Lec. 5 Posterior Palatal Seal د. تميم خضر

Posterior Palatal Seal (PPS) area: the soft tissue area at or beyond the junction of the hard and soft palates on which pressure, within physiologic limits, can be applied by a complete denture to aid in its retention. Posterior palatal seal area is frequently referred also as postdam area, vibrating line, and vibrating area.
This soft tissue seal around the posterior border of maxillary complete denture requires special consideration during denture extension determination because of the range and extent of the soft tissue activity along this border.
By utilizing the retentive function of atmospheric pressure, the presence of an intact border seal is necessary for the retentive function of atmospheric pressure. Posterior palatal seal completing the buccal and labial border seal.

Functions and importance of the Posterior Palatal Seal

1- The primary function is that of completing the peripheral seal and enhancing the retention of the complete denture by utilizing the retentive function of atmospheric pressure.

2- Diminishes the gag reflex by making the posterior border less noticeable to the tongue.

3- The proximity of the tissue contact prevents food from getting under the denture base.

4- Decreases the forces on the residual ridge by increasing the denture bearing area.

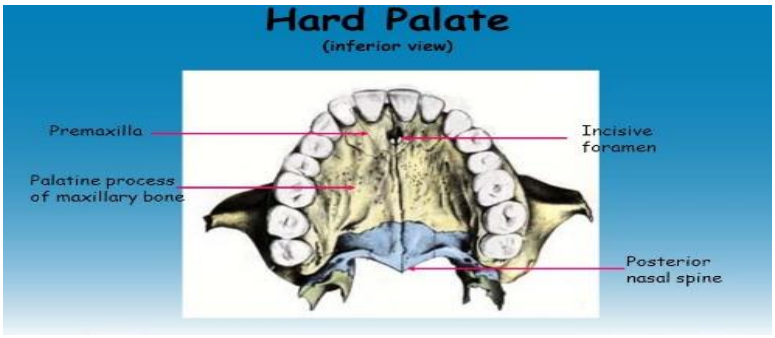
5- Strengthens the maxillary denture due to the additional bulk at the posterior border.

6- Compensates for polymerization shrinkage of acrylic resin.

7. Adds confidence and comfort to the patient by enhancing retention.

Anatomical Considerations

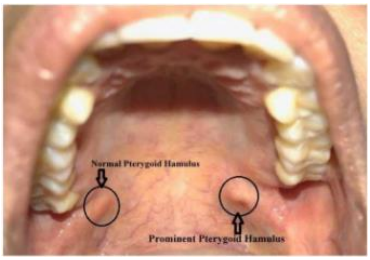
The seal area extends from around the hamular notch on one side across the junction of hard and soft palate to the hamular notch on the other side. The seal area narrows down in the mid palatine area due to the lack of connective tissue and the prominence of the posterior nasal spine.



Posterior palatal seal: it is a seal area at the posterior border of the maxillary denture. It can be divided into 2 areas – pterygomaxillary seal, posterior palatal seal

Pterygomaxillary seal extends through pterygomaxillary notch continuing 3-4mm anterolaterally, approximating the mucogingival junction. It occupies the entire width of the hamular notch (loose connective tissue lying between the pterygoid hamulus of the sphenoid bone and distal portion of maxillary tuberosity).
The notch is covered by pterygomandibular fold (extends from the posterior aspect of tuberosity to the retromolar pad). This fold influences the posterior border seal if the mouth is widely open during the final impression procedure.

Post palatal seal: is an area between anterior and posterior vibrating lines found medially from one tuberosity to another. It appears to be a cupid's bow.
posterior palatal seal area encompasses:
- Maxillary tuberosity & hamular process of the medial pterygoid plate.
- Hard palate anterolaterally; the submucosal contains adipose tissue, and posterolaterally; it contains displaceable glandular tissue.
- Soft palate is a movable, muscular fold, suspended from the posterior border of the hard palate. It separates the nasopharynx from the oropharynx.



