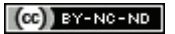


Definitive Impression Technique for Maxillary Defects in Patients with Reduced Mouth Opening- A Novel Approach

VINAY DUTTA¹, ARUN KHALIKAR², SATTYAM WANKHEDE³, SURYAKANT DEOGADE⁴

ABSTRACT

Palatal defects are categorised as a multicausal pathology, with its aetiology ranging from trauma and microbial infections to oncogenic origin. This by and large leads to surgical defects of the palatal tissues which warrants immediate treatment. Due to this, the patient faces a plethora of challenges, namely psychological, functional and social. These defects can be catered to by means of surgical closure or prosthetic therapy. Thereby, this uplifts the patient's self-confidence and performance of day-to-day activities. However, surgical closure by free flaps is not feasible in all cases due to the dearth of favourable tissues or prevalent co-morbid conditions. So, this makes fabrication of a palatal obturator the treatment of choice to rehabilitate these cases. An obturator is a maxillofacial prosthesis which blocks the oro-nasal communication and thus ameliorates the mastication, phonation and aesthetic profile of the affected subject. For fabricating well-fitting obturator prosthesis, making an accurate impression with appropriate spatial orientation of the orofacial structures is imperative. Many obstacles come in the way of a prosthodontist while making impression in such cases due to the complexity of the supporting stomatognathic system in terms of compressibility and multitude of geometric planes of the tissues. These patients present with restricted mouth opening due to scarring of tissues or radiation therapy. In this article, the authors describes a technique which predominantly addresses most of the problems related to the impression making procedures in patients treated with maxillectomy experiencing limited mouth opening.

Keywords: Maxillectomy, Obturator, Trismus

INTRODUCTION

Any palatal defect, be it congenital, neoplastic or surgically induced is both physiologically and psychologically challenging to the patient. Normal routine activities perhaps mastication, deglutition and speech are compromised. This leads to social and psychological downfall of the patient. Hence, rehabilitation of these defects is mandatory which renders the individual capable to perform his daily activities [1]. Surgical restoration is a viable option but is controversial and complex due to the compounded intraoral and facial anatomical orientation [2,3]. Surgical closure of these defects gives good results and lesser morbidity [4]. However, this is not practicable at times due to the vast extent of the defect or any other comorbidities or complications secondary to radiotherapy, making palatal obturator the only option which restores the normal anatomy and function [5,6].

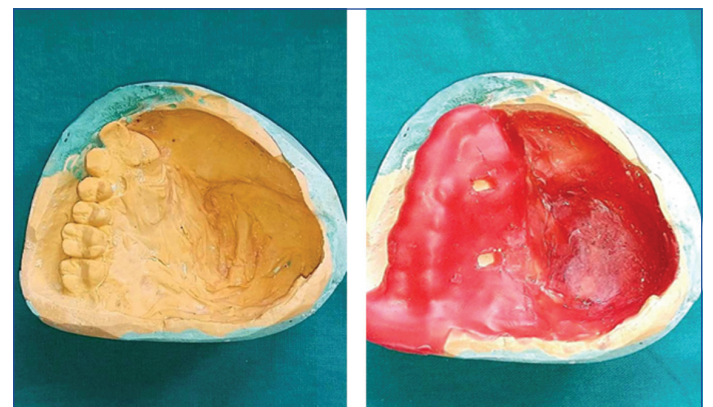
The key step for success in maxillofacial cases is the accurate impression making which will aid in fabrication of a well-fitting prosthesis with no undue stress on the surrounding musculature and tissues [7]. This can be achieved by the conventional and digital methodologies. Digital methodologies are fast-growing aids in prosthodontics and is promising in terms of accuracy and ease [8,9]. Digital approach may not be feasible in all cases where the defect is not accessible/limited mouth opening or when affordability is an issue [10].

