Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Case Report

A Technique never obsolete – Tooth supported Overdenture : A series of case reports

Bhuvanesh Kumar Dharani Vidhya[1], Vikash.K. Shetty[2], Sajida Begum Sekaran[3], Vignesh Veerakumar[4]

[1,3,4]Assistant Professor , Department of Prosthodontics, Crown and Bridge, Vinayaka Mission Sankarachariyar's Dental College, affiliated to Vinayaka Mission Research Foundation- Salem, Tamil nadu, India;
[2]Clinician & Consultant Prosthodontist

***ABSTRACT*:**
Tooth supported Overdenture is primarily a preventive prosthodontic concept. The preventive prosthodontic concept is primarily concerned with the preservation of the remaining oral structures while meticulously replacing the lost structures. The key to success of this treatment mainly depends on the strategic selection of the remaining teeth. It aids in preserving the bone anatomy and provides proprioception because of the presence of the few remaining natural teeth. This treatment procedure can effectively increase the masticatory potential and psychological wellbeing of the patient. There are several other advantages of tooth supported overdentures over the conventional dentures like improved retention, stability and decreased resorption of the alveolar ridge. Also the major disadvantages of implant supported overdenture like high cost and increased time consumption are overcome with the help of Tooth supported Overdentures. There are innumerable options available for fabricating these tooth supported overdentures. In this article we will see a series of 5 different cases fabricated using cast copings and ball attachments.
Key-words: Cast post, Metal copings, Ball attachments, Bone resorption, proprioception

Key Messages: Loss of proprioception and bone resorption are the primary obstacles in the treatment of patients with complete denture. These could be minimised with the help of tooth supported overdentures. Also the stability, retention and vertical dimension of occlusion are better with tooth supported overdenture prosthesis.

Received: 14 April, 2020 Accepted: 28 April, 2020

Corresponding author: Dr. Bhuvanesh Kumar Dharani Vidhya, Assistant Professor , Department of Prosthodontics, Crown and Bridge, Vinayaka Mission Sankarachariyar's Dental College, affiliated to Vinayaka Mission Research Foundation- Salem, Tamil nadu, India

This article may be cited as: Vidhya BKD, Shetty VK, Sekaran SB, Veerakumar V. A Technique never obsolete – Tooth supported Overdenture : A series of case reports. J Adv Med Dent Scie Res 2020;8(5):93-101.

INTRODUCTION:
Tooth supported overdentures form an important part of preventive prosthodontics. They prevent the patient from becoming completely edentulous and also aid in maintaining the health of the few remaining teeth. GPT 9 defines overdentures as a removable partial or complete denture that covers and rests on one or more remaining natural teeth, roots, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, tooth roots, and/or dental implants. It is also called as overlay denture or overlay prosthesis or superimposed prosthesis."[1] There are several advantages of tooth supported prosthesis which are as follows. The presence of few remaining natural teeth serve as a constant stimuli for the alveolar bone and thereby minimize bone resorption. There is better retention and stability when compared to the conventional complete dentures. They also eliminate the need for implant supported overdentures which have more of financial, anatomical and medical constraints and can also be time consuming. In short the sequence of events that take place in a complete denture patient like loss of proprioception, loss of alveolar bone, increased stress to the oral mucosa, loss of masticatory efficiency and psychological distress because of complete edentulism can all be overcome through tooth

supported overdentures.[2] There are innumerable ways of enhancing the retention and stability of these overlay prosthesis. These include attachments like bar and clip, ball and O- ring, ERA and magnet attachments.[3] This article discusses a series of five cases of tooth supported overdentures which are retained with the help of thimble copings, ball attachments and bar supported overdenture.

CASES:

Case 1:

A 52 year old female patient reported to the Department of Prosthodontics for replacement of her missing teeth. On intra oral examination, her maxillary arch was completely edentulous and the mandibular arch had few remaining teeth. The patient had a history of loss of teeth due to weak teeth supporting structures and dental caries for the past 8 years. The mandibular arch had 38, 37, 33, 43, 44 and 47. All teeth in the mandibular arch except 33 and 43 were recommended for extraction because of teeth mobility and severe bone loss. The patient had Kennedy's type I modification 1 type of partial edentulism after extraction.[Fig 1a]

The patient had difficulty in chewing and mastication and wanted a prostheses with efficient function and esthetics. She was also very reluctant in extracting her mobile teeth and hence was convinced that she would not be completely edentulous and that few of her teeth will be retained.

