

Case Report

Anchored guided rehabilitation

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Abstract

The loss of mandibular continuity leads to difficulty in swallowing, problems in mastication, altered mandibular movement, impaired speech articulation, and cosmetic disfigurement. Rehabilitation of such patients becomes more challenging in the case of complete edentulous maxillary and mandibular arches due to a lack of support and anchorage. This case report describes prosthetic rehabilitation of completely edentulous arches with segmental mandibulectomy. Hence, the anchorage was provided with the help of osseointegrated implants in both the maxillary and mandibular arches. Deviation of the mandible toward the unresected side during mastication and other functions was corrected using a palatal ramp. An attempt was made for prosthetic rehabilitation of mandibulectomy defect which required a multidisciplinary approach and which fulfilled the patient's requirement of mastication.

Keywords: Implant supported complete denture, palatal ramp, segmental mandibulectomy

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INTRODUCTION

More than 90% of oral cancer cases are of squamous cell carcinoma (SCC). It invades the floor of the mouth, tongue, and mandible. This leads to the resection of the mandible in conjunction with other structures, which results in difficulty in swallowing, problems in mastication, altered mandibular movement, impaired speech articulation, and cosmetic disfigurement.^[1] The most common effect of mandibulectomy is deviation and rotation of the mandible toward the resected side.

Rehabilitation of segmental mandibulectomy patients with completely edentulous maxillary and mandibular arches is very much challenging clinically, as no support and anchorage is available. This case report describes the rehabilitation of segmental mandibulectomy with

completely edentulous maxillary and mandibular arches using implant-supported denture, and the movement of the mandible was guided using a palatal ramp.

CASE REPORT

A 75-year-old male patient presented the department of prosthodontics with a chief complaint of difficulty in chewing food due to the deviation of the jaw, missing teeth, and wanted replacement of the teeth. The patient was detected with SCC and underwent surgery and radiotherapy (for a month) 3 years back [Figure 1]. The patient had a habit of tobacco chewing but stopped 3 years back. Intraoral examination showed completely edentulous maxillary and mandibular arches, segmental mandibulectomy of the right side, thin biotype of the mucosa, and macroglossia [Figure 2]. The case was diagnosed as Cantor and Curtis Class II mandibular defect

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[Figure 3]. Extraoral examination showed taut muscles on the resected side, deviation of the mandible toward the resected side, and lack of motor control to bring the mandible into centric occlusion. Hence, the patient was treated with implant-supported denture of the maxillary

and mandibular arches, while the deviation of the mandible was corrected using the palatal ramp.

The primary impression was made with irreversible hydrocolloid impression material (Marieflex, India) with both maxillary and mandibular arches, and the primary cast was fabricated using Type III gypsum product [Figure 4]. Custom tray was fabricated and the border was molded and the final impression was made with ZOE paste (Prime, India) with both the arches and the final casts were fabricated with Type III gypsum product [Figure 5]. Tentative jaw relation was recorded in the patient's mouth by manually deviating mandible to the desired occlusion [Figure 6]. Face bow



Figure 1: Pretreatment extraoral view



Figure 3: Preoperative orthopantomography

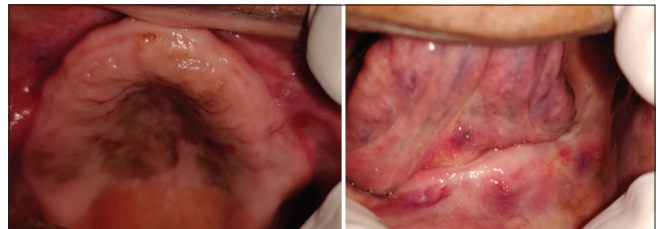


Figure 2: Pretreatment intraoral view

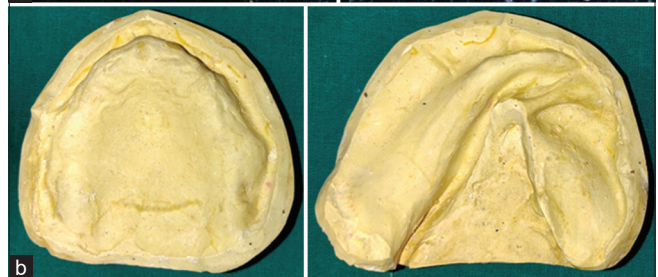


Figure 4: (a) Primary impressions, (b) primary casts

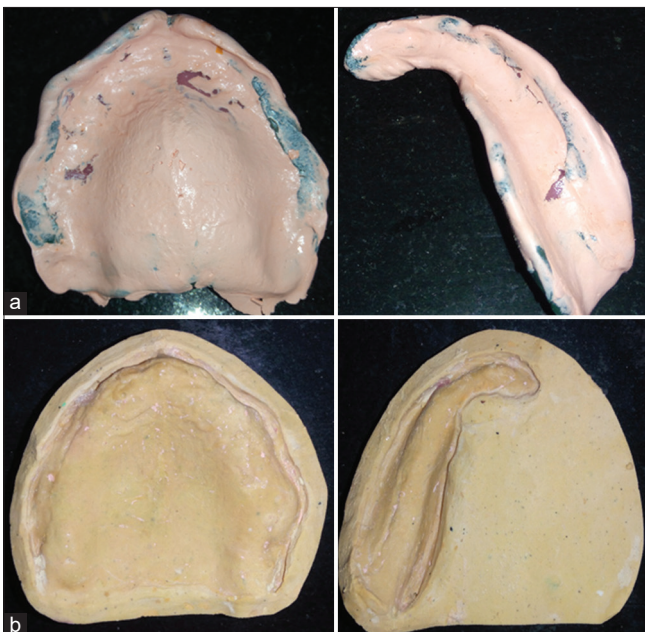


Figure 5: (a) Secondary impressions, (b) final casts

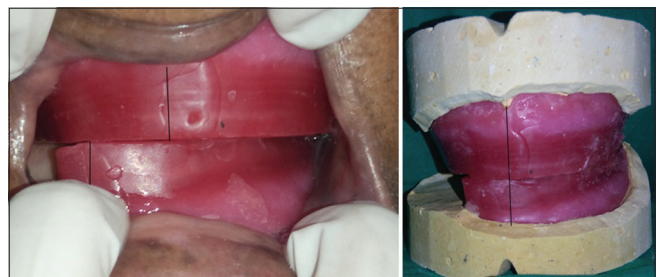


Figure 6: Jaw relation recorded by manual movement

transfer and mounting was done on a semi-adjustable articulator (Bio-Art, Brazil) with arbitrary values of condylar and incisal guidance [Figure 7]. Teeth arrangement was done in Class I molar relationship. Try in was done in the patient's mouth by moving the mandible manually to predetermined desirable occlusion [Figure 8]. Complete dentures were fabricated using Heat cure clear acrylic resin (DPI, India) [Figure 9].

These dentures were also used as a radiographic stent. For this, holes were made on denture at implant sites, i.e., at 15, 16, 23, 25, 31, 33, and 36 regions, which then filled with radiographic marker, gutta-percha^[2] [Figure 9]. Bone mapping at implant sites was done using a bone caliper. Furthermore, orthopantomography and cone-beam computerized tomography were taken while wearing dentures for deciding the length of the implant [Figure 10].

Implant placement was done (Genesis, USA) [Figure 11]. Ball abutments were placed after 4–6 months after proper osseointegration has occurred.^[3] Metal housings over ball abutments were transferred to the dentures [Figure 12]. Denture insertion was done with both maxillary and mandibular dentures.

The rim of the wax was placed over the palatal surface and the patient's bite was taken on the rim and the palatal ramp was fabricated accordingly. The putty index was made of the obtained wax palatal ramp to fabricate the palatal ramp of acrylic resin (DPI, Clear acrylic, India)^[4] [Figure 13]. Angulation and direction of the palatal ramp were changed in each appointment depending on the ability of the patient to move the mandible toward the unresected side to achieve a desirable occlusion. The patient was asked to use denture throughout the day and practice for the movement of the mandible.

