and occlusion was assessed. (Figure 9) Post placement instructions were given and recall of the patient was carried out the next day, after 7 days and after a month. The patient was pleased with the esthetics, phonetics and could chew efficiently.

DISCUSSION

A telescopic overdenture was deemed to be the treatment of choice as there is minimum coverage of tissues and better force distribution. Factors like the cost of treatment and patient age played a role in the selection of telescopic overdentures as an acceptable treatment option as opposed to implants, conventional fixed partial dentures and conventional removable prosthesis.

Owalet *al* stated that 25% of RPDs fabricated were discarded during the first year itself due to decreased retention and stability of the prosthesis.[7] This lack of retention and stability occurs due to residual alveolar ridge resorption. It occurs in all directions following tooth loss. [8] This resorption is rapid, progressive and irreversible especially immediately after extraction and it has been observed and documented in literature.[3]

It has also been observed that bone is maintained around remaining natural teeth and implants. Since overdenture prosthesis helps to preserve the remaining natural teeth, it also helps to maintain the alveolar ridge.[2] Robert J. Krum conducted a study to determine the amount of vertical residual bone loss in the anterior part of the maxillae and mandible in two groups of patients: One with complete maxillary dentures and mandibular overdentures and the other group with complete maxillary and mandibular conventional dentures. It was concluded that patients treated with complete maxillary dentures and mandibular overdentures demonstrated less vertical alveolar bone reduction than patients with complete maxillary and mandibular conventional dentures.[3]

Clasp or precision attached prosthesis have shown higher failure rates over a period of time as compared to conical crown retained prosthesis as seen in longitudinal follow-up studies.[8] The advantage is that teeth that are not ideal to be used as abutments for a fixed partial denture prosthesis can be used for overdentures. This results in more bone deposition as the periodontal ligament fibres get simulated. Telescopic prosthesis are indicated in cases with multiple natural teeth present on both sides of the arch. These natural teeth that serve as abutments increase the support of the ridges. Stability is also increased. Another advantage over the conventional complete dentures is proprioception which occurs due to the periodontal fibres.[9]

The double crown systems can be divided on the basis of their mechanisms of retention. The types of double coping systems are, telescopic crowns, conical or tapered crowns and that with a clearance fit or hybrid telescopic crown. In the telescopic crown, retention occurs due to friction. Wedging effect is seen for conical crowns or tapered crowns on complete seating. Wedging or friction is not seen for the double crown with a clearance fit on placement or on being removed. Here retention is achieved using secondary attachments.

In telescopic overdentures there is a primary coping which is cemented directly onto the natural tooth structure and a final crown which is detachable and is connected rigidly to the detachable prosthesis.[3] Copings provide protection to the natural teeth against caries, thermal irritants, chemical irritants, etc. The final crown thus encompasses the primary coping and forms a unit.

Tapering of the coping walls is done. This generates compressive interfacial surface tension due to its wedging action. As the convergence angle decreases, the frictional retention of the coping increases. Six degrees is the average angle. The copings are casted



according to the configurations of the convergence angles of the walls with each other. Thus, the crowns will have a common path of insertion. In cases with shorter clinical crowns, if the walls are parallel or the taper is reduced (2° - 5°) retention increases. The convergence angle of the walls can be determined prior.[3]

Retention and stability of the prosthesis is dependent on the quantity, location of the abutments. It also depends on the convergence angle of the primary coping.

The crowns transmit forces directly along the long axis of the abutment teeth. They also guide in placement of the prosthesis. They also protect from movements which might cause dislodgement of the prosthesis and thus, effectively helps in retention of the removable prosthesis.

Telescopic prosthesis are easy to retrieve. A telescopic prosthesis is an economic and viable option for patients as repair of the prosthesis is easily possible without fabrication of the entire removable prosthesis. Instructions have to be given to the patient to take care during cleaning so as to prevent damage. If it occurs, distortion of the final crown can occur which will result in an overall reduction in the prosthesis retentiveness. Telescopic dentures also motivate the patient to maintain good oral health because the abutments are more accessible. [10,11]

Digital dentistry has changed the field of dentistry for the better since sometime now.

