



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2019; 5(4): 16-21
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www.oraljournal.com
Received: 05-05-2019
Accepted: 10-06-2019

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Tooth supported Overdenture: Imperative treatment modality: Root to basics

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Abstract

Loss of alveolar bone is a great entity to be worried about after loss of natural teeth. Preservations of remaining surrounding tissues is of utmost importance. Overdenture is a good treatment modality in means of preservation, retention and stability of prosthesis and thereby increase the Patients perception, acceptance and quality of life.

Keywords: Tooth supported, over denture, stud attachment, locator attachment

Introduction

India being a developing country, the Socio-economic status (SES) is an important determinant of health and nutritional status as well as of mortality and morbidity [1]. Statically it is measured that 18% of Indians had a high standard of living, 44% had a medium standard of living, and 36% had a low standard of living [2]. Hence cost is the major dominating factor for survival of population. As far as oral health is considered the dentition plays an role in the health and the overall quality of life [3].

Nationwide study in Sweden over two decades showed that the prevalence of edentulism in subjects aged 55-84 years was 43% in 1980-81 and 14% in 2002. In the youngest age group (55-64 years) only 4% were edentulous in 2002. In a more recent study the prevalence of edentulism in 2012 among 70-year-old subjects in Sweden was only 3%. It is now well established that the loss of teeth is related to a number of factors, such as socio-economy, tradition, oral health resources, and not only to dental diseases [4].

According to DeVan golden statement: "Perpetual preservation of what remains is more important than the meticulous replacement. Complete edentulism deals with complete denture planning [5]. However, complete denture patient goes through a sequel of events like loss of discrete tooth proprioception, progressive loss of alveolar bone, transfer of all occlusal forces from the teeth to the oral mucosa and the most depressing sequel is the loss of patient's self-confidence [6].

Overdenture is an important part as the preventive treatment modality. According to GPT 8, Overdenture is 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, overlay prosthesis and superimposed prosthesis [7].

Overdenture treatment is a notion which precluded the inevitability of 'floating plastics' in edentulous mouth. The idea of conventional tooth-supported Overdentures is a modest and cost effective treatment compared to the implant Overdentures [8]. The presence of Periodonium in tooth supported Overdenture plays an important role of shock absorber, allows physiologic tooth mobility, elastic modulus of teeth more closer to bone, functional stimulus for bone preservation, as compared to implant over denture. For Overdenture fabrication if few firm teeth are present in compromised dentition, they can be used as abutments. In a 4 years study by Renner *et al.*, it was found that 50% of the roots used as Overdenture abutments remained immobile [9-11]. This article describes a two case reports in which different attachment systems was given to the partially edentulous patient which were successfully rehabilitated with comprehensive treatment of maxillary and mandibular natural teeth supported Overdenture with locator attachment (Zest Anchors) and stud and copings with Intraradicular post.

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Individually case was differently selected on the basis of total number of abutment teeth present, their position and intra-arch space present.

Case 1: A 62-year-old female patient, reported to the Department of Prosthodontics of K M Shah Dental College and Hospital with the chief complaint of missing teeth and difficulty to masticate the food. No abnormalities were detected on Extra oral and intra oral examination. Periodontically weak Teeth were extracted after bridge removal. 21,22,23,28,34,35, 45 were used as over denture abutments.(Fig1) The diagnostic impressions were made using irreversible hydrocolloid (DPI, Imprint) and diagnostic casts were poured in type IIIs and were mounted with a tentative jaw relation on mean value articulator to enable planning the final treatment. (Fig.2).