After 2 months, the patient was able to move the mandible toward the unresected side at a desirable occlusion [Figure 14]. As the patient progressively achieved a predetermined occlusion, simultaneously height of palatal ramp was reduced, followed by complete removal of the palatal ramp. The patient was recalled after 1, 6, and 12 months for maintenance of implant abutments and denture.

DISCUSSION

Various biomechanical changes take place after segmental mandibulectomy like deviation of the mandible toward the resected side, rotation of the mandible, angular path of closure, and chewing movement is toward the resected side. Leading to the difficulty for patients to

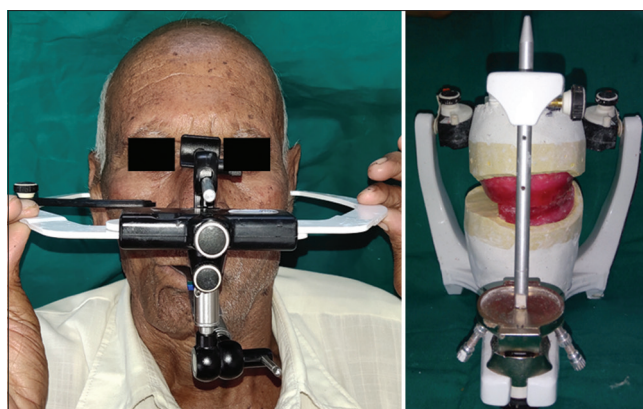


Figure 7: Facebow transfer and mounting

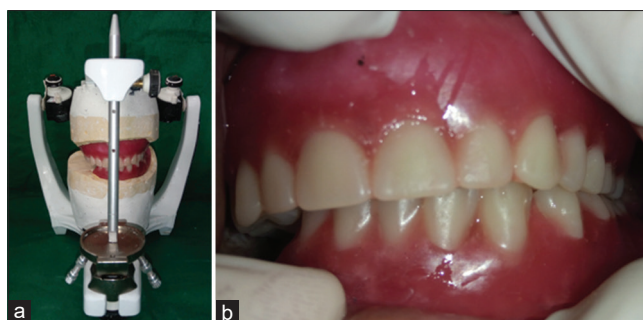


Figure 8: (a) Teeth arrangement, (b) try in

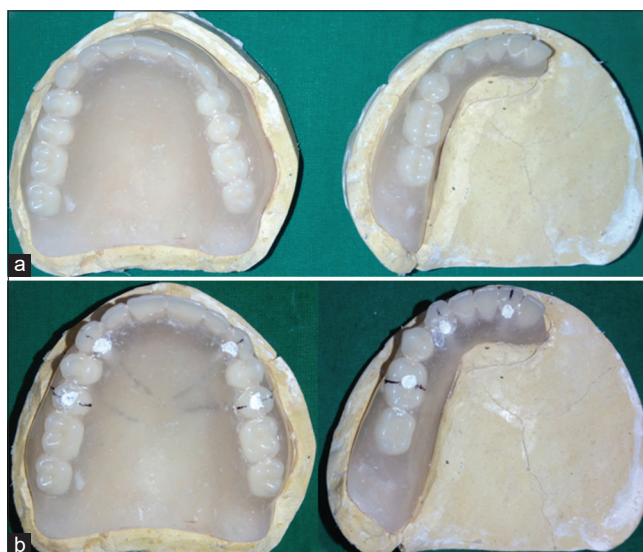


Figure 9: (a) Fabrication of denture, (b) holes at implant sites filled with gutta-percha

wear dentures because of lack of retention and occlusion, implant-supported denture should be used in completely edentulous cases.^[1] Furthermore, conventional dentures are given in patients where surgical reconstruction has been carried out with a fibular graft. Here, the patient was of 75-year-old and visited 3 years after segmental mandibulectomy; it becomes a tedious job to reconstruct after the first surgery.^[5]

