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Implant-supported prosthesis for marginal mandibulectomy: a case report

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ABSTRACT

Background This case report describes the prosthetic rehabilitation of a patient who underwent mandibulectomy, with the help of osseointegrated dental implants.
Case report A 22-year old female patient came to the observation following segmental resection of the mandible owing to an odontogenic myxoma requesting implant-suppoterd prosthetic rehabilitation.
Conclusion The use of endosseous implants for supporting the prosthesis is viable treatment plan when the residual anatomy is not capable of fulfilling the functions of retention, stability and support.

KEYWORD Implant prosthodontics; Odontogenic myxoma; Marginal mandibulectomy.

INTRODUCTION

Marginal or segmental resection of the mandible can be one of the most challenging clinical situations faced by a prosthodontist. Patients with benign and malignant neoplasms of the oral cavity are often treated by resection of the tumor which involves the teeth and alveolar bone and the surrounding soft tissue. Surgical resection for the tumors of the mandible more often than not leave the patient in a debilitating state. It is of primary importance to help these patients lead a respectable quality of life. This responsibility lies with the maxillofacial prosthodontist.
Cantor and Curtis (1974) gave an in depth classification of the mandibulectomy defects (1). Since then many authors have given numerous other classifications and the respective treatment protocols. Half a century later, we have at our disposal, better diagnostic aids, more sophisticated radiographic means and greater surgical knowledge. The introduction of osseointegrated dental implants by Per-Ingevar Brånemark has been hailed as a milestone in the treatment of completely or partially edentulous patients. Dental implants are being used extensively in the treatment of patients who have undergone surgical resection of the maxilla or mandible. Each and every case is unique, hence a multi-disciplinary approach is required for the best treatment. It is imperative to conduct proper clinical and radiographic examination, reach the correct diagnosis, and ensure proper treatment protocol is formulated and executed.
This clinical case report describes the prosthetic rehabilitation of a patient who underwent mandibulectomy, with the help of osseointegrated dental implants.

CASE REPORT

A 22-year old female patient was referred to the OPD of Department of Prosthodontics in Mangaluru (India) following segmental resection of the mandible owing to an odontogenic myxoma. On clinical examination, Class I defect was noted involving the mandibular left side with missing teeth 31, 32, 33, 34, 35, 36 and 37 (Fig. 1).
In the first phase of the treatment, maxillary and mandibular diagnostic impressions were made with Irreversible hydrocolloid (DPI, India) and the casts were mounted on a semi-adjustable articulator following arbitrary facebow transfer and interocclusal records.
A radiographic stent was fabricated using barium sulphate powder incorporated in heat cure acrylic resin

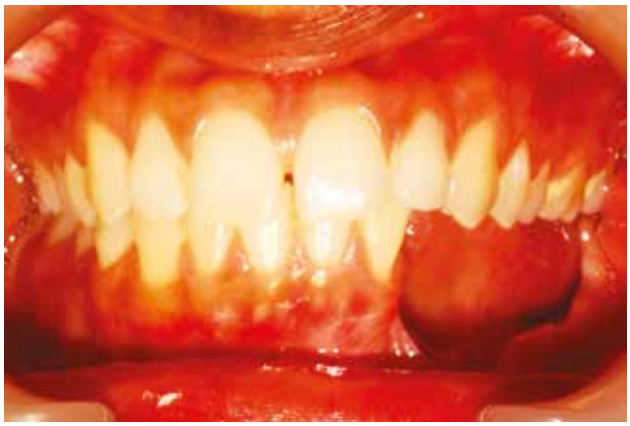

FIG. 1 Intraoral view showing the defect on left side of the mandible.

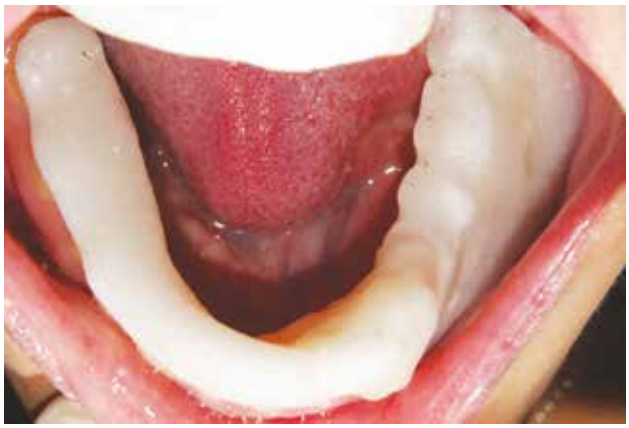

FIG. 2 Radiographic stent in place, to help in better treatment planning.

