Wax-up Technique | University of Toronto Faculty of Dentistry Information and Instructional Technology Services

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Introduction

The field of dental anatomy comprises the study and organization of the tooth as an isolated entity and as an integral part of both the dental and the dynamic masticatory systems. The dental professional who is committed to the preservation of human teeth and their harmony with existing jaw relationships and surrounding soft tissues should understand fundamentals of dental morphology and must develop enough dexterity to appropriately recreate lost tooth structure.

Objective

The purpose of this article is to present educational material that would allow dental students to understand and reproduce tooth morphology by waxing-up cast models.

Armamentarium

1. Cast molds with preparations on anterior and posterior teeth for direct and indirect restorations.

2. Hanau torch or Bunsen Burner:
    1. Hanau Torch: This alcohol torch is designed to be held and operated in one hand. It has a plunger which, when pushed in, ejects a stream of air to produce a pinpoint flame which is useful in applying heat to small, localized areas of wax, modeling plastic, or other material and instruments. Either ethyl or methyl alcohol may be used for fuel. Fill it from the opposite end of where the wick is (leave wick about 1 mm high). Pour about 50 ml of fuel into torch.
    2. Bunsen Burner: This is used frequently in the laboratory as a source of heat. This burner is designed so that gaseous fuel may be mixed with the correct amount of air to yield the maximum amount of heat. The three principal parts of the burner are: barrel, needle valve, and base. The quantity of gas admitted to the burner is controlled by the needle valve, while the air needed for combustion is admitted at the small opening around the bottom of the barrel. The air is controlled by turning the barrel so as to make the air holes larger or smaller. Always open the desk outlet valve fully and regulate the gas supply to the burner by the needle valve. Light the burner in an open space on the lab counter ensuring that the match is lit prior to turning on the gas. Always extinguish your burner by turning off the desk outlet valve, and then closing the needle valve and barrel.
3. Sharp red pencil
4. Clear nail polish or liquid Vaseline
5. Green inlay casting wax: This pattern material accurately represents desired mold space for inlays, onlays, and crowns. Characteristics required include good adaptation, homogeneity, thermal stability at ambient temperatures and complete pyrolysis at high temperatures. Composition:
    1. 60% Paraffin Wax (base wax)
    2. 25% Carnauba Wax (modifier wax)
    3. 10% Ceresin (modifier wax)
    4. 05% Bees Wax (modifier wax)
    5. <1% Colorants
6. P.K. Thomas Waxing Instrument #1: Has curved and tapered points that are used to flow molten wax on teeth.
7. P.K. Thomas Waxing Instrument #2: Has curved and tapered points that are used to flow molten wax on teeth (smaller in size compared to PKT #1).
8. P.K. Thomas Waxing Instrument #3: Used to perfect and enhance the supplemental grooves and developmental grooves.
9. P.K. Thomas Waxing Instrument #5: Used to remove excess wax as cusp ridges are developed. Its contour maintains desired convexity at ridges.
10. Half Hollenback Instrument: Used for carving and shaping the wax.
11. LeCron Instrument: Has a small spoon at one end and a ‘knife’ at the other. Used for carving and trimming wax.
12. Wax spatula #7: Used to hold small bits of wax over the flame.

Procedure Description

Step 1: Protect counter

Cover your work area with a white paper so that you do not get wax on counter.

Step 2: Mark the margins

Mark the cavity margins with the red pencil so that you can clearly identify them all around.

Step 3: Apply nail polish

Apply nail polish or liquid Vaseline outside of the cavity preparation to make the surface impermeable to wax.

Step 4: Insert wax to preparations

Use PKT #1 or PKT #2 to carry wax to the tooth preparation. The instruments should be heated in the flame and the wax added to the preparation in small amounts to avoid trapped bubbles as it starts to cool and gain some viscosity. If the wax is too hot, it will flow all over the preparation without control. Sink the heated instrument down to the base of the preparation when melting a new wax layer to the previously placed wax, so that they do not separate during carving. Start building up contact areas, embrasures and marginal ridges, tooth outer surfaces, then cusps and cusp ridges. Add a slightly greater amount of wax than needed to reproduce tooth morphology (0.5 to 1.0 mm above margins). Make sure all margins around the preparation are properly sealed.

Step 5: Carving

Use the wax carving instruments to refine the tooth shape. PKT #3 is good to enhance grooves and PKT #5 helps in enhancing the ridges. The LeCron and Hollenback will refine the whole morphology, removing all flash and excess material so that no wax is extending over the pencil mark. Lay the sharp cutting side of the Hollenback carver on a cusp (around 45° inclination) with the point of the instrument in the groove at the centre of a tooth. Scrape away the excess wax following the line of the cusps. This will give you a proper groove anatomy as well as shaping the cusps correctly. You will aim to mimic the mirror image of the same tooth in the adjacent quadrant. The marginal ridges should be at the same level as the adjacent teeth. You can check if you carved your wax enough by occluding your upper and lower models together. If they do not occlude properly (i.e., seem too high or are contacting more on the side of the preparation) you will need to reduce the height of the wax.

Step 6: Finishing

In the presence of voids or if too much wax was removed, add an appropriate amount of wax back by repeating step 4 and recarve. Polish your restoration with a toothbrush, gauze, and/or a piece of nylon or cotton.

General wax-up characteristics:

- Margins: Wax should be flush with the margin of the tooth preparation with no overhangs or submargins.
- Contour: Should be smooth and curved with no flat (under) or bulbous (over) contour.
- Outer surfaces (facial, lingual, mesial, distal): Should respect proper convexity, appear smooth, even and polished (with no scratches, waviness or voids).
- Morphological structures: All ridges, fossae, cingulum area and grooves should exhibit a polished surface with no scratches. The junctions between these structures should flow naturally.

Instrument care:

- Always keep your instruments clean and sharp.
- PKT #1, #2, #3, and wax spatula #7 can go into the flame.
- PKT #5, Hollenback, and LeCron should not go into the flame. They might lose sharpness or break.

Clinical Implications

Clinically, the preservation of the anatomical features of teeth such as height of contour, embrasures, proximal contacts and contour are important to protect and ensure the health of the surrounding soft tissue. Adequate interproximal contacts serve to anchor all teeth within the same arch and to avoid tooth migration or inclination. Proper occlusal anatomy and contacts confer comfort to the patient as well as harmony and stability of occlusion. Harmonious incisal planes, anterior line and point angles, and overall anatomy relate especially to patients' aesthetics and satisfaction. Therefore, the knowledge and maintenance of tooth morphological characteristics will certainly lead to restorations with improved aesthetics and function.

Don't forget: the more you practice the better you get!

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