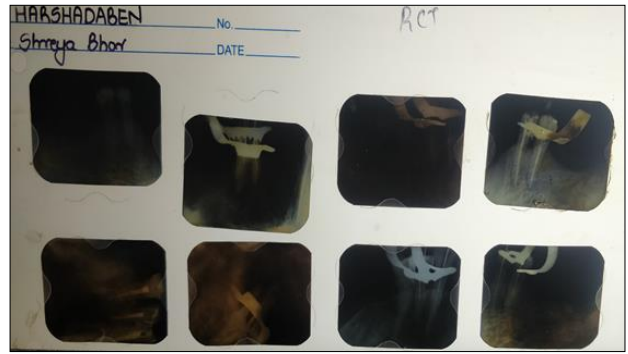
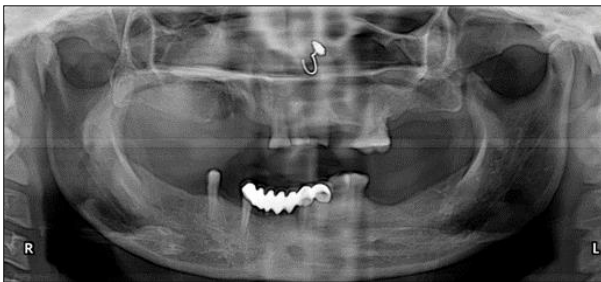


Fig 3: RCT Treated Remaining teeth



Fig 4: Decoronation done till 1 mm supra gingival



OPG



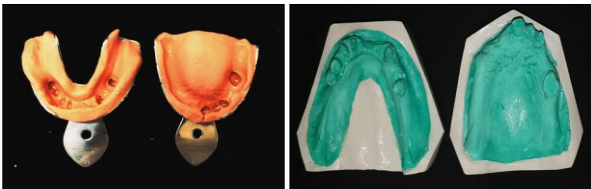
Post Space Preparation and Cementation of Stud Attachment



Fig 1: Intra Oral View



Fig 5, 6: Radiographic and Intra Oral Stud Attachment



Diagnostic impressions

Diagnostic cast



Diagnostic jaw relation

Diagnostic mounting

Fig 2: The Diagnostic impressions cast and jaw relation mounting

Root canal treatment of 21,22,23,28,34,35,45 was done (Fig 3). Decoronation 21,22,23,28,34,35,45 was done maintaining 1 mm of tooth structure supragingivally. (Fig 4)

Preparation for the post was done i.r.t 35, 45: 4 mm short of the apical length. (Fig 5) using grid markings. In 35 & 45, post space preparation was done with the pilot drill to final drill in recommended sequence. After finishing the preparation with both 35 and 45, the teeth were cleaned with 0.2% chlorhexidine Gluconate (Hexidine, ICPA Health Products Ltd). The stud attachments were then cemented with resin cement. (Fig 6).



Coping Fabricated Intra Orally



Fig 7: Coping Cemented With GIC

The copings were fabricated in dome shaped On 21, 22, 23, 28, 34, using pattern resin (Duralay inlay pattern resin extra pattern resin was trimmed off.

The copings were further evaluated for fit in the patients' mouth and lastly cemented with glass ionomer cement (Fig.7).

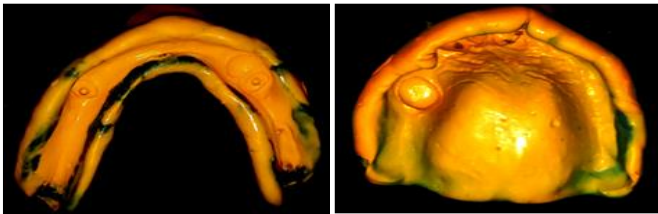


Fig 8: Show the Chaking mouth

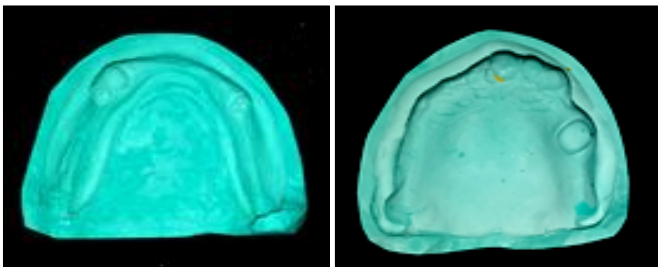


Fig 9: Final Cast



Fig 10: Tentative Jaw Relation

Border moulding was done with low fusing impression compound and final impression was made with light bodied polyvinyl siloxane for maxillary and mandibular arches (Fig. 8). Final cast was poured using type 3 dental stone. (Fig9) Diagnostic Jaw relations was recorded. (Fig 10)



