

Evaluative Comparison of the Ability of Three Border Molding Materials in Recording the Functional Lateral Throat form in Completely Edentulous Mandibular Arches: An In Vivo Study

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ABSTRACT

Background: Lateral throat form is an area situated at the distal end of the alveolo lingual sulcus. The extension of a denture into this area can resist horizontal forces, increase border sealing, act as a displacing lever on the denture border and contribute to neuromuscular control. Purpose of this study is to compare the depth of the lateral throat form in functional states using three materials i.e. low fusing compound, putty, and tissue conditioner.

Materials and methods: A customized instrument were used to record the actual depth of lateral throat form intraorally. Three different materials low fusing impression compound, soft liner and putty were used to record the bottom of lateral throat form in edentulous patients and depth of lateral throat form on border moulded trays were compared to the actual depth of lateral throat form intraorally.

Result: 50 % times soft liner gave the most exact result and 50% times low fusing compound gave under an extension of 2mm and 50% times putty gave under an expansion of 0.5 mm from the intraoral examination.

Conclusion: There are differences between the lateral throat form recorded intraorally and in the functional state. Out of three materials, the soft liner is the most accurate material to record lateral throat form followed by putty and low fusing impression compound.

Keywords: Functional states, lateral throat form, alveolingual sulcus, mylohyoid region.

INTRODUCTION

The distal portion of the alveolo-lingual sulcus is designated as the lateral throat. This area has a great influence on the mandibular complete denture fabrication, yet it is not properly recorded and noticed in most of the dentures^{1,2}. The denture extended to this area can resist horizontal forces, increase border sealing and contribute to

neuromuscular control¹. The length, as well as the thickness of the denture flange occupying this space, is dictated by the tonicity, activity and anatomy of the adjacent structures. It has been found that the length of lateral throat form was significantly more than that in the dentures⁴. This is mainly caused due to the inadequate extension of

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the impression tray. Only if the lateral throat form is measured accurately in the pre-impression stage, the lingual extension of the impression can be assessed accurately.

Neil has classified lateral throat form based on the distance between the floor of the mouth and the middle of the retromolar pad when the patients protrude the tongue one-fourth of an inch beyond the edge of the lower lips³. In order to bring accuracy, the customized designed device was used to measure the depth of lateral throat form. Depth of lateral throat form can be measured in the mouth, on the border moulded impression tray and on the finished denture. In the diagnosis phase, the patient is asked to make the tongue active by protruding it one-fourth of an inch beyond the edge of the lower lip. In the functional state i.e. after border moulding of the lateral throat form area, the length can be measured from two-thirds of the retromolar pad to the distal extension of the material. The same can be confirmed when the dentures are ready after processing^{2,3}.

Different studies have measured the length of the lateral throat form in the mouth and in the denture, by different methods^{6,7,9}. However, no study has been done, measuring the length in the functional state, i.e. after the border moulding. Thus, there is a need to measure the length of lateral throat form in functional form, different materials and techniques exist to record the functional and physiological border of the denture are low fusing impression compound, waxes, elastomeric materials, acrylic resin and tissue conditioner. Out of these, low fusing impression compound, putty and tissue conditioner were found to be superior in their purpose than others^{2,3,4}.

Purpose of the study

To compare the depth of the lateral throat form in functional states using three materials, i.e. low fusing compound, putty, and tissue conditioner.

MATERIAL AND METHOD

This study was conducted in the department of prosthodontics and Crown & Bridge Chhattisgarh Dental College and Research Institute, Sundra, Rajnandgaon. Twenty patients in the age group of 40-80 year were included in the study as per

inclusion and exclusion criteria. The customized instrument was used to measure lateral throat form.

Inclusion criteria's

1. Completely edentulous mandibular arches
 - a) Well-formed alveolar ridge including proper height and thickness.
 - b) No severe undercuts or bony exostosis.
 - c) Firm mucosa of moderate thickness.
 - d) No sign of inflammation, ulceration or hyperplasia.
2. Good neuromuscular coordination.
3. No history of systemic diseases.
4. Adequate mouth opening.

Exclusion criteria's

1. A congenital defect in the jaw.
2. Uncooperative patients.
3. Excessive ridge resorption.
4. Any surgical procedure of the jaws e.g. hemimandibulectomy, glossectomy

Methodology

Step1: Fabrication of instrument

The instrument was designed with a hollow "L" shaped plastic pipe with flexible stainless steel wire within it. This wire was freely movable inside the pipe and was extended on both sides of the L shaped tube. A scale was attached on the horizontal arm so that measurement can be made directly on the patient's mouth. Mouth mirror is used to retract the tongue from the area of interest. Extension on one side would engage in the depth of lateral throat form and on the other side it would move on a metal scale and give accurate result in millimetre. **(Fig no:1)**

Step 2: Determination of lateral throat form intraorally

A patient was instructed to sit in an upright position in the dental chair with head rested against the headrest. Patients were instructed to open their mouth and protrude their tongue so that it was ¼ inch ahead of the lower lip. Then the instrument was placed inside the patients mouths so that stopper of the instrument rested on the middle third of the retromolar pad ,due to functional movement of the tongue, the flexible wire was

pushed in the vertical arm. The length of wire coming out from the horizontal arm gave the depth of lateral throat form with the help of scale attached with the instrument. **(Fig no :2)**

Step 3: An impression making

1. Primary impressions:

After assessing lateral throat form clinically by finger method and verifying it with a customized instrument. Preliminary impressions were made by the medium fusing impression compound (DPI Pinnacle India), following the principles of clinical procedures given by Boucher.

