Fovea Palatini – what lies beneath and down under

Rahul Bhayana1, Sorabh R Jain 2, Deepika Bhayana3, Sudhanshu Sanadhya4, Devendra Pal Singh5, Kusha G5.

Abstract

Since the twenties of the last century many authors with more than 50 publications have described or evaluated techniques for locating the posterior border of the upper denture. For the extent of the denture to be decided, fovea palatini, formed by coalescence of mucous gland ducts, which was less emphasized by dental anatomists, can be used as a guideline for the placement of posterior palatal seal. The posterior palatal seal contributes for the retention of the maxillary complete denture. However, reasons responsible for the lack of denture retention have diverted dentist’s interest in these anatomic landmarks.


Key words: fovea, palatini, vibrating line, posterior palatal seal.

Introduction and Anatomy:-

Since 1920, more than 50 publications have described or evaluated techniques for locating the posterior border of the upper denture1. The posterior palatal seal contributes to the retention of the complete denture2. But the location and placement of the posterior palatal seal is a frequently neglected procedure. Its location and preparation on the master cast are often done by the dentist or dental laboratory technician without reference to the anatomic landmarks of the oral cavity3.

One of the easiest and most practical methods for determining the extent of posterior palatal seal and that of the maxillary complete denture is using the anatomical landmarks (fovea palatini and hamular notches)4. Fovea palatini is defined as “two small pits or depressions in the posterior aspect of the palatal mucosa, one on each side of the midline, at or near the attachment of the soft palate to the hard palate”5.

It appears as a small depressed point greyish red to coral pink in color6. They are the ductal openings and recipients of distributaries of ducts of the surrounding clusters of mucous glands. They are not constantly present as are those of the major salivary glands. They appear to be a peculiarly human feature, as the palatal mucous glands of other animal open individually, giving the palate the appearance of an orange peel7.
Material

A review of literature was done which engaged articles published in several journals relating to the subject in dentistry. The review itself began with the search of relevant key words linked with fovea, palatini, vibrating line in various search engines including PubMed, MedLine etc. Reports published only in English language were included in the review.

Various studies have been performed regarding the position of the Fovea Palatini to Vibrating Line.

Sicher\(^7\) had described the fovea as situated immediately behind the boundary between the hard and soft palates. According to Nagle and Sears, the fovea mark the posterior limit of the hard palate; while Anderson and Storer placed them in the glandular region of the soft palate, a view shared by Fenn and associates. Swenson concluded that the vibrating line passes about 2 mm in front of the fovea palatini. The vibrating line determines the useful limit of the posterior border of the denture. Silverman expressed the view that the posterior palatal seal could be extended further back (dorsally) than the Vibrating line by about 8.2 mm to substantially aid in the retention and stability of the upper denture. In accordance to this studies, a thorough investigation done by Lye for the location in relation to one another, together with the regional innervation and the inter-relation of the underlying soft and hard structures.

He conducted several studies:-

1. In clinical studies he founded in (mean 100) subjects with the mean measurements positioned the vibrating line the vibrating line 1.31 mm behind the fovea (varies from 3 mm anterior to 5 mm posterior to the fovea).

2. With radiographic studies, he was indicative of the relationship of the fovea to the edge of the horizontal part of the palatine bone which is the anatomic limit of the hard palate and his further findings revealed that the foveae were situated in soft tissue covering the hard palate. The mean distance from the junction of the hard and soft palates was 3.58 mm. Variations of 1.85 to 6.14 mm has occurred. The fovea was separated by an average distance of 3.27 mm.

3. On histological studies with trichrome, differential staining definitely confirmed that there was no direct attachment of muscles to the distal border of the bone. This meant that the vibrating line was located at, or in front of, the foveae as a result of the loose character of the connective and glandular tissues which were more susceptible to the influence of the palatine musculature.

So the whole study publicized that, although the mean position of the vibrating line is 1.31 mm behind the foveae, the posterior limit of the denture can be extended and additional 2 mm before soft-tissue movement is sufficient to break the seal.

According to Lye, the fovea palatini are located, on average, 1.31 mm anterior to the anterior vibrating line\(^8\).

In another study\(^9\), where sample sizes of 72 patients were considered, he came across with results that of 25% of the sample had their vibrating line laying directly on the fovea palatini and 75% had their vibrating line posterior to their fovea palatini and no patient had the vibrating line lying anterior to their fovea palatini. He also claimed that the patients with vibrating line that coincide with fovea palatini, to be posterior (dorsal) because of the width of the indelible pencil line which was approximately 0.5 mm.

Considering this study, another study was performed with 200 subjects\(^4\) and found that 44.5% had their vibrating line located in front of their fovea palatini, 49.1% had it at, and only 6.4% of the sample had it behind and these results were in agreement with the results obtained by Lye.

A clinical study was conducted on edentulous patients to determine the relation of the fovea palatini to vibrating line and the slope of the palatal contour\(^10\). The soft palate was classified in three classes by the angle of soft palate on vibrating line at the median palatine suture. The results were as follows:-
So, in this study they found that the fovea palatini were posterior to vibrating line more than anterior to vibrating line and the vibrating line is located approximately 2.62 mm anterior to the fovea. There is a highly significant correlation between the distances of vibrating line to fovea for the different palatal contours.

<table>
<thead>
<tr>
<th>Line Soft Palate</th>
<th>Fovea to vibrating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anterior</td>
</tr>
<tr>
<td>I</td>
<td>14.6%</td>
</tr>
<tr>
<td>II</td>
<td>3.3%</td>
</tr>
<tr>
<td>III</td>
<td>6.7%</td>
</tr>
</tbody>
</table>

**Fig. 1**

**Discussion**

According to Chen et al\(^9\), concluded that the fovea palatini are unreliable guides for locating the center portion of the posterior border of the maxillary denture, while in another study the results showed that fovea palatini may be considered as reliable anatomical landmark\(^4\). This was in agreement with the results of Lye\(^7\), Fenn, et al\(^11\), and Boucher, et al\(^12\). The posterior border can be located with great accuracy if it is possible to see the two small pits (fovea palatini) one on either side of the mid line on the anterior part of soft palate\(^11\). As studies and findings were in association with limited number of subjects, the situation demands for a further extensive study to be done for the more concrete outcome.

**Conclusion**

The posterior palatal seal is a significant contributing factor for the retention of the complete denture but its location and placement in the prosthesis is a frequently neglected procedure. Though, many techniques have been advocated for locating the posterior border as well as its extent, the fovea palatinae and hamular notches, which was less emphasized by dental anatomists earlier, can be used as a guideline and anatomical landmark making it one of the easiest and most practical methods for determining the extent of posterior palatal seal and the post limit of the maxillary complete denture.

However, its reliability factor for the wholesome aforesaid purpose of significance still remains a point of debate and needs to be studied extensively further to arrive at more substantial outcomes.

**References**

5. Glossary of Prosthodontic terms- 8.
