University of Basrah

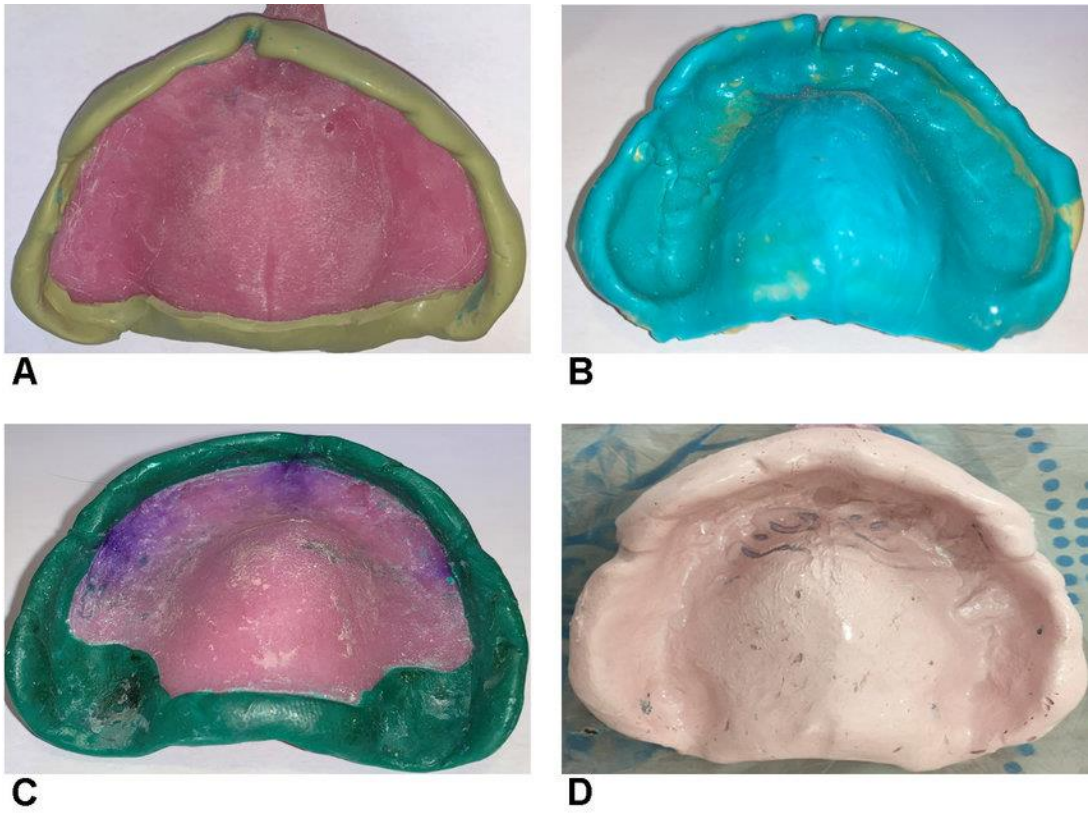
College of Dentistry

Department of prosthetic dentistry

5th stage / lec 4 ***Dr. Hasanein Al-namel***

1. Complete denture peripheral seal:

One potential issue with complete dentures is inadequate border extension, with particular emphasis on the posterior palatal extension in maxillary complete dentures being of utmost importance. The rear border concludes on a surface that exhibits different degrees of mobility, unlike the other borders of the denture which stop at a tissue fold. The identification and creation of the posterior palatal seal, following a comprehensive comprehension of the anatomical and physiological limitations within this dynamic area, significantly improves the effectiveness of the border seal and optimizes the retention of maxillary complete dentures. Numerous instances of denture failure have been attributed to the inadequate formation of the distal limit and an inappropriate posterior palatal seal. The positioning and fabrication of the master cast are frequently carried out by dental professionals, such as dentists or dental technicians, without explicit consideration of the anatomical landmarks within the oral cavity. The literature contains descriptions of many techniques for attaining and replicating the posterior palatal seal in the maxillary denture.