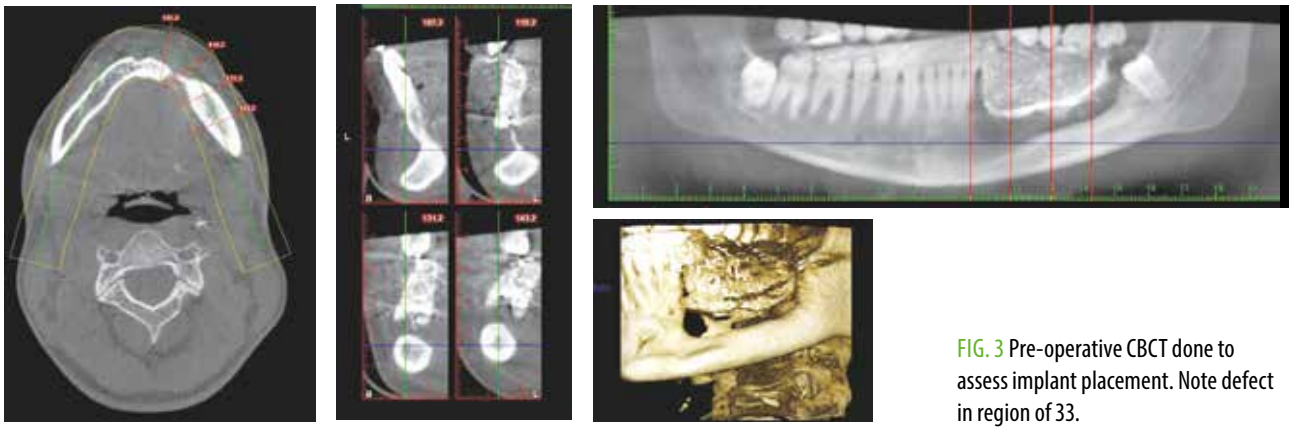

FIG. 3 Pre-operative CBCT done to assess implant placement. Note defect in region of 33.

plate. A Cone Beam Computed Tomography (CBCT) (Planmeca Promax® 3D Mid) scan was performed at 90kV, 8mA for 12 seconds for the area of interest with the stent in the patient's mouth (Fig. 2). The radiograph was then evaluated and it was planned to place two implants in the region of 34 and 36 of dimensions 3.5x6.6mm (Fig. 3).

Surgical phase

The surgical procedures were performed under aseptic conditions and prophylactic antibiotic coverage. Local anaesthesia was injected and a midcrestal incision placed in the area of 33 to 37. A full thickness mucoperiosteal flap was reflected and sequential osteotomies were performed according to the manufacturer's instructions (Ankylos Surgical kit). The implants were torqued to 35Ncm (Ankylos, Dentsply, Germany) in the region of 34 and 36 (Fig. 4).

Since the tissue height was approximately 10 mm, the implant mount was not removed. Polytetrafluoro ethylene (PTFE) 3-0 resorbable sutures were used to provide surgical closure. The patient was to continue with the same antibiotic regimen along with an analgesic (Paracetamol 500mg BD for 3 days) and chlorhexidine mouth wash (twice daily for 2 weeks).

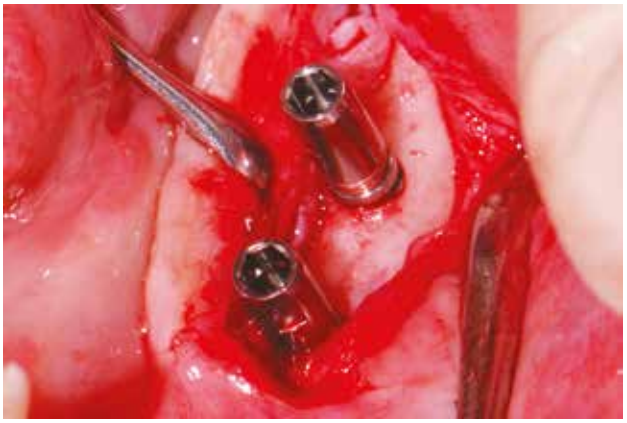

FIG. 4 Two 3.5x6.6mm implants placed in area of 34 and 36.