This evolution has led to an increased number of materials for fabrication of digital prosthesis. 3D printing has numerous advantages over milled frameworks as it reduces casting defects, it is more precise, accurate and shows higher efficiency.

As every coin has two sides there are certain drawbacks of the telescopic overdentures also, which are:[12]

1. Overdentures are more costly than other removable prosthesis
2. The abutment should have a good prognosis.
3. They are bulky.
4. Depends on the number and location of abutments.

Even Though it is more costly, telescopic overdentures have proven to be a better alternative as compared to other removable prosthesis. It has shown good retention, stability, support, stable occlusion, proprioception, phonetics and also provides psychological satisfaction to the patients due to preservation of teeth. It decreases the rate at which the residual ridge resorbs which minimizes unsettling of the denture. Even though the use of implants has increased exponentially for overdentures, tooth supported overdentures still serve as an excellent option for replacement of missing teeth.





FIGURE 1: PRE-OPERATIVE PHOTOGRAPHS



FIGURE 1: INTRAORAL PHOTOGRAPH OF THE MAXILLARY ARCH



FIGURE 1: INTRAORAL PHOTOGRAPH OF MANDIBULAR ARCH

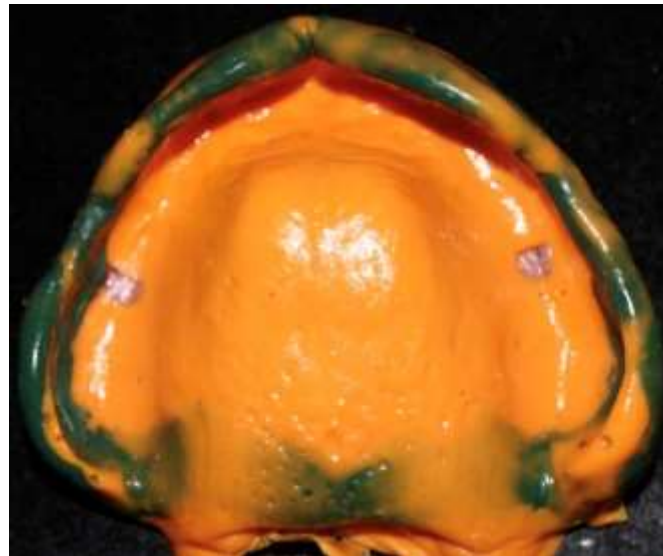


FIGURE 2: MAXILLARY CAST AND SPECIAL TRAY WITH FINAL IMPRESSION

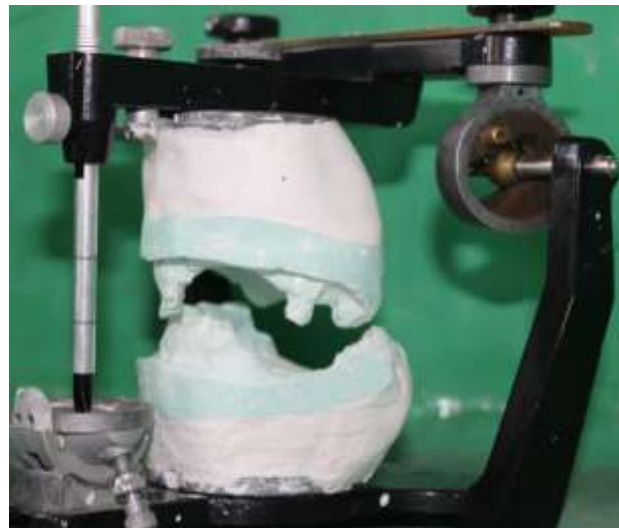


FIGURE 3: DIAGNOSTIC MOUNTING



FIGURE 4: PRIMARY COPINGS PLACED OVER THE PREPARED TEETH SURFACE ON THE CAST



FIGURE 4: PRIMARY COPINGS



FIGURE 4: CEMENTATION OF PRIMARY COPINGS



FIGURE 5: MANDIBULAR FRAMEWORK DESIGNING USING EXOCAD SOFTWARE

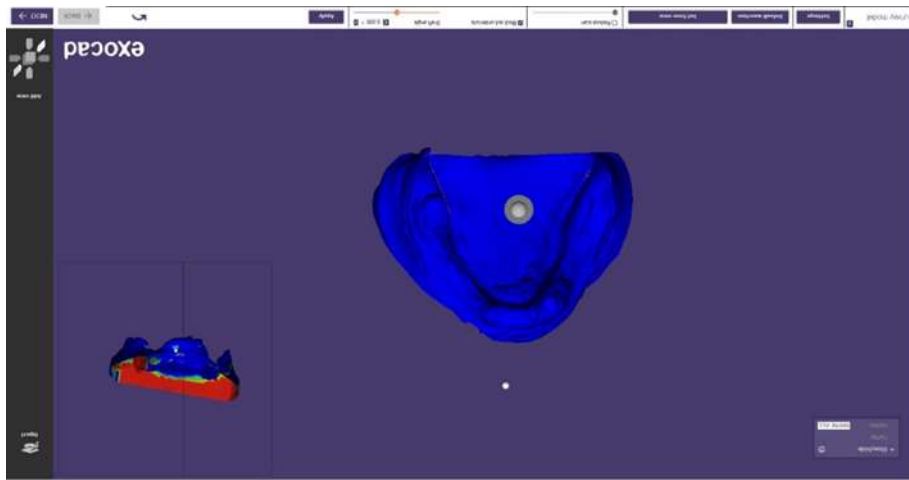


FIGURE 5: MANDIBULAR FRAMEWORK DESIGNING USING EXOCAD SOFTWARE



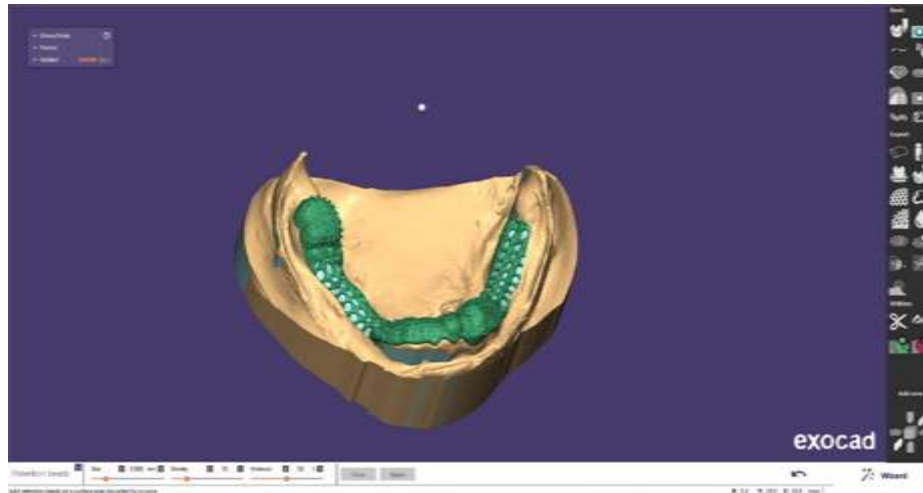


FIGURE 5: DESIGNING FRAMEWORK FOR THE OVERDENTURE ON EXOCAD SOFTWARE



FIGURE 5: 3-D PRINTED FRAMEWORK



FIGURE 6: 3-D PRINTED FRAMEWORK

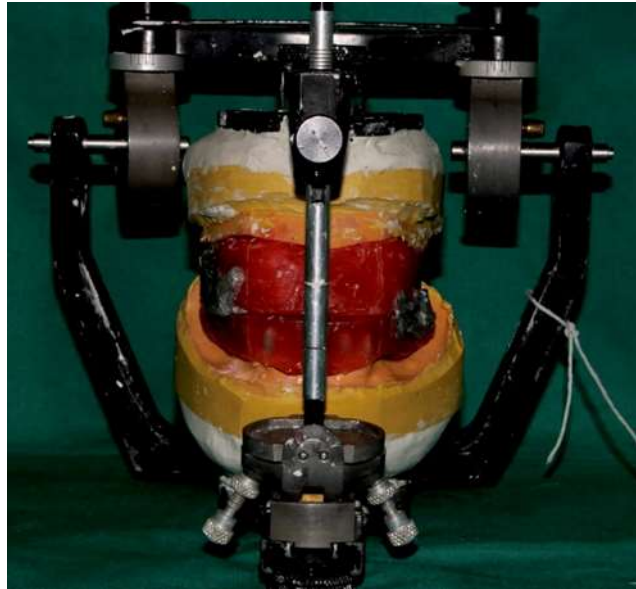


FIGURE 7: MAXILLOMANDIBULAR RELATIONSHIP RECORDED

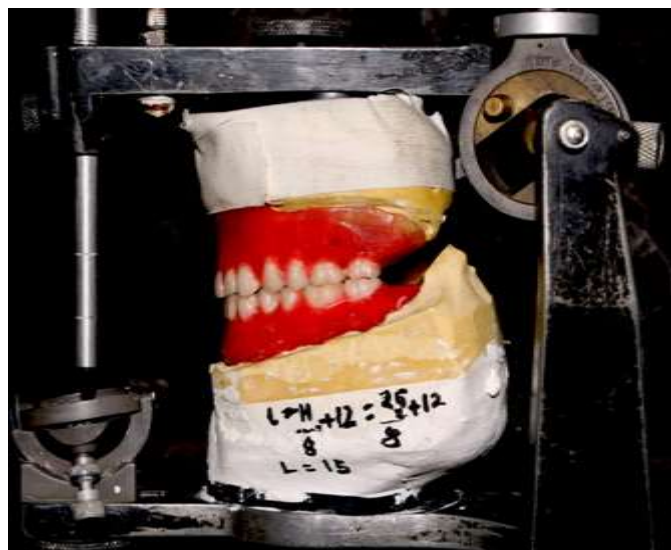




FIGURE 8- TRY IN



FIGURE 9- POST-OPERATIVE PHOTOGRAPHS

REFERENCES

1. Clark-Perry, Danielle & Levin, Liran. (2019). In the Dental Implant Era – Why We Still Bother Saving Teeth?. *Dental Traumatology*. 35. 10.1111/edt.12492.
2. Shruthi CS, Poojya R, Ram S, Anupama. Telescopic Overdenture: A Case Report. *IntJ Biomed Sci*. 2017 Mar;13(1):43-47. PMID: 28533736; PMCID: PMC5422644.