Tentative Mounting

Tentative Mounting



Gothic arch tracing

Inter Occlusal Records

Fig 11, 12, 13

Orientation jaw relation was recoded using Hanua Spring Bow- Face bow (Fig 11) and Gothic arch intra oral tracing was done for evaluating centric relation (Fig 12).inter occlusal records in centric and protrusion was made using polyvinyl siloxane (Jet bite fast). (Fig13)



Fig 14, 15: Bilateral Balancing On Semi Adustable Articulator and Intra Orally

Acrylic teeth selection was done for size, form (SPA factor) and shade. (Bio Rock) Bilateral balanced occlusion scheme was planned for stability of dentures (Fig 14) on semi adjustable articulator (Hanua wide-Vue-WATERPIK) Bilateral balanced occlusion was evaluated in try in intra orally (fig 15)



Fig 16: Fabricated Denture

Denture was fabricated in heat cure acrylic resin (DPI Heat cure, Mumbai) (fig 16) Both maxillary and mandibular dentures were inserted and recall was done after 24 hours. (Fig 17)



Fig 17: Denture insertion and Verifying Bilateral Balanced Occlusion

One week post-insertion, when patient was comfortable with both the dentures, space was created in the stud female assemblies with black processing caps were placed into cemented male assemblies in 35 and -45. These processing caps set up the vertical resiliency needed for the final female assembly. It was verified that the denture is seating perfectly on the maxillary and mandibular tissue surface without any interferences due to the stud attachments in 35 and 45. White processing sleeves (gloves) were placed on the attachment which prevented blocking of the attachment with auto-polymerizing acrylic resin while picking up the attachments. (Fig 18) Auto-polymerizing acrylic resin (DPI- Repair Resin, Mumbai) was mixed with the Stade female assemblies with black processing caps were placed into cemented males in 35 and 45 in dough stage, and the denture was placed in mouth and patient was instructed to close the teeth in centric occlusion. Minimum acrylic resin was used to prevent the excess flow of resin on intaglio surface of the denture. Once the acrylic resin was completely set, excess acrylic was trimmed off. Denture finishing and polishing was done and evaluated in the patient's mouth for the complete seating of the denture and occlusion (Fig. 19).



Fig 18, 19: the patient's mouth for the complete seating of the denture and occlusion

Case 2: A 67-year-old female patient named Mayaben Patel reported to the Department of Prosthodontics of K M Shah Dental College and Hospital with the chief complaint of loosening of teeth and difficulty to masticate the food. No abnormalities were detected on Extra oral and intra oral examination. Opg is shown. Periodontically weak teeth were removed and 13,14,15,28,43 were used as Overdenture abutments (Fig. 1) The diagnostic impressions were made using irreversible hydrocolloid (DPI, Imprint) and diagnostic casts were poured in type III and were mounted with a tentative jaw relation on mean value articulator to enable planning the final treatment. (Fig.2)



Fig 15: Denture insertion and verifying centric occlusion

One week post-insertion, when patient was comfortable with both the dentures, space was created in the mandibular denture in 13 and 43 regions to pick up the locator male assemblies in the denture Locator male assemblies with black processing caps were placed into cemented female assemblies in 13 and 43. These processing caps set up the vertical resiliency needed for the final male assembly. It was verified that the denture is seating perfectly on the maxillary tissue surface without any interferences due to the locator attachments in 13 and 43. White processing sleeves were placed on the attachment which prevented blocking of the attachment with auto-polymerizing acrylic resin while picking up the attachments. Auto-polymerizing acrylic resin (DPI- Repair Resin, Mumbai) was mixed with the Locator male assemblies with black processing caps were placed into cemented females in 13 and 43 in dough stage, and the denture was placed in mouth and patient was instructed to close the teeth in centric occlusion. Minimum acrylic resin was used to prevent the excess flow of resin on intaglio surface of the denture. Once the acrylic resin was completely set, excess acrylic was trimmed off. Denture finishing and polishing was done and evaluated in the patient's mouth for the complete seating of the denture and occlusion (Fig. 16).