CASE-1

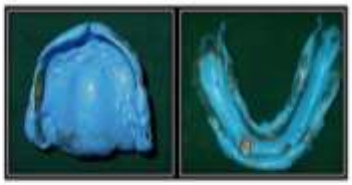
[Fig 1a] – After extraction of hopeless teeth, 33 & 43 were retained.

[Fig 1b]- Post space preparation done and both the teeth were reshaped to receive the metal copings

[Fig.1.c]- Post space impression made with the help of putty wash impression technique using J hooked wire.

[Fig.1.d]- Metal copings were casted.

[Fig.1.e]- Casted metal were luted to the respective teeth with the help of luting cement.



[Fig.1.f]. Maxillary and mandibular secondary impressions were made using Medium body addition silicone from Reprosil after border molding with low fusing tracing sticks from DPI

[Fig.1.g] Wax trial

[Fig. 1 h] Denture insertion

Procedure

An intentional root canal treatment was planned and executed on 33 and 43 with patient's consent. Post space was created using peso reamers 4mm short of the apical length. The teeth were shaped with a chamfer finish line which was placed subgingivally [Fig.1b]

The post space was recorded with the help of J hooked wire and light body addition silicone. The impression was verified if it was devoid of air bubbles. [Fig.1.c]

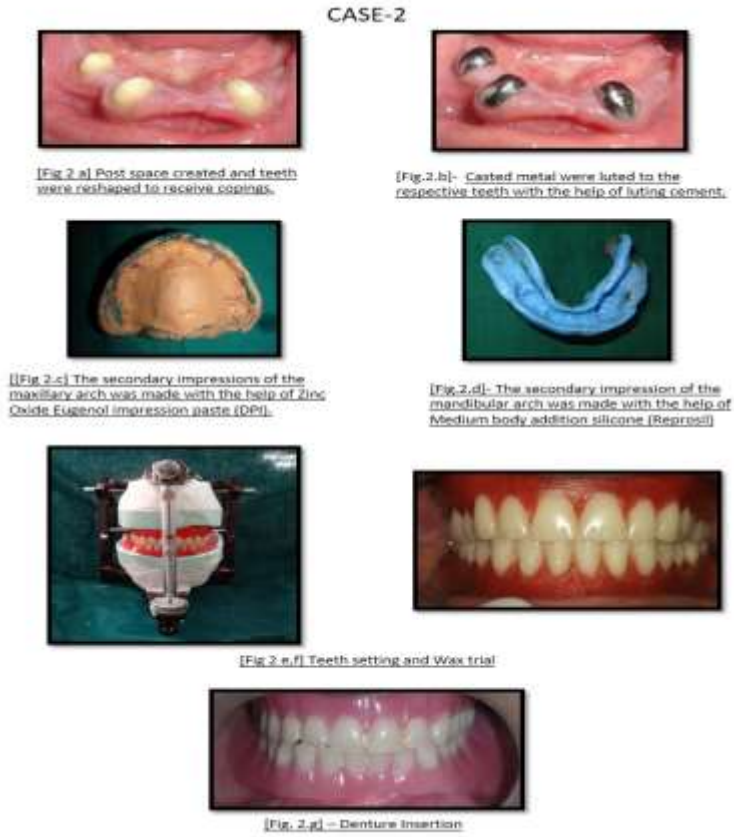
The cast was poured with the help of type IV Dental Stone. Wax pattern of the post and coping was fabricated [Fig.1d] Necessary care was taken to prevent any distortion of the wax pattern and the same was sprued and casted. The final fit of the casted post was verified in the post space and also the thickness of the coping was also verified to be within 1 mm thickness. The dome shaped cast post was then luted with the help of Glass ionomer luting cement.[Fig.1.e] Then the preliminary impression of the maxillary and mandibular arches was made with the help of Alginate (DPI Chromatex) and preliminary casts poured. Special trays were fabricated using autopolymerising resin and border moulding was done with low fusing impression compound {DPI}. The secondary impressions of the maxillary and mandibular arches were made with the help of Medium body addition silicone (Reprosil) [Fig.1.f]