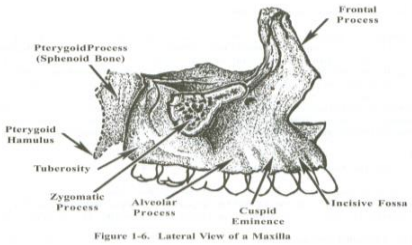
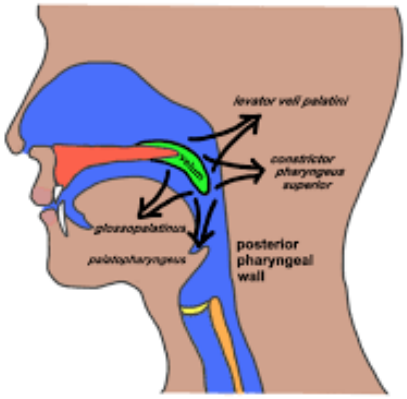
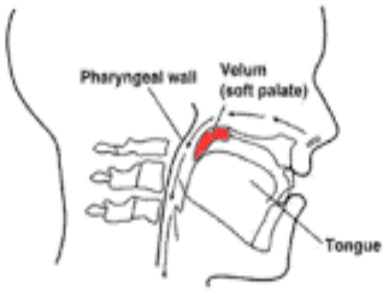


Figure 1-6. Lateral View of a Maxilla

The range of soft palate movement and the degree of displaceability of the seal area differs for every individual. House proposed three classes of palatal throat forms based on the angle, the soft palate makes with the hard palate, and the soft palate muscle activity that will be necessary to establish velopharyngeal closure.

velopharyngeal closure; closure of nasal air escape by the elevation of the soft palate and contraction of the posterior pharyngeal wall.





Velum - normal position

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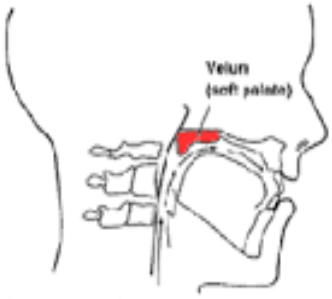

Velum - raised

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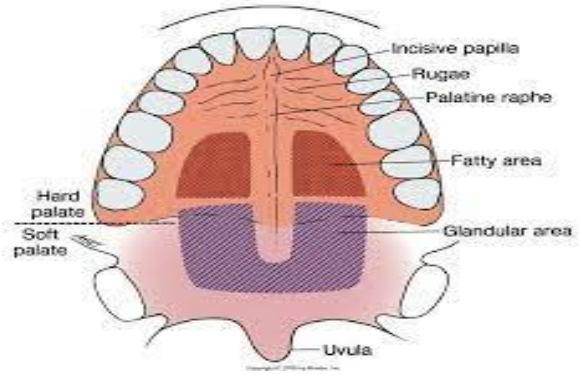
The mucosa of the seal region shows a transition from a fixed to loosely attached tissue beginning from its anterior extent on the glandular region of the hard palate to its posterior extent on the soft palate.



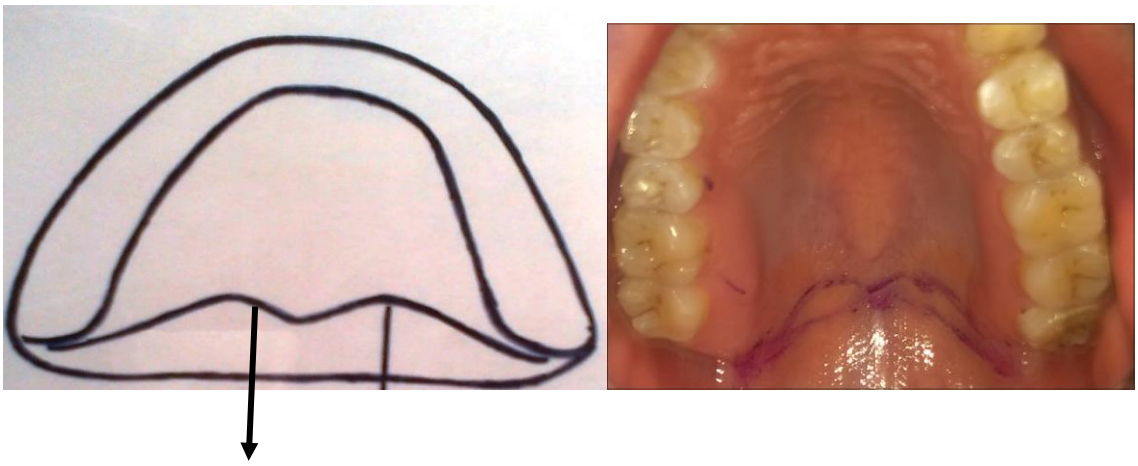
As the seal zone contains a varying thickness of loose connective tissue covered by mucous membrane, it shows differing areas of tissue vibration which are referred to as anterior and posterior vibrating lines with the seal area stretching out between the lines. These lines are defined as follows:

Anterior vibrating line: it is an imaginary line, lying between immovable tissue over the hard palate & movable tissue of the soft palate.

