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Research Article

Mucostatic Impression: A Useful Alternative Inpartially Dentate Free-Fibular Reconstructed Cases

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Abstract

In patients with free-fibular osseous reconstruction following segmental mandibulectomy, altered intra-oral anatomy leads to unusual soft tissue configuration and altered bony support. Rehabilitation of such patients is a challenging task even for the experienced prosthodontist. There are several treatment modalities advocated for such patients. A removable partial denture may be the treatment of choice. Unless managed appropriately, soft tissue contours with varied displace ability especially in reconstructed region adversely affect the support, retention and stability of such removable prosthesis. Various techniques have been proposed to record a desirable impression. The purpose of this article is to describe a novel, convenient and accurate technique of making an impression employing the mucostatic principle.

INTRODUCTION

The functional outcome of a conventional removable prosthesis is primarily dependent on the support, stability and retention of the prosthesis. A master impression made for such prosthesis should record the entire functional denture-bearing area to satisfy the cardinal principles of prosthesis success. However, variability in soft and hard tissue configuration of denture-bearing areas leads to difficulties in making an impression and compromise prosthetic success.

Patients who have undergone anterior segmental mandibulectomy with free flap reconstruction pose a challenge to the experienced prosthodontist. The edentulous segment usually displays unusual soft tissue configurations and compromised bone support incapable of withstanding occlusal forces.

Hence it is imperative for clinicians to recognize and record aberrant soft tissue contours accurately in order to deliver a stable functional prosthesis. This case report is a documentation of a novel and accurate mucostatic technique of recording the tissues at rest in post-mandibulectomy reconstructed case.

CASE PRESENTATION

A 63 year old gentleman with no comorbities reported with a desire to get missing lower anterior teeth replaced.

History of presenting illness

The patient first reported with a chronic ulcero-proliferaive lesion on lower labial mucosa of 3 months duration. Comprehensive clinical and histopathological examination confirmed the diagnosis as cT3N0M0 verrucous carcinoma. Middle $1/3_{rd}$ segmental mandibulectomy along with modified neck dissection followed by free-fibular osseocutaneous flap reconstruction was done.

Intra-oral examination

There was thick displaceable yet taut soft tissue evident in the anterior reconstructed region. Both labial and lingual sulci were obliterated in the region of skin paddle with associated incompetency of lips. Left second and third molars and right first molar were present in the mandibular arch. Occlusal surfaces of maxillary and mandibular teeth showed extensive attrition with resultant loss of vertical dimension (Figure 1).

Oral rehabilitation plan

Implant retained dental rehabilitation was not possible due to obliteration of vestibules and incompetent lips. Conventional cast partial prosthesis was planned. Varied soft tissue contours were recorded with a new technique of making a mucostatic impression.

Upper and lower preliminary impressions were made using irreversible hydrocolloid impression material (Zelgan Plus, Dentsply™). Diagnostic casts were poured in type III dental stone (Ultrastone, Kalabhai™). Mouth preparation was not advisable as supporting teeth already showed attrition. Subsequently, a

Figure 1 Pre-operative mandibular occlusal view showing obliterated labial vestibule with a thick, partially reconstructed lip.

double thickness wax spacer was made for two posterior stops bilaterally i.e left second and third molars and right first molar. Tissue stops were cut so as to aid in orienting the tray. Two custom sectional trays were fabricated in self-cure acrylic resin (DPI RR Cold cure resin, Bombay Burmah Trading Corporation, Limited™) (Figure 2). The same were verified intra-orally for fit and were then connected by gently adapting self-cure resin over the reconstructed tissues (Figure 3). Care should be taken not to displace the tissues while making the custom tray in the mouth. Once partially set, it was removed from the mouth and immersed in hot water. The custom tray was then relieved sufficiently in the areas of soft tissue contact and wax spacer was removed posteriorly to accommodate the impression material. Light body polyvinyl siloxane (Aquasil LV impression paste, DENTSPLY™) was impression material of choice. Final impression was made in the custom tray by stabilizing the tray by finger pressure posteriorly and the patient was asked to perform functional movements of tongue and lips. The impression thus obtained was carefully observed for any voids or tray exposure (Figure 4). Subsequently it was poured in type IV die stoneand cast partial prosthesis was designed and delivered adhering to conventional prosthetic principles (Figures 5-8).

