Case Report

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Tooth Supported Overdenture as Prosthetic Solution for Elderly Patients: A Case Series.

Abstract:
Overdenture treatment is a notion which precludes the inevitability of "floating plastic" in edentulous mouths. The concept of tooth retained overdenture is a simple and cost effective way to retain few firm teeth that are present in an otherwise compromised dentition to increase the retention and stability of complete denture leading to increased chewing efficiency of patient. The concept of overdentures is a positive means for delaying the process of complete edentulism and helps in reducing bone resorption. To top it all, it gives the patient the sensitivity and proprioception of having prosthesis with his natural teeth still present. In this article, case reports with three different types of Overdentures are discussed: Overdenture with submerged abutment, Overdenture without coping on abutment and overdenture with coping based on available inter-arch space.

Key Words: Tooth supported overdenture, overdenture, submerged overdenture, coping overdenture, bone resorption.

Introduction:

Overdenture treatment is a notion which precludes the inevitability of "floating plastic" in edentulous mouths. It has always offered a sensible and prudent appeal for dental practitioners, and numerous patients have benefited from its prescription.[1]

According to GPT-9, overdenture is a removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants. It is also called as overlay denture, overlay prosthesis and superimposed prosthesis.[2]

The overdenture is not a new concept in a technical approach to a prosthodontic problem. Indeed, its use dates back over 100 years. As people grow older, the probability of losing some or all teeth increases. Historical records have shown that conventional complete denture treatment improves the quality of life of edentulous patients. However, the dental ridge resorbs over time once the teeth have been lost. For a patient who has worn complete dentures for an extended period, this condition may be especially debilitating. The stability and retention of the denture prosthesis is diminished, causing discomfort, problems with facial esthetics, chewing, and biting. These difficulties can cause general dissatisfaction with the mandibular prosthesis, prompting the patient to request replacement dentures.[3]

Li Chen et al, 2002 compared the masticatory efficiency of tooth supported overdenture(TSO) patients with complete denture (CD)patients and the results revealed that the TSO provided the greatest degree of efficiency, followed by the CD group.[4]

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Today, with the stress on preventive measures in prosthodontics, the use of overdentures has increased to the point where it is now a feasible alternative to most treatment plan outlines in the construction of a prosthesis for patients with some remaining teeth.2The use of natural teeth as overdenture abutments has become a realistic alternative to the extraction of remaining natural teeth over the past decades.[5, 6]

Goals:

1. It maintains teeth as part of the residual ridge. This gives the patient a denture that has far more support than any conventional appliance. Instead of soft, movable mucous membrane, the denture literally sits on teeth " pilings," enabling the denture to withstand a much greater occlusal load without movement.[2]
2. The second goal achieved by the overdenture is a decrease in the rate of resorption. Alveolar bone exists as a support for teeth. If the teeth are removed, then the alveolar process begins resorption.[2]
3. The third goal achieved by the overdenture is an increase in the patient's manipulative skills in handling the denture. With the preservation of the teeth for an overdenture, there is also the preservation of the periodontal membrane that surrounds these teeth. This preserves the proprioceptive impulses supplied by the periodontal membrane. The patient, although wearing a complete denture, retains that important sensitive ability to be aware of occlusal contact.[2]

Requirements of an Overdenture:

1. Maintenance of health- The health of the underlying tooth structure should be maintained, without which the overdenture cannot sustain. Teeth that are to be utilized as overdenture abutments must first be evaluated for their periodontal condition. An increased crown-to root ratio, extensive bone loss, and mobility do not necessarily negate the use of a tooth for an abutment.[2]
2. Reduction in crown-to-root ratio- The reduction of the crown has an immediately favourable effect on tooth mobility because of the decrease in the length of the lever arm delivering the torque to the mobile tooth.[2]
3. Basal seat tissue- The tissue covering the remaining basal area should be treated and expected to respond quite similarly to the tissue under a complete or partial denture base. A well-fitting base is essential to distribute the load over as wide an area as possible.[2]
4. Simplicity of construction- The appliance should be relatively simple to construct and maintain.
5. Ease of manipulation - The base should be easily manipulated by the patient. Frequently, with the use of retaining devices, the overdenture becomes a struggle for the patient to insert and remove. This should not be the case, because an unwanted force could seriously damage the base or the abutment teeth.

Treatment Planning:

1. First of all radiographic examinations should be carried out to rule out any root stump or any periapical pathology and to evaluate the periodontal condition of the abutment teeth.
2. Inter-arch space should be evaluated before proceeding for overdenture treatment by doing the tentative jaw relation to plan whether we should go for submerged, non-coping or coping abutment overdenture.
3. Extractions should be carried out of non abutment teeth.
4. All the abutment teeth should be periodontally evaluated.
5. All abutment teeth should be caries free.
6. Root canal treated of the abutment teeth should be carried out where indicated.
7. Abutment teeth should be in bilateral configuration.

Inter-arch space is very important factor in selecting the fate of the abutment teeth and for the success of overdenture prosthesis. So, presenting a case series according to the inter –arch space of the patient with different abutment design.

