

Customized Mandibular Spring Guidance Appliance Therapy for Discontinuity Defect of the Mandible: A Case Report

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ABSTRACT

Background: Treatment of benign and malignant tumors may involve surgical resection of the mandible, which may be segmental resection or hemi-section resulting in discontinuity defects of the mandible. Prosthetic management of surgical defects is a big challenge for a prosthodontist if reconstruction of the discontinued defects is not carried out. These patients present with many problems along with deviation of mandible to the defective side. This incapacitation depends upon the amount of hard and soft tissue resected, remaining dentition and tongue mobility for mastication and other oral functions. This case report describes a procedure for fabricating customized mandibular spring guidance appliance to rehabilitate completely edentulous mandible after segmental mandibulectomy.

Keywords: Discontinuity defects, Spring guidance appliance, Aglossia.

INTRODUCTION

Complete rehabilitation of a surgically resected mandible involves restoration of form and function. Rehabilitation of the defect becomes difficult when reconstruction of the mandible is not undertaken due to various reasons. Mandibular discontinuity defects results in medial deviation of the residual jaw segment¹. The list of dysfunctions also includes compromised esthetics; difficulty in mastication, swallowing, speech; abnormal mandibular movements; control of saliva; psychic function and respiration². The degree of success is related to the location and extent of the mandibular resection, the amount of adjacent soft tissue removed during surgery, and presence or absence of natural teeth. Defects that interrupt the continuity of the mandible result in mandibular deviation and torque

which are evident cosmetically as well as occlusally. Maintaining continuity helps preserve normal muscle function and facial contours and leads to a more predictable and favorable prosthodontic treatment.³

SEQUELAE OF MANDIBULETOMY

The sequelae following mandibulectomy include the deviation of the mandible to the resected side by the muscular pull. The rotation of the mandible leading to occlusal derangement on the resected side.

Guidance prostheses that help in the correction of mandibular deviation are of two types:

1. Mandibular based guidance prostheses (or guiding flange prostheses) (GFP)

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2. Palatally based guidance prostheses (or palatal ramp prostheses)^{4,5}.

This article describes an alternative procedure to fabricate a Customized spring guidance appliance in a partially edentulous maxillary arch and completely edentulous mandible with discontinuity defects.

CASE REPORT

A 65-year-old female patient reported to the Department of Prosthodontics for prosthetic rehabilitation following resection of part of left side of mandible (Fig. 1). She complained of difficulty in mastication, esthetics, and speech. The patient gave a history of tobacco chewing since 20years. She was diagnosed with squamous cell carcinoma of the left buccal mucosa about 4 years back. Her medical history revealed that she had undergone an extensive resection of the mandible distal to the left lower central region, together with modified radical neck dissection with PMMC (Pectoralis major myocutaneous flap)graft followed by radiotherapy & underwent total glossectomy about 2 years ago due to recurrence of the lesion. An extra oral examination showed an asymmetrical face, concave profile and an ovoid face. Lips found to be collapsed with sunken cheeks. There was deviation of the mandible to the left side (defect side). An Orthopantomogram (OPG) revealed resection of the mandible distal to the lower left canine region involving the ramus, coronoid process and condyle. This represented class II type of resection according to the Cantor and Curtis classification⁶. On intra-oral examination, partially edentulous maxillary arch with 11,12,21,22 present & completely edentulous mandibular arch with discontinuity defect on the left side from the canine region (Fig. 2, 3).

Procedure:

