Enhanced CPD DO C

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Post-dam

Abstract: The success of an upper complete denture is dependent on various factors, including retention and stability during function, comfort and aesthetics. Physical retention of the denture depends upon adequate extension and fit, along with a good border seal. The border seal of an upper denture relies upon extension of the flanges to the functional depth and width of the sulci, and the post-dam. The post-dam of an upper complete denture is a raised 'lip' along the posterior border that becomes embedded into the palatal mucosa. This 'embedding' of the border within the mucosa helps to create the seal. This technique tip highlights the location and shape of the post-dam, as well as the clinical stages involved in its construction.

CPD/Clinical Relevance: Successful location and application of a post dam will help in retention of an upper complete denture.

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Retention of a denture is defined as resistance to vertical movement away from the underlying mucosa.[1] Retention can be affected by the three surfaces of a denture: occlusal, polished and impression (or fitting) surface. Retentive forces can be exerted by the oral musculature, or by the physical forces associated with the continuous thin film of saliva between the denture and the mucosa.[2] These physical forces largely depend upon the accuracy and form of the impression, and the polished surfaces, to provide a border seal. The physical forces contributing to retention rely on the following attributes.[1]

Area of impression surface

Maximum extension over the denture-bearing area is required for optimum retention: the physical retention of a denture is proportional to the area of the impression surface. Therefore, it is important that during the impression stage the functional width and depth of the sulcus is obtained using careful and effective border moulding.

Accuracy of fit

Accuracy of the impression surface enables the closest possible fit to the mucosa. Greater forces of retention are achieved if there is a thinner layer of saliva between the denture and the underlying mucosa. The space below a poorly fitting denture will result in a thicker layer of saliva with reduced cohesive forces, or to air bubbles below the denture, which will compromise the border seal if they extend to the border area.

Border seal

A border seal is created by extension of the flanges into the functional depth and width of the sulci, ensuring that contact between the polished surface and oral tissues is maintained at all times during normal function. This creates the 'valve' effect or the 'suction' that helps to retain a denture.

Figure 1. Palpating compressible tissues.

The post-dam

Along the posterior border of the upper denture, a border seal is created by the creation of a post-dam. According to the 'Glossary of Prosthodontic Terms', a post-dam (also known as a posterior palatal seal) is the 'raised posterior border of a maxillary removable complete denture that places pressure within physiological limits on the posterior palatal seal area of the soft palate to aid in its retention'.[3] Its functions include:

- Enhancing retention;
- Preventing ingress of fluid, air and food between denture and underlying mucosa;
- Reduced prominence of the posterior border by partially embedding the

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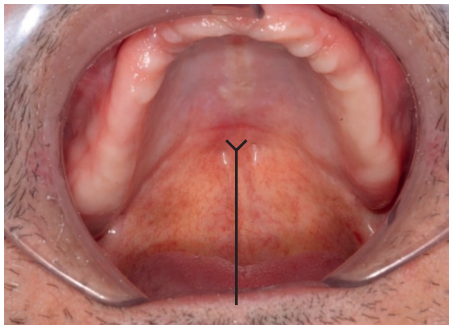


Figure 2. Location of fovea palatinae.

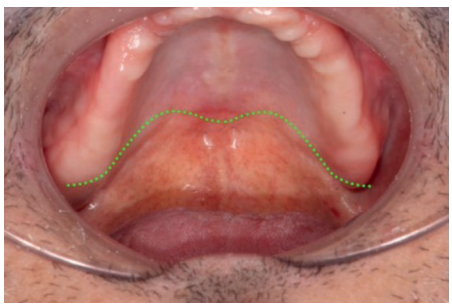


Figure 3. Cupid's bow.