Prosthetic phase

At the second stage, the implant mounts were removed and two balanced base abutments (Ankylos, Dentsply, Germany) of gingival height 6mm were torqued in at 25NCm. At the subsequent appointment, an open tray impression was made with polyvinyl siloxane impression material (Aquasil Monophase, Denstply, Germany). The implants were intended to be rehabilitated with a

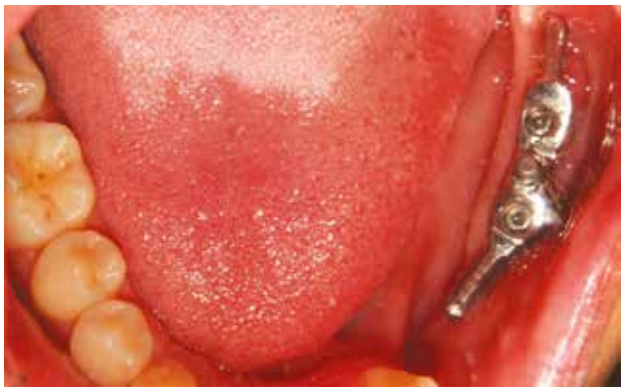

FIG. 5 Bar fabricated extending 5 mm mesial and 5mm distal to implants.

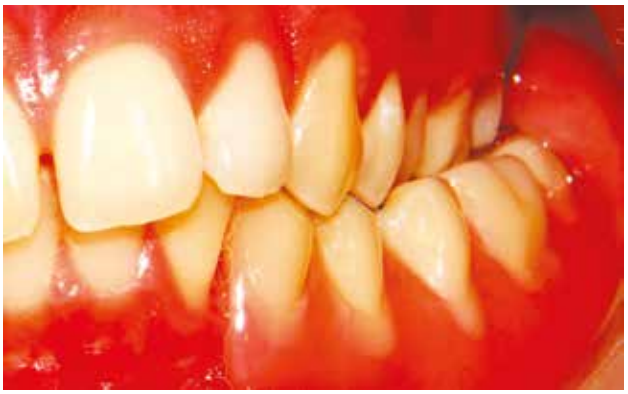

FIG. 6 Definitive prosthesis in place.

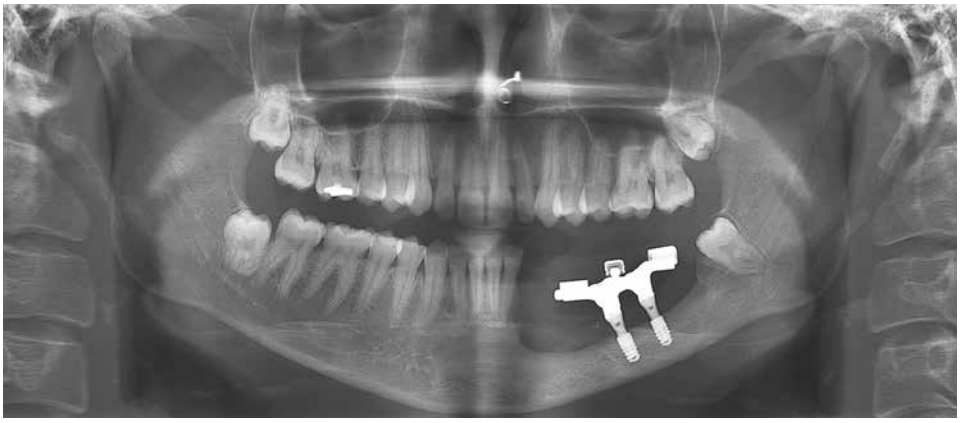

FIG. 7 Orthopantomograph showing implants with prosthesis.

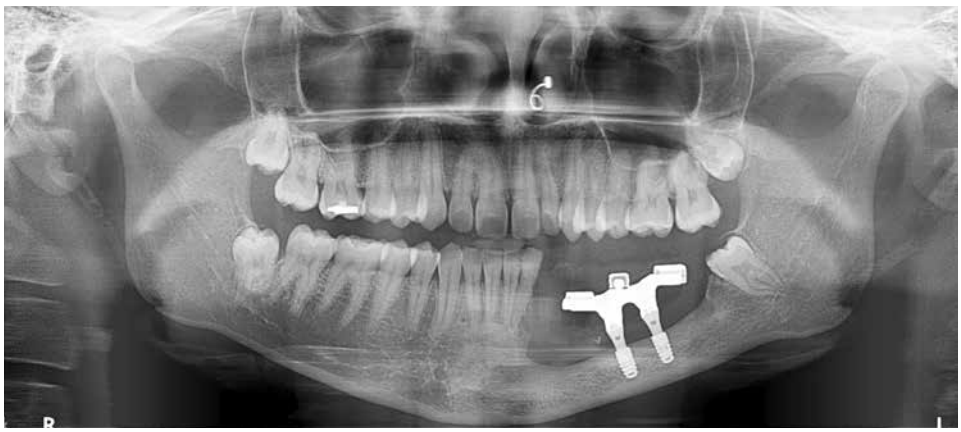

FIG. 8 Orthopantomograph taken at the Six-month follow-up appointment.

