Replacement of Mandibular Posterior Teeth With Implants in a Postmandibular Resection Case: A Case Report

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This case report describes the prosthetic rehabilitation of a patient who was treated for ameloblastoma by segmental resection of the mandible. Because of the size of the defect it was decided to use a healing obturator to facilitate bone formation in the defect. At the end of 3 months, bone formation had led to complete obliteration of the defect with an almost complete fill to the crest of the ridge. The next phase of the treatment was prosthetic rehabilitation. The patient preferred a fixed replacement of teeth as opposed to a removable option. The final treatment plan was an implant-supported fixed prosthesis that was progressively loaded.

Key Words: ameloblastoma, obturator, progressive loading

INTRODUCTION

Implant-retained fixed prosthesis is proving to be a viable and preferred treatment option for patients with a single missing tooth or a few missing teeth. Newer implant systems, treatment options, and diagnostic capabilities as well as better technology have enabled a more predictable result for rehabilitation with implants.

Many benign lesions cause mandibular swellings, including ameloblastoma, radicular cyst, dentigerous cyst, keratocystic odontogenic tumor, central giant cell granuloma, fibro-osseous lesions, and osteomas.[1]

Ameloblastoma is a locally invasive benign odontogenic tumor that is commonly seen in the mandible. There are three forms of ameloblastomas, namely, multicystic, peripheral, and unicystic tumors.[2] The tumor is often asymptomatic and may be detected during the course of routine radiography. A painless expansion of the jaw is the usual clinical presentation, and marginal resection is the most common treatment of choice for patients with ameloblastoma.[3] Depending on the location and extent of the lesion, jaw resection leads to varying degrees of impairment in appearance, speech, mastication, and deglutition and effects on the patients' quality,[4] It has been reported that endosseous implants can be successfully placed in jaws reconstructed with titanium mesh tray and particulate bone graft.[5] Rehabilitation with implants after jaw reconstruction not only improves oral function but also the patient's psychosocial well-being.[6]

CLINICAL REPORT

A 23-year-old female patient reported to the Department of Oral Medicine of Sri Ramachandra Dental College and Research Institute, Chennai, with the chief complaint of swelling of the mandibular right posterior region. On examination, a bony hard swelling was seen in the mandibular right posterior region with tooth displacement. The swelling was diagnosed as ameloblastoma and was treated by segmental resection of the mandible (Figure 1). The

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Figures 1–3. Figure 1. Postsurgical radiograph. **Figure 2.** Intraoral postsurgical view. **Figure 3.** Obturator.

mandibular right first and second molar and the mandibular second premolar was included, and a segment of the mandible was removed (Figure 2). Because of the size of the defect, it was decided to use a healing obturator to facilitate bone formation of the defect.

Procedure

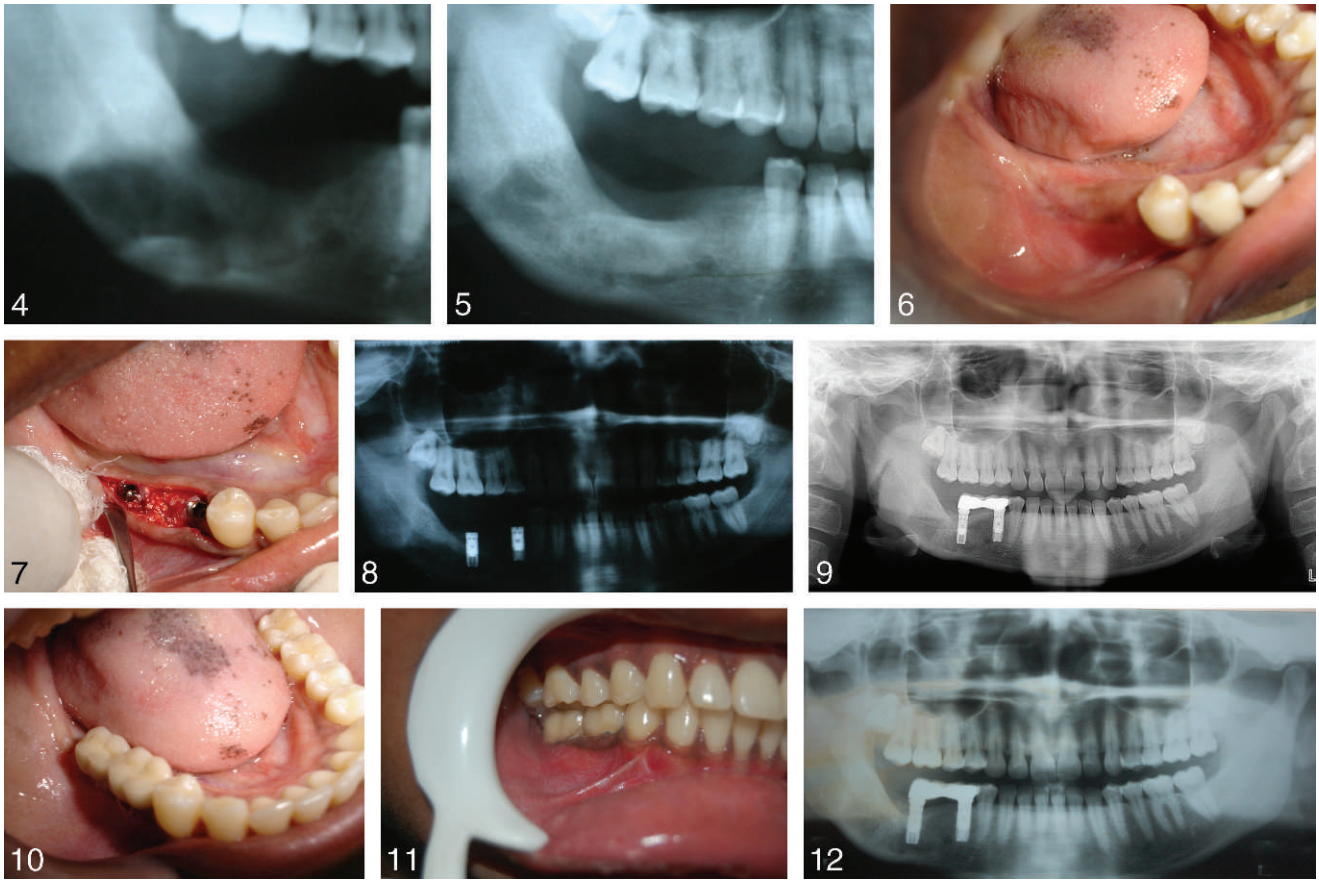
Maxillary and mandibular impressions were made with reversible hydrocolloid impression material. Casts were poured. The undercuts in the defect area were blocked out with plaster. Separating medium (sodium alginate) was applied over the cast. A complete wax-up was done of the cast. The wax framework consisted of 2 portions. The first portion was a solid bulb that completely filled the defect site. The second portion was a plate that followed the lingual contours of the remaining teeth and was confluent with the first portion of the pattern, the solid bulb. The wax framework was then processed, the cast was retrieved, and the acrylic solid bulb interim obturator (Figure 3) was seated on the cast and checked for fit. The obturator was then inserted in the patient's mouth and postinsertion instructions were given.

The patient returned after 24 hours for the initial postinsertion appointment. The patient then returned after 2 weeks. At the first 2-week appointment a total of 1.5 mm was removed from the external surface of the obturator. This allowed for bone formation on the surface of the defect to the level to which the obturator had been trimmed. The patient returned after an additional 2 weeks and the solid bulb portion of the obturator was trimmed another 1 mm. This procedure was repeated 5 more times over a 3-month period. As the obturator was trimmed, bone formation took place (Figure 4) along the inner surface of the defect. At the end of 6 months (Figures 5 and 6), bone formation had led to complete obliteration of the defect with an almost complete fill to the crest of the ridge.

The next phase of the treatment was prosthetic rehabilitation. The implant-supported fixed prosthesis is often considered the treatment of choice after jaw resection or reconstruction.[7] The patient also preferred a fixed replacement for the missing teeth.