Case 1

A 54 year old female patient complains of missing teeth and wanted to be replaced for good mastication and esthetics. Extraction of maxillary teeth was done 1 year back. Extraction of mandibular teeth was also done 1year back and only 33 and 44 teethe were left. Since there is severe gingival resorbtion around 33 and 44 so the crown to root ratio is

increased so, in order to reduce the crown to root ratio root canal treatment of 33 and 44 done. As there is reduced inter-arch space evaluated after taking tentative jaw relation so, submerged overdenture is planned. After root canal the teeth are reduced to the level of the marginal gingival (Figure 1).

Case 2

A 48 year old female patient complains of missing teeth and wanted to be replaced for good mastication and esthetics. Missing teeth in maxillary arch were 13, 16 and 26 and teeth present in the maxillary arch are 34 and 45. Generalised gingival recession and attrition present with 34 and 45. As posterior teeth are present in both arches so the vertical dimension of patient is maintained. Hence root canal treatment done with 34 and 44removable partial denture in the upper arch opposing overdenture and mandibular overdenture is planned opposing removable partial denture with maxillary arch. Since there is attrition so some vertical dimension of occlusion is lost hence overdenture is planned without coping. Both the abutment teeth (33 and 44) are prepared to dome shape (Figure 2).

Case 3

A 63 year old female patient complains of missing teeth and wanted to be replaced for good mastication and esthetics. Teeth present are [11, 13, 17, 21, 33] and [43]. Generalised gingival recession present. Mandibular arch had two teeth remaining in bilateral region and maxillary arch had four teeth remaining in tripod configuration. Crown to root ratio was good. But teeth had grade 1 mobility so, overdenture was planned with coping abutments instead of removable partial denture. Root canal done with all the teeth followed by tooth preparation followed by coping cementation (Figure 3).

Fig. 1 (a) Remaining 33 and 44 teeth (b)33 and 44 submerged after preparation (c) Pre-op Patient front profile (d) Post-op Patient front profile

Fig 2 (a) Pre-op intra-oral view (b)Prepared abutment tooth (c)Maxillary and manibular Prosthesis (d) Pre0op patients frontal profile (e)Post-op patients frontal profile

Fig 3- (a) Pr-op intra-oral view (b) Prepared teeth to receive coping (c) Copings placed over abutment teeth (d)Pre-operative Facial view (e) Post-operative facial view

Discussion:

Crum and Rooney7 graphically demonstrated in a 5 years study an average loss of 0.6 mm of vertical bone in the anterior part of the mandible of overdenture patients through cephalometric radiographs as opposed to 5.2 mm loss in complete denture patients. Miller8 in his study concluded that alveolar bone resorption depends upon three variables which are:

1. The character of the bone.
2. The health of the individual.
3. The amount of trauma to which the structures are subjected.

Overdenture helps reduce shrinkage of surrounding bone and reduces pressure on the alveolar ridge.

Rissin et al. in 1978 compared masticatory performance in patients with natural dentition, complete denture and over denture. They found that the over-denture patients had a

chewing efficiency one third higher than the complete denture patients.[9] Thayer HH in 1980 found that in case of overdenture prosthesis, proprioception is maintained.[10] There is the presence of directional sensitivity; dimensional discrimination; canine response and tactile sensitivity.[11] The average threshold of sensitivity to a load was found to be 10 times as great in denture wearers as in dentulous patients.[12, 13]

In the case reports described above, in first case submerged abutments used as there is inadequate inter-arch space present. Submerging the abutment increases the crown to root ratio which decreases the leverage effect on the abutment tooth and reduce bone resorption around the tooth and increase the sensitivity and proprioception their by increasing the chewing efficiency of the patient. There are chances of caries in the abutment tooth as it is open to the oral environment with chances of food lodgement between the denture and the abutment tooth.

In the second case overdenture is planned without copings directly on the prepared abutment as there is not much inter-arch space to provide coping to the abutments. These abutments increase the retention and support for the prosthesis along with bone preservation. Again chances of caries and periodontal breakdown are possible which may lead to tooth mobility.

Special precautions need to be taken for care of overdentures. Topical use of fluoride agents such as Stannous fluoride, sodium fluoride and stannous fluoride gel reduces the caries to occur.[14, 15] Patient should be motivated and educated to follow proper oral hygiene measures and frequent recall visits should be made.

In the third case overdenture is planned with copings on the prepared abutment teeth as there is sufficient inter-arch space to accommodate copings. This increases the retention and stability for the denture and reduces the chances of caries of the abutment tooth. Care should be taken while recording the inter-arch space before planning for coping as it may encroach the inter-occlusal distance, also there are chances that the denture is thin on buccal or lingual flanges. In planning the overdenture treatment case study is of utmost important. The inter-arch space, condition of the abutment, position of the abutment teeth and patients oral hygiene and mental attitude should be taken into consideration.

Only those who understand the limitations and benefits of attachments should be treated with attachment retained overdentures. Hence, patient selection is critical to the success of the treatment. A tooth supported Overdenture is very much at the forefront as the treatment modality incorporating Preventive Prosthodontics concepts to the core. Let's not forget our basics rather reinvigorate them and make them a regular part of our clinical practice.16

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