- Preliminary maxillary & mandibular impressions were made with irreversible hydrocolloid material (Zelgan2002, Dentsply) using stock trays.
- Impressions were poured with Type III Dental stone (Kalabhai Pvt Ltd, India). Mock teeth preparation, mock wax up & putty index was made for provisional restoration.
- Teeth preparation and temporization of maxillary anteriors was made with adequate incisal visibility.
- Maxillary and mandibular record bases were fabricated followed by the fabrication of wax occlusal rims along the crest of residual alveolar ridges for both arches and tentative jaw relation was recorded (Fig. 4). Mock wax up done for the provisional restorations were used as guide & occlusal plane analysis was done with occlusal plane analyser attached to the parallelometer (Fig. 5).
- The swivel position for the guidance spring was then customised through functional evaluation. Maxillary swivel position in the anterior region & mandibular in the posterior region was decided.
- Rhein 83 extracoronar attachments were attached using parallelometer to distal surface of wax patterns of both the lateral incisors (Fig. 6) & casting was done. The metal copings along with extracoronar attachments were sealed on to the master cast with wax for blockout & cast duplication.
- On to the refractory cast, OT ring caps (Rhein 83) were attached on to extracoronar attachments & wax pattern frame work was fabricated. To the wax framework on either side, ball attachments are attached at the customized anterior swivel position, to receive the mandibular guidance appliance (Fig. 7).
- Metal frame work was fabricated for mandibular denture & occlusal rims were made on both maxillary & mandibular framework after checking the fit of the framework.
- Orientation relation was recorded using a face bow (HANAU™ Spring Bow, Whip Mix, USA) followed by establishing vertical dimension and recording centric maxillomandibular relation (MMR) and transferred to semi-adjustable articulator (HANAU™ Wide-Vue Arcon Articulator, Whip Mix, USA).
- **Customized mandibular guidance spring:** It consists of an open coil spring made up 0.016 x 0.022 stainless steel wrought wire which is



Fig 1: Extra Oral View Showing Facial Disfigurement and Mandibular Deviation After Surgical Resection.



Fig 2: Maxillary Occlusal View.



Fig 3: Mandibular Intra Oral View



Fig 4: Tentative Jaw Relations.

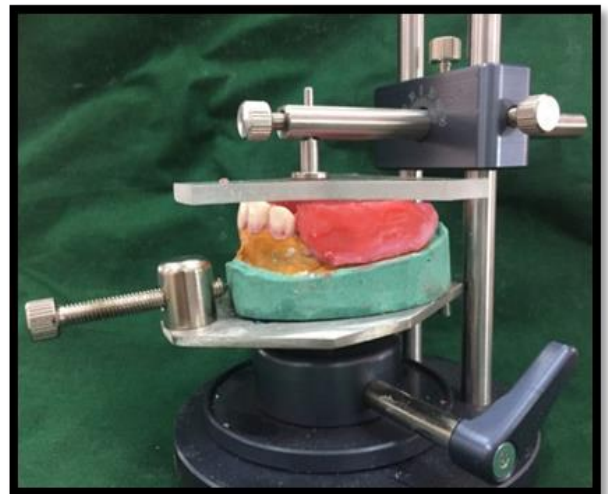


Fig 5: Occlusal Plane Analysis Using Parallelometer

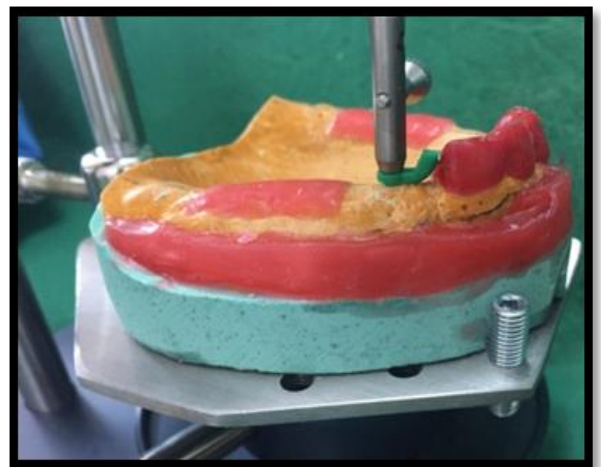


Fig 6: Placement Of Extracoronal Attachments Using Parallelometer

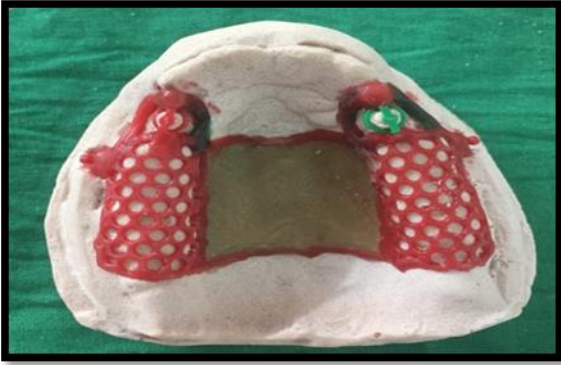


Fig 7: Maxillary Wax Pattern



Fig 8: Customized Mandibular Spring Guidance Appliance.