2. Posterior palatal seal area:

The posterior boundary of the soft tissue region is defined by the distal demarcation between the movable and non-movable tissues of the soft palate. The anterior boundary is formed by the junction of the hard and soft palates, where pressure can be exerted within physiological limits. This seal can be utilized by a removable complete denture to enhance its retention.

3. Functions of the Posterior Palatal Seal:

The primary function is that of completing the peripheral seal and enhancing the retention of the complete denture. The other purposes served by the **PPS** are as follows:

- Maintains contact of denture with soft tissue during functional movements of the stomatognathic system, which decreases gag reflex.
- Decreases food accumulation with adequate tissue compressibility.
- Decrease patient discomfort of the tongue with the posterior part of the denture.
- Compensation for volumetric shrinkage that occurs during the polymerization of PMMA
- Increases retention and stability by creating a partial vacuum.
- Increased strength of maxillary denture base.
- Adds confidence and comfort to the patient by enhancing retention.

The peripheral seal of the maxillary denture refers to the region where the mucosa comes into contact with the polished surface of the denture base. This seal serves the purpose of preventing the flow of air between the denture and the underlying tissue. The retention of a denture is attained through the combined effects of adhesion, cohesion, and interfacial surface tension, which collectively counteract the dislodging forces acting in a perpendicular direction to the denture base. The posterior palatal seal is inserted in the maxillary complete denture because the acrylic will distort slightly and pull away from the posterior palatal portion of the maxillary cast. The acrylic will shrink toward the places of greatest mass, which are the sections over the ridge where the teeth are put. The posterior palatal seal establishes a vacuum seal

between the denture and the soft palate that retains the maxillary full denture securely in place. The appropriate PPS resists the horizontal and lateral stresses exerted on the maxillary denture base as the denture border terminates on soft resilient tissue and so preserving a proper denture seal. A well-fitting and retentive full denture requires a well-fitting tissue surface, and a peripheral border suitable with the muscles and tissues that make up the mucobuccal and mucolabial spaces so that a peripheral seal is produced by the soft tissue draped over them. Typically, labial and buccal seals are employed to achieve it. In the posterior region, it is predominantly by the posterior palatal seal. At the posterior extension of the maxillary denture, where the tissues are less pliable, additional attention is required to make the seal effective.

4. Anatomical Considerations for Posterior Palatal Seal:

The PPS is divided into two anatomic separate boundaries

1. Post palatal seal.

2. Pterygomaxillary seal.

The post-palatal seal stretches from one tuberosity to the other. The pterygomaxillary seal is observed to continue into the pterygo-maxillary notch, with a continuation of approximately 3-4 mm in an anterolateral direction, in close proximity to the mucogingival junction. Furthermore, it completely fills the whole breadth of the pterygomaxillary notch. The pterygomaxillary fold is responsible for covering the notch, which spans from the posterior part of the tuberosity to the retromolar pad. The

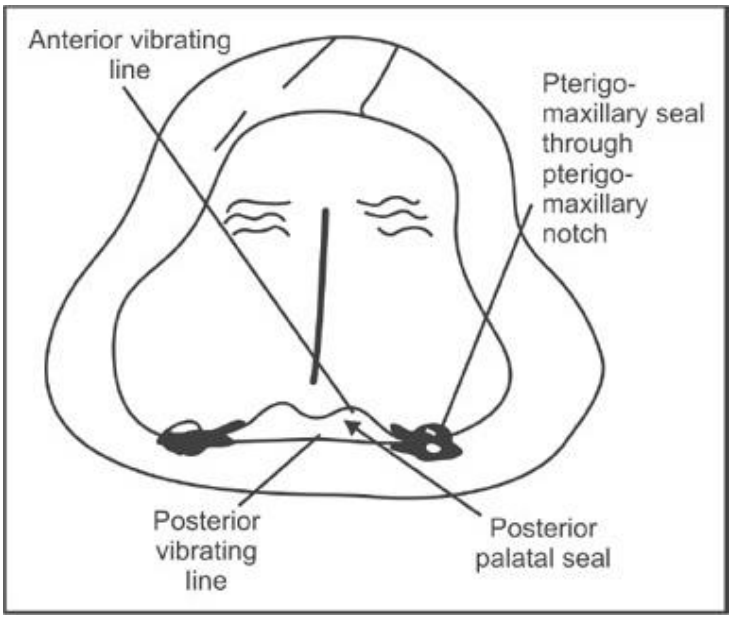
presence of this fold can impact the integrity of the posterior border seal when the mouth is in a wide-open position during the final impression operation.

