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IDENTIFICATION OF THE POSTERIOR PALATAL SEAL BY ANATOMICAL LANDMARKS

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ABSTRACT:

Posterior palatal seal is marked between the junction of hard palate and soft palate. Conventional method uses the phonetic sound to identify the posterior palatal seal. It is very challenging to record the junction due to various discrepancies. This method potentially extends beyond the posterior palatal seal which causes pain. To evaluate which method is more efficient in marking the posterior palatal seal and also which is more easier for the operator. A self designed questionnaire was circulated among the dental students in the Department of Prosthodontics. The questionnaire was divided into two groups before and after demonstrating anatomical method. The students were first allowed to record the posterior palatal seal in their method and then the anatomical method was demonstrated. It was found that nearly 50% of them had shortcomings with the technique they were following. Some of the few shortcomings are tissue compression, improper retention. About 90% of the dentists could mark the fovea palatine. Nearly 45% of them chose anatomical method over conventional. Many of them felt anatomical method had more retention than the other types. Furthermore studies should be conducted to check whether proper retention is attained through this technique.

INTRODUCTION

The main aim of the complete denture is to attain complete functional need, for fulfilling this, the denture must have complete retention [1]. The fit of the denture should be accurate [2].Many improvements have been made in dental materials in recent years [3–5]. Only the improvisation of the material is not sufficient, therefore various techniques must also be discovered [6,7]. For providing proper retention, posterior palatal seal recording is very essential [8]. The PPS is defined as " the soft tissue area at or beyond the junction of hard and soft palates on which pressure, within physiological limits, can be applied by a complete denture prosthesis to aid in retention" [9].

The functions of posterior palatal seal are to improve retention, seal the denture base with that of the underlying tissue and decrease the gag reflex. It also compensates for the shrinkage and therefore prevents the entry of foreign particles under the denture, strengthening the maxillary denture. The posterior palatal seal is performed by recording the area between the anterior and posterior vibrating line. Some of them are taught only one vibrating line concept to the students. The palatal seal can be obtained by scraping out the cast before denture processing. Majority of them are taught the arbitrary scraping method.

The anatomy of the posterior palatal seal have been described by many researchers [10]. The anatomic and physiological limit is very distinct. Therefore knowing them well makes the practitioner's work easier. Post dam or vibrating line are the other words given to the posterior palatal seal [11]. Some of them disagreed to this stating even anterior had variance and therefore should be termed as vibrating area [12]. Ultrasound investigation by other states that the vibrating lines on the soft palate and the seal area extends approximately about 4-6mm anterior [13]. This concludes that the posterior palatal seal contacts both masticatory and lining mucosa. Transition from fixed to loosely attached tissue is observed in the mucosa of the seal region. The posterior palatal seal can be divided into post palatal seal and pterygomaxillary seal [14].

Silvermanin his study concluded that the hypothesis for extending the denture border more posteriorly to contact the soft tissue while in function are supported by anatomic, radiographic and neurophysiological conditions[15].
Various methods have been introduced and described in the literature for recording the posterior palatal seal. Few of them are Conventional, Fluid wax, Arbitrary scraping of the master cast, extended palatal technique and modified border moulding technique. The most common causes of failures in recording posterior palatal seals are under extension, over extension, under post damming and over post damming[16].

The concept of providing a PPS in dentures has been practiced for years yet the origin of this procedure is not well documented in dental history. Pendleton showed the width of the seal area to range from 1 to 12 mm anteroposteriorly. The posterior palatal seal can be extended more than 4 mm forward from the distal

border of the denture in some areas and narrower in others such as the hamular notches where it should be about 2mm wide. The depth can also vary according to the displaceability of the underlying soft tissues, being thicker over tissues lateral to midline where there is more resilience, and thinner in the midline where there is little tendency for tissues to yield, or about one half the amount the tissues can be displaced. These authors also recommended the cross-sectional shape where the depth is maximum at the centre and tapers to zero towards the anterior and posterior borders.

Previously our department has published extensive research on various aspects of prosthetic dentistry [17–27], this vast research experience has inspired us to research about identification of posterior palatal seals by anatomical landmarks. The most common method used to record the posterior palatal seal is the conventional. To evaluate which method is more efficient in marking the posterior palatal seal and also which is more easier for the operator.