- **Methods for locating the anterior vibrating line (AVL)**

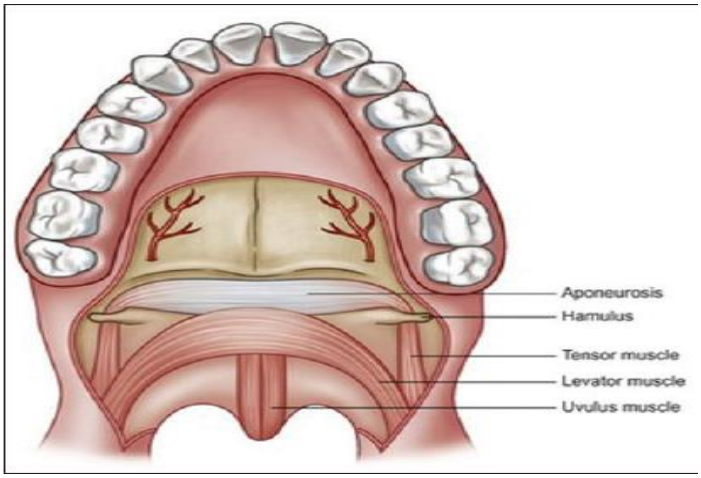
It is generally cupid bow-shaped, visualized while the patient is instructed to say "ah" with short vigorous bursts, or Ask the patient to blow air gently through the nose with nostrils closed by fingers.

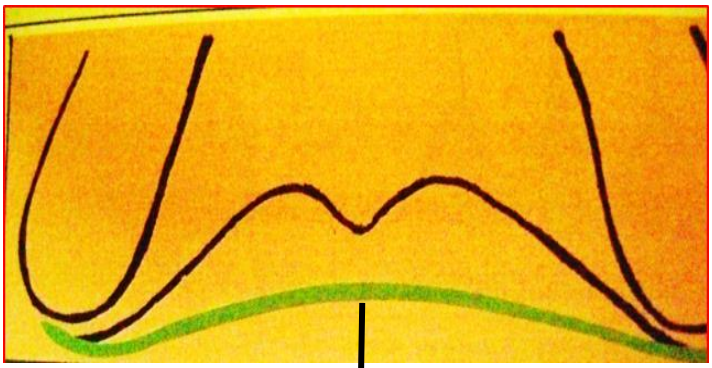
Due to the projection of the posterior nasal spine, the anterior vibrating line is not a straight line between both hamular processes. The anterior vibrating line is always on soft palatal tissues.



Anterior vibrating line

Posterior vibrating line: The posterior vibrating line is an imaginary line at the junction of the aponeurosis of the Tensor veli palatini muscle and the muscular portion of the soft palate. It represents the intersection of the soft palate that shows limited movement & the remainder soft palate that shows marked movement. It is usually straight & generally with slight curvature anteriorly.



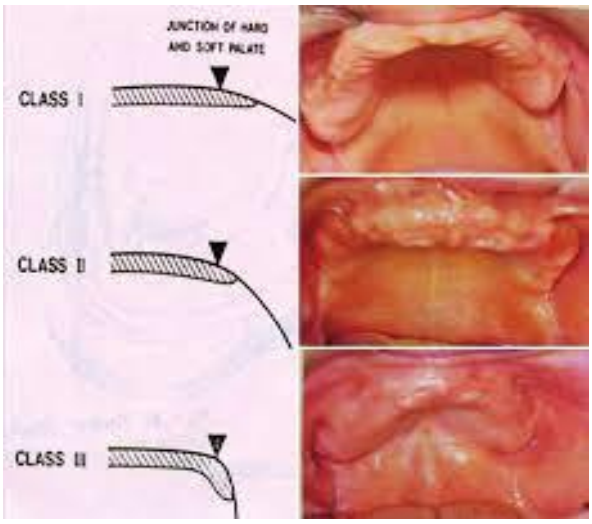


Posterior vibrating

Relationship of vibrating line with fovea palatine
Fovea palatines are two indentations oval to round in shape & unique to the human race located approximately 1-3 mm anterior to the anterior vibrating line.