The master casts were obtained using type IV gypsum (Ultrarock Kalabhai). The record bases were fabricated after blocking the undercuts in the coping and wax occlusal rims were fabricated. A tentative jaw relation is then done in the patient and mounted in the semiadjustable articulator after facebow transfer. The teeth setting was done and wax trial checked in the patient to verify esthetics, vertical dimension and phonetics. [Fig.1.g]

The dentures are then processed using heat cure denture base resin (DPI Heat cure) and final insertion done in the patient.[Fig. 1.h]

Case 2:

A 61 year old female patient reported to the Department of Prosthodontics and Crown & Bridge with the chief complaint of inability to chew food and unesthetic appearance due to multiple missing teeth. The maxillary arch was completely edentulous and the mandibular arch had few remaining teeth. The teeth present in the patient were 36,33,43,45 and 46. The patient was advised extraction of 36 and 46 due to grade II mobility.33, 43 and 45 were planned to be retained and a Tooth supported overdenture was planned for the patient. The patient had Kennedy's type I modification 2 type of partial edentulism after extraction.



Procedure: The procedure is similar to that of the previous case. An intentional root canal treatment was done for 33, 43,45 and then a post space was created using peso reamers 4mm short of the apical length. The teeth were shaped with a chamfer finish line which was placed subgingivally [Fig 2 a]

The post space was recorded with the help of J hooked wire and light body addition silicone. The cast was poured with the help of type IV Dental Stone. Wax pattern of the post and coping was fabricated. Necessary care was taken to prevent any distortion of the wax pattern and the same was sprued and casted. The final fit of the casted post was verified in the post space and also the thickness of the coping was also verified to be within 1 mm thickness. The dome shaped cast post was then luted with the help of Glass ionomer luting cement.[Fig.2.b]

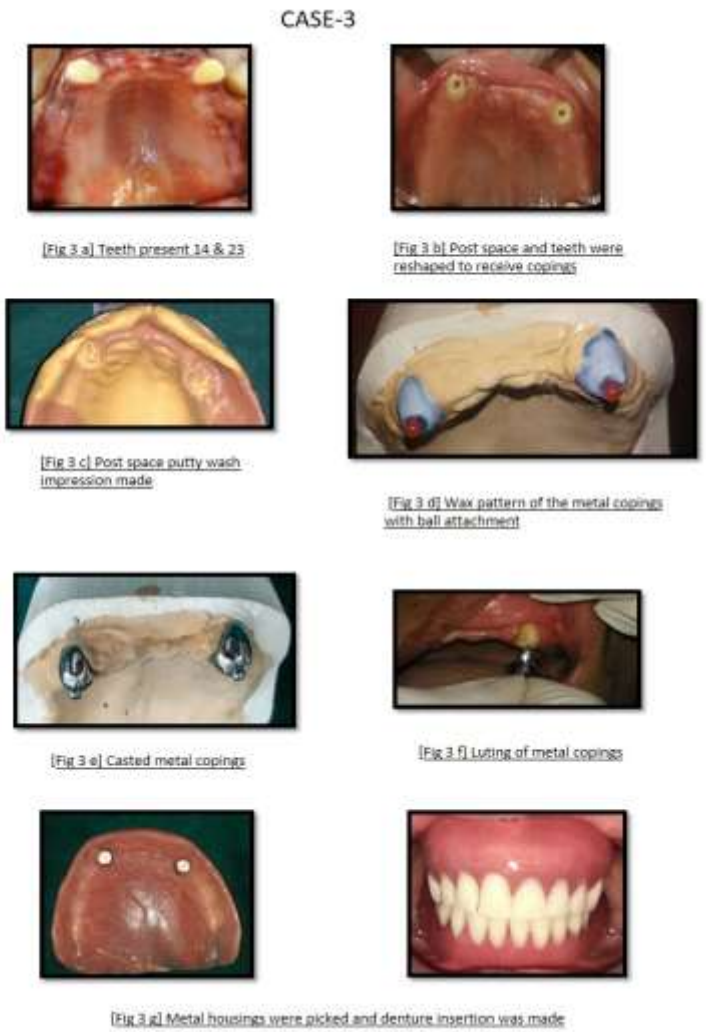
A preliminary impression of the maxillary and mandibular arches was made with the help of Alginate (DPI Chromatex) and preliminary casts poured. Special trays were fabricated using autopolymerising resin and border moulding was done with low fusing impression compound. The secondary impressions of the maxillary arch was made with the help of Zinc Oxide Eugenol impression paste (DPI).)[Fig.2.c]

