Stud Attachment Retained Mandibular Overdenture - A Case Report

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Abstract

Utilizing natural teeth to enhance support for prosthesis is not new in prosthodontics. Few teeth can be conserved in compromised edentulous ridge patients and be used to provide support to the prosthesis. The use of stud attachments allows the ability to the clinician to improve the retention of the prosthesis, thus allowing the patient to experience better comfort.

Keywords: Atrophic mandibular ridge, over denture, stud attachments.

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Introduction

It is the basic principle of dentistry to preserve what remains, which holds true even in this era of implants. The percentage of older population is increasing and so is the trend of preserving the roots by endodontic and periodontal treatments. The remaining roots can be preserved and used to aid in providing retention & support for the prosthesis, thus improving denture performance.[1,2] An overdenture may be defined as 'a denture the base of which covers one or more prepared roots or implant.[3]

The concept of preserving natural roots for better prosthodontic prognosis is very old. Ledger in 1856 described something similar to overdenture prosthesis. His restorations were referred to as 'plates covering flangs' at that time.[4] In 1961 Atkinson published an article with the same title.[4] Overdentures received special attention and were popularized particularly between the period of 1970 and 1980.[5] Root supported Overdentures seem to be a valid alternative to conventional complete dentures especially in cases where advanced resorption of alveolar bone has occurred. The principal reason for the recommendation of the use of this treatment modality in such cases is its improved retention, stability and support.[1] In addition to this overdentures offer many advantages as preservation of proprioception[6] retardation of alveolar bone resorption, psychological advantage of preserving natural teeth[7] and improved chewing efficiency as compared to conventional complete dentures[8].

The use of overdentures also presents with certain disadvantages and mandates proper case selection. The disadvantages of overdentures are plaque accumulation, as all gingival margins are covered and hence the need for strict oral hygiene measures, increased cost for endodontic and periodontal treatment of abutments & sometimes attachments, bulky nature of certain types of attachments, and the mechanical disadvantage of increased chewing force and decreased space available for denture base materials which makes them susceptible to breakage.

Various studies have been undertaken to determine the success of overdentures. 10 year prospective study by tools on and tylor 9 showed 84% survival of overdenture abutments and 54% of abutment failure was attributed to secondary caries. In a 5 year study the alveolar bone loss in conventional complete denture wearers was reported to be an average of 5.2 mm while it was 0.6 mm in tooth supported overdenture wearers.[10]

The aim of the present article is to describe the use of stud attachments in mandibular tooth supported overdenture prosthesis as an aid to attain stability, support and retention in a case of severely resorbed alveolar ridge.

Case report

A 62 year old male reported to the department of prosthodontics, crowns and bridges, with the chief complaint of loose mandibular prosthesis. Past dental history revealed extraction of all maxillary and mandibular teeth except tooth 33 and 43 due to periodontal disease. Complete denture was fabricated for maxillary and mandibular arches before 2 years. The patient had no complaints with the denture regarding esthetics and function for the first year, and

he noticed that the lower denture gradually became loose (Fig. 1).

Extraoral examination showed no abnormalities, and acceptable esthetic profile with the prosthesis in situ. Intraoral examination showed high and well-rounded completely edentulous maxillary ridge. Coping was present on 33 and 43, splinted by bar attachment. The coping on 43 had decemented.

Examination of the existing prosthesis revealed a broken left lateral incisor in upper denture. Maxillary denture showed good oral hygiene, adequate extensions, good retention, stability and support. However the mandibular porsthesis lacked retention and stability. The mandibular prosthesis was lined with permanent tissue conditioning material which suspectedly showed signs of candida infection. (Fig. 2) However, the patient did not complaint of any symptoms pertaining to canididial infection. The patient did complaint of discomfort due to the bulky bar present, especially when the dentures was removed from the oral cavity at night.

Fig. 1: Existing Prosthesis in situ

Fig. 2: The previous mandibular denture with the permanent silicone relining material

Procedure

After a thorough diagnostic evaluation, treatment plans were formulated and discussed with the patient and an attachment retained tooth supported mandibular complete denture and a tissue supported maxillary complete denture was selected as the treatment of choice. The bar was removed and the abutment teeth were further reduced to receive a prefabricated axial attachment (CEKA® PRECILINE®, Alphadent NY, Belgium). The maxillary and mandibular muscle trimming was done with tracing compound and final impressions were made with zinc oxide eugenol material in conventional manner, (Fig. 3) followed by the fabrication of trial denture bases. The maxillomandibular jaw relation was made on the trial denture bases and conventional try in procedure was accomplished. Post space was prepared in the abutments and the prefabricated patrix (male component) of the axial attachment was cemented in the post space. (Fig. 4) The dentures were then processed in pink heat polymerized acrylic resin. A hole was drilled with a no. 2 round bur in the lower denture corresponding to the region of the stud attachment. After satisfactory placement of the lower and upper dentures, their extensions were adjusted and occlusal refinement was done by selective grinding. Next the matrices (female attachments) were positioned over the patrices (male studs) and picked up in self polymerizing acrylic resin while obliterating the openings created in the lower denture. As the vertical space available was limited on the left side, the metal housing was incorporated only on the right side. A medium retention plastic matrix (yellow) was used on the right while a low retention matrix (white) was used on the left to account for the non-parallelism of the stud attachments. (Fig. 5) Final occlusal refining was then accomplished and the patient was educated on insertion and removal of the new dentures. Patient was satisfied with the retention and esthetics of the new set of dentures and was feeling relieved of the bulk due to the bar in the earlier dentures. Oral hygiene was reinforced and recall appointments were scheduled.

Fig. 3: Final Impression

Fig. 4: Stud attachments luted into the post space prepared in abutments

Fig. 5: Final Prosthesis with the medium retention patrix (yellow) and the low retention partix (white) incorporated into it.

Discussion

The rehabilitation of the patient with few teeth present, which are neither capable of supporting a removable or fixed partial denture is a challenging task. The severely resorbed alveolar ridge in such cases only adds to the complications. Overdentures not only preserve the teeth in such cases, but are a viable option in such cases and can improve the patient satisfaction.

Precision attachments provide enhanced retention for the prosthesis. They may be rigid or resilient. Resilient attachments with built-in stress-breaking action compensate for the multidirectional loading forces acting on the overdenture prosthesis.[11] Rigid attachments on firm roots, with adequate bony anchorage, often undergo fatigue failure, while those on roots with less than adequate bony anchorage, often lead to loss of tooth before the attachment rigidity is lost. [11] In light of the current knowledge, resilient connectors seem to have a longer useful lifespan and a broader safety margin in overdenture fabrication than rigid ones.

Resilient attachments for tooth supported overdentures can be classified as intracoronal attachments or Extracoronal attachments depending on the location of the matrix. The matrix can be incoreporated into the tooth structure (intracoronal) or it can be incorporated into the prosthesis (extracoronal). Besides providing good retention, intracoronal attachments provide an improved crown: root ratio as compared to the extracoronal ones, however, they require radical removal of tooth structure to create space for the matrix.[12-14] Extracoronal attachments do not require extensive abutment reduction but they exert more loading on the abutments, outside their long axis. For use in complete denture cases, extracoronal attachments require increased height of the prosthesis, which is especially important when acrylic resin prosthesis is planned. Extracoronal prosthesis can be stud type or bar type, depending on the shape of the patrix. Both types provide good retention characteristics, however bar attachment provides better stability to the prosthesis by limiting the movement of the prosthesis. On the negative side, bar attachments are costlier, bulkier, difficult to clean, technically more challenging, and exert more load on the abutments as they reduce the movement of the prosthesis by directing forces to the abutments.[12-14] Stud attachments provide movement to the prosthesis, thereby providing a stress breaking action to the abutments. They are less bulkier and easy to clean.[13,15] Stud attachments can be of the semi precision type or the precision type. The semi precision type of stud attachments, have to be cast in non-precious metal while the precision attachments are provided in pre-cast forms by the manufacturer. According to a study, precision attachments provide superior retention as compared to the semi-precision attachments.[16]

In the presented case, the patient was not satisfied with the bulky nature of the bar attachment and it was cumbersome for the patient to clean the undersurface of the bar. However the space for stud attachment was limited on the left side. Hence the use of stud attachments was planned but the metal housing was eliminated on the left side to compensate for the deficient space. Precision attachments were selected as they provide superior retention.[16] In this case, the matrix was directly picked up in the denture with the help of self-polymerizing acrylic resin due to the limited space available. Alternatively the metal housings could directly be incorporated into the denture during the processing, with the help of a pick-up impression of the studs (patrix) and incorporation of the lab analogue during processing. This procedure eliminates the use of self-polymerizing acrylic resin, which is mechanically inferior to heat polymerizing acrylic resin. However, this procedure requires ample vertical height of the prosthesis, or the metal housings

may perforate the polished surface of the denture during processing.

Summary

The present case described a simple alternative to conventional complete dentures, utilizing precision attachments as an aid to improve retention of the prosthesis. In addition to the superior patient acceptance, this method also avoids the radical removal of remaining teeth for the replacement of missing teeth, which is against the basic principles of Prosthodontics.

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