

Management of Prosthetic Challenges in Mandibular Implant Retained Overdenture: A Case Report

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Abstract

Mandibular implant retained/supported overdenture is a widely accepted treatment modality for rehabilitation of edentulous patients. This is a beautiful amalgamation of the conventional and modern prosthodontics for the benefit of patient. Mandibular implant supported/retained overdentures have proved to improve the quality of life of edentulous patients. With its increased use in the past two decades it becomes increasingly pertinent to understand the challenges faced in this treatment modality. Such a treatment modality should not only focus on the implant success but also should take into account the prosthetic challenges which may arise at different stages. This article aims to highlight the prosthetic challenges associated with implant overdentures and clinical management of one such complication.

Keywords : Interforaminal Distance, Interocclusal Space, Splinted Implants, Non – Splinted Implants.

Introduction

The dental world in the past four decades has witnessed a revolution in terms of rehabilitation. Implants have redefined the levels of prosthodontic success. McGill consensus states that as a minimal treatment objective, the mandibular two implant overdenture (as opposed to conventional denture) should be considered as a first choice standard of care for the edentulous patient.¹

The literature reports the mandibular interforaminal region as the zone with highest level of implant success.² Fortunately, this is also the zone in which the implants are placed for mandibular implant retained/supported overdentures.³

An implant retained/supported mandibular overdenture has 3 components i.e. the implant fixtures, the superstructure/attachments (male part/ patrix) and the prosthesis with attachments (female part/matrix). The implant number in the interforaminal region is planned based on the horizontal interforaminal distance and the superstructure is planned based upon the available interocclusal space.⁴

The success rates of such a treatment modality should not only take into account the success rate of implants but should equally focus upon the prosthetic challenges in this regard. Few of such complications are summarized in Table I.

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Table I : Complications and management of prosthetic complications in Implant supported/ retained overdentures

S No.	Treatment Phase	Challenges	Solution
I.	Treatment Planning	<p>Inadequate space for prosthetic superstructure</p> <p>Inadequate space for prosthetic teeth after superstructure placement</p> <p>Visibility of attachments in the anterior region- an esthetic failure</p> <p>Consideration for A-P spread⁵</p> <p>Selection of superstructure</p>	<p>Jaw relations to be established.</p> <p>The prosthetic wax up to be completed before implant planning is initiated</p> <p>Implant placement to be planned using an index made from the teeth arrangement.</p> <p>The available interforaminal and interocclusal space to be assessed first</p>
II.	Surgical phase	<p>Non parallel implants</p> <p>Implants not equidistant</p> <p>Implants at varying osseous level</p>	<p>Guided surgery with stereolithographic stents⁶</p> <p>Duplication of a functionally correct denture as a guide for planning</p>
III.	Early Prosthetic Phase	<p>Non passive Bar superstructure</p> <p>Mismatch in the seating of male and female components of implant attachments</p> <p>During direct curing of female attachments inadequate blocking of the undercut</p>	<p>Spark erosion</p> <p>Usage of Milled bars</p> <p>Splinted implant impressions for enhanced accuracy⁷</p> <p>Adequate precautions in blocking undercuts. Brass spacers available for the same (eg. Dalla bona attachments)</p>
IV.	Maintenance Phase	<p>Fracture of mandibular overdenture</p> <p>Soft tissue inflammation below bar superstructure</p> <p>Loss of retention in attachments (female parts)</p>	<p>Implant prosthesis to be reinforced with metal denture base</p> <p>Regular maintenance of oral hygiene</p> <p>Adequate distance between soft tissue and bar</p> <p>Periodic assessment</p>

Case Report

The present case report highlights the management of one such prosthetic complication i.e. fracture of mandibular overdenture.

A 60 year old male patient reported to the Department of Prosthodontics, ITS-CDSR, Muradnagar with a chief complaint of fractured mandibular implant supported overdenture. The clinical evaluation revealed that the patient had four implant in the interforaminal region with Dalla Bona male attachments with no clinical signs and symptoms. The radiographic evaluation (Fig 1) showed well osseointegrated implant fixtures. It was decided to refabricate the prosthesis with reinforced metal framework for both maxillary conventional and mandibular implant supported prosthesis. Impression for both the arches were obtained and casts were duplicated after blocking out in refractory material (Wirovest, Bego, Germany). Wax framework was designed for both arches (Fig. 2 & 3). The framework was casted and finished. The frameworks were evaluated for fit in the oral cavity (Fig. 4 & 5). The dentures were processed in heat cure acrylic (Lucitone 199, Dentsply). The dentures were evaluated intraorally (Fig. 6 and 7) and in the mandibular denture female Dalla Bona attachments were incorporated intraorally (VOCO Germany) (Fig. 8). The patient was recalled after 48 hours, 72 hours and 6 months. He has been put on 6 months recall visit.

The patient has not reported any problems since 24 months besides minor adjustments.

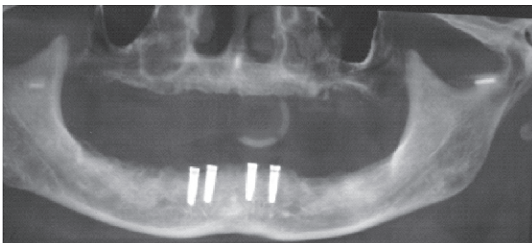


Fig. 1: OPG

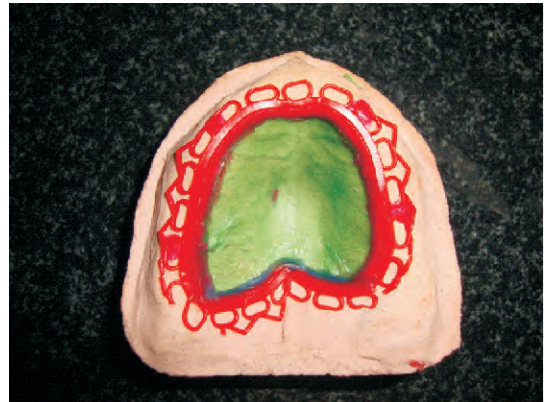


Fig. 2 : Wax framework design of maxillary denture base



Fig. 3 : Wax framework design of mandibular denture base

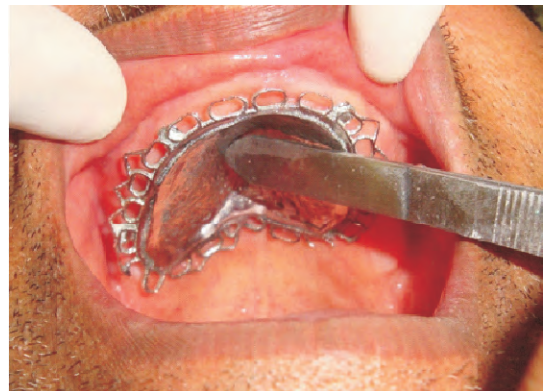


Fig. 4 : Maxillary metal denture base



Fig. 5 : Mandibular metal denture base



Fig. 6 : Intraoral view of maxillary denture



Fig. 7 : Dentures in occlusion



Fig. 8 : Intaglio surface of mandibular implant retained overdenture

Discussion

Success of any prosthesis is dependant upon the optimization of the interfaces within. An implant supported prosthesis has three crucial interfaces. The bone-implant interface which is highly important for the stability and success of implant. The implant fixture-superstructure interface which is important for the biomechanical success of the prosthesis.

Another interface is the superstructure-prosthesis interface which is responsible for the longevity of the prosthesis.

Implant supported overdenture treatment modality is dependant upon multitude of factors. The treatment planning phase has to be prosthetically driven which is influenced by the available interocclusal space, interforaminal distance, jaw relations besides the general surgical considerations. The next important step is the meticulous surgical execution of the treatment plan. This can be aided by stereolithographic guides if required for enhanced success.

Berglundh et al in a systematic review, observed that a 4- to 10-times higher incidence of prosthetic complications was associated with implant-supported or implant-retained overdentures in comparison to fixed implant prostheses.⁸

The choice of superstructure has to be decided in the treatment planning phase and not in the prosthetic phase. The prosthetic / restorative phase should focus on perfect execution of the treatment plan.

Goodacre et al in their systematic review reported a few common prosthetic complications for implant supported mandibular overdentures (listed in order of frequency): overdenture loss of retention or adjustment (30%), overdenture rebasing or relining (19%), clip or attachment fracture (17%), overdenture fracture (12%), opposing prosthesis fracture (12%), acrylic resin base fracture (7%), prosthesis screw loosening (7%), abutment screw loosening (4%), abutment screw fracture (2%), and implant fracture (1%).⁹

An important component of prosthetic implant rehabilitation are the various attachments that provide the superstructure on which a

prosthesis is attached to the fixtures. This may be in the form of bars - (milled or casted) or stud attachments.

Further introspect into the literature of mandibular implant overdentures, advocates splinting in case immediate loading is planned, to prevent the micromotion at the bone implant interface. However, for early/conventional loading the implants may be splinted or even non-splinted attachments can be used.¹⁰

Both types of attachments (bars or stud attachments) require space in the prosthesis and in this process the strength of acrylic is diminished in the anterior zone.⁹ A minimum vertical space requirement for implant-supported overdentures with Locator attachments is 8.5 mm.¹¹ A separate report on maxillary implant overdentures suggested that a minimum of 13 to 14 mm of vertical space is required for bar supported overdentures, and 10 to 12 mm for overdentures supported by other individual attachments.¹² This can lead to a biomechanical failure of the overdenture due to inadequate material dimension of the denture material in anterior part. The use of a metallic denture base helps to reinforce the prosthesis and prevents fracture in use. Such a prosthetic failure compromises the quality of life of the edentulous patient and casts a doubt in the mind of patient regarding the success of this modern treatment modality. The case report was aimed to throw light on one such mechanical complication and its management. A meticulously drawn treatment plan should be based upon the final prosthetic design and an incorporation of metallic denture base ensures longevity and increased fracture resistance of the implant supported prosthesis.

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