Trismus among maxillectomy operated patients is common due to either scarring of the tissues or irradiation therapy [11]. This does not permit for a surgical intervention to correct the limited mouth opening. Thus, forcing the prosthodontist to compromise on the extensions into the defect. For which a sectional tray can be used to make an impression in parts and reassemble it extraorally. This is a cumbersome procedure and is bound to have inaccuracies due to improper alignment of the trays [12]. The following article

describes a novel technique of making impression using a single custom tray.

IMPRESSION TECHNIQUE

- Preliminary impression was made using a suitable perforated stock tray with irreversible hydrocolloid impression material (ColteneColtoprint Alginate Powder, Alginate Impression Material, Coltene-whaledent) and cast was poured using die stone (Kalabhai Ultra Rock Die Stone, kalabhai) [Table/Fig-1].
- Modelling wax (MDM Link Modelling Wax, wax for modelling dentures, Mdm) was adapted all over the normal side of the palate and unwanted undercuts were blocked in the defect (to provide space for the final recording impression material) [Table/Fig-2].



[Table/Fig-1]: Preliminary impression poured using die stone.

[Table/Fig-2]: Adaptation of wax spacer and undercuts blocked on the preliminary cast (note the tissue stops)

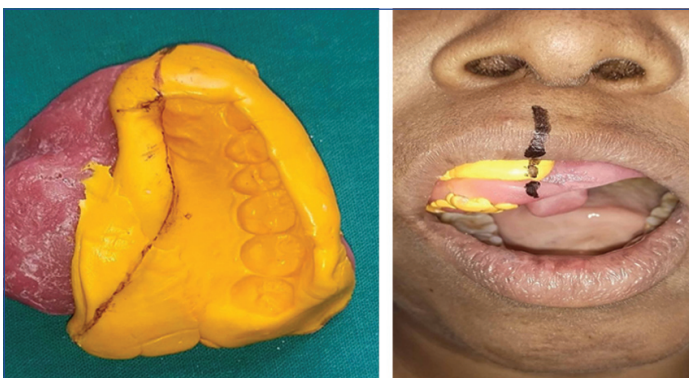
- Tissue stops were carved out on the normal part of the palate (to ensure proper thickness of impression material).

- Custom tray was fabricated using auto-polymerising resin (Dpi Rr Cold Cure. Denture Base Material, Dpi) [Table/Fig-3].
- Holes were incorporated on the normal counterpart of the palate (to facilitate easy escape of excess material and also to enhance mechanical bonding of the impression material to the custom tray).
- The tray was tried in the patient's mouth after all the wax was removed.
- Tray adhesive (Coltene Tray Adhesive, Tray Adhesive, Coltene-whaledent) was applied to the perforated part of the impression tray as per the manufacturer's guidelines.
- The normal part of the palate was demarcated using an indelible pencil [Table/Fig-4].



[Table/Fig-3]: Customised tray; [Table/Fig-4]: Demarcating the normal counterpart of the palate. (Images from left to right)

- An assistant was made to mix addition silicon impression material, heavy body (Zhermack Elite P and P, Putty, Addition Silicone Impression Material, zhermack) and the tray recording the normal counterpart of the palate was loaded.
- Tray was placed in the patient's mouth and necessary movements were made. The markings got transferred to the impression [Table/Fig-5].
- Any impression material extending to the defect part was cut based on the markings and discarded. Also, excess impression material along the vestibule was scraped off to reduce the bulk of the tray.
- The interdental areas recorded along the teeth containing segment was cut-off to facilitate easy placement and removal at later stages of impression making.
- Tray with addition silicon on one side was tried in the patient's mouth, a mark was made on the patient's face and then on the putty impression (acts as a repositioning guide) [Table/Fig-6].



[Table/Fig-5]: Addition silicon impression of the normal counterpart (note the transfer of the demarcation marking); [Table/Fig-6]: Marking on patient's face and custom tray (acts as repositioning guide).

- The defective part was moulded using green stick compound (Dpi Green Stick, Tracing Sticks, Dpi).
- It was ensured that no green stick compound extended over the addition silicon impression area.

