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Case Report

Managing prosthetic complication in implant-retained overdenture

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Introduction

Implant retained overdenture are the most reliable treatment options for edentulous patients to address the problems associated with complete dentures such as lack of stability and retention. Outcome of implant therapy is no longer measured by survival of implant alone, but by aesthetic and functional success of the prostheses.^{1,2}

Fracture of denture base is one of the prosthodontic complications seen with implant retained overdentures with ball attachments. This clinical report describes a treatment approach for oral rehabilitation of a patient with implant retained mandibular overdenture who had chief complaint of repeated fracture of mandibular denture.

Case report

A 55-year-old male presented at Dental centre with chief complaint of repeated fracture of implant based mandibular prostheses. Patient gave a history of placement of two implants in year 2009 in the same centre followed by prostheses placement. Clinical examination revealed maxillary edentulous ridge and highly resorbed mandibular edentulous ridge with two Ball end abutment in sites of the mandibular right and left premolar region (Fig. 1). Patient had an implant and soft tissue supported removable complete denture on the mandibular ridge which had fractured into two fragments and conventional complete denture on the maxillary ridge. Patient gave a history of removal of O Ring Attachment housing from the mandibular denture base due to repeated fracture. Retention, stability and support provided by maxillary complete denture was satisfactory.

Records maintained in the centre and a panoramic radiograph revealed 2 × 23 mm bicortical implants in mandibular premolar region with adequate bone support in the region of implants (Fig. 2). To combat repeated fracture of prostheses, a treatment plan for an implant-supported overdenture with a metal base for mandibular arch was formulated. A closed-tray impression was made with a custom tray and elastomeric impression material (3M addition silicone) for mandibular arch. The impression was poured with Type IV stone (Bego, Germany). Designing of the framework was done on the

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Fig. 1 – Two ball end mandibular implants in mandibular premolar region.

Fig. 2 – Radiological imaging showing two bicortical implants in mandibular premolar region.

cast. Fabrication of the implant-supported removable denture framework was then initiated. The framework was made from chromium-cobalt metal alloy (Bego, Germany). Openings in the framework were placed to accommodate the implants. Metal base trial was carried out and it was incorporated in permanent record base (Fig. 3). Centric relation record was obtained with record base and occlusion rim opposing maxillary complete denture with silicone interocclusal registration material. The casts were transferred onto the articulator by the centric relation record. Prosthetic teeth were arranged for trial insertion. Since maxillary denture already existed, modification in teeth of mandibular denture was done. Selective grinding of buccolingual inclines of buccal cusp of mandibular teeth were done to decrease inclined plane forces which create horizontal displacement of bases during function. The denture was processed in fibre reinforced heat cure polymerizing resin (Lucitone) and the area around the implants was relieved. Passive fit of denture was checked with disclosing paste in the region of ball end of implant. Flanges of denture were kept relatively short as compared to conventional dentures (Fig. 4). After the insertion of denture, patient was recalled for follow-up appointments for a year. No further fracture of the prostheses was noticed.

Discussion

Edentulous patients with resorbed ridges experience problems with conventional dentures due to lack of stability and retention. Several studies have reported following benefits of overdenture in comparison to conventional complete denture treatment in the mandible: better chewing ability, better fit and retention, improved function, and improved quality of life.³ The removable implant-retained or implant-supported overdenture has become a reliable treatment alternative, offering the same masticatory efficacy as a fixed prosthesis.⁴ Primary focus in early clinical studies was survival of

Fig. 3 – Metal framework incorporated in permanent record base.

Fig. 4 – Denture in situ.

implant and oral hygiene. More recently, prosthetic maintenance has gained importance. Berglundh et al, in a systematic review, observed that a 4–10 times higher incidence of prosthetic complications was associated with implant-supported or implant-retained overdentures in comparison to implant fixed prostheses.⁵ Moreover, the amount of ridge resorption, the length and number of implants, the opposing dentition, the angulations of the implants, and parafunctional habits may increase the susceptibility for such complications.^{6,7} Goodacre et al has shown that incidence of complications of overdenture fracture amounts to 12%.⁸ However, cast chromium-cobalt framework reinforcement has been recommended to eliminate this complication.⁹

In this case report, the dental implants placed were two in number. Implant with ball end abutments had lead to decreased thickness of denture base leading to repeated fracture of denture base as functional stresses were exerted. Due to severely resorbed mandible, implants retaining an overdenture may have been subjected to excessive masticatory forces by the mesial and distal cantilever and also from the occlusolingival lever arm leading to acrylic resin failure. Therefore modifications were done in occlusion along with use of fibre reinforced resin and cast chromium-cobalt framework. Pound and Murrell has suggested the reduction of buccal cusps of mandibular teeth and introduced the term lingualized occlusion.¹⁰ Since maxillary denture was already existing and mandibular ridge was resorbed, modification in teeth of mandibular denture were done by selective grinding of buccolingual inclines of buccal cusp of mandibular teeth to control lateral thrust during functional movements as advocated in literature.¹¹ Processing of denture in fibre reinforced heat cure polymerizing resin resulted in increase in impact and flexural strength and significant improvement in fatigue resistance, effectively minimizing tendency for denture fracture. Flanges of the denture were kept short as compared to conventional complete dentures due to overdenture's relative immobility as advocated by several authors.¹²

An implant-supported overdenture with cast chromium-cobalt framework reinforcement further increased the

durability of denture and addressed the chief complaint of patient of repeated fracture of denture base. However, one of the disadvantages of using metal base is difficulty in relining procedures. Although it may have been possible to fabricate an implant-supported overdenture with bar attachment along with placement of additional implants, but unwillingness by the patient made this option unacceptable. For this situation, considering the interarch space and maxillomandibular relationship, a removable implant-supported overdenture with cast chromium-cobalt framework reinforcement appeared to be appropriate.

Conclusion

Incorporating cast chromium-cobalt framework reinforcement in denture base in implant-retained mandibular overdentures addresses the problem associated with the fracture of denture base. Overdentures should be routinely reinforced with metal framework to prevent denture base fracture.

Conflicts of interest

All authors have none to declare.

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