



ORIGINAL RESEARCH ARTICLE

LATERAL THROAT FORM CLASSIFICATION USING A CUSTOMIZED GAUGE AND NEIL'S METHOD – A COMPARATIVE STUDY

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ABSTRACT

Introduction: Lateral throat form (LTF) is the critical area which has to be recorded properly for obtaining proper retention and stability in complete denture especially in geriatric patients with resorbed ridges. Popular method used for determining LTF is Neil's method which depends on the forces applied by the floor of mouth when the tongues protrude out. Since the perception of the forces differs among different operators, there are high chances of error in the classification. So, customized instrument was fabricated to prevent this inter-observer variation. The aim of the study was to compare the inter-observer accuracy between Neil's method of classification and classification done by customized gauge. **Methods and methodology:** Total 30 edentulous patients were taken. Two observers measured the LTF depth by customized tool and also by Neil's method. Cohen's kappa test was used to evaluate the agreement between two operators in two different classifications. **Result:** The agreement between the two observers was evaluated by means of Cohen's kappa value. There was good agreement between observers in proposed classification done by customized tool with kappa value 0.658 and fair inter-observer agreement with kappa value 0.0492. **Conclusion:** The method of measuring the depth of LTF with fabricated instrument was more accurate and reliable than Neil's method.

Key words: Lateral throat form, Neil's classification, Retention, Stability.

INTRODUCTION

Most of the patients visiting to the prosthodontic department for complete denture prosthesis are old aged with resorbed ridges and with high expectations. Because of the tongue and other muscular forces acting during various functions, such as chewing, talking, and swallowing, stability and retention in lower denture are hampered.¹ This problem is magnified due to less available mandibular denture bearing area (14cm²) than maxillary denture bearing area (24cm²).² The above constraints contribute towards the challenge in fabricating stable, retentive and satisfying lower denture. Recently, more retentive option like implant supported fixed and removable dentures are available. However, due to the medical conditions, costs and fear of surgery, not all of them prefer implant.

The method for increasing the stability and retention is including as much denture bearing

area as available. This can be done by incorporating the distal part of the alveolingual sulcus (LTF). It is an area located below and behind the retromolar region and is bounded anteriorly by mylohyoid muscles, laterally by retromolar pad, posterolaterally by superior constrictor muscles, posteromedially by the palatoglossus muscles, medially by tongue.³ Mandibular dentures are shallow in premylohyoid region, and turn towards the tongue in mylohyoid region and deep in the retromylohyoid region. This area provides larger vertical height for the denture which in turn increase the retention and horizontal support of the lower denture.⁴ The extension of the denture into this area can resist horizontal forces, increases border seal, prevents tongue from returning to denture's polished surface, act as a displacing lever on the denture border and contribute in the neuromuscular control mechanism.⁵ Beside these, glandular triangle (lower part of retromylohyoid

space) is the soft structure. So, if the margin of the lingual flange is continued posteriorly to the LTF area, flange is snugly fitted providing appreciable seal.⁶

Till date, Neil's classification is considered, the most appropriate for recording lateral throat form depth.⁴ As classified by Neil's, an index finger is placed in retromolar region and patient is asked to protrude the tongue 1/4th inch beyond the lower lip. If appreciable displacing force is felt in the finger, it is Class I, if the force felt is negligible it is considered as class III. If the force felt is in between, it is class II.⁷ It is a subjective method of classification and depends upon the tactile sensation experienced by the observer. This may result in inaccurate recording of depth of LTF which ultimately prevents proper extension of the lingual flange to the proper limit.

Due to these several drawbacks in Neil's method, many clinicians used different technique and fabricated new tools to record depth of LTF. In this study, a simple customized gauze was designed and fabricated to take the measurement of LTF and interobserver variation between the Neil's method and customized gauze was compared.

METHODS

This study was done in the department of Prosthodontics and Implantology in KIST medical college and hospital which included 30 edentulous patients between age 50-85 years from different places of Kathmandu. Patients with completely edentulous mandibular arch and in whom easy recognition of retromolar pad was possible were included in the study. Those patients who had undergone hemimandibulectomy or glossectomy, uncooperative patients, patient having congenital defect and patients with impaired neuromuscular coordination were excluded from the study.

Simple and economical instrument was designed. Hollow 'L' shaped pipe was fabricated with acrylic resin. Flexible wrought wire was inserted inside it. This wire was freely movable inside the acrylic pipe. Both ends were extended outside the pipe. One end had small acrylic ball that rest on the floor of the mouth. Extension on the other side would move on a scale attached to the acrylic pipe (Figure 1). The reading in this side gave the lateral throat form

depth. Stopper was fabricated on the vertical arm of the pipe so that it rests on the retro molar pad. Patients were instructed to keep the tongue 1/4th inch ahead of the lower lip (Figure 2). The tongue was retracted and the reading was taken. It was then classified according to the classification purposed by Kalavathy et al.⁴



Figure 1: Customized instrument used to measure LTF



Figure 2: During measuring of LTF

RESULTS

Table 1: LTF left and right side observer I

Classification range	LTF left Frequency (Percent)	LTF right Frequency (Percent)
0.5-1.4	18 (60 %)	15 (50 %)
1.5-2.4	12 (40 %)	15 (50 %)
Total	30 (100 %)	30 (100 %)

Table 2: LTF left and right side observer II.

