Journal of Craniomaxillofacial Research

Vol. 2, No. (3-4)

# Fabrication of cast metal guidance flange prosthesis for a patient with segmental mandibulectomy: A clinical report

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**ARTICLE INFO**

*Article Type:*
**Case Report**

*Received:* 16 May 2014
*Revised:* 26 Jul 2014
*Accepted:* 7 Aug 2014

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**ABSTRACT**

**Introduction:** Mandibular resection usually results in altered mandibular movements, disfigurement, and difficulty in swallowing, impaired speech/articulation and deviation of the mandible toward the resected site. To overcome this impairment, numerous prosthetic methods, such as maxillomandibular fixation, implant supported prosthesis, removable mandibular guide flange prosthesis, and palatal based guidance restoration have been employed to reduce or minimize deviation and to improve function. However, the management of these mandibular resected patients is difficult.

**Case Report:** This article tries to describe step by step prosthetic management of a patient, who has suffered from mandibular resection.

**Conclusion:** This treatment modality seems to be the treatment of choice. In our patient, the adequate intercuspal position was obtained but due to compromised tongue mobility, the guide flange prosthesis, like other treatment options could not improve patient's mastication ideally.

**Keywords:** Guide Flange Prosthesis, Segmental Mandibulectomy, Squamous Cell Carcinoma

## Introduction

Loss of continuity of the mandible due to any reason (e.g., cancer or trauma destructs the equilibrium of the lower face and results in decreased mandibular function due to the deviation of the residual segment toward the surgery site) [1]. The span of mandibular resection and loss of its continuity decreases the masticatory function [2]. The sooner the mandibular guidance therapy is fabricated, the higher the chance of successful definitive occlusal relationship [1]. Postponing the fabrication of mandibular guidance therapy, due to postsurgical complications such as severe tissue loss, tightly-closed wounds, radical neck dissection, necrosis of the borders or the flap, and radiation therapy, may lead to difficulty in achieving normal maxilla-mandibular relationships. Different prosthetic appliances such as mandibular-based guidance restorations, intermaxillary fixation, and palatal based guidance restorations will decrease mandibular deviation [1]. Various treatment options are available including the following:

1. Intermaxillary fixation
2. Vacuum formed PVC (Polyvinyl siloxane) splints
3. Mandibular guidance prosthetics
4. Maxillary inclined plane prosthesis
5. Positioning prosthesis with palatal flange
6. Mandibular lateral guide flange prosthesis
7. Acrylic splint herbst
8. A widened maxillary occlusal table [3].

## Case Report

A 56-year-old white female with the chief complaint of a lesion in the left mandibular buccal vestibule was referred to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Tehran University of Medical Sciences, Tehran, Iran. The patient was referred to Dr. Shariati Hospital for incisional biopsy of the ulcer (Figure 1a and b). The lesion was diagnosed as squamous cell carcinoma which had

invaded the ramous and condyle of the mandible. Hemi-mandibulectomy, including left condyle, ramus, and angle of the mandible was performed.

The patient was referred to the Department of Prosthodontics of Tehran University of Medical Sciences. The patient experienced deviation of her mandible to the defective side, resulting in difficulty in mastication and speech. The patient was evaluated for the fabrication of guide flange prosthesis.

Primary impression with stock tray using irreversible hydrocolloid, alginate (Kromopanidrocolloide; Lascod SpA, Firenze, Italy) was made from the maxillary and mandibular arches. Then, customized trays were made for both arches, and the mandibular tray was border molded with compound (Impression Compound; Kerr Italia SpA, Salerno, Italy). The definitive impression was made by C.Silicon (light body spidex, colten) for each arch. Definitive casts were poured with Type 3 dental stone and a record base was made for the mandible. Occlusal records were made while a 3 mm gap was restored between the maxillary and mandibular first molars, so the incline of the guide flange could be determined. The record base and the casts were mounted on a semi-adjustable articulator (dentatus articulator) and the mandibular partial framework with the guide flange was waxed up. Also for the maxillary arch a framework for a partial denture was waxed up for achieving cross arch stability (Figure 2a and b). Then, the maxillary and mandibular frameworks were cast with Cr-Co (CoCr Model Casting Alloy; Degussa Dental, Hanau, Germany) (Figure 3a and b).