3. Ravikumar, Prasad S, Kashinath K.R., Naveen B.H. Telescopic complete denture-with a custom mode stud attachment. *Journal of Dental Sciences and Research*.2012;3:10–13.
4. Glossary of Prosthodontic Terms. *J. Prosthet Dent*. 2005;94:10–92.
5. Miller PA. Complete dentures supported by natural teeth. *J Prosthet Dent* 1958;8:924-28
6. Singh K, Gupta N. Telescopic Denture - A treatment modality for minimizing the conventional removable complete denture problems: A case report. *Journal of Clinical and Diagnostic Research*. 2012;6:1112–1116.
7. Owall G, Bieniek KW, Spiekermann H. Removable partial denture production in western Germany. *Quintessence Int*. 1995;26:621–627.
8. Bhagat TV, Walke A. Telescopic partial dentures-concealed technology. *Journal of International Oral. Health*. 2015;7:143–147.
9. Lord JL, Teel S. The overdenture: Patient selection, use of copings and follow-up evaluation. *J. Prosthet Dent*. 1974;32:41–51.
10. Langer Y, Langer A. Tooth-supported telescopic prostheses in compromised dentitions: A clinical report. *J. Prosthetic Dent*. 2000;84:129–132.
11. Goswami R, Mahajan P, Siwach A, Gupta A. Telescopic overdenture: Perio-prosthodontic concern for advanced periodontitis. *Contemp. Clin. Dent*. 2013;4:402–405
12. Bibinagar R, Anam C, Mamidi P, Saxena A, Gautam, Rathinam J. Telescopic Overdenture. *J Orofac Res* 2013;3(1):57-62