2. Fabrication of custom trays:

After the primary cast was obtained, the mandibular cast was marked with three lines, i.e. sulcus depth, custom tray extension and spacer extension. Then the spacer wax adapted (Maarc spacer wax, Shiva products, India). After this, the custom tray was fabricated using auto polymerizing acrylic resin (DPI, RR, Mumbai, India) using the dough method.

3. Border moulding and measurements:

The mandibular custom tray extensions were trimmed 2mm short of the sulcus depth. The custom tray was checked in the patient's mouth; it was refined if needed. The sectional method was used

for border moulding and was done using three different material low fusing compound (DPI Pinnacle tracing stick, India), Putty (speedex), soft liner (GC Reline soft, India) of the mandible ridge. Only the lingual border portion was moulded. All three materials were used to record the depth of lateral throat form in each patient on both right and left side. **(Fig no:3)**

The patient was asked to protrude the tongue and wet the lower lip for moulding the anterior portion of the alveololingual sulcus- sublingual crescent region. Then the patient was asked to perform lateral movements with the tongue; the patient was asked to touch the tongue in both the left and right buccal vestibule region to mould the middle portion of alveololingual sulcus- mylohyoid region. Then the patient was asked to swallow and close the mandible slightly for moulding the distolingual extension of the alveololingual sulcus- retromylohyoid region. Once the material was set, then only it was removed from the patient's mouth. Then if any excess material was there, it was removed and checked in the patient's mouth.

Step 4: Extraoral measurements

After the moulding was done, measurements were made in the lateral throat form region extra orally, in the distolingual portion by the customized instrument. The material extension was measured. **(Fig no :4)**

RESULTS

Table 1: Depth of lateral throat form, obtained in the mouth, by low fusing compound, soft liner and putty materials.

Serial. No	Intral oral examination (mm)	Difference from intraoral oral examination (mm)		
		Low fusing compound	Soft liner	Putty
1	14	-2	-0.5	-1
2	14	-2	0	-0.5
3	14	-2	-0.5	-1
4	14	-2	-0.5	-1
5	12	-1	0	-0.5
6	12	-1	0	-0.5
7	13	-1.5	-1	-1
8	13	-1.5	-1	-1.5
9	11	-2	0	-1
10	12	-2	-0.5	-2
11	9	-1	0	-0.5
12	10	-1	-1	-1

13	11	-1	0	-0.5
14	11	-1	0	-0.5
15	12	-2	-1	-1
16	12	-2	-0.5	-1
17	11	-2	-0.5	-0.5
18	11	-2	0	-0.5
19	13	-0.5	0	-0.5
20	13	-0.5	0	-0.5
Mean	12.1			

Table 2: Frequency of difference of extension of material from the depth of lateral throat obtained intraorally.

Serial no.	Differences with intraoral examination(mm)	Frequency of differences		
		Low fusing compound	Soft liner	Putty
1.	0	0 times	10 times	0 times
2.	-0.5	2 times	6 times	10 times
3.	-1	6 times	4 times	8 times
4.	-1.5	2 times	0 times	1 times
5.	-2	10 times	0 times	1times

A Result Showing (1) The mean depth of lateral throat form measured intraorally was found to be 12.1mm. (2) 50 % times soft liner gave most exact result (3) 50% times low fusing compound gave underextension of 2mm from intraoral examination (4) 50% times putty material gave underextension of 0.5 mm from intraoral examination (5) No overextension in lateral throat form observed by any of three materials.

DISCUSSION

Most edentulous mandibular stock trays are short in length of the lateral throat form, and therefore, the study cast is short for the fabrication of the custom tray. There are few studies regarding the measuring of the lateral throat form in the mandibular denture⁶.

A study by Kluth et al. measured the lateral throat form by William's periodontal probe. However, it could measure only till 10mm and not more than that. Hence, it was not successful. This study did not report the measurements⁵. To rectify this error, K.V

et al, designed an instrument know as MCS gauge¹⁰. Patients were divided into Class.I, which had a mean value of 18mm and Class.II, with 16mm and Class.III, with 10mm.

