

Prosthodontic Rehabilitation of an Acquired Mandibular Defects with Fixed-removable Partial Denture Prosthesis: A Case Report

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ABSTRACT

Partial dentures are an excellent means of restoration in a partially edentate patient. When trauma, surgery, or abnormal resorption patterns have caused excessive bone loss, it is difficult to design a prosthesis that meets the esthetic, functional, and restorative requirements of the prosthesis. In cases of acquired mandibular defects, wherein a segment of the mandible is removed, the balance and symmetry are sacrificed along with function and esthetics. A fixed-removable prosthesis that reestablishes the continuity and occlusal table of the mandible provides an obvious benefit in esthetics and facilitates the potential for improved function. A prosthesis which meets the principles of retention, support, stability, and esthetics can be appealing to the patient as well.

Key words: Acquired mandibular defect, fixed-removable prosthesis, semi-precision attachments

INTRODUCTION

Rehabilitation of acquired maxillomandibular defects often poses a challenge to the prosthodontist as it has to fulfill the demands of the patient and also the prosthodontist in various aspects. A prosthesis which meets the biomechanical as well as clinical requirements should be chosen for the longevity of the restoration.^[1]


A pathological lesion in the jaws can cause minor to significant disfigurement in facial contour, esthetics, and compromises function either because of its size or abnormal site. Ameloblastoma/adamantinoma is one of the most common odontogenic tumors that accounts for approximately 1% of all oral tumors and 18% of all odontogenic tumors. Ameloblastoma in the mandible can progress to great size and can cause

facial asymmetry, displacement of teeth, loose teeth, malocclusion, and pathologic fractures.^[2,3]

Robinson has described ameloblastoma as, “usually unicentric, nonfunctional, intermittent in growth, anatomically benign, and clinically persistent.” Its local microscopic aggressive infiltration of the bone interface leads to various complications due to compression or erosion of vital structures.^[4,5]

Lesions in the dentulous areas can cause root resorption and tooth displacement. The treatment modality is determined based on the behavior of the tumor, duration of illness, anatomic site of occurrence, clinical and radiological extent, size of the tumor, histologic assessment, age, and general health of the patient. The surgical management includes marginal resection or segmental resection with or without continuity defect.^[5]

Reconstruction and rehabilitation of such cases should be planned taking into consideration the soft- and hard-tissue availability, post-surgery, and recurrence rate of the tumor. At least 6 months should have elapsed before the prosthesis is planned.^[6-9] In partially edentate patients, conservative and minimally invasive treatment

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option which meets the principles of retention, stability, support, and esthetics can be an appealing choice.^[10-12] Partial overdentures or partial dentures extract the advantage of favorable biomechanical principles for stability and retention as well as post-operative follow-up care.

A hybrid or composite dental prosthesis which replaces not only the missing teeth but also the contiguous soft tissue structures can be an affordable choice to the patient.^[13] The long-term prognosis is also merited, provided, a sound diagnosis, and a proper maintenance protocol is followed.

CASE REPORT

A 26-year-old male patient reported to the Department of Prosthodontics, Government Dental College and Hospital, Hyderabad, with a chief complaint of missing lower back right teeth and need for replacement of the same. History revealed that the patient was diagnosed with ameloblastoma in the body of the mandible on the right side and had undergone *en bloc* resection of the involved site along with the extraction of mandibular right premolars, first and second molars, 2 years ago [Figure 1].

Radiographic examination revealed bone plating that was done to prevent the dehiscence of the wound and an ample amount of bone formation, which ruled out the necessity for bone grafting [Figure 2].

The suggestive treatment option was a removable partial denture (RPD) considering the length of the edentulous area. Entirely tooth-supported fixed partial denture (FPD) could not be used in this situation because of the unfavorable long-term prognosis. As the patient was not willing for a removable prosthesis and also could not afford the cost and elective surgery associated with an implant-supported prosthesis, a fixed-removable dental prosthesis using cement retention for the metal fused to ceramic bar framework and a ball retention for the RPD was planned to rehabilitate the mandibular defect with long span Kennedy's Class III partially edentulous space in relation to the right mandibular premolars and first and second molars.