removable prosthesis retained by a bar.
A cobalt chromium bar was fabricated extending 5mm mesial and distal to the two implants and 2mm above the level of the gingiva. The implants were connected using a ball attachment (as the inter-implant space was inadequate for bar). The metal framework was checked for passivity and the centric bite was recorded in modeling wax (Fig. 5). Teeth arrangement was done using semi-anatomic acrylic teeth (AcryRock Ruthinium Dental Products, India); the overdenture was acrylised and fit in of the prosthesis was done (Fig. 6). An immediate post-insertion OPG was taken to check the fit and the stability of the prosthesis (Fig. 7).

The patient was recalled after six months of prosthesis insertion and a follow-up OPG was taken (Fig. 8). It shows no bone loss and stability of the implants.

DISCUSSION

"Every human has the divine right to look human" (2). Patients who have undergone surgical resection or traumatic loss of a part of the mandible face great amount of complexity and range of choices of treatment when it comes to the prosthodontic rehabilitation (3). The correct diagnosis, prognosis and treatment plan

need to be formulated before the start of the surgery. The patient should be informed in advance about the prognosis, multiple additional surgical procedures, significant morbidity and outcomes which are all key to the patient's decision making process among the various treatments offered (3).

The treatment plan of surgical resection of a tumor should be done with the final prosthetic outcome in mind, thereby involving a multidisciplinary approach. The mandible in association with the tempopromandibular joint, the masticatory muscles and its ligaments forms an important part of the stomatognathic system which helps an individual perform various functions like speech, swallowing, mastication and breathing (3). The prosthodontic rehabilitation of patients with resections of the mandible should aim to restore most of these functions.

Retention of prosthesis relies on frictional contact which may cause irritation to the oral mucosa leading to alteration of the residual anatomy or eventual loss of the abutment teeth. Albrektsson et al., in 1987, used endosseous implants for retention of prosthesis in treating 174 patients with various defects post-cancer surgery (4). The authors reported a success of 85.4%.

Maintenance of continuity of the mandible is an important prognostic factor for the prosthetic rehabilitation. In this case, since there was adequate bone height available in the region of the defect, the implants were placed in the same region. Two implants were placed, both osseointegrated successfully.

The irradiated bone is more prone to osteoradionecrosis (5). Implant placement must precede radiotherapy or after a healing period of 9–12 months. Radiation of more than 5000 cGy increases the implant failure rate to 33% (6). Granstorm has stated that irradiation per se has a negative impact on osseointegration. High chances of failure are associated with higher dose and longer time from radiotherapy (6).

The current protocol for ideal rehabilitation of cancer patients with defects of the mandible is: excision of the tumor, placement of a vascularized free fibula graft with dental implants, at the time of resection followed by radiotherapy after 6 weeks. This protocol helps in maintaining the continuity of the mandible with ideal healing time for osseointegration of the dental implants. Implants are placed either in the residual bone or the unaffected bone and used for retention, support and stability of the prosthesis. The use of implants in hemimandibulectomy patients is complex. Even after successful osseointegration there are chances of failure in the prosthetic phase. This is primarily because the clinician cannot anticipate the direction of the centric and eccentric forces (7). The resected mandible may place forces on the implant that are not parallel to the long axis of the implants. Lateral force application has shown to cause crestal bone loss and implant failure (8). Maximum occlusal force of a patient with resected mandible is lesser than an unresected mandible which may offset failure.

CONCLUSION

Patients with benign or malignant tumors of the mandible treated with resection of the mandible will suffer from loss of function, esthetics, comfort and natural appearance. It is the duty of the maxillofacial prosthodontist to rehabilitate the patient in the best possible way following the basic principles of prosthodontics. The use of endosseous implants for supporting the prosthesis is a viable treatment plan when the residual anatomy is not capable of fulfilling the functions of retention, stability and support.

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