3. Fovea palatine

Fovea palatine is two glandular openings within the tissue posterior of the hard palate lying on either side of the midline. Fovea palatina should be used only as a guideline for the placement of the posterior palatal seal.

4. Medial palatal raphe

The term "overlies" refers to the concept of one thing being positioned directly above or on top of another thing. The medial palatal suture is characterized by a minimal or absent submucosal layer and exhibits little capacity for compression. The narrowing of the seal area in the mid-palatine region can be attributed to the limited presence of connective tissue and the protrusion of the posterior nasal spine. A slender bundle, resembling a ligament, is often observed to be created at the convergence of the aponeurosis and the posterior nasal spine. The placement of the posterior palatal seal does not extend to encompass this limited region. If the palatine tours extend beyond the bony limit of the palate, resulting in limited or no space available for the placement of the PPS, then the use of a removable PPS is recommended.



5. **Physiological consideration:**

- **Saliva**:

The presence of thick ropy saliva can create hydrostatic pressure in the area anterior to the posterior palatal seal, resulting in a downward dislodging force.

- **Vibrating line:**

An imaginary line across the posterior part of the soft palate marks the division between the movable and immovable tissues; this line can be identified when the movable tissues are functioning.

1. Anterior vibrating line.
2. Posterior vibrating line.

- **Anterior vibrating line:**

It is an imaginary line lying at the junction between the immovable tissues over the hard palate and the slightly movable tissue of the soft palate.

- **Methods of the location of the anterior vibrating line (AVL):**

Instructing the patient to say "AH" with short vigorous bursts due to projection of the posterior nasal spine. The anterior vibrating line is not a straight line between both hamular processes. The AVL is cupid bow-shaped.

- **Posterior vibrating line (PVL):**

It is an imaginary line at the junction of the aponeurosis of the tensor veli palatine muscle and the muscular portion of the soft palate visualized, while the patient is instructed to say 'ah' in short bursts in a normal unexaggerated fashion. It represents demarcation between the part of the soft palate that has limited or shallow movement during function and the remainder of the soft palate that is markedly displaced during functional movement. The posterior vibrating line marks the most distal extension of the denture base

6. Classification of soft palate:

According to House classification:

- **Class I:**

It indicates a soft palate that is rather horizontal as extends posteriorly with minimum muscular activity. There is considerable separation

between 5mm anterior and posterior vibrating lines, does having a wide PPS area yields a more retentive denture base.

- **Class II:**

The soft palate gradually slopes from the hard palate. Overextension of the posterior limit of the denture can be tolerated to some extent. The palatal contour lies between class I and class III.

- **Class III:**

it is seen in conjugation with a high V-shaped palatal vault. There is a few mm separation of the anterior and posterior vibrating line thus there is a small PPS area and less retention. The soft palate abruptly slopes from the hard palate. Hence, the posterior limit of the maxillary denture remains

7. **Designs of the posterior palatal seal:**

Winland and Young surveyed the commonly employed posterior palatal seal designs and summarized them as follows:

- ✓ bead posterior palatal seal
- ✓ double bead posterior palatal seal
- ✓ butterfly posterior palatal seal
- ✓ butterfly posterior palatal seal with a bead on the posterior limit
- ✓ butterfly posterior palatal seal with the hamular notch area cut to half the depth of a no. 9 bur

posterior palatal seal constructed in reference to House's classification of palatal forms:

- ✓ Class I: A butterfly-shaped posterior palatal seal with3-4 mm wide.
- ✓ Class II: Posterior palatal seal is narrow with 2-3 mm of width.
- ✓ Class III: A single beading made on the posterior vibrating line. very critical.

8. Methods or techniques of recording posterior palatal Seal area:

a. Conventional approach.

After the special tray is fabricated, there are certain instructions given to the patients

- Rinse with an astringent mouthwash that is to remove the stringy saliva that might prevent clear transfer marking.
- The location of the pterygo-maxillary notch is done by moving the T burnisher along the posterior angle of the maxillary tuberosity until it drops into the pterygo-maxillary notch. This is necessary as there are times when a small depression in the residual ridge may resemble a pterygo-maxillary notch.
- Identification of posterior vibrating line, the patient asked to say "AH" in a normal unexaggerated fashion.
- Identification of the anterior vibration line. This is done by asking the patient to say "AH" with short vigorous bursts.

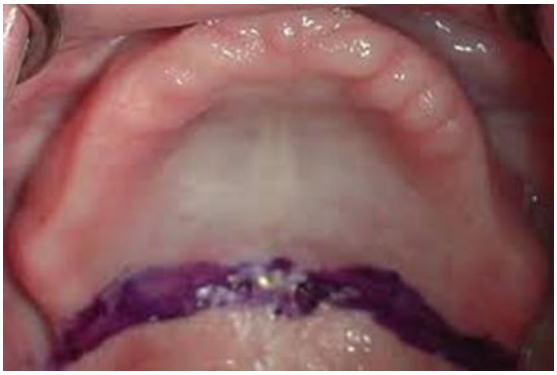
Procedure:

- A line is placed with an indelible pencil through the pterygo-maxillary notch and extended 3-4 mm antero-laterally to the tuberosity area approximating

the mucogingival junction, the same is done on the opposite side. This completes the outlining of the pterygo-maxillary seal.

- The posterior vibrating line is marked with an indelible pencil by connecting the line through the pterygomaxillary seal with the line just drown demarcation of the post palatal seal.
- The resin or shellac tray is inserted into the mouth and seated firmly to place so that upon removal from the mouth the indelible lines will be transferred to the tray.
- Sometimes it is necessary to redefine transfer marking. The tray is returned to the master cast to complete the transfer of the posterior border.
- The tray is trimmed until the posterior vibration line so that it decides the posterior extent of the denture border.
- Returning to the mouth the palatal fissures are palpated with the 'T' burnisher or mouth mirror to determine their compressibility in width and depth.
- The termination of glandular tissue usually coincides with the anterior vibrating line.
- The anterior vibrating line is now marked and transferred to the master cast. This will complete the transfer of the outline of the posterior palatal seal area.
- The visual outline is in the shape of a cupid bow, the area between the anterior-posterior vibrating lines is usually narrowest in the mid-palatal region because of the projection of the posterior nasal spine. • Carving of the master cast is done using a Kingsley scraper. The deepest areas are located on either side of the midline, one-third the distance anteriorly from the PVL, depth of 1-1.5 mm. The tissues covering the Mid-palatal raphe are scored to a depth of 0.5-1 mm because they contain little submucosa and cannot

withstand the same compressive force as the tissue lateral to it. 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. Failure to taper the seal posteriorly led to tissue irritation.



Advantages of this technique:

1) The trial base will be more retentive.
2) This can produce more accurate maxillo mandibular records.
3) Patients will be able to experience the retentive qualities of the trial base, giving them the psychological security of knowing that retention will not be a problem in the completed prosthesis.
4) The practitioner will be able to determine the retentive qualities of the finished denture.
5) The new denture wearer will be able to realize the posterior extent of the denture which may ease the adjustment periods.

Disadvantages:

1) It is not a physiologic technique and therefore depends upon accurate transfer of the vibrating lines and careful scraping of the cast.
2) The potential for over-compression of the tissue is great.

b. Fluid wax technique. (functional technique or physiological technique):

All of the procedure remains the same as a conventional technique which is transfer location and transfer marking of the anterior and posterior vibrating line.

