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Unveiling The Realities And Challenges Of Indirect Bonding: The Glue Gun Dilemma

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Abstract:
This article delves into the often-overlooked challenges associated with indirect bonding utilizing a glue gun in orthodontic practice. While this method offers the promise of cost-effectiveness and simplified procedures, it also presents significant drawbacks. The use of a glue gun can result in messy application, leading to potential inaccuracies in bracket placement and compromised treatment outcomes. Furthermore, the melting of the glue under composite curing light can make tray removal after bonding a cumbersome and time-consuming process, adding complexity to an otherwise streamlined technique. Through a thorough examination of these challenges, this article sheds light on the practical considerations and potential pitfalls of utilizing hot glue in indirect bonding, providing valuable insights for orthodontic practitioners seeking to optimize their clinical procedures.
Key Word*: Indirect bonding; Glue gun material; Sectional bonding; Transfer trays.*

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I. Introduction

Orthodontists are united in their pursuit of achieving outstanding treatment outcomes and delivering radiant, healthy smiles. The cornerstone of successful orthodontic treatment lies in the precise positioning of brackets during bonding, streamlining subsequent phases of care and enhancing the predictability of results. Indirect bonding techniques offer a three-dimensional perspective of tooth positioning, facilitating greater accuracy in bracket placement.[1] This method involves laboratory-based procedures, with custom trays later transferred to the patient's mouth, effectively minimizing chair-side time by shifting the procedural burden to the laboratory setting.[2] Indirect bonding boasts several key advantages, including precise bracket placement, reduced chair-side time for clinicians, avoidance of band fitting on posterior teeth, enhanced ability to bond posterior teeth, and improved patient comfort and hygiene. While drawbacks such as time-consuming laboratory procedures and additional material costs exist, the substantial benefits have led to the widespread adoption and popularity of this technique.[3]

Indirect bonding techniques in orthodontics have evolved to include a variety of materials for creating transfer trays. These trays are essential for the precise placement of brackets on teeth

1.Opaque Silicone (Exaflex Very High Viscosity Putty): This material is known for its high viscosity, making it useful in creating stable and precise molds for indirect bonding.

2. Translucent Silicone (Memosil): This offers the advantage of visibility, allowing for better accuracy when positioning the brackets.

3. Thermoplastic Materials: Common options include Bioplast and Biocryl, which are valued for their flexibility and ease of use. These materials can be moulded when heated and then harden to hold the brackets in place.[4]

4. Thermal Glue: Proposed by White[5], this is an innovative, cost-effective alternative. The thermal glue used for the transfer tray matrix is a type of thermoplastic adhesive that is FDA-approved. It comes in solid cylindrical sticks of various diameters and is designed to be melted using an electric hot glue gun. This method provides a practical and affordable solution for creating accurate transfer trays.

These materials and techniques enhance the precision and efficiency of indirect bonding, contributing to better orthodontic outcomes.

The objective of this article is to outline the technique employed for indirect bonding using a glue gun, along with the hurdles encountered during its implementation.

II. Material Used

1. Glue gun with sticks - It consists of ethylene vinyl acetate copolymers. It is approved by FDA (Food and drug Administration) as non- carcinogenic, non –toxic.
2. Seperating medium
3. Reverse tweezer or bracket holder
4. MBT Gauge ,Marking led pencils
5. 3M Unitek Transbond™ XT
6. 3M Unitek Gemini Metal brackets.(Figure 1)

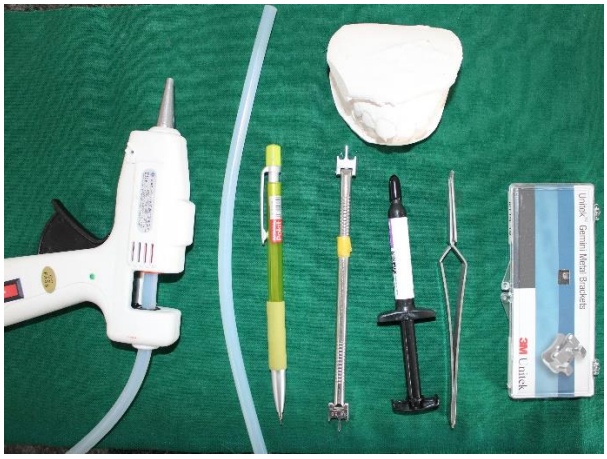

Figure 1 : Materials used for indirect bonding

III. Procedure

1. Accurate impressions are taken using alginate impression material, and the working casts are poured with Orthokal.(Figure: 2)

2. The laboratory procedure begins with drawing reference lines using gauges to determine the desired bracket positions.(Figure :3-4)

3. A uniform layer of cold mould seal is applied all over the cast and left to dry.(Figure:5)

4.A minimal amount of composite (3M Unitek Transbond™ XT) is placed on the bracket base using reverse tweezers. The bracket is then positioned accurately using the pre-drawn guidelines. Any excess flash is removed with an explorer, and the brackets are cured for 10 seconds with an LED curing light.(Figure: 6-9)

5. The glue gun is preheated for about 5 minutes. Once heated, the molten glue is flowed over the incisal and occlusal wings of the bracket, extending over the palatal surfaces of the teeth on the working cast. The thickness above the bracket area should not exceed 1mm just enough to engage the brackets. The tray can be constructed either as a single unit or in sectional components.(Figure : 10-11)

6. After the tray is fabricated, it is allowed to cool down for about 2-5 minutes. Once cooled, the tray will become slightly opaque, whereas it is crystal clear when hot. The model is then dipped in cold water to facilitate easy retrieval of the tray from the model.

7. With precision, the tray is gently raised off the model, initiating from one end and employing a sharp tool like a wax knife. As the lifting progresses, the tray effortlessly disengages, seamlessly carrying the brackets along.(Figure: 12)

8. Following this, the tray undergoes cleaning, beginning with the removal of the cold mould seal layer. Subsequently, any surplus adhesive on the bracket base is eliminated through sandblasting. Then, the tray, along with the brackets, undergoes a thorough washing and sterilization process using isopropyl alcohol.(Figure: 14)

7. The clinical procedure includes preparation of the patient for the bonding with proper isolation and acid-etching.(Figure: 15)

8. Bonding agent is applied all over the etched area and is cured. 3M Unitek Transbond™ XT composite is applied over the bracket base in sufficient amount and brushed and smoothened with bonding agent. Once, applied over all the brackets on the tray, the tray is put over on the respective region. When positioning the tray, it's crucial to provide support to the occlusal and labial surfaces of the teeth to prevent displacement. The light-curing material is initially cured from the gingival aspect before proceeding to the occlusal aspects of the brackets.(Figure : 16-17)

9. Once the curing process is complete, the tray is meticulously dislodged, starting by gently loosening it with an explorer from the gingival aspect. This step reduces the tray's grip on the brackets, facilitating its removal. Subsequently, the tray is lifted away. Following the removal of the tray, an additional 10-second curing session is performed. Any cured flash is then carefully removed using a fine tapered fissure bur.(Figure: 18-19)

