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Posterior Palatal Seal.

A Clinical Survey

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Fotoula Nikolopoulou*[1], Anestis Chrysostomidis[2], Gerasimos Filippatos[3]

[1]*Assistant Professor Dental School, National and Kapodistrian University of Athens-Greece*

[2]*Dental School, National and Kapodistrian University of Athens-Greece*

[3]*Research Fellow of Dental School, National and Kapodistrian University of Athens-Greece*

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ABSTRACT

This article was carried out at the Department of Prosthodontics, of the Dental School, National and Kapodistrian University of Athens. Forty-five patients were screened for this clinical survey. The shapes of the posterior palatal seal were examined. The results showed that there was a high proportion of 68,88% (31 complete dentures) without the post dam. There is no difference between males and females.

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INTRODUCTION

One of the problems in complete denture service is the provision of retentive dentures. To obtain good retention of upper dentures, the denture base should be well-fitting, correctly extended and have a good posterior palatal seal. This is determined in the mouth and its location is transferred onto the cast.

A lot of publications dating from 1920 described and evaluated techniques relating to the location of the posterior border of the upper denture. The soft palatal is part of a dual valve system that separates the oropharynx, the oral space from the nasal space. (1- 3)

The posterior border of the upper denture must be extended at least to vibrating line. Physiologically the vibrating line of the palatal is the junction of the movable and immovable portion of the soft palate. This should not be confused with the anatomic junction of the soft and hard palate. (4-5)

To determine the location and extent of the posterior palatal seal, a superficial evaluation of the potential denture foundation is succeeded by a more detailed examination. The bone of the maxilla, palate and alveolar ridge has periosteal attachments and a mucosal covering with varying distribution of connective and glandular tissue elements. Palpation normally reveals firm and dense tissues of the residual ridge and tissues of limited elasticity over the anterior part of the hard palate, where the rugae appear as irregular elevations. (6)

It is generally agreed than the posterior border of the maxillary denture must be extended to the vibrating line, or in most instances, the denture should end at the vibrating line. The location of the vibrating line relies on visual observation. (7)

The currently used techniques for deterring the location of the vibrating line are based on 1) phonation of an “ah” sound, 2) the swallowing method and 3) the nose-blowing method. (8, 9) The vibrating line of the soft palate, which is the ideal posterior border of the denture, is usually located on a slightly anterior or slightly posterior palatine. The soft palate and tongue thus contact and separate as they protrude backward and forward to selectively permit food and air to pass the forces for swallowing, speech and respiration. The neurologic control for the valving action is mediated by the ninth and tenth cranial nerves for the palate and tongue (these nerves have both high somatic conscious and visceral automatic components) and the twelfth cranial nerve which is dominated by the somatic conscious motor component. There

is also a large proportion of visceral components in the ninth and tenth cranial nerves, it does not imply that the soft palate cannot be conditioned to respond appropriately to the denture which encroaches upon its environment.

It merely suggests that more time may be required to condition the soft palate tissue to adapt to the presence of the denture which initiates a gag reflex. To facilitate the patient's adjustment to the denture touching the soft palate, the border should be convex in contour on both the tongue and soft-palate sides. (9-11) The vibrating line can be traced to the palatal tissues with an indelible pencil. The width of the posterior palatal seal and the vibrating line depend on the soft palatal form. (11-12)

Many techniques for developing the posterior palatal seal have been described in the literature. They can be classified as functional, semi-functional and empirical. In the functional techniques, the final impression is border molded in the posterior palatal seal area with soft stick modeling compound by sucking and bubbling movements performed by the patients. The border molding is done by the dentist in functional techniques. Author comments, to have a good post dam, it is not necessary to compress this tissue to a maximum as it is often done by the post damming techniques, employing modeling compounds.

In the empirical technique, the posterior palatal seal is developed on the cast by grooving the cast to the desired depth. With this technique, the dentists can check the sufficiency of the posterior palatal seal and they can also gain an insight into the retention of the final product. (12)

It has been described various patterns or shapes of post dam, butterfly figure, single bead on the vibrating line, and the use of double beads with one on the anterior aspect and one on the posterior limit of the posterior palatal seal area. (13)

It is generally agreed that the determination of the posterior palatal seal is the responsibility of the dentist and should not be delegated to a technician.

This clinical study was carried out at the Department of Prosthodontics of the Dental School, National and Kapodistrian University of Athens. The purpose of the survey was to examine the posterior seal in patients who wore a complete denture. They came to the Dental School, to construct new dentures. The main complaint of them was the retention of dentures and they could not speak fluently.

MATERIALS AND METHODS

Forty-five subjects screened for this clinical survey. The posterior palatal of each patient who wore upper complete denture was examined for the shape of the post dam. This investigation was conducted at the Department of Prosthodontics of the Dental School of Athens.

The sample frame consisted of twenty-three males and twenty-two females. The mean age of the patients was 69 years old. The sample population was examined for four academic years.