Types of Palates; two types:
-Hard palate – Anterior part.
-Soft palate - Posterior part.

Classification of Soft Palates; (House classification**)**
Class I - it is horizontal & makes 10° angle to the hard palate & allows more than 5 mm of the seal area. Ideal retention.
Class II - soft palate makes a 45° angle to the hard palate, 1 to 5 mm of seal area depending on the muscular activity of the soft palate. Good retention
Class III soft palate makes a 70° angle to the hard palate. The soft palate is more acute in relation to the hard palate, permitting a narrow seal of less than 1 mm. Poor retention.



Designs of the posterior palatal seal
The most common posterior palatal seal configurations are:
1. A bead posterior palatal seal.
2. A double bead posterior palatal seal.
3. A butterfly posterior palatal seal.
4. A butterfly posterior palatal seal with a bead on the posterior limit.
5. A butterfly posterior palatal seal with the hamular notch area cut to half the depth of a #9 bur.
6. A 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.

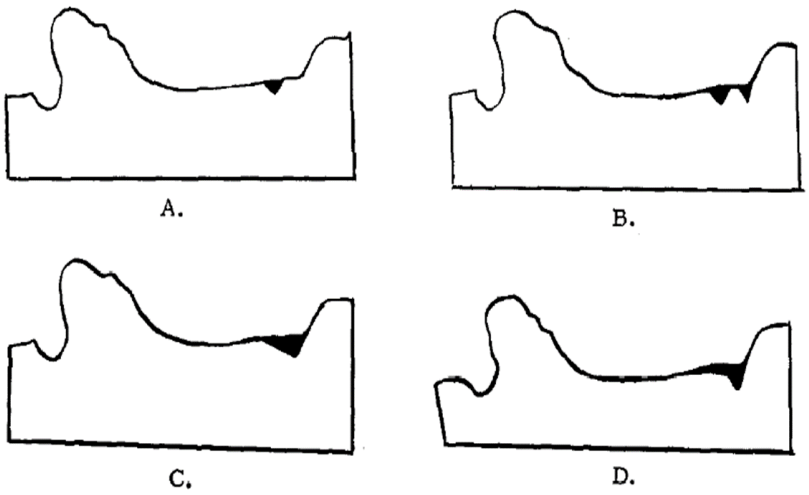


Fig. Cross-sectional views of various posterior palatal seals: *(A)* bead, *(B)* double bead, *(C)* butterfly, and *(D)* butterfly with bead.

Locating Posterior Palatal Seal Region:
As tissues of this area are displaceable, the seal area can be identified when the movable tissues are functioning.

Different methods of recording PPS: -
1) Conventional method.
2) Fluid wax technique.
3) Arbitrary scraping of the master cast.

1-Conventional method:
1- Gently dry the tissues in the posterior palatal seal and pterygomaxillary notch by rinsing with a mouthwash to remove the viscous saliva and with the use of a sterile gauze pad.

2. Locate the pterygomaxillary (hamular) notches with a T-burnisher by passing it posteriorly along the crest of the ridge until it drops into the notch. Mark the notches with the indelible marker.

3. Locating the posterior vibrating line, by asking the patient to say a series of short “ah” in a normal unexaggerated fashion and mark it in the mouth with the indelible marker. Mark the area of the soft palate where movement just begins.

4. Insert the dried maxillary record base in the patient's mouth and seat it fully. Ask the patient to tilt his head down and swallow and/or say a series of short "ah" and visually observe the relationship of the record base to the line marked in the patient's mouth.

5. Remove the maxillary record base and check if the indelible marking transferred to the record base. If the line is not transferred to the record base, reinsert and redo the procedure.