The secondary impression of the mandibular arch was made with the help of Medium body addition silicone (Reprosil)[Fig.2.d] The mast casts were poured using type IV gypsum (Ultrarock Kalabhai)

The record bases were fabricated after blocking the undercuts in the coping and wax occlusal rims were fabricated. A tentative jaw relation was then done in the patient and mounted in the semiadjustable articulator after facebow transfer. The teeth setting was done and wax trial checked in the patient to verify esthetics, vertical dimension and phonetics.[Fig.2.e,f]

The dentures are then processed using heat cure denture base resin (DPI Heat cure) and final insertion done.[Fig. 2.g]

Case 3:



[Fig 3 a] Teeth present 14 & 23

[Fig 3 b] Post space and teeth were reshaped to receive copings

[Fig 3 c] Post space putty wash impression made

[Fig 3 d] Wax pattern of the metal copings with ball attachment

[Fig 3 e] Casted metal copings

[Fig 3 f] Luting of metal copings

[Fig 3 g] Metal housings were picked and denture insertion was made

Another female patient aged 55 years reported to the Department of Prosthodontics and Crown & Bridge for replacement of her multiple missing teeth. The mandibular arch was completely edentulous and the maxillary arch had very few remaining teeth. The patient had Kennedy's type I modification 1 type of partial edentulism.[Fig 3 a].
The teeth present were 14 and 23. A diagnostic articulation was done to verify the vertical dimension of occlusion. As there was sufficient vertical dimension of occlusion was present, a maxillary tooth supported overdenture was planned with attachments

Procedure: An intentional root canal treatment was done for 14 and 23 and then a post space was created using peso reamers 4mm short of the apical length. The teeth were shaped with a chamfer finish line which was placed subgingivally [Fig 3 b].
The post space was recorded with the help of J hooked wire and light body addition silicone. The impression was verified if it was devoid of air bubbles.[Fig 3 c]
The cast was poured with the help of type IV Dental Stone. Wax pattern of the post and coping was fabricated. To the pattern, the ball attachments [Male component] were attached after surveying the path of insertion [Fig.3d]
The wax patterns were casted and the copings with the ball attachment were fabricated.[Fig 3 e]
The fit of the fabricated metal copings were checked in the patient's mouth and were cemented with the help of luting glass ionomer cement. [Fig 3 f]
After the copings were luted, A preliminary impression of the maxillary and mandibular arches was made with the help of Alginate (DPI Chromatex) and preliminary casts poured. Special trays were fabricated using autopolymerising resin and border moulding was done with low fusing impression compound. The secondary impressions of the maxillary arch was made with the help of Zinc Oxide Eugenol impression paste (DPI)
The secondary impression of the mandibular arch was made with the help of Medium body addition silicone (Reprosil). The mast casts were poured using type IV gypsum (Ultrarock Kalabhai) The record bases were fabricated after blocking the undercuts in the coping and wax occlusal rims were fabricated. A tentative jaw relation was then done in the patient and mounted in the semiadjustable articulator after facebow transfer. The teeth setting was done and wax trial checked in the patient to verify esthetics, vertical dimension and phonetics.
The dentures were then processed using heat cure denture base resin (DPI Heat cure). The dentures were inserted and checked for extensions. Using the direct method, metal housings along with the rubber sleeves [female component] placed over the ball attachments were picked up using auto polymerizing resin [Fig 3 g]

Case 4:
A male patient aged 60 years reported to the Department of Prosthodontics and Crown & Bridge for replacement of his multiple missing teeth. The maxillary arch was completely edentulous and the mandibular arch had very few remaining teeth. The patient had Kennedy's type I modification 1 type of partial edentulism.[Fig 4 a].
The teeth present were 34,33 & 43,44. A diagnostic articulation was done to verify the vertical dimension of occlusion. As there was sufficient vertical dimension of occlusion was present, a mandibular tooth supported overdenture was planned with attachments and thimble copings.