When patients seated in the chair and their mouth was opened, the tissues at the junction of the soft and hard palate were dried with cotton. Then the patient was instructed to say "ah". The vibrating line was traced to the palatal tissues with an indelible pencil. To determine the anterior outline of the posterior palatal seal a ball-ended burnisher or with a mouth mirror was pressed gently against the hard palate and was gradually worked backward until displaceable tissue could be located. Then the upper complete denture was seated firmly and in such a way and that line was transferred to the denture base. These points were marked with an indelible pencil. Two parallel lines were drawn, from the anterior points to the posterior border of the palatal seal area. The above procedures were repeated twice for each patient. We also examined the shapes of the posterior palatal seals.

RESULTS

In this clinical survey, forty-five patients were examined. The sample consisted of twenty-three males (51.11%) and twenty-two females (48.88%).

Table I shows the number of posterior palatal seal on the upper complete dentures. Thirty-one (68.88%) complete dentures didn’t have PPS. There is no difference between males and females.

Table II describes the various patterns or shapes that were existed on the complete dentures. The figure of the butterfly shape (21.42%) was on three complete dentures, the single bead (64.28%) on nine complete dentures. We saw two (14.28%) double beads with on the anterior aspect and one on the posterior limit of the posterior palatal seal area.

Table No. 1: Number of the Posterior Palatal Seal on the upper complete dentures

Posterior Palatal Seal

No. of CD	No. with PPS	No. without PPS
Male 23	7 [30,43%]	16 [69,56%]
Female 22	7 [31,81%]	15 [65,18%]
Total of 45	14 [31,11%]	31[68,88%]

Table No. 2: Description of the shape of the Posterior Palatal Seal

Gender	Description of the shape of PPS		
	Butterfly Number	Single bead Number	Double bead Number
Male	1 [14,28%]	4 [57,14%]	2 [28,57]
Female	2 [28,57%]	5 [71,42%]	0
Total	3 [21,42%]	9 [64,28%]	2 [14,28%]

Table No. 3: The end of the denture concerning to the vibrating line

Gender	Vibrating line of CD Yes	Vibrating line of CD Non
Male	2 [8,69%]	21 [91,30%]
Female	5 [22,72%]	17 [77,27%]
Total	7 [15,55%]	38 [84,44%]

DISCUSSION

One of the problems in complete dentures service is the provision of retention. To obtain good retention of an upper denture, the base should be well-fitting correctly, extended and has a good posterior palatal seal. The delineation of the area of PPS is not a laboratory obligation. This is the responsibility of the dentist who constructs the prosthesis. To assign the laboratory technician is a breach of the patient's faith in the diagnostic ability of his dentist. The success of the complete denture may depend on these simple but critical procedures.

It has been written that the extension of the posterior border of the upper denture is indicated especially for patients who have small residual ridges or who have ridges that are more mobile and displaceable. The extension is useful when the maxillary dental arch is small, narrow and high vaulted. The additional border seal is also useful for patients with a marked retrusion of the mandible or with a mandible that is relatively prognathic and much larger in bearing areas than the maxillae. (1)

It is generally agreed that the posterior border of the maxillary denture must be extended at least to the vibrating line or in most instances; the denture should be ended at the vibrating line. (14-16)

The phonation technique was used for determining the location of the vibrating line. Many authors suggested this technique. (5, 8, 17, 18) Other authors had suggested the swallowing method and the nose-blowing method. (2, 5, 8)

In our investigation, 38 complete dentures were found to have the PPS on the vibrating line. An investigation reported that the end of dentures was located within 1 to 2mm posterior to the vibrating line. (5)

Iwaraga et al supported that the shape of the anterior border of the Potsdam is often described as butterfly-shaped and should differ among patients. (23) Other studies suggested that a wider PPS area could be obtained if the patients had a gentle palatal contour at the junction of the hard and soft palate. (24-25) Other investigators measured the angle of the junction between the hard and soft palate from the lateral cephalogram and they found that it was correlated to the distance between the anterior and the posterior vibrating lines. (26)

It has been written that a PPS is necessary for optimum retention of maxillary complete dentures. A lot of authors have proven that the altering type of the posterior palatal of PPS affects retention. (8,13,18,19,20, 21, 25)

We also recorded that 31 (68.88%) upper complete dentures didn't have PPS. The patients had difficulties with retention during the functional movements.

Chandu et al concluded that the incorporation of a PPS is important for obtaining optimum retention of the maxillary complete denture. (26) All types of PPSs provided a constituent and substantial increase in the retention of the denture base. The butterfly-shaped posterior

palatal seal showed superior retention compared to a single bead and double bead type of posterior palatal seal. (26)

It is known that most dentures are made of polymethylmethacrylate resin, which shrinks on polymerization. This shrinkage affects the posterior area of the maxillary denture and often creates a gap in adaptation between the denture base and the palate. The incorporation of a PPS helps to compensate for the volumetric shrinkage of the acrylic resin and maintains the denture-tissue interface, which is essential for retention. (27)

It is generally preferred that the determination of PPS is not only a clinical procedure but also it depends on the laboratory process. An article showed that denture bases processed on high expansion stone had better posterior palatal seal adaptation compared with those processed on buff stone, independent on processing techniques. (12)

After much deliberation, we must conclude that the incorporation of PPS in the upper complete denture is significant for this appliance function.

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