

Original Article**Relation of fovea palatine and vibrating line in different soft palatal forms****Shanti Chhetri*, Ankita Rathi and Neha Gupta**

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Abstract**Background**

The posterior palatal seal (PPS) area plays a major role in retention of a maxillary denture. Many dentures have failed due to faulty recording of posterior palatal seal area. Hence, locating posterior palatal seal area is a critical step in complete denture fabrication. Various techniques have been described in the literature for locating the posterior border of maxillary complete denture. One of the most commonly used methods is the one that uses anatomical landmark like fovea palatine for locating the palatal seal area. However, many studies show a wide range of variation regarding position of fovea palatine with the vibrating line.

Materials and Methods

A total of 200 subjects were selected for the study and clinical examination carried out to mark the vibrating line and fovea palatine. The location of vibrating line whether it is anterior to fovea palatine, on the fovea palatine or posterior to the fovea palatine in the different soft palate type (Class I, II or III) was recorded using the phonation method.

Results

The vibrating line was located anteriorly to the fovea palatine in 70%, 54% and 60% of the subjects with Class I, II and III soft palate. The vibrating line was located on the fovea palatine in 22%, 40% and 36% of the subjects with Class I, II and III soft palate and posteriorly to the fovea palatine in 23%, 5% and 3% of the subjects with Class I, II and III soft palate respectively.

Conclusion

The vibrating line was predominantly found to be anterior to the fovea palatine in all the soft palatal forms.

Keywords: *Soft Palate, Dentures, Retention*



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Introduction

Conventional complete dentures (CD) remain a major prosthodontic option for the treatment of completely edentulous patients and treating these patients has always been a demanding task [1]. The end result should be a prosthesis that is properly retained in the patient's mouth during function of speech and mastication and it should be esthetically pleasing as well [2]. Retention of a complete denture is primarily achieved by a valve like seal between the denture border and the underlying mucosa. Achieving this kind of seal in posterior border of maxillary denture is difficult [3]. Posterior palatal seal area plays a vital role in retention of maxillary denture. When properly recorded and incorporated into the prosthesis, it will also aid in reduction of gag reflex, prevention of food accumulation beneath the posterior part of the denture and increase patient comfort during contact between dorsum of tongue and posterior part of the denture [4].

Posterior palatal seal area is defined as the soft tissue area at or beyond the junction of hard and soft palate where pressure within physiological limits can be applied by a denture to aid in retention of the prosthesis [2]. Anatomical landmark like fovea palatine serve as a reliable guideline for locating the posterior border of the denture. Fovea palatine are basically two small pits or indentations in posterior part of the palatal mucosa on either sides of the mid palatal raphe at or near the attachment of soft palate to the hard palate formed by coalescence of several mucous gland ducts which are usually located close to vibrating line [5]. Vibrating line is an imaginary line drawn across the palate which marks the beginning of movement in the soft palate when the individual says "ah". It extends from one hamular notch to the other and is usually 2 mm in front of the fovea palatine [5].

The position of the vibrating line varies with the contour of the soft palate [6]. Based on the angle formed between hard palate and soft palate, three classes of palatal throat form have been described. In class I, soft palate is horizontal or turns downward around 10-degree angle to the hard palate at the midline. In class II, the soft palate turns downward around 45-degree angle to the hard palate and in class III soft palate, the soft palate turns downward around 70-degree angle to the hard palate respectively [7].

There is a great deal of variation regarding position of fovea palatine with relation to the vibrating line. According to Zarb [5], fovea palatine is 2mm behind the posterior vibrating line, Lye [8] stated it to be 1.31 mm anterior to anterior vibrating line and according to Chen [9] and it is either on or behind the anterior vibrating line. The reliability of the fovea palatine thus remains a controversial issue for locating maxillary posterior denture border. Hence, aim of this study is to determine the relation of fovea palatine with respect to the vibrating line in different soft palatal forms so that its reliability as a landmark for marking the posterior extent of denture can be verified.