Diagnostic impressions of the maxillary and mandibular arches were made with irreversible hydrocolloid impression material (Algitec, DPI, Mumbai) [Figures 3 and 4]. The casts were poured with Type III gypsum product (Neelkanth stone

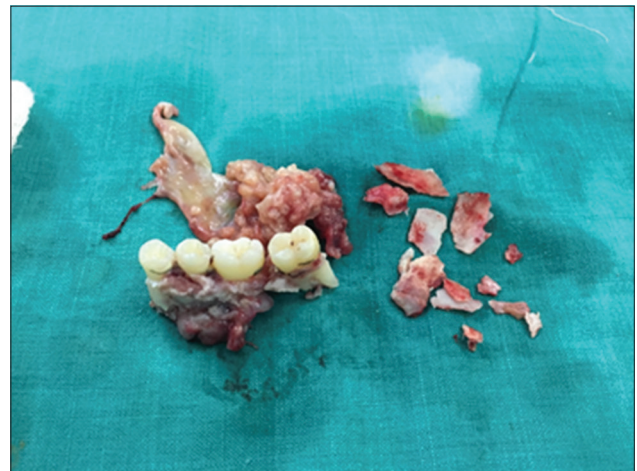


Figure 1: *En bloc* resection of the right body of mandible along with extracted right mandibular premolars, first and second molars



Figure 2: Post-operative orthopantomogram of the patient revealing bone plating that was done to prevent the dehiscence of the wound and ample amount of bone formation



Figure 3: Diagnostic impression of the maxillary arch

plaster, Jodhpur, India) and were mounted on a mean value articulator using centric record. On the articulated casts, a diagnostic wax-up (No. 2, Y-Dents modeling wax, Delhi, India) was fabricated of the missing teeth. An index of the pattern was made using addition silicone putty material (Photosil, DPI, Mumbai) to fabricate a temporary restoration at a later stage.

The distance between the maxillary posterior teeth and the area of the defect was measured to be 15 mm. Hence, bar and ball attachments were planned for retention of the removable component of the composite prosthesis. The abutment teeth were prepared to receive the porcelain fused to metal restoration in relation to the right mandibular lateral incisor and canine and all metal restoration with respect to the right mandibular third molar. A two-stage putty- light body impression (Photosil, DPI, Mumbai) of the lower arch was made and poured in die stone. Temporization was done with the putty index and luted with temporary cement (Zinc oxide and Eugenol, Mumbai, India).

Wax patterns were fabricated for all the prepared teeth, and a wax castable bar spanning over the edentulous area was connected to the wax pattern. Ball attachment patterns (OT cap, Rhein 83, USA) were attached to the castable bar in the region of premolars and molars. A framework trial was done in the patient's mouth to assess the fit and availability of the inter-arch space. After a satisfactory try in, bisque trial was done to check the shade and fit of the prosthesis.

A single-stage putty light body addition silicone pick-up impression was made with retention caps secured over the ball attachment [Figure 5].

Trial of waxed up denture and bisque trials were performed. Final glazing and polishing of the metal framework were completed, and the RPD was fabricated using heat-cured acrylic resin (ACRYLN-H denture material).

Cementation of the metal framework was done using type I glass ionomer cement (GC Gold Label, Tokyo, Japan), and the removable denture was attached to the framework using the ball attachment [Figures 6 and 7]. Post-insertion hygiene and home care instructions were explained to the patient.

Post-insertion follow-up was done after 15 days, 1 month, and 3 months later. The hard and soft tissues were in normal limits, and the post-operative maintenance was satisfactory.