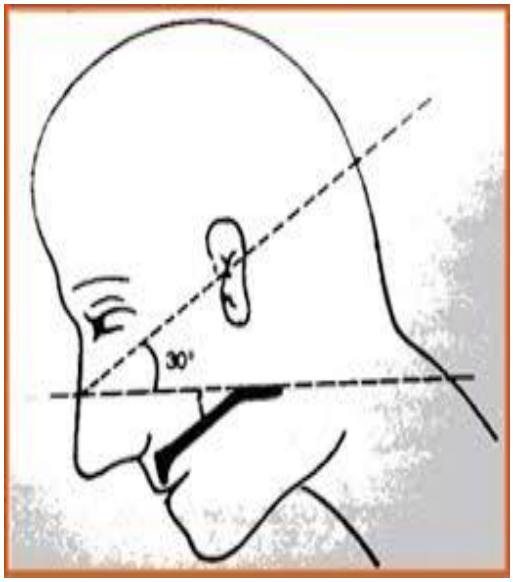
The marking is recorded in the final impression. ZOE/impression plaster (not with elastomeric impression material as they are resilient, non-adherent to wax, and distort wax when reseated into the oral cavity). One of the four types of wax can be used for this technique: -

- Iowa wax white
- Adaptol green wax.
- Korecta wax no. 4 (orange).
- K.L physiologic paste (yellow-white).

These waxes are designed to flow at mouth temperature. The melted wax is painted into the impression surface and in the outline at the seal area, usually, the wax is applied in slightly excess of the estimated depth and allowed to cool to below mouth temperature to increase its consistency and make it more resistant to flow. The impression is carried to the mouth and held in place under gentle pressure for 4-6 min and allow time for the material to flow.

Patient position during impression making of palatal seal area:

An impression should be made when the patient is seated in an upright position with the head flexed 30 degrees forward, below the FH (Frankfort) plane to allow the soft palate to reach its functionally depressed position. The patient's tongue should be placed under tension against either the handle of the impression tray or the dentist's finger which is held in the region of the upper maxillary incisors. After 4 min remove the impression tray, if the tissue contact has been established it will appear glossy. Trim excess (or) if no tissue contact is established then add and redo the procedure. A Secondary impression is reinserted and held for 3-5 minutes under gentle pressure followed by 2-3 minutes of firm pressure applied to mid palatal area of the impression tray, upon removal of the tray from the mouth it is carefully examined to see the wax terminate in feathered edge near the anterior vibrating line.



Advantages:

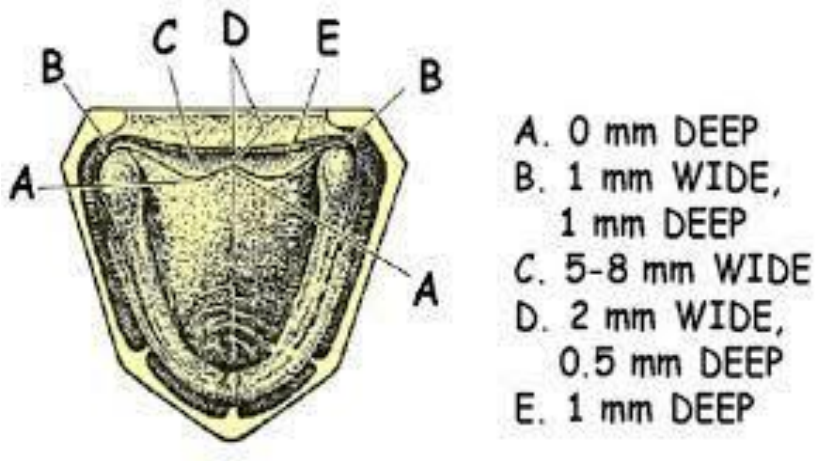
- It is a physiologic technique displacing tissues within their physiologically acceptable limits.
- Over-compression of tissue is avoided.
- Posterior palatal seal is incorporated into the trail denture base for added retention.
- Mechanical scrapping of the cast is avoided.