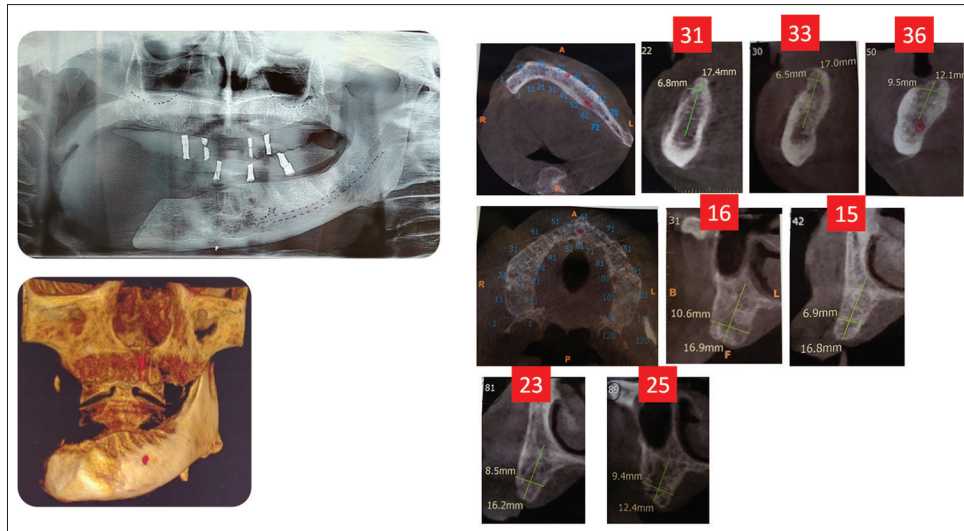


Figure 10: Orthopantomography and conebeam computerized tomography for bone mapping

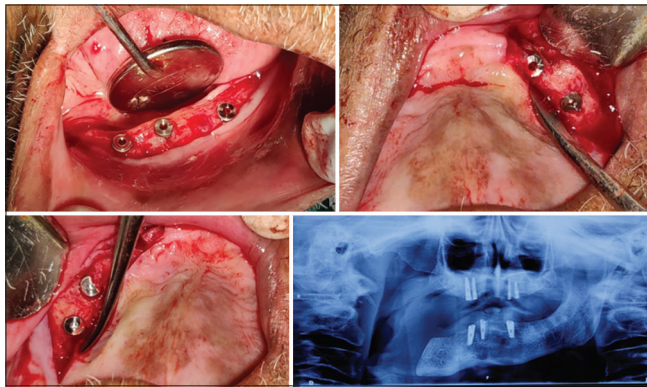


Figure 11: Implant placement in maxillary and mandibular arch



Figure 12: (a) Ball abutment placement, (b) pick up of metal housing in denture

Schoen *et al.* determined that >50% of oral cancer patients who were edentulous were dissatisfied with a conventional denture, so dental implants were used as a solution to improve retention, support, and stability in the hope of improving function for patients.^[6] Placement of osseointegrated implants enables the fabrication of well-retained and stable overlay prostheses. In segmental mandibulectomy, unilateral occlusal forces and lateral forces are generated during the chewing cycle which tends to dislodge maxillary denture.^[7] Hence, implants were placed in the maxillary arch. In the mandibular arch, three implants provide tripod support and retention to the denture.^[1] Garrett *et al.* in their clinical trial observed that the percentage of subjects reporting high levels of chewing comfort, denture security, and overall satisfaction with prosthesis were significantly greater for implant-supported dentures than for the conventional prosthesis.^[8]

To avoid early complications of radiotherapy in case of implant placement, wait for 12-18 months for bone remodeling, otherwise it leads to necrosis and implant failure.^[9]

Ball abutments of the implant allow for rotation so that torquing forces are reduced but improves retention and stability of restoration.^[10]

To correct the deviation of the mandible due to segmental mandibulectomy, options available are palatal ramp, guiding flange, and twin row.^[1] If a patient would not have been able to achieve desirable occlusion, we could have decided to give twin row to the patient.