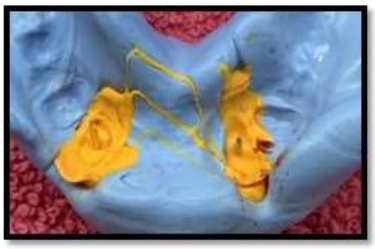
Procedure: An intentional root canal treatment were done for 34,33 & 43,44 and then a post space was created using peso reamers 4mm short of the apical length. The teeth were shaped with a chamfer finish line which was placed subgingivally [Fig 4 b]
The post space was recorded with the help of J hooked wire and light body addition silicone. The impression was verified if it was devoid of air bubbles.[Fig 4 c]
The cast was poured with the help of type IV Dental Stone. Wax pattern of the post and coping was fabricated. To the pattern, the ball attachments [Male component] were attached after surveying the path of insertion [Fig.4d]
[Fig 4 d] Wax pattern of the metal copings with ball attachment on 33, 43 ; thimble coping pattern on 34,44
The wax patterns were casted and the copings with the ball attachment were fabricated.[Fig 4 e]
The fit of the fabricated metal copings were checked in the patient's mouth and were cemented with the help of luting glass ionomer cement. [Fig 4 f]
After the copings were luted, A preliminary impression of the maxillary and mandibular arches was made with the help of Alginate (DPI Chromatex) and preliminary casts poured. Special trays were fabricated using autopolymerising resin and border moulding was done with low fusing impression compound. The secondary impressions of the maxillary and mandibular arch were made with the help of Light body addition silicone (Reprosil) [Fig 4 g]
The mast casts were poured using type IV gypsum (Ultrarock Kalabhai) The record bases were fabricated after blocking the undercuts in the coping and wax occlusal rims were fabricated. A tentative jaw relation was then done in the patient and mounted in the semiadjustable articulator after facebow transfer. The teeth setting was done and wax trial checked in the patient to verify esthetics, vertical dimension and phonetics

The dentures were then processed using heat cure denture base resin (Ivoclar). The dentures were inserted and checked for extensions. Using the direct method, metal housings along with the rubber sleeves [female component] placed over the ball attachments were picked up using auto polymerizing resin [Fig 4 h]

CASE-4

[Fig 4 a] Teeth present 34,33 & 43,44

[Fig 4 b] Post space and teeth were reshaped to receive copings



[Fig 4 c] Post space putty wash impression made

[[Fig 4 d] Wax pattern of the metal copings with ball attachment on 33, 43 ; thimble coping pattern on 34,44

[Fig 4 e] Casted metal copings

[Fig 4 f] Luting of metal copings

[Fig 4 g]- Maxillary and Mandibular final impression

[Fig 4 h] Metal housings were picked and denture insertion was made

Case 5:

A 52 year old female patient reported to the Department of Prosthodontics for replacement of her missing teeth. On intra oral examination, her maxillary arch was completely edentulous and the mandibular arch had few remaining teeth. The patient had a history of loss of teeth due to weak teeth supporting structures and dental caries for the past 8 years. The mandibular arch had 33, 43, 44 and 47. All teeth in the mandibular arch except 33 and 43 were recommended for extraction because of teeth mobility and severe bone loss. The patient had Kennedy's type I modification 1 type of partial edentulism after extraction.[Fig.5.a]

A diagnostic articulation was done to verify the vertical dimension of occlusion.[Fig.5.b] As there was sufficient vertical dimension of occlusion, a mandibular bar supported overdenture was planned.

Procedure

An intentional root canal treatment was planned and executed on 33 and 43 with patient's consent. Post space was created using peso reamers 4mm short of the apical length. The teeth were shaped with a chamfer finish line which was placed subgingivally.[Fig.5.c]

The post space was recorded with the help of J hooked wire and light body addition silicone (Reprosil). The impression was verified if it was devoid of air bubbles.[Fig.5.d] The casts were poured using type IV gypsum (ultrarock kalabhai).[Fig.5.e]

The two wax copings on the mandibular canines were connected with a pre-fabricated plastic bar and was casted. The fabricated bar was fitted to the cast.[Fig.5.f] Then it was verified in patient's mouth. Once the fitting was fine it was luted.[Fig.5.g]

Then the preliminary impression of the maxillary and mandibular arches was made with the help of Alginate (DPI Chromatex) and preliminary casts poured. Special trays were fabricated using autopolymerising resin and border moulding was done with low fusing impression compound. The secondary impressions of the maxillary arch and mandibular arch were made with the help of Medium body addition silicone (Reprosil).