- At the end, a final wash impression should be made all over using addition silicon impression material, light body (Zhermack Elite P and P, light body cartridge material, Addition Silicone Impression Material, zhermack) [Table/Fig-7]. However, in this particular case, the medial wall of the defect had undercuts, which if recorded would create irritation to the respiratory epithelium [13] during placement and removal of the prosthesis. Since light body addition silicon impression is less viscous it would flow into the undercut. To avoid this, only green stick impression compound was used sequentially to develop the bulb portion of the defect.
- However, in other cases where such problems are not encountered, the impression of the entire defect and the normal counterpart can be made with light body addition silicon impression material by a single wash.
- Cast was poured using die stone (Kalabhai Ultra Rock Die Stone, kalabhai) [Table/Fig-8].



[Table/Fig-7]: Moulding of the defect using green stick compound and final light body wash; [Table/Fig-8]: Definitive cast. (Note the finer details along with record of the distal most teeth). (Images from left to right)

DISCUSSION

For an obturator to function adequately, the soft tissues should be recorded functionally as per the compressibility and resistance of the tissues and the teeth anatomically. Spatial orientation of the hard and soft tissues becomes a prime factor in determining the success of a prosthesis. The vertical extension or bulb portion of the obturator plays a major role in rendering the prosthesis functionally and vocationally effective [14]. It was found that in contrast to high bulb obturators, low bulb obturators produced a hypernasal speech among patient [15]. So, it can be inferred that the height of the bulb should not be compromised to facilitate easy impression making in patients with trismus.

The above-mentioned technique majorly addresses the issues pertaining to impression making among individuals with limited mouth opening. Hence, it is indicated in patients with trismus and severe gag reflex. It can also be followed as a definitive impression procedure in individuals with normal mouth opening.

This impression technique provides for a better record of tissues as per their respective histological makeup. The patient's comfort will not be compromised as only a single tray is used. It mitigates the drawback of disorientation of the two trays as used in conventional or sectional technique resulting in minimal errors. Putty index developed on the normal counterpart contributes to superoinferior, mesiodistal and anteroposterior orientation of the tray and thus reduces the rotation of the tray. The marking over the patient's face acts as a repositioning guide for the sequential impression making procedures. The demerit of this technique is that, it is time consuming and necessitates the use of a wide range of materials.

Different authors have come up with several other new techniques for recording palatal defects which can be used based on the need and convenience of the clinician [Table/Fig-9] [10,16-19].

Author and year	Place of the study	Technique
Hou YZ et al., 2012 [16]	Peking University School and Hospital of Stomatology, Beijing, China	Prosthesis was fabricated according to the opposing lower arch and the intaglio surface (defect region) was moulded functionally under pressure and uniform occlusal contact was achieved with the opposing arch.
Krishna Ch et al., 2013 [17]	Sri Sai College of Dental Surgery, Vikarabad, India	Propagated altered cast technique with the impression made using cast metal framework fabricated over the primary impression.
Iqbal Z et al., 2015 [18]	Pakistan	A mass of impression compound rolled in a thread was moulded in the defect finer details were recorded with tissue conditioner. Markings were made on the intraoral surface of that and the same was impressed with irreversible hydrocolloid impression tray. Extrorally the two parts were assembled.
Londono J et al., 2015 [10]	Faculty Practice Clinic of the College of Dental Medicine, Georgia Regents University, Georgia, United States of America	Digital intraoral scanner was used to make an impression of the defect.
Aponte-Wesson R et al., 2019 [19]	MD Anderson Cancer Centre (MDACC), Houston, Texas, United States of America	Digital manipulation of tissue conditioner through the vents made in the surgical obturator to record the undercuts in the defect.

[Table/Fig-9]: Several other new techniques for recording palatal defects [10,16-19].

CONCLUSION(S)

This technique emphasised on the three-dimensional record of the defect by a simple method thereby minimising the errors and enhancing the success of prosthodontic rehabilitation in palatal defects. A proper knowledge of the various impression materials and an amalgamation with the right techniques would result in accurate impressions. Modifications in the procedure are necessary as per the patient's considerations and comfort.

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