MATERIALS AND METHOD

A questionnaire was framed and then circulated among twenty dental students who had been taking the secondary impression for edentulous patients after the procedure was completed. First the students were advised to record the posterior palatal seal according to the method they use routinely. And then the anatomical method was demonstrated to them by the usage of various landmarks. The landmarks taken were:

1. Hamular notch
2. Hamularextension of sphenoid bone
3. Midpoint posterior to fovea palatinae.

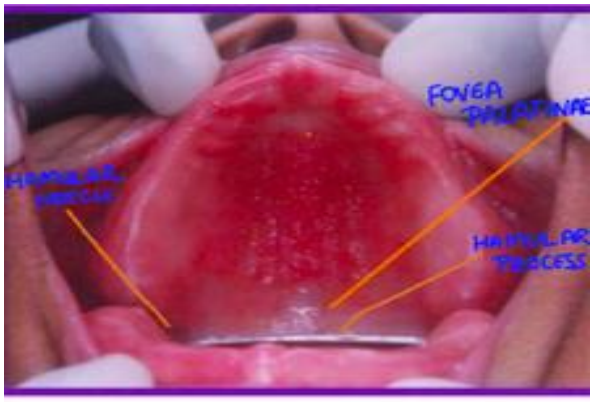

Figure 1: Anatomical landmarks

The landmarks were demonstrated and the participants were allowed to mark the landmarks in the patient's mouth and connect them to obtain the posterior limit. After this they were given questionnaires. The questionnaire comprised 11 questions which included both before and after demonstration of the anatomical landmarks. The results were found using the descriptive analysis.

The questionnaire is as follows:

Before showing anatomical landmarks

1. Which technique do you follow to record pps area?
2. Were you able to easily locate or identify posterior imaginary vibrating lines using the technique which you follow?
3. Are you satisfied in marking the posterior limit using your technique?
4. Did you feel any shortcomings with your own technique that you follow for recording pps?
5. What error or mistake you found commonly while recording pps by your own technique?

After showing** anatomical **landmarks

6. Were you able to clinically palpate the hamular process of sphenoid bone?
7. Were you able to appreciate the fovea palatinae at the posterior midline?
8. Using T-burnisher and identification of the hamular process of sphenoid bone were you able to mark pterygomaxillary seal region?
9. Were you able to mark 1-2 mm posterior to the fovea palatinae?
10. Were you able to connect the three points I.e right & left side hamular notch, identified by hamular extension of sphenoid bone and the midpoint marked posterior to fovea palatinae ?
11. Among these two techniques which you followed which one you feel can locate the posterior most limit of denture base easily?

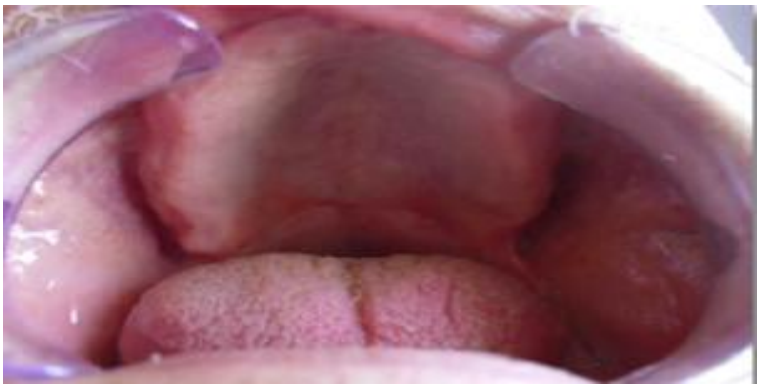

Figure 2: Intra-oral image

RESULTS AND DISCUSSION:

BEFORE SHOWING THE ANATOMICAL LANDMARKS:

From our observation, it was found that the majority of them use conventional methods for recording the posterior palatal seal. Majority of them even found it to be an easy method for recording the posterior palatal seal. Few of them found difficulty in marking the posterior limit of the vibrating line. When asked about any shortcomings of the method, many of them had various negatives such as tissue compression, overextended denture, mild retention and even difficulty in recording for a few.