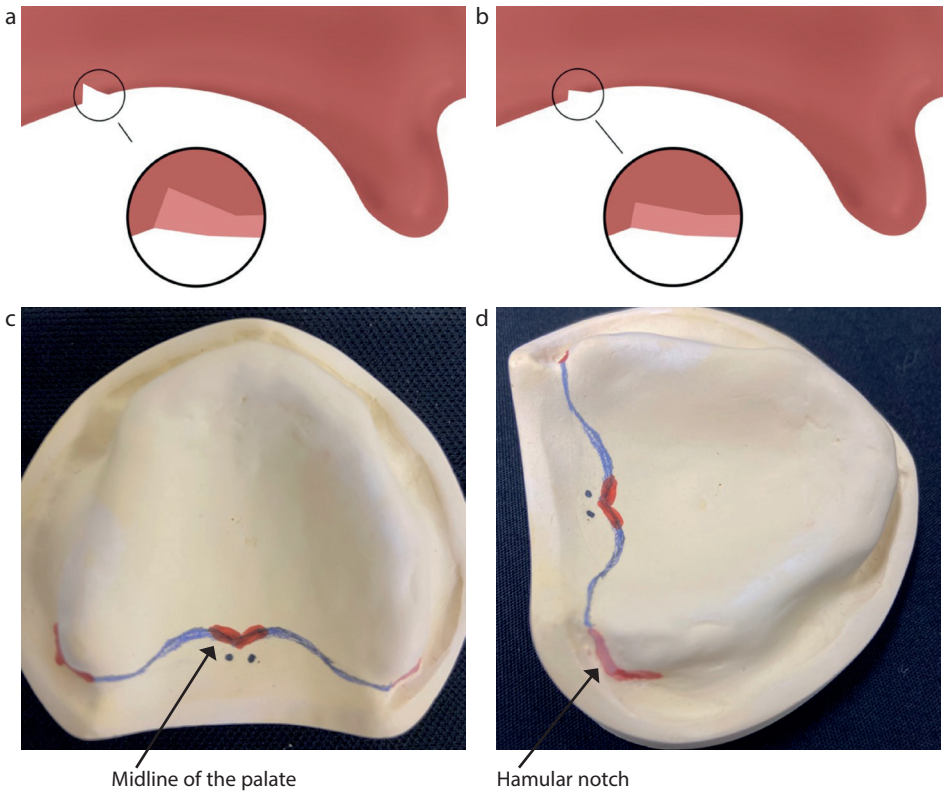


Figure 4. Cross-sectional image of varying depths of the post-dam along the palate. The post-dam is scribed deeper along **(a)** compressible tissues compared to **(b)** non-compressible tissue. The highlighted areas in **(c)** and **(d)** show the areas of non compressible tissue: the midline of the palate and the hamular notches.

margin in the soft tissue;
- Increased strength of the connector via the increased thickness at the border

This article highlights the location and shape of the post-dam, as well as the clinical stages involved in its construction.

Anatomical considerations

The posterior palatal area varies from patient to patient and depends on various anatomical factors. The location of the post-dam should therefore be prescribed by the clinician based on clinical examination and understanding of several anatomical landmarks including the vibrating line, fovea palatinae and the hamular notches. Gentle palpation of the region enables the clinician to gain an understanding of the anatomy and compressibility of the soft tissue, together with an idea of any potential gag reflexes because limited patient tolerance may cause nausea and compromised retention of the upper complete denture. A ball-ended burnisher or the end of a dental mirror handle can also be used if there are concerns that finger pressure may induce a gag reflex (Figure 1).

The post-dam is traditionally located at the vibrating line: the junction between the fixed tissues of the hard palate and the mobile soft palate.[3] The palatal aponeurosis is an area of compressible, fibrous tissue attached to the posterior border and inferior surface of the palatine bone. An anatomical study of the palatal aponeurosis concluded that the incompressible tissues are lined with palatine bone, while the compressible tissues with palatal aponeurosis. On this basis, the study suggested the palatine aponeurosis is related to the vibrating line.[4] Extending the location of the post-dam further posteriorly may cause gagging or nausea, and the movement of the soft palate relative to the denture will cause soreness or loss of border seal.

There is much debate in the current literature about the number of vibrating lines, as some schools teach the one vibrating line concept, while others teach the presence of two.[5,6] In the concept of two vibrating lines, the anterior vibrating line would be distinguished by the Valsalva manoeuvre. This requires the patient to holds both nostrils firmly while the patient blows gently through their nose. The posterior vibrating line is located by asking the patient to say 'ah'.[6] The authors of the present Technique Tip believe the use of one vibrating line is sufficient to retain the upper denture. The posterior border of the denture should then extend laterally to the hamular notches.

The fovea palatinae are two small depressions in the posterior aspect of the palatal mucosa, one on each side of the midline located at the junction of the soft palate and hard palate. The vibrating line is situated slightly anterior or slightly posterior to the fovea palatinae (Figure 2). The posterior border of the denture should typically be located in close proximity to the fovea palatinae.[5]

Shape and depth

The posterior palatal seal is normally found to be in the shape of a cupid's bow or a butterfly pattern (Figure 3).[6]

The depth to which a post-dam is carved depends on the compressibility of the palatal mucosa. Such variation is detected by the clinician, and the depth is modified accordingly. The post-dam will be deepest over the more compressible tissue either side of the midline, and tend to have a depth of 1–1.5 mm, reducing to 0.5 mm over the non-compressible tissue in the midline and over the hamular notches (Figure 4).

