



Research Article

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Posterior Palatal Seal (PPS): A brief review

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Abstract

For retention of the maxillary denture during functional movements of the stomatognathic system like mastication, deglutition, and phonetics, it must maintain contact with the anterior portion of the soft palate. Correctly incorporated Posterior Palatal Seal into the prosthesis also helps in reduction of gag reflex, reduce food accumulation beneath the posterior aspect of the denture, reduce patient's discomfort when contact occurs between the dorsum of the tongue and the posterior end of the denture & the thickened area provides added strength across the denture. In the present review article, a brief overview is presented on the Posterior Palatal Seal importance and its clinical significance.

Keywords: PPS, Maxillary Denture, Retention, Gag Reflex, Hamular Notch.

Introduction

According to the glossary of Prosthodontic terms, the posterior palatal seal area is stated as "the soft tissues along the junction of the hard and soft palates on which pressure within the physiologic limits of the tissues can be applied by a denture to aid in the retention of the denture."

Posterior Palatal Seal consists of two separate but confluent areas: Pterygomaxillary seal, which extends through the pterygomaxillary notch/ hamular notch and continuing for 3-4mm antero-laterally approximating the mucogingival junction & Post palatal seal which extends medially from one tuberosity to the other. PPS area lies between the anterior and posterior vibrating lines.^{1,2}

Placement of the posterior palatal seal includes; proper oral examination and diagnosis, anatomic and physiologic considerations, determination of anterior and posterior vibrating lines, determination of the type of soft palate, incorporation of proper clinical techniques, use of proper impression materials, proper carving of the PPS into the cast and the incorporation of proper Laboratory techniques & recognition of troubleshooting aspects and making adjustments.

Literature Review

Boucher (1964) reported that arbitrary scraping of the cast for incorporating the posterior palatal seal carved a single hand design on the master cast. A V shaped groove 1.0 –1.5mm deep and 1.5mm wide at its base was carved 2mm anterior to the vibrating line. Silverman and Sidney (1971) documented the hypothesis that the retention and stability of a complete maxillary denture will be increased by extending the posterior denture border beyond the vibrating line. Winland and Young (1973) reviewed the various types of posterior palatal seals and their construction. Avant W.E (1973) did a study to determine if a posterior palatal seal is necessary for complete denture retention and if altering the type and location of that seal affects retention.³⁻⁵

Anterior vibrating line (AVL): is an imaginary line located at the junction of the attached

tissues overlying the hard palate and the tissues of the immediately adjacent soft palate. (In other words, its an imaginary line which demarcates movable and immovable tissues.)

Locating AVL: Method 1: Valsalva Maneuver: Both nostrils to be held firmly while the patient blows gently through the nose. This will position the soft palate inferiorly at its junction with the hard palate. **Method 2: 'Ah' line:** It is the area at, or distal to the junction of the hard and soft palates where movement occurs when the patient says 'ah' with short vigorous burst. Due to the projection of the posterior nasal spine, the anterior vibrating line is not a straight line between both hamular processes. The anterior vibrating line is always on soft palatal tissues.^{6,7}

Posterior vibrating line (PVL): is an imaginary line at the junction of the aponeurosis of the tensor veli palatine muscle and the muscular portion of the soft palate. It represents the demarcation between that part of the soft palate that has limited or shallow movement during function (quivers) and the remainder of the soft palate that is markedly displaced during functional movements.

Locating PVL: Method: 'Ah' line: Asking the patient to say 'ah' in short burst in a normal, unexaggerated fashion. PVL marks the most distal extension of the denture base.

Classification of Soft Palate

There are three classes of soft palate configuration that are commonly used. The House Classification (named after M. M. House) is also customarily used to designate the shape of the soft palate, and it describes the amount of posterior tissue that will be covered by the PPS (or in other words, the amount of posterior tissue that will accept the PPS).

Class I: More than 5 mm of movable tissues available for post-damming. Ideal for retention and allow wide PPS. *Class II:* 1-5mm of movable tissues available for post-damming. Good retention is usually possible. *Class III:* Less than 1 mm of movable tissue available for post-damming. Retention is usually poor. Usually seen in conjunction with a high V-shaped palatal vault.⁸

Functions of PPS: Millsap and Ettinger summarized functions of the posterior palatal seal as follows: to establish positive contact posteriorly (to prevent the final impression material from sliding down the pharynx, to serve as a guide for positioning the impression tray, aid in compensating for dimensional changes in curing and to determine if adequate retention and the seal of the potential denture border is present.

Methods for recording PPS

1. Conventional approach: Final impression is made then boxed and poured. Well adapted resin or shellac tray is fabricated on the stone cast. The patient is seated in an upright position and

instructed to rinse with an astringent mouthwash. Then the posterior palatal area is dried with gauze. A 'T' burnisher or a mouth mirror is used to palpate the hamular process. Then it is marked/ noted. The 'T' burnisher (or mouth mirror) is then placed along the posterior angle of the tuberosity until it drops into the pterygomaxillary notch. The same procedure is performed on the other side.⁹

Posterior vibrating line (PVL) is marked (by using the method explained earlier). The line through the Pterygomaxillary seal and the PVL are joined and the posterior denture extension is delineated. The palatal tissues anterior to the posterior border are palpated with 'T' burnisher or mouth mirror to determine their compressibility in width and depth termination of the glandular tissues usually coincides with the anterior line. AVL is marked (by the use of Valsalva maneuver or "Ah" line method visual outline is in the shape of a cupid's bow. The patient is instructed to keep the mouth open to prevent smudging of the markings resin or shellac tray inserted into the mouth and seated firmly to place upon removal, the indelible lines should have been transferred to the tray. A tray then returns to the master cast to completely transfer these markings.