Table 1: Before demonstrating the anatomical landmarks:

Questions	Percentage
1. Which technique do you follow to record pps area?	Conventional- 75% Fluid wax – 25%
2. Were you able to easily locate or identify posterior imaginary vibrating lines using the technique which you follow?	Yes- 74.2% No- 25.8%
3. Are you satisfied in marking the posterior limit using your technique?	Yes- 70.2% No- 29.8%
4. Did you feel any shortcomings with your own technique that you follow for recording pps?	Yes- 61.2% No- 38.8%
5. What error or mistake you found commonly while recording pps by your own technique?	Tissue compression Difficult to record Mild retention

AFTER SHOWING THE ANATOMICAL LANDMARKS:

Once demonstrations was done of the anatomical method of recording the posterior palatal seal. For the anatomical method the landmarks taken are discussed already above. From our observations, we found that nearly half of them could identify fovea palatinae when properly palpated. Majority of them could mark the pterygomaxillary region using the T-burnisher and identification of hamular process of sphenoid bone. Nearly 80% of the participants were above to mark 1-2 mm posterior to fovea palatinae. Majority of them could easily identify the bony structure- hauler extension of the pterygoid plate. Many of them found easy to connect all three anatomical landmarks I.e the right and left side of hamular notch by the hamular extension of sphenoid bone and the midpoint marked posterior to fovea palatinae. In the last, 45% of the participants chose anatomical method over the conventional or other methods.

Table 2: After demonstrating the anatomical landmarks:

Questions	Percentage
1. Were you able to clinically palpate the hamular process of sphenoid bone?	Yes- 85.5% No- 14.5%

2. Were you able to appreciate the fovea palatinae at the posterior midline?	Yes- 90% No-10%
3. Using T-burnisher and identification of the hamular process of sphenoid bone were you able to mark pterygomaxillary seal region?	Easily- 85.3% Not so easily- 14.7%
4. Were you able to mark 1-2 mm posterior to the fovea palatinae?	Yes- 85.5% No- 85.5%
5. Were you able to connect the three points I.e right & left side hamular notch, identified by hamular extension of sphenoid bone and the midpoint marked posterior to fovea palatinae ?	Easily- 90% Not so easily-10%
6. Among these two techniques which you followed which one you feel can locate the posterior most limit of denture base easily?	Conventional- 55% Anatomical – 45%

Posterior palatal seal aids in retention of complete denture [28]. It serves as a barrier and prevents ingress of fluid, food, air between denture and tissue surface. It helps in decreasing gag reflex by maintaining positive contact with moving soft palate [29]. It guides the positioning of custom trays during secondary impressions. By providing a thick border it compensates the warpage that occur during polymerisation.It provides comfort and confidence to the patient by increasing the retention of denture [30].In a study conducted by Swathy only 42% of the participants were aware about the techniques involved in recording the posterior palatal seal [8]. In the present study the bony anatomical landmarks as guides such as posterior to tuberosity- hauler notch and anterior to hauler extension of pterygoid plate will help the operator to easily identify the posterior palatal seal area.

Posterior palatal seal can be recorded with many other techniques such as conventional, fluid wax, extended palatal method. A correlation between the conventional and fluid wax concluded conventional was more better in recording than the fluid wax. Miler in his study used scrape technique which also had few advantages over the others. Ansari also described the same technique with different types of wax.

CONCLUSION

Nearly 45% of them felt anatomical method that is recognizing the hamulus extension of the pterygoid and distal aspect of tuberosity made it easier for

identification and to record the posterior palatal seal than the conventional method. Furthermore studies should be conducted to check the various properties such as retention and stability of the dentures using the anatomical method of recording the posterior palatal seal.

AUTHOR CONTRIBUTIONS

Author 1 (Subashri.A) carried out retrospective study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2 (Dr.Suresh) aided in the conception of the topic, participated in the study design, statistical analysis and supervised in preparation of the manuscript and helped in study design and coordinated in developing the manuscript. All the authors have equally contributed in developing the manuscript.

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CONFLICT OF INTEREST

There are noconflicts of interest.

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