Figure 2: Working cast poured in Orthokal

Figure 3: MBT gauge used for guideline marking

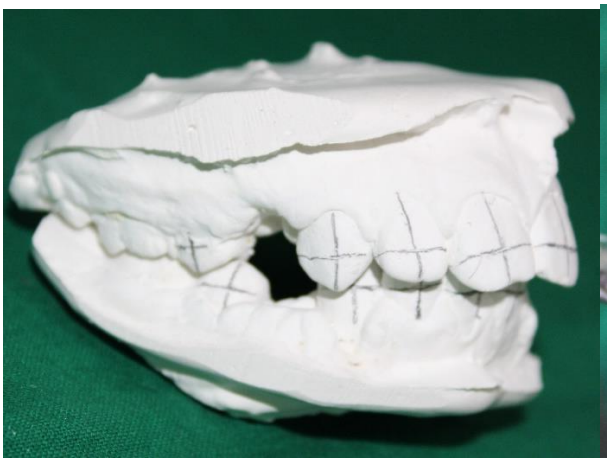

Figure 4: Full guidelines for bonding marked on cast

Figure 5: Cold Mould Seal applied over the cast

Figure 6: Composite applied over the bracket base

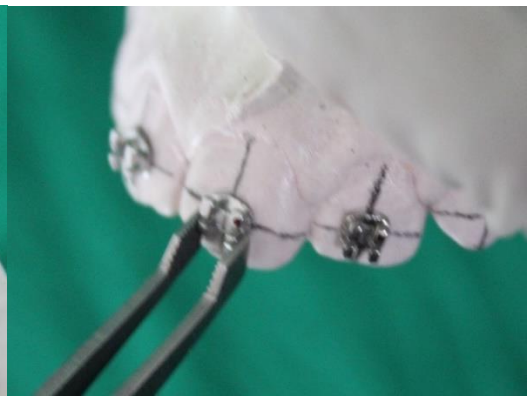

Figure 7: Bracket placed over the cast with guidelines

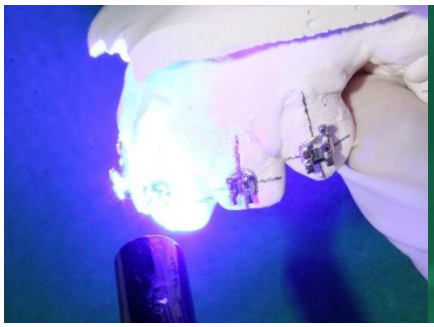

Figure 8: Composite curing using UV light

Figure 9: Fully boded brackets to the cast

Figure 10: Molten glue applying for the tray fabrication

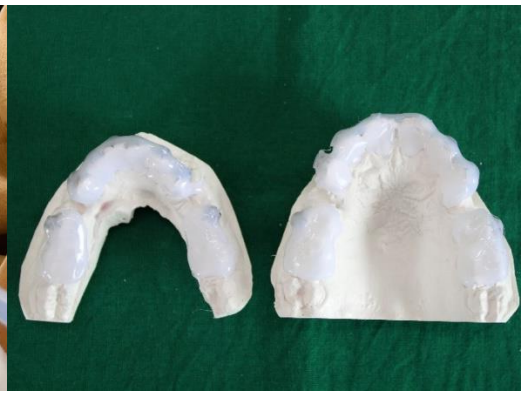

Figure 11: Transfer trays of upper and lower arch

Figure 12: Wax knife using for the separation of trays

Figure 13: Trays immediately after removal

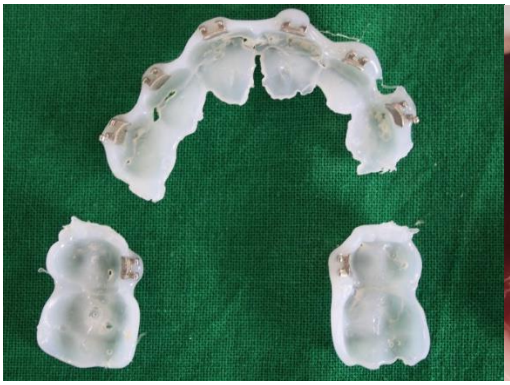

Figure 14: Transfer trays after sandblasting and cleaning

Figure 15: Etching of the teeth surface

Figure 16: Application of bonding agent

Figure 17: Transfer trays with brackets are light cured

Figure 18: Gently removed using an explorer

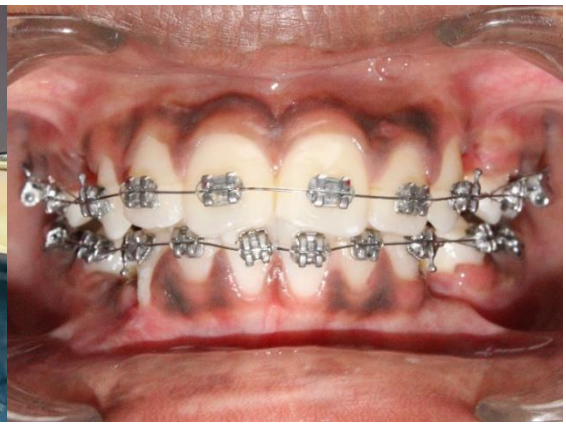

Figure 19: Fully bonded upper and lower dentition

IV. Discussion

The glue gun method for indirect bonding is a cost-effective procedure that offers several advantages, particularly in busy orthodontic practices. One of its primary benefits is the significant reduction in chairside time, which enhances efficiency and patient throughput. This makes it an attractive option for practitioners looking to streamline their workflow and manage larger patient volumes.[6]

However, despite these advantages, the glue gun method presents several challenges that must be considered. One notable drawback is the cleaning process of the fabricated tray. Excess adhesive must be removed using a sandblasting procedure, which requires a high degree of precision. If not done carefully, there is a significant risk of damaging the fabricated tray, which can compromise the entire bonding process.

Additionally, cleaning the remnants of sandblasting is a laborious task. The fine particles left behind can be difficult to remove completely, adding to the complexity and time involved in preparing the tray for use.

Another critical issue arises during the curing process with UV light. There is a risk that the heat generated by the UV light could cause the hot glue gun adhesive to melt. This melting can impact the precision and accuracy of the bracket placement, potentially leading to less optimal outcomes. Furthermore, if the gluer melts again , it complicates the removal of the tray from the dentition, increasing the likelihood of debonding the brackets.

Full arch tray, reduces chairside time but is difficult to remove while Sectional tray, needs comparatively more time but offers easy removal and more accuracy.

In summary, while the glue gun method offers a cost-effective and time-saving solution for indirect bonding, it also comes with several disadvantages. The meticulous cleaning process, the potential for tray damage during sandblasting, and the risks associated with UV light curing all pose significant challenges. These factors must be carefully weighed when considering the glue gun method for indirect bonding in orthodontic practice.

V. Conclusion

Indirect bonding using a glue gun offers an efficient and cost-effective alternative for orthodontic bracket placement. The process involves precise steps to ensure accurate positioning and strong adhesion of the brackets. However, it is important to consider the challenges associated with this method. These include potential difficulties in handling the thermoplastic adhesive and ensuring consistent application. Moreover, this technique may not be as widely accepted or validated as traditional methods, which could impact its adoption in clinical practice. Overall, while the glue gun technique can streamline the bonding process and provide economical benefits, practitioners should carefully weigh its limitations and ensure it meets their clinical needs and standards.

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