The mast casts were poured using type IV gypsum (Ultrarock Kalabhai) The record bases were fabricated after blocking the undercuts in the coping and wax occlusal rims were fabricated. A tentative jaw relation was then done in the patient and mounted in the semiadjustable articulator after facebow transfer. The teeth setting was done and wax trial checked in the patient to verify esthetics, vertical dimension and phonetics.[Fig.5.h] The dentures were fabricated and tried in patient's mouth. The plastic positioner clip was placed and verified of its fit on the metal bar. A metal housing was fabricated for the plastic sleeve clip. The metal casing along with the plastic sleeve was picked up using autopolymerizing acrylic resin through direct method. Once the excess picked up resin was trimmed , the dentures were inserted.[Fig.5.i]

DISCUSSION:

Even the mere thought of loosing all teeth and becoming completely edentulous brings nightmare to the patients. Hence extracting all teeth and treating patients with complete denture should be sort after as a last resort. Retaining as many natural teeth as possible is very essential to boost the morale of the patient. It also serves the Devans Dictum of perpetual preservation of what remains rather than meticulous replacement of what is missing. Also, the tooth supported overdentures are an effective method of preventive prosthodontics and slow down the resorption process of the alveolar ridge.

According to Crum and Rooney et al [4] the average amount of bone loss in the anterior mandibular ridge of a tooth supported overdenture patient is only 0.6mm as compared to the bone loss in the anterior part of the mandible of a complete denture patient. Thus overdentures help in considerably reducing the resorption of the alveolar ridge and its surrounding bone. Also retaining the natural tooth aids in maintaining the proprioception in the oral cavity indirectly bringing about directional sensitivity; dimensional discrimination; canine response and tactile sensitivity.[5]

According to a study by Rissin et al the masticatory efficiency of the over denture patients is 3 times better compared to the completely edentulous patients.[6] An other major advantage of tooth supported overdenture is redirecting all the occlusal forces vertically along the long axis of the tooth, thereby minimizing the lateral torque acting on the prostheses and indirectly protecting the periodontium.[7]

Retention of these tooth supported prostheses can be increased considerably with the help of attachments which are either extraradicular or intraradicular. These attachments act as shock absorbers and stress redirectors.[8] They also provide excellent retentive features and have become an integral part of prosthodontic treatment as an alternative to conventional mandibular dentures to overcome the problems of retention associated with it.

The attachment provides dual retention and the design of the pivoting male, allows a resilient connection for the prosthesis without any resulting loss of retention. However these attachments need constant maintenance and recall to prevent complications. Also these are expensive, time consuming and need to be replaced if there is damage or wear.[9]

The attachments most commonly used are bar and clip, ball and O ring, Stud attachments and magnetic attachments. The choice of attachment is determined by various factors like number, location and distance between the remaining natural teeth, interarch space, clinical expertise and willingness of the patients.[10]

In this case report, for the 1st two cases, customized short copings with cast posts were selected because of the limited interarch space, reduced crown height and patients affordability.The short coping design shows least amount of stress than any of the other designs and minimizes horizontal torque on the roots and provides ease of maintenance of oral hygiene

The third case was done with the help of prefabricated ball attachments. These ball {stud} attachments function as effective resilient attachments for overdentures.[11]The smaller size of the head needs less removal of the material from the denture base and hence does not compromise with the strength of the denture and the procedure can be done effectively by the chair side.[12,13,14] However there is a risk of movement of the denture in different directions and hence a constant follow up is necessary.[15]This type of attachment does not require exact parallelism because of the rounded male portion.[16]

The fourth case was done with the help of both thimble coping or small copings in 34 and 44 and metal copings with casted ball attachments in 33 and 43. The use of small copings on all 4 teeth makes parallelism an essential factor which would in turn require the need of surveying.[18] Thus because of the increased time consumption, technical considerations and cost factors ball attachments were fabricated only for 33 and 43.