Disadvantages:

- More time is necessary during the impression appointment.
- Difficulty in handling the materials and added care during the boxing procedure.

c. Arbitrary scraping of the master cast.

According to Winkler, arbitrarily mark the anterior and posterior vibrating line and scrape about 1-1.5 mm. It is the least accurate method used to mark the posterior palatal seal. Its high potential for over-post damming is due to its nature of unphysiological technique of recording.



Error in recording PPS:

1) Under extension: This is the most common cause of poor posterior palatal seal. It may be produced due to one of the following reasons: -

- The denture does not cover the fovea palatine; the tissue coverage is reduced and the posterior border of the denture is not in contact with the soft resilient tissue which will move along with the denture border during functional movements.
- The dentist leaves the posterior border extended to reduce the patient's anxiety to gagging.
- Improper delineation of the anterior and posterior vibrating line.
- Excessive trimming of the posterior border of the cast by the technician.

2) Under post damming.

- This can occur due to improper head positioning and mouth positioning. E.g., the mouth is wide open while recording the posterior palatal seal, and the mucosa over the hamular notch

becomes stretched. This will produce a space between the denture base and the tissue.

- Inserting a wet denture into a patient's mouth and inspecting the posterior border with the help of a mouth mirror. If air bubbles are seen to escape under the posterior border it indicates underdamming.
- Prevention: The master cast can be scraped in the posterior palatal area or the fluid wax impression can be repeated with proper patient position.

3) Over post damming.

- This commonly occurs due to excess scraping of the master cast. It occurs more commonly in the hamular notch region.
- Pterygo maxillary seal area, then upon insertion of the denture the posterior border will be displaced inferiorly.
- Prevention: Reduction of the denture border with a carbide bur, followed by lightly pumicing the area while maintaining its convexity.

4) Overextension.

Overextension of the denture can lead to:

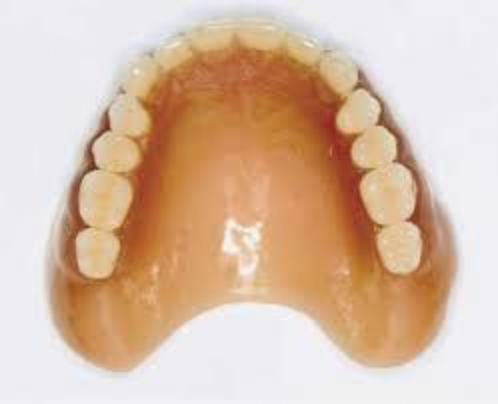
- Ulceration of the soft palate and painful deglutition.
- The most frequent complaint from the patient will be that swallowing is painful and difficult.

- The hamuli are covered by the denture base, the patient will experience sharp pain, especially during function. (Prevention): These regions are trimmed with a bur and carefully polished.

9. Addition of posterior palatal seal to existing denture: -

Existing dentures may have poor length and depth of PPS. Properly examine existing dentures. If there are other problems in the dentures (vertical dimension, centric, esthetics, etc.) then new dentures are to be made. If only PPS is short then correction should be undertaken. Different authors using different materials have advised various techniques. Moghadam and Scandrett advised the use of the fluid wax technique for recording the posterior palatal seal and the addition of the posterior palatal seal with auto-polymerizing acrylic resin. A similar technique using a softened greenstick modeling compound has been suggested by Carrol and Shaffer. Other suggested materials for correction of PPS include:

1. Heat-cured acrylic resin material.
2. Self-cured acrylic resin.
3. Light-cured resin.



10. When to record PPS:

There are two schools of thought as to when to record PPS.

a. Before trying in - provide the patient with psychological confidence.

b. After trying to prevent possible mechanical displacement of the trail base by the tissues, which results in an inferior placement of the posterior segment of the denture base leading to occlusal error in the 2nd molar region due to improper seating of bases during jaw relation.

Orally, the area of the vibrating line is recorded by making marks with an indelible transfer stick in the fovea palatina area and the hamular notch areas on both sides of the palate and then connecting them with a solid line.