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Directfit Tray – Customised Tray for Fixed Lingual Retainer

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Abstract

Long-term stability is the ultimate goal of orthodontic treatment, with retention being its final and essential phase. While some relapse is expected despite retentive appliances, true stability begins with accurate diagnosis, a sound treatment plan, and establishing a functional occlusion that complements facial features and musculature. Retainers are classified as removable or fixed. Removable retainers allow for minor adjustments during post-treatment settling, whereas fixed retainers are preferred in cases prone to relapse, such as crowding, spacing, and rotations. Initially made from plain wires, fixed lingual retainers have evolved to multistranded stainless steel wires for better retention and physiological tooth movement. Placement techniques include direct and indirect methods. The direct method, though widely used,

is technique-sensitive and time-consuming. The Direct fit Tray method improves upon this by fabricating the stabilization tray outside the mouth, reducing chair side time and contamination risk. Unlike indirect methods that interfere with curing and may cause bond failure, the Direct fit Tray leaves the lingual surface exposed for optimal composite bonding. Furthermore, it is remoldable, unlike putty materials, allowing precise adaptation. This technique ensures durable bonding and enhances the long-term success of orthodontic outcomes.

Keywords: Stability**,** Retention**,** Relapse**,** Retainer**,** Settling**,** Bond Failure

Introduction

The long-term stability of orthodontic treatment is the ultimate goal for every orthodontist, and retention is the final stage of the process. It is commonly understood that some degree of relapse may occur, even with a retentive appliance. However, achieving lasting stability begins at the very start of treatment, as it is deeply rooted in an accurate diagnosis and a carefully crafted treatment plan. Furthermore, establishing an appropriate functional occlusion that complements the patient's facial features and musculature is essential in ensuring stable post-treatment results.

Retainers can then be classified into removable and fixed types. Conventional removable retainers are designed to guide the post-treatment settling process of the dentition. They help maintain the teeth in their new positions while allowing slight adjustments over time as the teeth adapt. These retainers play a vital role in preserving the alignment achieved during orthodontic treatment[3].

However, for certain types of malocclusions—such as crowding, spacing, and rotations—more secure and permanent retention is often necessary. In such cases, teeth are more prone to relapse due to surrounding tissue pressure or the inherent instability of the alignment. To address this, bonded lingual retainers were initially made with plain round or rectangular wires[4,5]. Over time, multistranded stainless steel wires have emerged as the preferred choice due to their superior mechanical retention and ability to allow for physiological tooth movement, as shown by Zachrisson[5,7]. These advancements have significantly improved the effectiveness of retainers, helping maintain stable, long-term orthodontic results.

When it comes to placement retainers, there are two main methods: direct and indirect[1,2], with the direct method being the most commonly preferred.

The conventional direct method for placing a fixed lingual retainer is a technique-sensitive process. It requires significant chairside time for proper adaptation to the lingual surfaces of the teeth. Additionally, stabilizing the retainer wire on the lingual surface is more difficult in the direct conventional method.

However, the 'Directfit Tray' offers a more efficient alternative by eliminating the need for stabilization of the wire inside the patient's mouth, significantly reducing chairside working time. One of the challenges of the direct method is the risk of contamination from saliva and moisture, which can lead to bond failure due to the lack of direct vision during placement. In contrast, the 'Directfit Tray' technique minimizes this risk by fabricating the retainer outside the patient's mouth, thereby enhancing bond strength and reducing the potential for contamination.

The indirect method involves covering both the buccal and lingual surfaces of the teeth, which can interfere with the curing process and potentially lead to bond failure. A major drawback is that the retainer wire is placed directly on the patient's study model and cured. After creating a tray, the retainer wire becomes embedded in it, with dental stone and other impurities often sticking to the

wire, and make it difficult to clean, which can also lead to bond failure

In contrast, the 'Directfit Tray' technique offers a more precise approach by using impression compound to secure the retainer wire interdentally. This method leaves the lingual surface of the tooth exposed, allowing for optimal placement of the retainer wire. The flowable composite can then be directly cured on the exposed lingual surface, ensuring a strong and durable bond. This precise technique not only enhances the overall stability of the retainer but also reduces the risk of complications during the curing process, making it a more reliable and efficient option.