The fifth case was done with the help of bar attachment due to presence of adequate interarch space and difficulty in obtaining parallelism with small copings. This customised bar joint with snug fit metal sleeve provides effective stability and retention. Also the

incorporation of plastic sleeve in the tissue portion of the denture base makes for an effective replacement whenever needed. The splinting of the teeth with the bar makes them more firm and stable and the occlusal loads are shared by both the teeth.[17] The decision for tooth supported overdenture should be done based on the prognosis of the remaining teeth and its caries susceptibility, vertical dimension of occlusion and patient's attitude towards the treatment to make the treatment a success.

CONCLUSION

In recent years because of the commercialization of implants, the practice of preventive prosthodontics has taken a back seat. Dentists should be aware about the various factors which help in selecting the patient for tooth supported overdenture. Also a thorough knowledge about the various attachments and their uses and application should be kept in mind while deciding the treatment plan for the patient. However it is imperative that the patients are educated about the importance of oral hygiene to maintain their remaining teeth so that the longevity of the treatment is maintained.

This article describes a series of case reports where different types of attachments are used for different clinical situations.

REFERENCES:

1. Glossary of prosthodontic terms 9
2. Renner RP, Gomes BC, Shakun ML, Baer PN, Davis RK, Camp P. Four-year longitudinal study of the periodontal health status of overdenture patients. J Prosthet Dent 1984;51:593-8.
3. Z. Ben-Ur, C. Gorfil, A. Shifman Anterior implant-supported overdentures. Quintessence Int, 27 (1996), pp. 603-606
4. Crum RJ, Rooney GE Jr. Alveolar bone loss in overdentures: A 5-year study. J Prosthet Dent 1978;40:610-3.
5. Thayer HH. Overdentures and the periodontium. Dent Clin North Am. 1980; 24:369-77.
6. Rissin L, House JE, Manly RS, Kapur KK. Clinical comparison of masticatory performance and electromyographic activity of patients with complete dentures, overdentures, and natural teeth. J Prosthet Dent 1978; 39:508-11.
7. A.B Warren, A.A Caputo. Load transfer to alveolar bone as influenced by abutment design for toot-supported dentures. JPD 1975;33;137-148
8. Bambara GE. The attachment-retained overdenture. N Y State Dent J 2004;70:30-3.
9. Mishra R, Shivrayan A, Jain S, Mehta S. Fabrication of bar-retained tooth-supported mandibular overdenture. Int J Oral Health Sci 2014;4:37-41.
10. Gilboa I, Cardash HS. An alternative approach to the immediate overdenture. J Prosthodont 2009;18(1):71-5.
11. Rodrigues RC, Faria AC, Macedo AP, Sartori IA, de Mattos Mda G, Ribeiro RF. An *in vitro* study of non-axial forces upon the retention of an O-ring attachment. Clin Oral Implants Res 2009;20:1314-9.
12. Schwartz IS, Morrow RM. Overdentures. Principles and procedures. Dent Clin North Am 1996;40:169-94.
13. Guttal SS, Tavargeri AK, Nadiger RK, Thakur SL. Use of an implant o-ring attachment for the tooth supported mandibular overdenture: A clinical report. Eur J Dent 2011;5:331-6.
14. Cohen BI, Pagnillo M, Condos S, Deutsch AS. Comparative study of two precision overdenture attachment designs. J Prosthet Dent 1996;76:145-52.
15. Singh B, Tamrakar A, Chethan MD, Mall B, Kumar U, Sinha N. Attachment retained overdenture: a case report. Journal of Dental and Orofacial Research. 2015;11(1):69-73.
16. Zamikoff II. Overdentures—theory and technique. The Journal of the American Dental Association. 1973 Apr 1;86(4):853-7.
17. Evans DB, Koeppen RG. Bar attachments for overdentures with nonparallel abutments. J Prosthet Dent 1992;68:6-11.
18. RC, Faria AC, Macedo AP, Sartori IA, de Matros MD, Ribeiro RF. An in vitro study of non-axial forces upon the retention of an O-ring attachment. Clin Oral Implants Res 2009;20:1314-9.