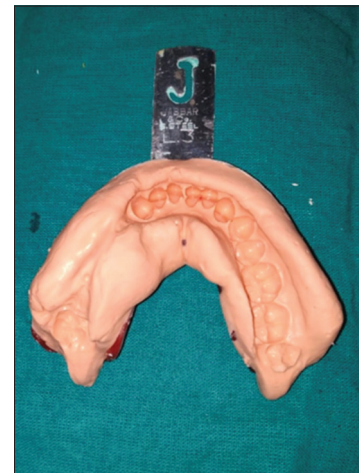


Figure 4: Diagnostic impression of the mandibular arch

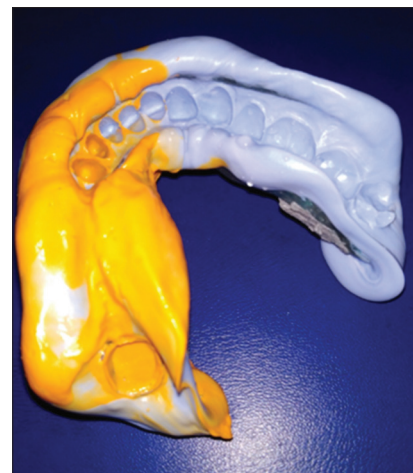


Figure 5: Single-stage putty light body addition silicone pick-up impression



Figure 6: Metal framework with crowns of the mandibular right lateral incisor, canine and third molar, luted with type I glass ionomer cement



Figure 7: Final insertion of the prosthesis in occlusion

DISCUSSION

The differences in the alignment of the opposing arches or segmental deficiency of a particular arch can compromise esthetic replacement of teeth by conventional RPD.^[10-14] In such compromised situations, a fixed-removable prosthesis can be a reliable option. The primary indications for a fixed-removable prosthesis are cases where residual ridge has been partially lost due to some congenital defects, trauma, or other pathologic process where a conventional FPD would not restore patient's missing teeth and supporting structures adequately. It is also indicated in patients with tissue deficiency, several fistulae, soft palate dysfunction, or uncoordinated nasopharyngeal sphincter action that can cause hypernasal speech. Moreover, in the circumstances of vertical bone loss in the edentulous region, RPDs can overcome the problem of hygiene maintenance, deficiencies of labial support which were seen in FPD, and can also provide good esthetics. Despite these advantages, patient satisfaction with RPDs significantly reduces with age. The removable nature of the prosthesis accentuates its artificiality.^[15,16]

The concept of fixed-RPD was pioneered by down in alliance with Steiger and Boitel. Carr described a method of restoration using bar attachments in 1898 and Goslee published a comprehensive article on the subject in 1913. Various attachment designs were proposed by Fossum (1906), Gilmore (1913), and later on by Dolder, Baker, Hader, and Andrews, who employed the "bar and clip" and whose names are still applied to various forms of bars. A design called "bar and sleeve" was patronized by Bennett (Bennett blade). Various custom made attachments

have been developed to meet the increasing demand for accuracy and patient comfort.^[17-19]

In the present case, a fixed-removable prosthesis was planned for the patient as it could provide a means of replacement of teeth with the optimum esthetic arrangement, compensate for the soft-tissue defects and be removed by the patient for maintenance of day-to-day hygiene. Besides, incorporation of a semi-precision attachment provided an added advantage by the elimination of clasps and created a less stressful prosthetic design.^[17] A precision attachment differs from a semi-precision attachment in that the former is prefabricated in metal, whereas the latter is fabricated by the direct casting of plastic, wax, or refractory patterns. The custom made contour of the fixed component and alignment of the prosthetic teeth provides for the wide variation in design, placement, contour, and retentive capability.^[19,20] The minimum tissue coverage helps reduce the bulk and also permits easier maintenance of oral hygiene, thus contributing to the durability of the prosthesis. The laboratory procedures involved in the fabrication of the prosthesis were similar to conventional techniques and are less costly. Repairs and adjustments can also be performed with ease as and when required.^[12]

CONCLUSION

A fixed-removable prosthesis with auxiliary precision attachment can be a favorable choice for rehabilitating a jaw defect along with the dentition, provided, proper knowledge of the clinical, laboratory, and the post-operative maintenance is taken care of.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained appropriate patient consent for the use of images and other clinical information. The patient understands that due efforts have been made to conceal their identity, but anonymity cannot be guaranteed.

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