Material and Methods

This cross-sectional study was conducted in the Department of Prosthodontics, Nobel Medical College and Teaching Hospital, Biratnagar, Nepal from June 2017 to November 2017. Approval was acquired from the Institutional Review Committee of Nobel Medical College and Teaching Hospital before the start of the study. The study consisted of 200 healthy subjects between the age group of 18-25 years. It was a non-interventional and observational study where simple random sampling was done. The subjects were selected from undergraduate students (BDS first, second, third, fourth and final year), interns and dental hygienist of Nobel Medical College.

Inclusion criteria was subjects between the age group of 18-25 years and those having normal pink color palatal mucosa with clinically visible fovea palatine. Exclusion criteria included subjects with large palatal torus, any acquired or congenital defects of the palate, inflammation or pathology of palatal mucosa. The subjects meeting the inclusion criteria were selected. Informed consent was taken verbally and in written form from each of the subject regarding their willingness and participation in the study. Subjects were instructed to sit comfortably on a dental chair in an upright position and they were asked to open their mouth wide. The soft palate of each subject was examined for visibility of fovea palatine and the soft palate type was clinically observed and recorded as Class I, Class II or Class III soft palate. Of the various methods available, phonation method that is phonation of 'ah' sound was used to locate the posterior vibrating line. For this, the subjects were instructed to pronounce "ah" sound in short bursts but in a normal unexaggerated



fashion repetitively. Posterior palatal seal area was dried with gauze piece of 2*2 inches. The fovea palatine and the posterior vibrating line was marked with indelible pencil as the subject pronounced the “ah” sound. The procedure was repeated again to verify the accuracy of the markings. The vibrating line whether it was anterior to the fovea palatine, on the fovea palatine or posterior to the fovea palatine was observed and recorded in the proforma. The data collected was entered in MS Excel and analyzed in SPSS version 23.0.

Results

In the present study, frequency and percentage was calculated for gender and the various location of vibrating line with respect to fovea palatine in different soft palatal types. Stratification was done with regard to gender and various location of vibrating lines. Chi square test was done to observe the statistical difference between gender and various location of vibrating lines with respect to fovea palatine. Out of total 200 subjects (n=200), 54% were male and 46% were female. Among them, 126 subjects had vibrating line located anterior to fovea palatine, 62 of them had vibrating line located at the fovea palatine and 12 subjects had vibrating line located posterior to the fovea palatine. Regarding the frequency of soft palate type, Class I soft palate was found to be 97 (48.5%), Class II was 70 (35 %) and Class III was found to be 33 (16.5%).

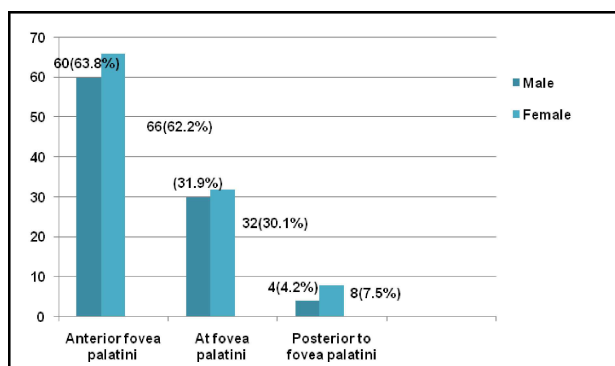


Figure 1: Comparison of gender with respect to various location of vibrating line (P- Value 0.68)

The vibrating line was located anteriorly to the fovea palatine in 70%, 54% and 20% of the subjects with Class I, II and III soft palate. The vibrating line was on the fovea palatine in 22%, 40% and 36% of the subjects with Class I, II and III soft palate and posteriorly to the fovea palatine in 23%, 5% and 3% of the subjects with Class I, II and III

soft palate respectively (Table 1). Chi-Square test was done to analyze the relation between gender and the various location of vibrating line with respect to fovea palatine. No statistically significant difference was seen. (P value 0.68, Fig 1 and Table 2).