Maxillary and mandibular impressions were made with alginate impression material. Casts were mounted on an articulator. Implant presurgical diagnostic procedures were completed, and it was decided to place 2 implants (4.7 mm $\times$ 11 mm; Zimmer Dental Inc, Carlsbad, Calif), the first implant in second premolar region and the second implant in first molar region (Figures 7 and 8). A surgical guide was made for the implant surgery. A flap was raised and osteotomy sites were prepared. Primary stability was achieved at the time of implant placement. In cases where threads are exposed during implantation, a bioactive material such as hydroxyapatite along with a barrier membrane can be used to enhance bone formation. Calcium phosphate biomaterials are osteoconductive, are biocompatible, and have an increased surface area. They are known to fill any defect size or shape.[8] For this patient a combination of hydroxyapatite and β-tricalcium phosphate (Ossifi Regenerative Bone Matrix, Equinox Medical Technologies B.V, Amersfoort, The Netherlands was used to cover the exposed implant threads.

After implantation, the site was sutured and the patient was asked to report back at 3 months. At 3 months, a flap was raised and the abutments were placed in the patient's mouth using only finger pressure and no torque wrench, so as not to disturb the immature interface and to ensure easy removal



Figures 4–12. Figure 4. Three months after obturator. **Figure 5.** Six months after obturator. **Figure 6.** Six months after obturator, intraoral view. **Figure 7.** Implant placement. **Figure 8.** Radiograph after implant placement. **Figure 9.** Radiograph after final prosthesis. **Figure 10.** Intraoral postoperative view with final prosthesis. **Figure 11.** Intraoral postoperative lateral view. **Figure 12.** Radiograph 3 years after surgery.

of abutments after making the impressions.[9] Impressions were made using a single-stage putty wash impression technique with additional silicone impression material. The abutments were removed from the fixtures and healing abutments were placed intraorally. The casts were poured and mounted. Abutment preparation was done on the cast and a transitional prosthesis was fabricated using tooth-colored chemical-cure acrylic resin. Three weeks later,[9] the prepared abutment components were placed in the mouth and final impressions were made; in addition, silicone impression was made using the single-stage putty wash technique and casts were poured. The transitional prosthesis was cemented with non-eugenol zinc oxide cement. There was a total absence of occlusal contacts.

At the next appointment 3 weeks later, the transitional restoration was modified by adding acrylic on the occlusal contact areas. The contacts were limited only on the implants, and no contacts were given on the pontic.[9] The final restoration was a metal ceramic 3-unit fixed partial denture (Figures 9 through 11). The patient was satisfied with the esthetics and function. The patient was reviewed after 15 days and then every 6 months for a period of 2 years (Figure 12).

Discussion

Ameloblastoma is a locally invasive benign tumor that is commonly seen in the mandible. It causes painless expansion of the mandible with displacement of teeth. The most common treatment of choice for patients with ameloblastoma is resection of the mandible. In a study by Chana et al[10] it was concluded that segmental mandibulectomy and immediate vascularized fibula osteoseptocutaneous flap reconstruction, with simultaneous placement of osseointegrated implants, represents an ideal meth-

od for treating large ameloblastomas of the mandible.

In cases of mandibular resection, preserving the lower border of the mandible (continuity defect) will help maintain the normal anatomy of the face and help restore the patient to health and function. The presence of a large defect may impede healing as there may be a central area of liquefaction necrosis. In such cases a plug-type device, such as the one used in this case, can be used. This device can be uniformly and periodically reduced in size on the outer surface so as to prevent an excessively large defect from forming at any time.

Beta tri-calcium phosphate was preferred as the bone graft material in this case because the patient did not want an allograft to be used. Furthermore, allograft is more expensive and not readily available.

The use of progressive loading was essential in this situation for developing bone that was capable of bearing occlusal load. A progressive loading protocol ensures that the immature bone in the region develops into a bone that is capable of withstanding the occlusal load that is transmitted through the prosthesis.

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