One of the major advantages of the 'Directfit Tray' is its ability to be remolded as needed, unlike materials such as putty impression compounds, which cannot be reshaped once set. This flexibility provides a significant benefit in ensuring precise adaptation over time.

Materials Required

1. Alginate impression material- WALDENT
2. Patient working model
3. Retainer wire- TITANIUM TRI-FLEX [0.010 in (w) x 0.028 in (h)]
4. Impression compound- PINNACLE
5. Flowable Composite- IVOCLAR IVADENT TETRIC N-FLOW
6. Etchant- FROST (Etching gel, 37% phosphoric acid)
7. Bonding agent- ORTHOSOLO, universal bonding primer
8. Light curing gun -WOODPECKER- iLED PLUS LIGHT CURE UNIT

Technique

1. **Impression making of upper and lower arches:** Begin by taking accurate impressions of the patient's upper and lower arches using an alginate impression material (WALDENT). (Figure 1)
2. **Pouring of cast and creating working model:** Pour the impressions with dental stone to create a cast. Use the cast to prepare a study model that accurately reflects the patient's dental anatomy. (Figure 2)
3. **Fixing retainer wire on the working model:** Passively place the retainer wire (TITANIUM TRI-FLEX -0.010 in (w) x 0.028 in (h)) onto the working model. Secure the wire in place using flowable composite. (Figure 3)
4. **Making impression compound tray:** After soaking the impression compound (PINNACLE) in warm water, mold it in the labial and lingual areas to secure the retainer wire. Windows are created on lingual surfaces of individual tooth on the impression tray. (Figure 4)
5. **Removal of tray:** Once the impression compound has set, carefully remove the tray from the study model. The retainer wire will be embedded in the tray, ready for further processing.(Figure 5, 6)
6. **Polishing:** The composite pads were gently polished with a brush using light pressure, and acetone was applied on the composite pad to remove residual impurities that could affect the bond strength.
7. **Etchant:** Use 37% phosphoric acid etching gel (FROST), then rinse thoroughly and dry to enhance bond strength. (Figure 7)
8. **Application of bonding agent:** After etching, apply a thin layer of bonding agent (ORTHOSOLO, universal bonding primer) to the surface of the etched teeth to ensure a secure bond with the flowable composite material.
9. **Place Tray in Patient's Mouth:** Position the impression compound tray with the flowable composite and retainer wire in the patient's mouth. Ensure that the tray fits properly and is seated well,

and apply flowable composite on the exposed retainer wire. (Figure 8)

10. **Cure the Composite with a Light curing Gun:** Use a curing light gun (WOODPECKER- iLED PLUS LIGHT CURE UNIT) to cure the flowable composite material, ensuring it sets properly and bonds securely to the retainer wire. (Figure 8)
11. **Final Adjustments:** After curing, we will remove the tray from the patient's mouth and ensure that the retainer wire is securely fixed to the tooth surface, with optimal bond strength. (Figure 9)

This process ensures that the retainer wire is securely embedded within the tray, providing effective retention and support after orthodontic treatment. (Figure 1 to 9)

Conclusion

In conclusion, the 'Directfit Tray' technique represents a significant advancement in the placement of fixed lingual retainers, offering numerous advantages over both conventional direct and indirect methods. By eliminating the need for wire stabilization inside the patient's mouth, reducing chairside time, and minimizing the risk of contamination, it provides a more efficient and reliable solution. The ability to remold the tray as needed further enhances its adaptability, ensuring a precise and durable fit. Additionally, the technique's ability to optimize the curing process and maintain bond strength makes it a superior choice for achieving long-term orthodontic stability, ultimately improving both the patient's experience and the success of retention.

Limitation

The impression compound material is quite brittle, which can lead to distortion during removal. Additionally, the technique is highly sensitive to customization, requiring precise handling to achieve an accurate fit.

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Legend Figures

Figure 1:

Figure 2:

Figure 3:

Figure 4:

Figure 5:

Figure 6:

Figure 7:

Figure 8:

Figure 9: