

## Evaluating the position of fovea palatinae in relation to posterior palatal seal in completely edentulous patients.

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### Abstract

**Purpose:** The purpose of this study was to examine and establish the relationship of fovea palatinae to anterior and posterior vibrating lines in completely edentulous patients.**Materials and methods:** One hundred and twenty completely edentulous patients were selected based on the inclusive and exclusive criteria. For each patient anterior, posterior vibrating lines and fovea palatinae were marked intraorally on edentulous maxillary arch and these markings were transferred to irreversible hydrocolloid impression. After pouring dental cast, digital vernier caliper was used to measure the distance between the midpoint of the fovea palatinae to anterior and posterior vibrating lines.Two examiners on every patient made all assessments independently and the measurements obtained were analyzed using statistical methods.**Results:** There was a significant correlation between fovea palatinae and posterior vibrating line (P value - 0.00001) and insignificant correlation between fovea palatinae and anterior vibrating line (p value 0.28). It was also observed that the average distance between the posterior vibrating line and anterior vibrating line with fovea palatine were  $3.68 \text{ mm} \pm 1.78(\text{S.D})$  mm and  $0.21 \text{ mm} \pm 2.6 (\text{S.D})$  mm respectively. **Conclusion:** Within the limitations of the study, we can conclude that fovea palatinae is a reliable landmark for determining the posterior extent of the maxillary complete denture and in order to obtain a good peripheral seal for the retention, the maxillary denture should extend 2-4 mm beyond the fovea palatinae.

**Key words:** Anterior Vibrating Line, Digital Vernier Caliper, Fovea Palatinae, Posterior Vibrating Line, Posterior Palatal Seal.

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### I. Introduction

An appropriately designed posterior palatal seal is the most important factor for the success of maxillary complete denture as it mostly influences the denture retention. <sup>[1]</sup> The major function of the posterior palatal seal (PPS) in the complete maxillary prosthesis is to sustain contact with the anterior portion of the soft palate (the tissues that undergo shallow displacement) during functional movements of the stomatognathic system. Therefore, primary rationale of the posterior palatal seal is retention of the maxillary denture. <sup>[2]</sup>

In order to achieve a well-fitting and retentive complete denture ,the tissue surface should be closely fit and peripheral border should be companionable with the muscles and tissues as they make up the mucobuccal and mucolabial spaces which are required for draping of the soft tissue over them to create a peripheral seal. This seal is achieved posteriorly by the posterior palatal seal. Most of the dentures become futile due to the improper establishment of the distal limit and an inappropriate posterior palatal seal as it is very difficult to locate posterior palatal seal. <sup>[3]</sup>

The posterior border of the maxillary denture has unambiguous anatomic and physiologic boundaries that can permit recording of the posterior palatal seal which is a simple and easy procedure with inevitable results. Location of the vibrating line relies on visual surveillance. For this reason, a disparity exists between different observers in locating PPS (location and size) , anterior and posterior vibrating lines and. <sup>[4]</sup>

Hence, in this study we focused on the prevalence of fovea palatinae and location of fovea palatinae with respect to vibrating lines in order to evaluate the relationship between fovea palatinae and vibrating lines on patient's casts.

## **II. Materials And Method**

The present study was conducted in the Department of Prosthodontics and Crown and Bridge including Implantology, SIBAR institute of dental sciences, Andhra Pradesh. This study was conducted in one hundred and twenty completely edentulous patients who were selected based on inclusive and exclusive criteria, after obtaining the ethical clearance.

### **Inclusion criteria**

- Edentulous patients with healthy palatal mucosa.
- Mentally sound patients.
- Visibility of fovea palatinae.

### **Exclusion criteria**

- Abused soft tissues.
- Palatal tori.
- Cleft palate extending to soft palate .

The parameters taken into evaluation were

- To determine the prevalence of the fovea palatinae.
- To determine the distance between the fovea palatinae and vibrating lines.

## **III. Procedure**

Initially fovea palatinae was identified and marked on each patient. Later, the anterior and posterior vibrating lines were identified on each patient by palpating hard and soft palate with the help of T burnisher. These vibrating lines were confirmed visually with the help of Valsalva maneuver and phonation method (via verbalization of a soft 'ah'sound) respectively. Two examiners on each patient made all assessments independently. If both had recorded the same position, the recording was deemed completed. If both examiners recorded different position, observations were repeated again. If still, there is incongruity between both, the case was examined by a third examiner for final decree. Finally, these lines were marked with an indelible pencil after drying the area with gauze (Fig-1), and then those markings were transferred on to the irreversible hydrocolloid impression (Fig-2). The ink markings were enhanced on the impression with eosin and heamatoxylin pencils.

Boxing of impression was done to preserve the borders, and the cast was poured using dental plaster (Type II gypsum product). The ink markings drawn on the impression were transferred to the cast (Fig-3). Using digital vernier caliper (BAKER AN ISO 9001-2000 SERIALNO-3196) the distance between the midpoint of the fovea palatinae to anterior and posterior vibrating lines (Fig-4) were measured.

All the records were entered into respective proformas and analyzed using descriptive statistics. Continuous variables were summarized with the help of mean, standard deviation. Z-test of single mean was used to test the significance of distance from the fovea palatinae to anterior and posterior vibrating line at mid point, Microsoft excel and In-silico project support for life sciences were used to analyze the data.

## **IV. Results**

Table-1 shows, distribution of study subjects based on number of fovea palatinae. Graph-1& Graph-2 represents the distribution of study subjects based on the distance from midpoint of fovea palatinae to anterior and posterior vibrating line respectively.

According to observations at mid point, in relation to anterior vibrating line the mean is  $0.21 \pm SD 2.16$ , which was statistically insignificant ( $P$ -value 0.28). Mean distance of fovea palatinae to posterior vibrating line at midpoint was  $3.68 \pm SD 1.78$  and  $z$ -value is 22.64, which was statistically significant. In the present study, a significant correlation was observed between the fovea palatine and posterior vibrating line ( $P$  value -0.00001). We also observed that, the fovea palatinae was found in 93.33% of study sample.

## **V. Discussion**

The posterior palatal area is in definite anatomic and physiologic precinct that once understood will make the placement of the posterior seal a quick and easy procedure with predictable results.<sup>[3]</sup> It has been agreed that the PPS area lies between these anterior and posterior vibrating lines. Careful observation and palpation of the tissues are necessary as their locations vary with the contour of the soft palate.<sup>[5]</sup> To determine

the compressibility of the palatal tissues, anterior to the posterior border are palpated using a blunt instrument, which usually coincides with the anterior vibrating line. Hence, a combination of the palpatory and visual methods have been used in the present study.<sup>[6]</sup>

Fovea palatinae is a clinically visible indentation in the mucosa of the midline of the palate formed by the coalescence of several mucous gland ducts, which is inimitable to humans.<sup>[7]</sup> The fovea palatinae are repeatedly been used as guides for helping to locate the vibrating line but not in relation to the type of soft palate contour.<sup>[8]</sup>

In the present study, a significant co-relation was observed between fovea palatine and posterior vibrating line (*P* value -0.00001). We also observed that the fovea palatinae was found in 93.33% of study sample and statistically insignificant results were found in relation to anterior vibrating line. These findings were in accordance with the studies done by Sicher and Silverman<sup>[9]</sup> where in they stated that fovea palatinae is present anterior to the posterior vibrating line. Keng and Ow<sup>[8]</sup> also stated that in (83.4)% fovea palatinae was present but in the remaining 6.67% of the subjects no fovea palatinae was found.

We also found that these were not in accordance with the studies done by Bolender<sup>[10]</sup> and Chen<sup>[11]</sup> who stated that fovea palatine lies behind the vibrating line (posterior vibrating line as it is produced during the phonation of ah sound), this is because Chen determined location of the location of anterior vibrating line by valsalva maneuver.

Many researchers have also reported absence of fovea palatinae in their study samples. Such as work reported by Lye<sup>[12]</sup> did not find fovea palatinae in 8% and in the study conducted by Chen<sup>[11]</sup> it was 7.7%.

In addition to this, we also found that, the average distance between the fovea palatinae and the posterior vibrating line was 3.68 mm  $\pm$  1.78 mm. This indicates that in order to aid in good retention, the maxillary denture should extend 2-4 mm beyond the foveae palatinae. Studies done by Kyung et al<sup>[1]</sup> and Lye<sup>[12]</sup> also reported that fovea palatine lies anterior to the posterior vibrating line, but the measurement from the posterior vibrating line to fovea was different which is 0.71+0.68mm and 1.31mm respectively.

Few studies reported<sup>[11]</sup> differences in the distance between the foveae palatinae and the vibrating line owing to numerous factors. These factors may include, using different methods for identifying vibrating lines and specifically marking the vibrating line. The vibrating line is an imaginary line, that is more similar to an area than a clear line and the measurement can vary depending on the area of the vibrating line selected as the standard for measuring the distance to the fovea palatinae.

In the present study, patients presenting with fovea palatinae more than two were excluded altogether and no attempt was made in determining the relative position of both foveae to each other. So, this needs to be studied extensively further to arrive at more substantial outcomes.

## VI. Conclusion

Within the limitations of the present study, it was concluded that foveae palatinae can also be considered as a reliable landmark for determining the posterior extent of the maxillary complete denture. Hence, to obtain a good peripheral seal for retention the maxillary denture should extend 2-4 mm beyond the fovea palatinae.

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TABLE 1:

Distribution of study subjects based on number of fovea palatinae

Graph 1: Distribution of study subjects based on distance from midpoint of fovea palatinae to anterior vibrating line

Graph2: Distribution of study subjects based on distance from midpoint of fovea palatinae to posterior vibrating line from right and left side.

Fig:1-Intra oral marking of fovea palatinae, anterior and posterior vibrating lines

Fig:2-Alginate impression with transfer markings

Fig 3 Dental cast with transferred markings

Fig :4- Distance measured on cast with digital vernier caliper

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