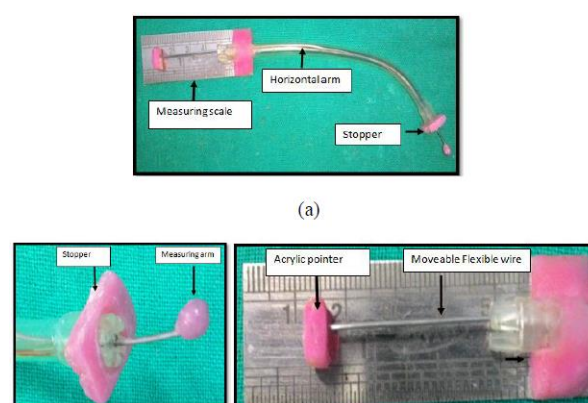


Fig 1: Showing customized instrument used to measured latreal throat form depth.

Huang et al., measured the lateral throat form by implant depth gauge, which measured till 16mm. This was measured by patient's functional

movements. The mean value obtained in this study was 10.0mm⁸.

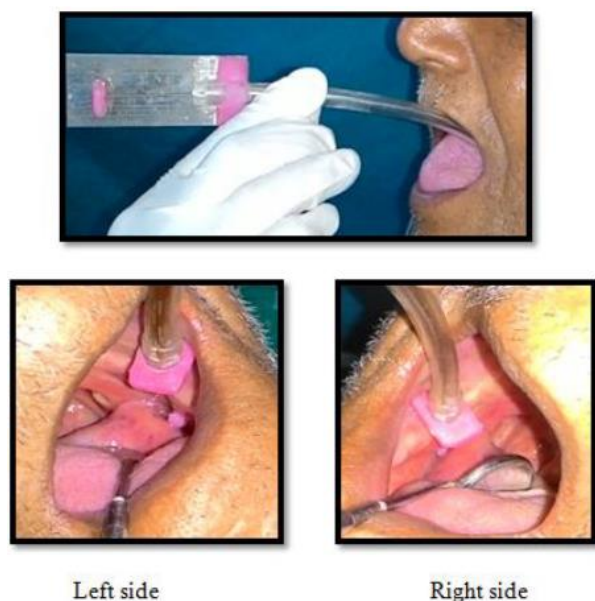


Fig 2: Showing determination of depth lateral throat form intraorally by using customized guage,measuring scale showing the depth in mm.

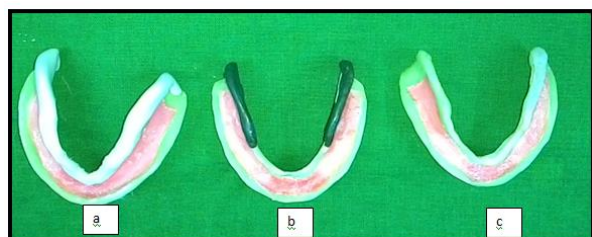


Fig 3: Showing border moulding with (a) condensation silicon(putty) (b) low fusing impression compound (c) soft tissue liner.



Fig 4: Showing extra oral recording of depth of lateral throat form by customized instrument.

Moreover, there is no specific tool available to measure this area .The customized tool described in this report gives us the exact value of lateral throat form depth which will be for making a good preliminary impression by selecting a proper stock tray .A good preliminary cast will ensure that the custom tray is fabricated with a proper extension which will be reflected in the final denture. This will help in better retention and stability in mandibular denture^{7,9}.

Based on our study, any of three (low fusing impression compound, putty, soft liner) materials can be used to record the lateral throat form.50 % times soft liner gave the most exact result. A soft liner is the best material to record lateral throat form out of 3 materials. The findings of this study suggest that the clinician should use an instrument to measure the depth of lateral throat form before fabricating the complete dentures. Then the measurement can be made with the corresponding portion of the custom tray to examine whether its extension is adequate. Based on the material of choice, we can adjust the tray e.g.- For low fusing compound, 1 mm under extension should be there.

Significance of our study is that as lateral throat form is the distal end of the alveololingual sulcus. This area had a great influence on the fabrication of complete dentures. The extension of the denture into this area can resist horizontal forces, increase border sealing, prevent the tongue from returning to its polished surface, act as a displacing lever on the denture border and contribute to neuromuscular control⁹. The length and thickness of the flange in the space are different depending on the tonicity, activity, and anatomic attachments of the adjacent structures^{1,3}. These data could be a useful guideline for clinicians to fabricate a proper custom tray for the majority of patients⁶. According to the results of our study, the depth of the lateral throat form in the patient's oral cavity was statistically longer than in their dentures.

The findings of our study suggest that the clinician should use an instrument to measure the depth of lateral throat form before fabricating the complete dentures. Then the measurement can be made with the corresponding portion of the custom tray to examine whether its extension is adequate.

CONCLUSIONS

- Within the limitation of the study, it can be concluded that there is a difference between the lateral throat form recorded in the patient's mouth and in the functional state.
- Out of three materials, the soft liner is the most accurate material to record lateral throat form followed by putty and low fusing impression compound.
- The instrument which was customized to measure lateral throat form depth gave consistent results when compared against the conventional method.
- Based on the material of choice, we can adjust the extension of custom tray e.g.- For low fusing compound, 1 mm under extension should be there.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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