Fig 9: Maxillary Trial Denture.



Fig 10: Mandibular Trial Denture.



Fig 11: Insertion Of Maxillary Prosthesis.



Fig 12: Insertion of Mandibular Prosthesis.



Fig 13: Final Prosthesis Insitu Showing Correction of Deviation of Mandible.



Fig 14: Extra Oral View Showing Mandibular Deviation correction with spring guidance appliance

soldered to a metal Housing which exerts a pressure of 200-300gms. The metal housing with nylon cap snaps onto the maxillary anterior swivel & hooked onto the mandibular swivel position posteriorly (Fig. 8).

- Two rows of non-anatomic teeth arrangement was done in the right side of maxillary arch & conventional teeth arrangement was done in the mandible. Esthetics, phonetics and function were verified during try-in (Fig. 9, 10) and denture was finished and polished in conventional manner (Fig. 11, 12).
- Porcelain fused metal crowns for upper right and left centrals & laterals with extracoronal attachments was then cemented using luting cement & insertion of upper & lower prosthesis along with customized spring guidance appliance (Fig. 13, 14).

DISCUSSION

Rehabilitation of a edentulous discontinuity defect of the mandible is a difficult task when compared to the rehabilitation of a reconstructed jaw. Discontinuity defects post surgically results in deviation of the remaining mandibular segment toward the defective side and rotation of the mandibular occlusal plane inferiorly. Rotation is caused by the pull of the suprahyoid musculature on the residual mandibular fragment causing inferior

displacement and rotation around the fulcrum of the remaining condyle. Gravity, loss of continuity, loss of anchorage, loss of temporomandibular ligaments allows the mandible to fall vertically away from the normal position. The frontal plane rotation occurs due to loss of proprioceptive sense of occlusion, which leads to un-coordinated and less precise movement of the mandible⁷. Also, because of the absence of attachment of the muscles of mastication on the defective side, there is significant rotation of the mandible upon forceful closure. When the force of closure increases, the remaining mandible actually rotates through the frontal plane.

A Customized spring guiding prosthesis was attempted in this patient with discontinuity defect of mandible. Mastication was the primary concern of the patient. The patient had a facial asymmetry and was not concerned with esthetics. The patient had reported in a partially edentulous state in maxilla & completely edentulous mandible with discontinuity defect on leftside. Due to presence of incisors in maxilla & with good residual alveolar ridge height, the fixed removable prosthesis was planned in maxilla with predictable favorable prognosis. Conventional complete denture with metal denture base customized spring guiding prosthesis was planned; therefore, functionally customized spring guiding prosthesis was fabricated to rectify mandibular deviation.

Out of different swivel positions⁸, the most appropriate swivel position & length of the spring is functionally evaluated. Swivel position was concluded as anterior to the second premolar region in the maxillary & posterior to 1st molar region in the mandibular arches.

The described procedure does not require an additional appointment, as the spring guiding appliance is recorded during the tentative jaw relations stage. The procedure demands patients cooperation while recording the path of deviation. Customized spring guiding prosthesis precisely directed the deviating residual mandibular segment in centric occlusion and provided a psychological comfort to the patient during various functional movements. The primary need of mastication was satisfied, and an improvement in the speech was

also observed that was appreciated by the patient as well.

CONCLUSION

The philosophical approach to the treatment and rehabilitation of edentulous patients with resected mandibles is not in concentrating on what has been sacrificed in the eradication of the disease, but rather in taking full advantage of the remaining structures. Customising the swivels position & use of the resilient springs like wrought wire is more important in the success of mandibular guidance therapy appliance.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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