Table 1: Frequency of various location of vibrating line with respect to fovea palatine in Class I, II and III soft palate types.

Soft Palate Type	Location of vibrating line with respect to fovea palatine			Total
	Anterior to fovea palatine	At fovea palatine	Posterior to fovea palatine	
Class I	68(70.1%)	22(22.6%)	7(23.3%)	97(48.5%)
Class II	38(54.2%)	28(40%)	4(5.7%)	70(35%)
Class III	20(60.6%)	12(36.3%)	1(3%)	33(16.5%)
Total	126(63%)	62(31%)	12(6%)	200

Table 2: Location of vibrating line with respect to fovea palatine in different gender (P value 0.68)

Gender	Location of vibrating line with respect to fovea palatine			Total
	Anterior to fovea palatine	At fovea palatine	Posterior to fovea palatine	
Male	60(63.8%)	30(31.9%)	4(4.2%)	94(47%)
Female	66(62.2%)	32(30.1%)	8(7.5%)	106(53%)
Total	126(63%)	62(31%)	12(6%)	200

Discussion

A successful prosthesis is one that is well-retained in the mouth for a long period of time and which is able to perform well during functions of speech and mastication. A well-fitting and retentive denture requires a well-fitting tissue surface with a proper labial flange, buccal flange and a posterior seal. The posterior extent of maxillary denture where tissues are less compliant requires special attention for effective seal. This is the posterior palatal seal area which has to be accurately located and transferred to the cast. Various methods are used for recording the posterior border of the denture which includes phonation of ah sound, palpatory method and Valsalva maneuver or the nose blowing method (ask patient to blow gently through the nose with nostrils closed using finger). Anatomical landmarks like fovea palatine act as guidelines for locating the vibrating line. The “ah” method or the phonation method for recording the vibrating line is used in the current study. It is one of the convenient methods

of recording the posterior palatal seal area. In most dental colleges of Nepal, including Nobel Medical College, the same method is used for recording the posterior palatal seal area. Based on an educational survey conducted by Rashedi et al [10], it was found that majority of dental schools follow the “one vibrating line concept” for establishing posterior palatal seal. Zarb also recommended the one vibrating line concept, where the dentures are made to extend 1-2mm behind the posterior vibrating line. According to Silverman, the posterior palatal seal can be extended back dorsally beyond the vibrating line to an average distance of 8.2mm to help in retention of denture [11]. However, many schools also follow the two vibrating line concept where the posterior palatal seal area is marked between anterior and posterior vibrating line.

A study conducted by Alousi [12] included 200 randomly selected patients. The soft palate type was not differentiated in these patients. His study showed that 50.9% of patients had their vibrating line located at fovea palatine, 44.5% had it in front of fovea palatine and 6.4% posterior to the fovea palatine. He stated that fovea palatine is an important landmark that helps in determining the posterior palatal seal area of maxillary denture. He found no significant difference between gender and location of vibrating line with respect to the fovea palatine. These findings are similar to the findings of our study.

Kumar et al [1] conducted another study on 197 subjects in which the relation of fovea palatine with vibrating line was assessed. The vibrating line was located anterior to the fovea palatine in 68%, 70% and 50% of subjects with Class I, II and III soft palate types. It coincided with the fovea palatine in 32%, 30% and 50% of subjects with Class I, II and III soft palate. None of the subjects in any soft palate type had the vibrating line located posterior to the fovea palatine. This finding differs from our study in that 6% of the subjects had vibrating line posterior to the fovea palatine. No correlation was found between age and gender with respect to the location of vibrating line which is similar to the results of our current study.

Conclusion

The vibrating line was predominantly located anterior to the fovea palatine in all the three types of soft palate. Very few patients had vibrating line

posterior to the fovea palatine that is 6%. Hence, use of the anatomical landmarks like fovea palatine can guide the clinician in accurate recording of the vibrating line which further aids in the fabrication of more retentive and stable dentures.

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Conflict of Interest

No conflict of interest.

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