Fig 16: the complete seating of the denture and occlusion

Discussion

One of the most important oral health indicators is the ability to retain more number of teeth throughout life. Edentulism or complete tooth loss is prevalent worldwide among older people. Earlier studies have shown that edentulism affects the health and the overall quality of life of the elderly [3]. Alveolar bone resorption is considered as a oral disease and ungerdoes throughout the life in edentulous patients. However complete edentulism affect the quality of life [12]. Social participation can have a positive effect on quality of life among elderly individuals, for it provides a social support system that contributes toward minimizing feelings of loneliness and abandonment. The activities carried out appear to be an important factor, as they reinforce feeling of self-worth while also enabling personal growth [1, 13, 14].

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 treatment. Implant prostheses do not have as much occlusal awareness as teeth [15]. They cannot fully compensate the loss of periodontal sensory mechanisms that guide and monitor gnathodynamic functions. 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.

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. The masticatory performance in patients

with Overdentures is also higher than the complete denture patients. The use of Overdentures is therefore, a practical alternative that provides a relatively quick, easy and cost-effective solution to the functional and esthetic oral rehabilitation in patients with pronounced Edentulism and/or severe wear ^[16].

However there always pros and cons consort with each and every treatment. Various challenges encountered includes Periodontally compromised teeth, presence of undercuts, restoring vertical dimension, satisfy the patient's aesthetic desires, while also fulfilling occlusal and functional parameters that are essential for long-term success ^[17]. Hence, a multidisciplinary approach is necessary to fulfill the patient's need with most suitable modality of treatment.

The demerits of over dentures treatment pertain at meticulous oral hygiene in order to prevent caries and periodontal disease. The over-denture tends to be bulkier and Overcontoured Encroachment of inter-occlusal distance is another disadvantage. This treatment modality is an expensive approach with frequent recall check-ups of the patient than a conventional removable complete denture.

Overdenture with attachments can redirect occlusal forces away from weak supporting abutments and onto a soft tissue or redirect occlusal forces toward stronger abutments thereby resulting in superior retention ^[18]. Attachments are often used in Overdenture construction by either connecting the attachments to cast abutment copings or intra-radically. Overdentures require careful assessment of vertical space. There must be sufficient room for the possible attachments, together with an adequate thickness of denture base material and artificial teeth, all this without jeopardizing the strength of the denture ^[19].

Locator attachment (Zest Anchors) requires least vertical space with a total attachment height of 3.17 mm which is least among available attachments for natural teeth. The male attachment of locator permits a resilient connection for the prosthesis. The retentive nylon male remains completely in contact with the female socket while its metal denture cap has a full range of rotational movement over the male. The unique dual retention provides the locator attachment with a greater retention surface area than other attachments. Locator attachment creates a longer lasting, more retentive attachment for natural teeth supported Overdentures.

However, adequate bone support, a 1:2 crown/root ratio and at least 5 mm of bone surrounding the root (confirmed by radiographs) allows the use of ball attachment. The ball and socket attachment of Access post allows rotation of the denture attachment. Small head of the attachment limits the amount of material that has to be removed from the denture and thus the strength of the denture is not jeopardized. The technical work can be carried out easily at Chairside ^[20]. The amount of retentive force provided by the stud attachments are not likely to be detrimental to the abutments and at the same time provides sufficient amount of retention to the denture. The use of short-copings are planned in reduce vertical height and will reduce the possibility of fracture of the Overdenture base and helps to preserve at most alveolar bone as they are projected to less amount of axial stresses.

It is important to highlight that a correct mouth care regimen should be followed in patients with teeth/root supported Overdentures, as treatment failures are attributed to poor oral hygiene and inadequate follow up care, leading to caries or periodontal disease.

However this series presents two cases, one of each category where the treatment plan was primarily decided by the

amount of Interarch distance and periodontal grade of the abutment teeth.

Conclusion

An Overdenture is a practical and viable treatment alternative to conventional complete denture. Proper attachment system for the particular individual case directs the success and long term clinical longevity in the treatment of tooth retained overlaid dentures. For selection of any attachment system, considerable factors like, available amount of bone support, Buccolingual and inter arch space, opposing dentition, clinical experience, personal preferences, maintenance problems, cost and most important being patient's motivation are to be determined. Cautious selection of the strategic abutment is utmost necessary. Our primary focus should be on retaining the teeth as Overdenture abutments and later attachments should be planned. multidisciplinary team approach and patient education determines the outcome of treatment and post prosthesis quality of life of the patients

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