6-Trim the posterior border of the record base to the transferred marking using a bur designed for trimming acrylic. Reinsert the record base in the patient's mouth and evaluate

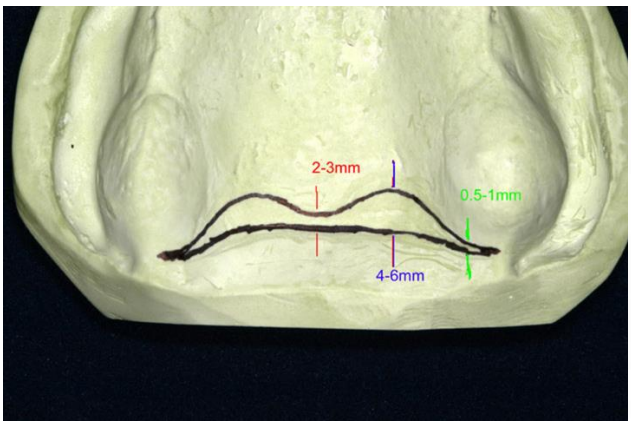
the relationship of the posterior border to the vibrating line. Adjust until the correct extension is obtained. The fovea palatine is not a reliable indicator for the location of the vibrating line.

7. Place the maxillary record base on the cast. Scrape a line into the cast, marking the posterior border of the record base using a sharp instrument. Extend this line approximately 3 mm beyond the crest of the pterygomaxillary notch continuous with the disto-buccal border. This marks the posterior limit of the denture.

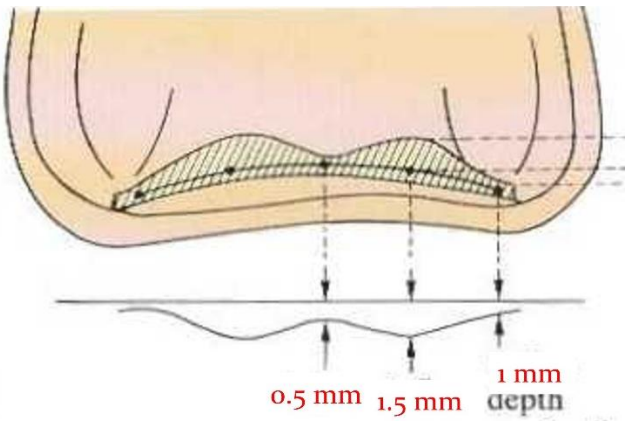
8. Locating the anterior vibrating line by palpating the thickness and displaceability of the tissue anterior to the posterior vibrating line with the ball end of the T-burnisher and locating it by instructing the patient to say "ah" with short vigorous bursts, or to blow air gently through the nose with nostrils closed by fingers. Using an indelible marker to outline the anterior palatal seal and repeat steps 4&5.

9. The generally accepted outline of the established Posterior Palatal Seal Region (anterior and posterior vibrating lines) is a butterfly or mustache pattern. The average dimensions are 2-3 mm in the midline and 0.5-1 mm distal to the tuberosities. Width of 4-6 mm is appropriate for the areas between the midline and pterygomaxillary notches. The seal should be deeper posteriorly becoming more shallow as it extends anteriorly. It should be rounded and smooth in contour.

10. Scrape the master cast using a discoid-cleoid carver to the proper depth. This is usually one-half of the depth the ball of the T-burnisher displaces the tissues. The deepest part of the posterior palatal seal usually is placed on either side of the midline where the seal approaches the hamular notches. This is generally in the range of 1.0 - 1.5 mm in depth. It should be 0.5 mm deep in the middle of the posterior palate, 1 mm deep in the hamular notch area, and 1.5 mm deep in the glandular area between the hamular notch and the middle of the posterior palate.



Width



Depth

Advantages: -

1. Highly retentive trial bases make recording jaw relations easier and precise.
2. Give psychological confidence to the patient that retention will not be a problem in a complete denture.
3. The dentist can determine the retention of the final denture.
4. The patient will be able to realize the posterior extent of the denture, which may ease the adaptation period.

Disadvantages: -

1. Not a physiological technique and therefore depends upon accurate transfer of vibrating line and careful scrapping.
2. Potential for over-compression is more.

2- Fluid wax technique: Start with locating and transferring anterior and posterior vibrating lines similar to the conventional approach. Then with markings made, the final impression is made using ZOE or impression plaster (not with elastomeric impression material as they are resilient, non-adherent to wax, and distort wax when reseated into the oral cavity).

The melted wax is painted into the impression surface (within the outline of the seal area). The wax is applied slightly in excess of the estimated depth and allowed to cool below mouth temperature to increase its consistency and make it more resistant to flow. This impression is carried to the mouth and held in place under gentle pressure for 4-6 minutes.