Carving of the master cast is done using a kingsley scraper. Deepest areas are located on either sides of the midline, one-third the distance anteriorly from the PVL. Depth of 1-1.5 mm is carved. The tissues covering the Midpalatal raphe are scored to a depth of 0.5-1 mm. As the seal approaches the anterior vibrating line there is just a slight scraping of the cast. Just posterior to the deepest portion of the seal, it is tapered again towards the PVL. A non-physiologic technique.¹⁰

2. Fluid Wax Technique: After making the definitive impression, the markings are made for AVL & PVL in the usual manner as described above. Now the PPS area is transferred in the definitive impression. The area is cut and Fluid wax is painted over it. Definitive impression is reinserted in the pt's mouth and PPS area is recorded. A physiologic technique.

Any one of four types of wax can be used for this technique: Iowa wax, white, developed by Dr. Earl S. Smith; Korecta wax No. 4, orange, developed by Dr. O. C. Applegate. H-L physiologic paste, yellow-white, developed by Dr. C. S. Harkins; Adaptol, green, developed by Nathan G Kaye. These waxes are designed to flow at mouth temperature. The melted wax is painted onto the impression surface within the outline of the seal area and PPS is recorded. The impression is carried to the mouth and held in place under gentle pressure for four to six minutes to allow time for the material to flow. According to Nelson, for recording PPS, the position of head must be downward so that the Frankfort plane (portion- orbital) is a 30 (below the horizontal and the tongue is firmly positioned against the mandibular anterior teeth. Flexion of the head also contributes to moving excess impression material and saliva out of the mouth, rather than progressing down the pharynx. The

patient is asked to periodically rotate the head so that all functional positions of the soft palate are recorded.

3. Arbitrary Scraping of Master Cast: Final impression is made then boxed and poured. In the master cast, the Laboratory Technician or the dentist makes her/his own call about the recollection of the palatal configuration and tissue compressibility for arbitrary trimming the master cast. A non-physiologic technique.

4. Extended Palatal Technique: Advocated by Silvermann. He believed that the extension of Denture border 8-10mm beyond PVL helps in Denture retention. A non-physiologic technique.

5. Modified Border moulding Technique: In an Indian set-up, we usually follow this modified version of the fluid wax technique. Here before making the definitive impression, PPS Area is recorded in the Low-fusing impression compound. Followed by Definitive Impression.

Failures in PPS¹¹

Under extension: Most common causes of failure. Commonly this is because the practitioners use fovea palatine as a landmark for terminating denture base (because it is not a fixed landmark it cannot be used.) sLab technicians may over trim the posterior border thereby leading to loss of posterior border seal.

Over extension: In order to maximize the retention qualities of a denture, the dentist may violate the physiology of soft palate musculature. And place the pps too far distally. Patient frequently complains that swallowing is painful and difficult. Small ulcerated areas are seen in the region of the soft palate. It should be carefully visualized, trimmed and re-polished.

Under post damming: There may be insufficient placement of tissues at some points along the terminal borders of the denture it may be a result of recording the tissues when the mouth was wide open during final impression (pterygomandibular fold becomes taut). So when the patient assumes any other positions a space will be present between denture base and tissues. The correction can easily be made by further scraping the cast and adopting the trial base if the conventional approach is used or by adding more wax and reminding the patient to refrain from opening the mouth so wide if the fluid wax technique is employed.

Over post damming: On the other it is also possible that the cast was scrapped too aggressively and the pps displaced too much tissue. Selective reduction of the border followed by light pumicing will solve the problem.

Adding a Posterior Palatal Seal to an Existing Denture¹²

There are times when a completed denture is deficient in the posterior palatal seal area. The deficiency may be either in depth or in the length of the denture base, or in both. There are many

techniques to improve the posterior palatal seal in an existing denture.

Moghadam and Scandrett suggested a procedure that utilizes the fluid wax technique. All of the steps outlined for locating, marking, and placing the wax in the seal area are followed, except that this time the wax is placed on the processed denture base. An indelible pencil is used to outline the anterior extent of the seal on the denture. Fluid wax is painted in PPS area. After the PPS is recorded (4-6 mins.), the denture is removed from the mouth. Stone is vibrated into the denture wax surface. After the stone has set, the wax is eliminated. The auto polymerizing acrylic powder is sprinkled between the denture base and the cast while holding on a vibrator. The monomer is then added drop wise. The denture is then replaced on the stone cast and held firmly with rubber bands. They are then placed in a pressure pot with water (140 (F) for 20 minutes under 30-psi pressure. After the cast and denture are separated, the excess acrylic is trimmed and the border polished lightly. The denture should be stored in water for 24 to 36 hours to reduce harmful residual monomer.

Conclusion

The placement of the correct posterior palatal seal area is not a difficult procedure once the anatomy and physiology of the area is understood. Careful examination during the diagnostic phase of the treatment and following established techniques for the placement of the border, seal will ensure a more retentive prosthesis for the patient, whose satisfaction is the practitioner's main concern.

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