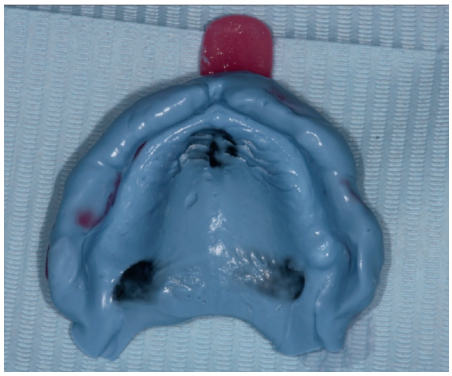


Figure 5. Tracing compound visible through muco-compressive impression material.

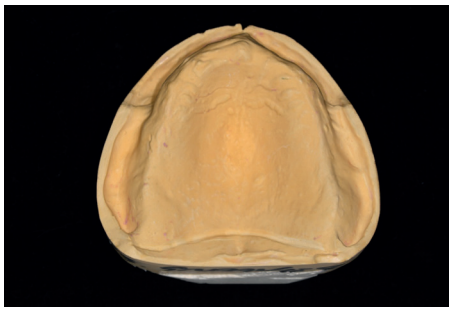


Figure 6. Post-dam carved on the master cast.

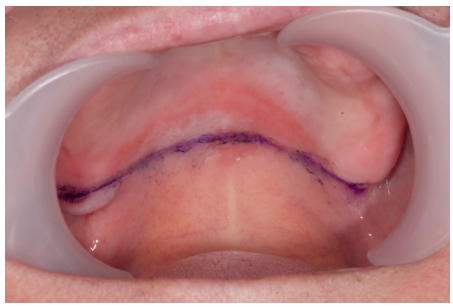


Figure 7. Marking landmarks with indelible pencil.

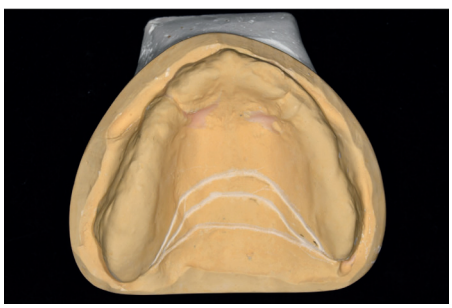


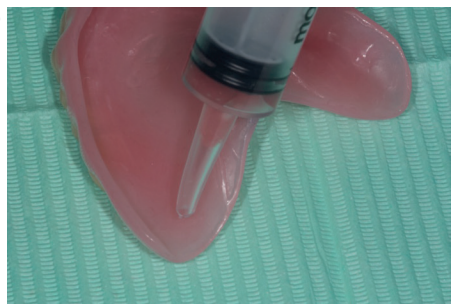
Figure 8. Carving several post-dams on the master cast.

Prescribing the post-dam

The location of the post-dam should not be an arbitrary laboratory procedure.[6] In order to appropriately prescribe the post-dam, the clinician should gain an appreciation of the anatomy and compressibility of the tissues in the region.

a

b



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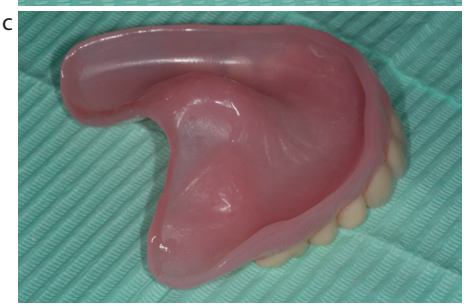

Figure 9. Creating a post-dam chairside using Tokuyama Rebase.

Once the post-dam has been prescribed, it is advised that the wax rim is fabricated on a rigid base, such as a light- or heat-cured acrylic resin. This will allow the laboratory technician to form a post-dam in the palatal region for jaw registration and try-in. This enables an early assessment of the likely retention of the final prosthesis.

There are different methods to record the posterior palatal seal at various stages of complete denture construction.

Creating a post-dam by muco-compression with custom tray

After tray extensions have been adequately carried out, tracing compound (such as green or pink stick) is added along the posterior border of the adjusted tray. While the material is still soft, the tray should be returned to the mouth to record an impression of the posterior palatal area. A relatively low viscosity impression material should then be placed over the tracing compound for a definitive impression. To ensure the impression material is displaced from over the tracing compound, the tray should be inserted with enough pressure so that the tracing compound is visible through the impression material (Figure 5). This will result in a denture base that has a raised lip along the posterior border.