DISCUSSION

Segmental mandibulectomy followed by free-fibular osseocutaneous flap is a definitive modality of treatment in patients affected by locally invasive carcinoma of lower alveolus [1]. The post-surgical clinical situation is often characterized by highly displaceable skin paddle substituting firm attached gingiva overlying deficient bone. It is often further complicated by obliteration of both labial and lingual sulci in the reconstructed region. The presence of displaceable denture-bearing tissues often presents a difficulty when fabricating any removable prosthesis [2]. Unless managed appropriately, such bands of scar tissue are easily irritated by the prosthesis and can cause its frequent displacement [3].

Recent advancements in implant dentistry have helped clinicians in rehabilitating head and neck cancer patients with predictable success rate. However, such procedures should be carefully planned and executed as they are affected by a variety of confounding factors [4].

Removable prosthesis may be a preferred alternative for head and neck cancer patients who are not suitable to receive dental implants. When indicated, removable partial denture frameworks should follow basic principles for cast framework design related to support stability, retention, reciprocation and minor and major connectors [5].

In the presented case, a thick, highly displaceable yet taut skin paddle was seen replacing the edentulous alveolar mucosa anteriorly extending up to the molars bilaterally. There was

Figure 2 Bilateral custom sectional trays fabricated in self-cure acrylic resin.

Figure 3 Intra-oral tray fabrication using mucostatic technique.

Figure 4 Master impression made in light-body addition polysilicone material.

Figure 5 Intra-oral cast metal framework try-in.

Figure 6 a) Wax try-in on the master cast. b) Intra-oral wax try-in of cast partial framework.

Figure 7 Intra-oral frontal view of final prosthesis.

Figure 8 Extra-oral frontal view of final prosthesis.

absence of lower lip height and complete obliteration of both labial and lingual sulci with continuity between the reconstructed lip and floor of mouth anteriorly. There was also loss of vertical dimension with severe attrition of buccal and occlusal surfaces of right first molar.

The soft tissues along the inner surface of lower lip displayed rebound effect on the seating of impression tray and were anticipated to have the same ill-effect on the final prosthesis. Also, obliteration of anterior sulci meant that accurate capture of buccal and posterior lingual functional contours was imperative for stabilization of the prosthesis.

Thus a mucostatic impression of the reconstructed region along with functional recording of the borders was carried out. The primary advantage of molding self-sure resin intra-orally is that it can be accurately and gently adapted over the UN displaced denture-bearing tissues at rest. Care should be taken so as not to put finger pressure during intra oral manipulation of self-cure resin. The use of light body polyvinyl siloxane in custom tray fabricated intra-orally by pressure less technique will aid in maximal extension of denture-bearing area coupled with functionally recorded borders. Moreover, resultant denture will be more closely adapted over the underlying tissues and hence will be more retentive.

Savita and Srinivas reported use of specially designed custom tray in marginal mandibulectomy patients to make a final impression with two different impression materials. They advocated using heavy consistency condensation silicone to record the displaceable residual ridge [5].

Others have stated use of altered cast technique to record adequately extended borders [6,7] and neutral zone philosophy to maximize denture stability to counteract peri-oral dislodging forces [3].

The presented case report is a documentation of a novel technique which is extremely helpful in faithfully recording aberrant displaceable tissues around a free-fibular grafted mandible. The method of carefully molding the custom tray intra-orally accommodates the movement of the tissues and records the tissues within their physiological limit. Though it relies on the age-old principle of impression making using a custom tray, it provides clinicians with a worthy technique of achieving an exact final result.

We would also like to point out that we fabricated a cast framework for the patient utilizing conventional selective-pressure impression technique. Primary impression was made with an irreversible hydrocolloid material followed fabrication of a custom tray on the primary cast. Subsequently, a wash impression was made in poly-vinyl silloxane material. However, the fit of the cast framework was poor. It was not adapting to the soft tissues as they were displaced during impression making even though we were careful not to displace them too much.

Hence, the presented technique was proposed and it definitely helped in achieving an intimate fit of the final cast partial prosthesis.

This case report is an endeavor in documenting relevant, scientifically driven data which will help fellow clinicians in delivering high quality clinical care to their patients

CONCLUSION

The presented technique of recording the soft tissues of the reconstructed mandible is useful, accurate and convenient.This assists in fabrication of a stable denture to withstand the occlusal forces of mastication on altered denture-bearing mucosa.

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