The palatal ramp was used in this case as the patient lacked motor control to bring the mandible into a centric



Figure 13: Palatal ramp fabrication

occlusion.^[1] Lingual extension on unresected site will vary depending on the severity of mandibular deviation and it is more adjustable.^[1] In an edentulous patient, loss of proprioception is seen, so it is difficult to achieve functional position after insertion of the prosthesis.^[11] Hence, it serves as a training appliance for the patient by gliding mandibular teeth toward the unresected side to achieve a desirable occlusion. In each recall visit, an improvement was seen in the movement of the mandible, occlusion, and mastication.

This case was treated using implant-supported complete denture with a palatal ramp, which was a novelty, whereas previously such cases were treated using complete denture with twin row. Another novelty is that the mandible was guided gradually by changing inclination and angulation to achieve the maximum translatory and rotatory movement.

CONCLUSION

Prosthetic rehabilitation of completely edentulous arches with segmental mandibulectomy required a multidisciplinary approach which fulfilled the patient's requirement of mastication. Anchorage was provided with the help of osseointegrated implants, and the mandible was guided with the palatal ramp.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts



Figure 14: (a) Initial postoperative occlusion, (b) final postoperative occlusion

will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Beumer J, Marunick MT, Esposito SJ. Maxillofacial Rehabilitation: Prosthodontic and Surgical Management of Cancer-Related, Acquired, and Congenital Defects of the Head and Neck. 3rd ed. Chicago: Quintessence Publication; 2011.
2. Esser E, Wagner W. Dental implants following radical oral cancer surgery and adjuvant radiotherapy. *Int J Oral Maxillofac Implants* 1997;12:552-7.
3. Gupta S, Bhargava A, Mehra P. A bar and ball attachment prosthesis over osseointegrated implants post mandibular resection. *J Indian Prosthodont Soc* 2016;16:395-9.
4. Marathe AS, Kshirsagar PS. A systematic approach in rehabilitation of hemimandibulectomy: A case report. *J Indian Prosthodont Soc* 2016;16:208-12.
5. Ahmed ZU, Huryn JM, Petrovic I, Rosen EB. Oral rehabilitation following fasciocutaneous free-flap reconstruction: A retrospective study. *J Indian Prosthodont Soc* 2019;19:221-4.
6. Schoen PJ, Raghoebar GM, Bouma J, Reintsema H, Burlage FR, Roodenburg JL, *et al.* Prosthodontic rehabilitation of oral function in head-neck cancer patients with dental implants placed simultaneously during ablative tumour surgery: An assessment of treatment outcomes and quality of life. *Int J Oral Maxillofac Surg* 2008;37:8-16.
7. Joshi PR, Saini GS, Shetty P, Bhat SG. Prosthetic rehabilitation following segmental mandibulectomy. *J Indian Prosthodont Soc* 2008;8:108.
8. Garrett N, Roumanas ED, Blackwell KE, Freymiller E, Abemayor E, Wong WK, *et al.* Efficacy of conventional and implant-supported mandibular resection prostheses: Study overview and treatment outcomes. *J Prosthet Dent* 2006;96:13-24.
9. Epstein JB, Wong FL, Stevenson-Moore P. Osteoradionecrosis: Clinical experience and a proposal for classification. *J Oral Maxillofac Surg* 1987;45:104-10.
10. Misch CE. Contemporary Implant Dentistry-E-Book: Arabic Bilingual. 2nd ed. China: Elsevier Health Sciences; 2007.
11. Bhattacharya SR, Majumdar D, Singh DK, Islam MD, Ray PK, Saha N. Maxillary palatal ramp prosthesis: A prosthodontic solution to manage mandibular deviation following surgery. *Contemp Clin Dent* 2015;6:S111-3.