Classification range	LTF left Frequency (Percent)	LTF right Frequency (Percent)
0.5-1.4	17 (56.7 %)	17 (56.7 %)
1.5-2.4	13 (43.3 %)	13 (43.3 %)
Total	30 (100 %)	30 (100 %)

Table 3: Neil’s LTF observerI and observerII

Neil’s classification	Observer I Frequency (Percent)	Observer II
Frequency (Percent)	17 (56.7 %)	17 (56.7 %)
Class I	3 (10 %)	5 (16.7 %)
Class II	15 (50 %)	18 (60 %)
Class III	12 (40 %)	7 (23.3 %)
Total	30 (100 %)	30 (100 %)

Table 4: Neil’s LTF observer I, Neil’s LTF observer II cross tabulation:

		Neil’s LTF observer II			Total
		Class I	Class II	Class III	
Neil’s LTF observer I	Class I	3	0	3	3
	Class II	2	12	1	15
	Class III	0	6	6	12
	Total	5	18	7	30

Study was conducted among 30 patients. Observer I classified 60% of patients as class C, 40% as class B on left side. Whereas observer II classified 56.7% as class C and 43.3% as class B on left sides. On right side observer I classified 50% as class B and 50% as class C. According to Neil’s method observer I classified 10%, 50% and 40% as class I, class II and class III respectively. Observer II classified 16.7%, 60.0%, 23.3% as class I, class II and class III.

Agreement between the observers for these methods were analyzed using kappa statistics. When customized gauze was used, right side agreement between observers was found good with kappa value 0.658 (p=0.01). Similarly, agreement between observer I and observer II on left side was good with kappa value 0.600 (p=0.01). Whereas in Neil’s method the agreement between two observers were less with kappa 0.0492 (p=0.01).

DISCUSSION

The attachment of the mylohyoid muscles extends about 1cm distal to the end of the mylohyoid ridge. This anatomy prevents the denture from locking against the bone in the LTF region. Extension of flange in distal end of alveolingual sulcus (LTF) makes the border seal continuous from the retromolar pad to the middle region of the alveolingual sulcus. Secondly, the distolingual flange is shaped so that it will guide tongue on top of the flange of the denture. This contour assists the patient to control the denture without interfering with the functions of the soft tissues which in turn enhances the retention and stability of complete denture.⁸

In the present study, according to the Neil’s classification observer I have classified 3 patients as class I, 15 patients as class II and 12 patients with class III LTF. Observer II have classified 5 patients as class I, 18 patients as class II and 7 patients as

class III. So inter-observer variation was seen in the Neil's classification. When measurement was done with customized gauze, more consistent result was obtained. Our result is consistent to the study done by Sadvi et al, who used a customized instrument for LTF readings intraorally and reported about consistent result.⁹ In present study, class II followed by class III was more common than class I. This finding was not consistent with the study performed by Parajuli et.al in which class I LTF was maximum.⁵ Similar result was found by Ajay Sharma with Class I being the maximum and class III the least.¹⁰ Huang et al also reported class I as maximum and class III as minimum.⁹ This finding can be explained by the statement that their studies were done on dentulous young patients and anatomy is best at younger age and decreases as the age increases.⁵ In our study the study participants were of advanced age and were wearing denture after long period of edentulism.

In the present study, economically fabricated tool has helped us to overcome the commonly practiced subjective method and also the inconsistency between the examiners. However, there is only one study in which attempt has been made to classify the LTF based on measurement made by customized tool.⁴ This study aims to see the accuracy between interobserver by using the Kalavathy et al⁴ classification and compare it with Neil's classification.

A variety of clinical situations like inexperienced clinicians who is unable to position the instrument properly, excessively large tongue which hampers the visibility of metal ball, patients with OSMF and other fibrotic and degenerative conditions were not justified by the relatively small sample size in this study.

CONCLUSION

Fabricated instrument gives the consistent result and helps in the proper selection of stock tray which in turn results in the proper extension of custom tray. Thus, extension of lingual flange can be taken to proper limit. This method of LTF measurement is more beneficial in edentulous patient with advanced age with resorbed ridge.

REFERENCES

1. Heo Y-R, Kim H-J, Son M-K, Chung C-H. Contour of lingual surface in lower complete denture formed by polished surface impression. *The journal of advanced prosthodontics*. 2016;8(6):472-478.
2. Zarb GA, Bolender CL, Eckert SE. *Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-supported Prostheses*. 12 ed: Mosby; 2004.
3. Rastogi I. Evaluation of lateral throat form-an in vivo study. 2014. 2014;2(2):5.
4. Kalavathy N, Kumar PR, Gupta S, Sridevi J, Shetty M, Sanketh AK. Lateral throat form re-classified using a customized gauge: A clinical study. *The Journal of the Indian Prosthodontic Society*. 2016;16(1):20.
5. Parajuli P, Shetty TB, Shenoy V, Rodrigues SJ. Comparative evaluation of the lateral throat form and the border extension of mandibular complete denture in the distolingual region among the south coastal Karnataka population: An in vivo study. *Journal of Nepal Dental Association*. 2010;11(2):121-125.
6. Barrett SG, Haines RW. Structure of the mouth in the mandibular molar region and its relation to the denture. *Journal of Prosthetic Dentistry*. 1962;12(5):835-837.
7. Huang P-S, Chou T-M, Chang H-P, et al. The proportion of 3 classes of lateral throat form. *International Journal of Prosthodontics*. 2007;20(6).
8. Swenson MG, Boucher CO. *Complete Dentures*: Edited by Carl O. Boucher. Mosby; 1964.
9. Sadhvi K, Nair C, Shetty J. Lateral throat form-design of a measuring instrument. *KDJ*. 2010;33:18-19.
10. Sharma A. Distolingual Vestibule And Retromylohyoid. *Worlds Journal Of Dental Science*. 2016;1(1).