Tooth-supported overdenture vs stud retained overdenture: a case report

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ABSTRACT
Overdenture can preserve alveolar bone while providing support and stability to the prosthesis. This case report describes a treatment of a tooth-supported partial overdenture for the upper and lower stud retained overdenture. This method provides an alternative solution to the conventional partial denture and implant retained overdenture. This treatment is a simple and cost-effective, which provides the patient with a highly retentive, stable denture with improved masticatory performance.
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INTRODUCTION

Residual ridge resorption is a continuous process that occurs throughout life. Severely resorbed ridge is classified as a technically difficult case due to the limited structural availability that is integral for the support, stability and retention of a denture. According to the Glossary of Prosthodontic Terms an overdenture can be defined as any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, dental implant.[1] An implant overdenture provides an excellent retention to the denture as proposed by the McGill consensus. However, in consideration of the economy, the cost of an implant overdenture can be enormous.

Tooth-supported overdenture offers an alternative option to an implant where the supporting structure were derived from a precision attachment. There are 5 different types of attachment available in the market such as stud, extracoronal attachment, intracoronal attachment, bar, and auxillary group.[2] This case report describes a treatment where the patient was prescribed with an upper tooth supported overdenture and lower stud-retained overdenture.

CASE

A 67-year-old female came to the clinic with a complaint of a loose upper and lower denture. Intraorally patient presented with discolored and severely attrited upper anterior teeth underneath a partial overdenture opposed to a complete denture with a worn-down stud attachment on teeth 33 and 43 (Fig.1A). The upper anterior teeth are carious due to long-standing tooth-supported overdenture, however, there are no history of pain, no tender to palpation and all upper anterior teeth are vital. The lower residual ridge was severely resorbed with recession occur on tooth 33 and 43 although there was no mobility detected. Medically, patient had no relevant history that can affect her visits and treatment. Radiographic examination of the upper anterior teeth showed no periapical lesion and no pulp involvement. Lower radiographic examination (Fig.1B) showed root canal treated teeth of 33 and 43 with crown to root ratio of 1:1, however, the was a small void between the posts and gutta percha. Further examination on both teeth 33 and 43 showed no signs and symptoms of pain.

Based on the intraoral and radiographic findings, the treatment options given to the patient for the upper arch were; extraction of all upper anterior teeth followed by a conventional partial denture or constructing a new tooth-supported overdenture. For the lower arch, the plan was to redo the stud attachment followed by tooth supported overdenture. After deliberation of the advantages and disadvantages of the treatment, the patient then decided to retain her upper anterior teeth so the treatment chosen for the upper arch was tooth-supported overdenture.

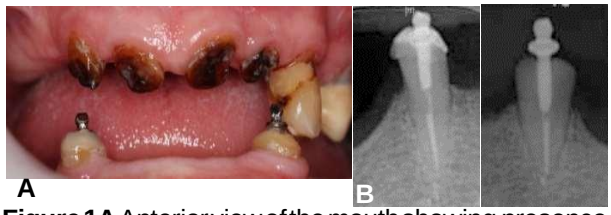

Figure 1A Anterior view of the mouth showing presence of carious anterior teeth and worn down lower studs on teeth 33 and 43; **B** Radiograph showing lower anterior teeth of 33 and 43.

MANAGEMENT

This treatment was chosen due the severely attrited upper anterior teeth and considering the success of previous stud attachment on the lower overdenture. Removal of caries was done and all affected dentine were removed. Patients' upper anterior teeth were then contoured leaving only 2 mm of coronal height as the abutment for the upper

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partial denture (Fig.2A). The initial treatment procedure for the construction of denture was parallel to the construction of a conventional denture. However, during the bite registration visit upon confirmation of the occlusal vertical dimension (OVD), the height of occlusal rim was measured to ensure inter-arch distance. This is to assess whether the height of the OVD was able to accommodate both the height of the upper abutment teeth and lower stud attachments without encroaching patients' freeway space area.

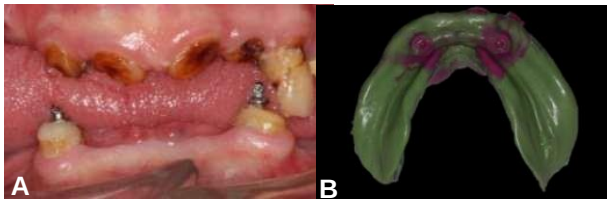

Figure 2A Stabilization of caries and upper abutment teeth preparation; **B** impression of the canal for the construction of stud attachment

After the confirmation of the availability of inter-arch space, stud attachments on teeth 33 and 43 were removed under rubber dam isolation and the abutments were contoured leaving only 2 mm of coronal height intraorally. The abutment was prepared with a chamfer margin at 0.5 mm all around with dome- shape preparation. Impression of the canal was taken for the construction of stud attachments (Fig.2B) and the stud attachments were cemented using Panavia.

Figure 3 Stud attachment on teeth 33 and 43

All treatment stages were done in the same manner as the conventional denture, however, during the try-in stage it is crucial to assess the occlusal vertical dimension (OVD) to ensure adequate interocclusal space for the tooth overdenture and stud attachment. After assessment of space, old studs on teeth 33 and 43 were removed. Preparation of chamfer margin was done at the equigingival level and an impression was taken using light and medium bodied silicone (Fig.2B) for the construction of new studs (Fig.3). After cementation of stud, try-in partial and complete denture was done to assess the aesthetic while ensuring the OVD is correct by phonation assessment.

Figure 4 Try-in of tooth-supported overdenture vs stud-retained full denture

Upon confirmation on the try-in stage, new impression of the lower arch was taken. The new impression will be used in-lab pick-up technique. After the denture was processed, laboratory will use the new impression for housing pick-up using auto-polymerizing acrylic resin. During final visit the processed denture was tried and the any necessary occlusal adjustment was performed (Fig.4). During the delivery visit, the occlusion was checked along with the stability and retention of the final prosthesis. Patient was issued with the definitive denture (Fig.5) and OH instructions alongside maintenance information regarding her new denture.

Figure 5 Stud housing and rubber after acrylic resin pick-up

Discussion

Tooth-supported overdenture offers the advantages of proprioception from the periodontal ligaments, preservation of alveolar bone and enhanced support, stability and retention to the denture and increase the masticatory performance.[3,4] In cases where patient is partially dentate the overdenture offers a slower transition pace to edentulism, better denture adaptation and acceptance to denture which helps with the psychological factors in the long run.[5]

The confirmation of the OVD in this patient is one of the crucial steps in the treatment planning. This is because the added vertical height of the anterior teeth abutments and stud attachment in comparison to a conventional denture inter-arch requirement. The minimum requirement of 2 mm of acrylic resin above the attachment to acquire the optimum acrylic strength should also be considered. The technique that can be used to determine the adequacy of inter-arch space can be achieved is by using diagnostic models and fabrication of temporary prosthesis on a mounted semi adjustable articulator.[6]

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There are a few disadvantages of tooth-supported overdenture and as seen in this patient. The use of overdenture increases caries risk underneath the denture especially in the elderly patients. Overdenture requires meticulous OH technique to reduce caries risk and periodontal diseases. A thorough oral and denture hygiene education with regular follow-up visit is imperative in this type of the treatment.

There are two techniques that can be used for stud housing pick-up; chair side and laboratory, which were described in this case report. For a chair side technique pick-up, a space was created and the housing was placed on the stud while autopolymerizing acrylic resin was loaded in the space created. The denture was then positioned in the mouth waiting for the acrylic resin to set in a closed mouth technique. This technique has the benefit of reduced impression required for the denture construction in comparison to laboratory pick up. However, extra precaution needs to be taken to avoid displacement of acrylic resin in an undercut that can caused a locked-in denture.

The rubber ring located in the housing will requires replacement after rigorous denture use due to wear although this is a simple procedure that can be done in a short visit.

It is concluded that patient was satisfied with the denture and its well-functioning properties. The stability and retention of the denture was greatly improved. This finding confirmed that overdenture is a simple and cost-effective treatment which can be an alternative to implant retained denture while providing better retention than conventional denture.

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