Creating a post-dam by carving the cast

A groove can be carved into the working model so that when the denture base is processed, the upper wax rim has a raised lip (Figure 6). This method is normally completed at the jaw registration appointment so that the trial dentures are likely to offer more retention. However, if there are early concerns with the retention of the upper denture, this can be completed on the master cast so that the post-dam is present on the wax rims, which will help with the jaw registration.

Marking with indelible pencil

The clinician can directly feel the areas of compressible tissues and mark the cupid's bow shape directly with an indelible pencil (Figure 7). Once this has been completed, the finished impression can be returned to the mouth so that the imprint of the indelible pencil is recorded on the impression.

Marking several post-dams

If the patient has an existing denture that is considerably underextended in the posterior palatal region, or has a sensitive gag reflex, concerns may arise as to the likely tolerance of an optimally extended denture. If the subsequent denture is made to the full extent of the post-dam, it is unlikely to be tolerated by the patient, and will need considerable relief around the posterior extent of the replacement denture. Once the extension has been adjusted, the post-dam along the posterior border is lost, and the border seal compromised as a result. As a method of insurance, at least two post-dams can be marked on the master cast, with one post-dam marked in the region of the existing denture so that the laboratory technician can produce this on the acrylic base of the wax rim (Figure 8). This will help facilitate the jaw registration and try-in appointment, and gives an idea to the clinician and patient on how far

back the upper denture can be extended. The post-dam can then be trimmed chairside using an acrylic trimming bur to the newly agreed post-dam location. Equally, the denture can be taken to finish with several post-dams and the patient can be asked to return after a few days. If they have been unable to tolerate the new position of the post-dam, it can be trimmed accordingly to the new posterior extent without risk of breaking the border seal.

Creating a post-dam chairside

There can be some occasions where the post-dam is trimmed chairside causing the raised border of the denture to be lost. This should ideally be pre-empted by ensuring appropriate extension during the fabrication process, or by marking multiple post-dams.

If this reduction is required, a new post-dam can be created using a cold-cure acrylic (eg Tokuyama Rebase, Tokuyama, Japan). A thin line of the material can be applied to the posterior border of the denture using a large monojet syringe (Figure 9). The end of the syringe tip can be cut off if it is too thin. The new post-dam should be carefully created with a depth and width appropriate to the patient's tissues, and can then be polished accordingly, to adjust the depth.

Conclusion

Forming a posterior palatal seal during the construction of an upper complete denture is vital to enhance retention. Assessing anatomical landmarks is key during the examination appointment so that the clinician can gain an understanding of the limits of the denture bearing area. There are different methods available to record the post-dam, and the onus should be on the clinician to mark this based on the anatomical boundaries and compressibility of the tissues. This is likely to result in a successful upper complete denture that is built to be retentive, stable and functional for the patient.

Compliance with Ethical Standards

Conflict of Interest: The authors declare that they have no conflict of interest.

Informed Consent: Informed consent was obtained from all individual participants included in the article.

References

1. Basker R, Davenport J, Tomason JC. *Prosthetic Treatment of the Edentulous Patient*. 5th edn. Oxford: Wiley-Blackwell, 2011.
2. Tyson KW. Physical factors in retention of complete upper dentures. *J Prosthet Dent* 1967; **18**: 90–97. https://doi.org/10.1016/S0022-3913(67)80049-0
3. The glossary of prosthodontic terms: ninth edition. *J Prosthet Dent* 2017; **117(5S)**: e1–e105. https://doi.org/10.1016/j.prosdent.2016.12.001
4. Iwanaga J, Kido J, Lipski M *et al*. Anatomical study of the palatine aponeurosis: application to posterior palatal seal of the complete maxillary denture. *Surg Radiol Anat* 2018; **40**: 179–183. https://doi.org/10.1007/s00276-017-1911-2
5. Kyung KY, Kim KD, Jung BY. The study of anatomic structures in establishing the posterior seal area for maxillary complete dentures. *J Prosthet Dent* 2014; **112**: 494–500. https://doi.org/10.1016/j.prosdent.2014.01.002
6. Rashedi B, Petropoulos VC. Current concepts for determining the postpalatal seal in complete dentures. *J Prosthodont* 2003; **12**: 265–270. https://doi.org/10.1016/s1059-941x(03)00101-3