The impression should be inserted when the patient is seated in an upright position with the head moved 30 degrees forward, below 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.

Excess (or) if no tissue contact is established then add and redo the procedure. Ask the patient not to rinse with cold water, between the procedures (contraction of tissues act to decrease flow properties of wax). Examine the surface morphology of wax at the anterior vibrating line. The wax should terminate in a feathered edge near the anterior vibrating line.

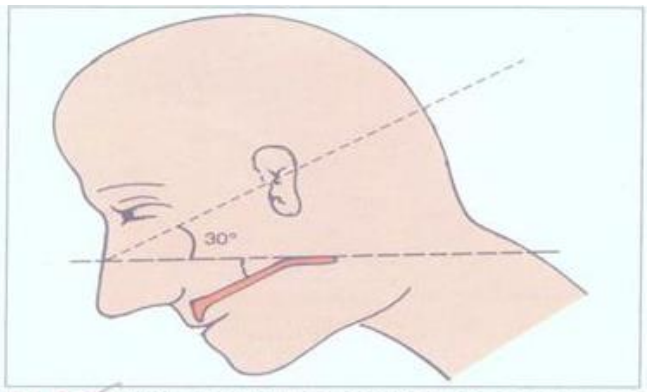


Fig. 7.19: While recording the postdam, the patients head should be tilted downwards by 30°. The blue dotted line shows the Frankfort's plane. Notice that the soft palate hangs down in this position

Types of wax that can be used for this technique:

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

Advantages:

a) It is a physiologic technique of displacing tissues.
b) No over-compression of tissues.
c) PPS is incorporated into the trial denture base for added retention.
d) No mechanical scraping of the cast.

Disadvantages:

a) Time-consuming.
b) Difficulty in handling material and additional care to be taken during boxing procedure.

3) Arbitrary scraping of the master cast

In this technique, the anterior and posterior vibrating lines are visualized by examining the patient's mouth and approximately marked on the master cast. Scrapes 0.5 to 1mm of stone in the posterior palatal seal area of the master cast and fabricate the denture. This technique is inaccurate and not physiological and should be avoided.

Disadvantages:

1- It is the least accurate method.
2- High potential for over-post damming.

Errors in recording the posterior palatal seal

Underextension: The most common error. May be produced due to the following reasons.

1- When the denture does not cover the fovea palatina, the tissue coverage is reduced & the posterior border of the denture is not in contact with the denture border during functional movements.
2- Improper delineation of the anterior and posterior vibrating lines.
3- Excessive trimming of the posterior border of the denture by the dental technician.
4- Some patients inform the dentist on the very first visit for complete denture therapy that they have a gagging reflex. So the dentist intentionally leaves the posterior borders underextended to reduce the patients' anxiety in gagging.
To correct this error. ***Addition of posterior palatal seal to the existing denture:***

A. Fluid wax technique.
B. Softened greenstick modeling compound.
C. Heat cured acrylic resin material.
D. Self-cured acrylic resin.
E. Light cured resin.

Overextension: Overextension of the denture base can lead to ulceration of the soft palate and painful deglutition. Covering the hamular process can lead to sharp pain in that region. To relieve these areas, indelible pencil markings are made on them (hamular process, ulcers, etc) and transferred to the denture. These regions are trimmed and polished.

Underpostdamming: - This can occur due to improper head positioning & mouth positioning, e.g. when the mouth is wide open while recording the posterior palatal seal the mucosa over the hamular notch becomes tense. This'll produce a space between the denture base and the tissues.
To correct this error:
1- Inserting a wet denture into a patient's mouth and inspecting the posterior border with the help of a mouth mirror can identify underdamming.
2- If air bubbles are seen to escape under the posterior border, it indicates underdamming.
3- To correct underdamming, the master cast can be scraped in the posterior palatal area or the fluid wax impression can be repeated with the proper patient position.

Overpostdamming: - This commonly occurs due to excess scraping of the master cast. It occurs more commonly in the hamular notch region.
Mild overdamming in the hamular notch region can lead to tissue irritation of the mucosa and excessive postdamming produces downward displacement of the denture posteriorly.
To correct this error, selective reduction of the denture border with a carbide bur, followed by lightly polishing the area while maintaining its convexity will remedy the problem.

When to record PPS:

a. Before try in.
b. After try in.