a

b

***Figure 1.*** (a and b) Patient before treatment

***Figure 2.*** (a and b) Frame work wax-up

***Figure 3.*** (a and b) Frame work cast

The frameworks were finished, evaluated, and adjusted intraorally. The guidance flanges were evaluated for manipulating the mandible into centric occlusion, and this relation was recorded using the compound (Impression Compound; Kerr Italia SpA, Salerno, Italy) (Figure 4). Then, the teeth were arranged for the affected area and were evaluated intraorally. Completed wax patterns were replaced with heat-polymerized acrylic (Meliodent; Heraeus Kulzer, Armonk, NY) following conventional laboratory procedures. The acrylic resin on the meshes of both frameworks was polymerized, finished, and polished.

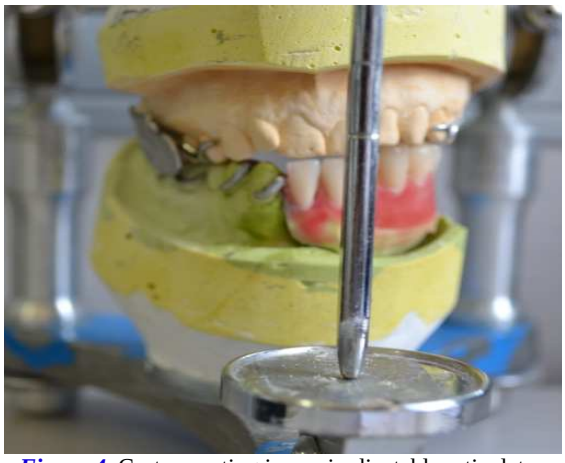

***Figure 4.*** Cast mounting in semi-adjustable articulator

The frameworks were evaluated intraorally, and the mandible was guided to centric occlusion. The prostheses were polished again and delivered to the patient, and adequate instructions were given to her (Figure 5).

***Figure 5.*** Patient after prosthesis delivery

## Discussion

One of the most important phases in cancer treatment planning is the rehabilitation of the patient, considering function and esthetics which should be ideally noticed by a trained team of prosthodontics-surgeon before performing any surgery. For many patients, mandibular resection is an inevitable surgical choice for eliminating the tumor which may result in facial asymmetry, malocclusion, and functional impairment [1]. The remaining segment of the mandible deviates medially and superiorly. This deviation may differ greatly, depending on the site and extension of the resection, the amount of damage to the soft tissue, the number, and location of any remaining natural teeth. Guide flange prosthesis is a corrective device which may reduce the clinical complications and restore the mandible functions to some extent [2].

Various treatment options are available which are summarized in table 1.

***Table 1.*** Various treatment options available for unilateral mandibulectomy [3]

| Prosthetic treatment | Advantages | Disadvantages |
|---|---|---|
| Inter maxillary fixation | Maintain proper mandibular position | Fixation of the mandible is required |
| | Permits healing with tooth in occlusion | Immediate postoperative time zone |
| Vacuum formed PVC splints | Easy to make intermediate prosthetic | Low shelf time |
| | Comfortable for the patient to wear | Replacement of the prosthetic is required |
| Mandibular guidance prosthetics | Retains neuromuscular system in patients who cannot undergo reconstruction surgery | |
| Positioning prosthetic with palatal flange | Minimize nocturnal deviation of the mandible | Interference with tongue movement |
| | Intraoral formation of the acrylic flange | |
| Mandibular lateral guide flange | Maintain mediolateral position of mandible for adequate time | |
| Acrylic splint herbst | Prevention of mandibular deviation | Rather expensive choice |
| | Allows opening and closing movement during mastication | |
| Widened maxillary occlusal table | Suitable choice for patients with no other option | |

PVC: Polyvinyl siloxane

Mandibular lateral guide flange prosthesis may be a suitable treatment modality for patients who can obtain the proper mediolateral position of the mandible, but they cannot remain in this position long enough during mastication. The guide flange is connected to a cast removable partial denture of the mandible. Heavy wire loop may be used for the guidance flange or it can be molded in wax at the try-in session and processed in clear acrylic resin. The guide flange is spanned into the mucobuccal fold of the maxilla in an oblique and superior position on the nonsurgical side without any impaction on the mucobuccal fold. This extension serves as a platform against posterior teeth of the maxilla and could mechanically retain the remaining mandible in a proper position for adequate vertical chewing stroke and force application with the least lateral movement by reducing the extent of mandibular deviation [4, 5]. The guidance prostheses including both maxillary and mandibular cast removable partial dentures with some involvement with each other have been proposed different literatures [5]. Sahin et al. [6] have described the construction of cast metal guidance flange prostheses. They fabricated maxillary and mandibular removable partial dentures which had buccal guidance flanges on the non-surgical side that engage with each other during function. Supporting flanges are also made on the surgical side of both frameworks to control the deviation of the mandible and coordinate movements during mastication [7].

Chalian et al. [8] have described a similar method for fabrication of guide flange prosthesis. The frameworks of this prosthesis are designed to be in contact with each other during the function that results in the limitation of mandibular deviation. A mandibular inverted U-shaped flange slides against a maxillary horizontal bar on the non-surgical side. Only vertical movements could be performed during mastication [9, 10].

The success key of these guidance appliances depends on the beginning of the treatment as soon as possible, extension and severity of the surgical defect, and patient's cooperation. Mandibular guidance therapy initiates when the immediate postsurgical complications have subsided which is usually within 2-3 weeks after surgery. This therapy is more successful in patients who have lost only bony structures, and the remaining soft tissue is intact with minimal involvement of the tongue and floor of the mouth. The presence of patient's natural teeth in the maxillary and mandibular arches is substantial for adequate guidance and the reprogramming of the movements of the mandible. As the patient in this clinical report retained all her teeth, except those on the defect site, she had better proprioceptive sense and was able to obtain the functional position after the insertion of the prosthesis [3].

The chief goal of this treatment is to re-educate the mandibular muscles to regain an acceptable occlusal relationship (physiotherapeutic function), so the patient can control the opening and closing of her mouth and repeat these movements. This advanced prosthetic rehabilitation consists of removable partial dentures with artificial teeth which can guide the mandible to a more stable occlusion. For optimal results, an exercise program should be started 2 weeks after the surgery; in the maximum opening, an extreme force should be applied to the non-affected side of the mandible by hands. In patients with mandibular discontinuity, this exercise program is essential for the reduction of scar contracture, trismus, and improving the maxilla-mandibular relationship.

The patient in this clinical report had a discontinuity in the mandible and had retained most of her natural teeth in both arches but unfortunately, was not referred immediately after surgery. However, considering the mentioned advantages of guide flange prosthesis, this treatment modality seems to be the treatment of choice. In our patient, adequate intercuspal position was obtained but due to compromised tongue mobility, the guide flange prosthesis, like other treatment options could not improve patient's mastication ideally.

## Acknowledgement

We would like to show our gratitude to the Craniomaxillofacial Research Center (CMFRC) for their comments on an earlier version of this manuscript.

*Conflict of Interest: 'None declared'.*

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***Please cite this paper as:***
Akhoondinasab F, Mir-Mohammad-Rezaei S, Gerami Panah F Mohiti A ,Bahrami M. Fabrication of castmetal guidance flange prosthesis for a patient with segmental mandibulectom -y: A clinical report. J Craniomax Res 2015; 2(3-4):142-146