Bonding of brackets has changed the practice of orthodontics and has become a routine clinical procedure in a remarkably short time. Modification of technical devices, sealants, attachments and procedure are continuing. Several methods and techniques have been introduced by recent advances in indirect bonding techniques which have made clinician to do a more expensive laboratory work. A new method which is more simplified and employed in our department with few expenses to invest has been followed with application of Erkogum (transparent blocking wax) as adhesive and glue gun material as transfer tray with minimal efforts and time duration to obtain a precise indirect bonding technique. Our trails have made it more effective and efficiently manageable to obtain a desired bonding of attachments and ease to the patient.

Keywords: Indirect bonding, Erkogum wax, Glue gun material, Transfer tray.

INTRODUCTION
Bonding of brackets has revolutionized the practice of orthodontics and has become an integral part of clinical procedure in a remarkably short period of time. Compared with direct bonding technique, indirect bonding is more precise in bracket positioning, decreases the chairside time and patient’s discomfort. Indirect bonding is a technique in which orthodontic brackets and other attachments are transferred from dental casts and bonded onto the dentition using a transfer device. Silverman and Cohen in 1972, first introduced the concept of indirect bonding. Several methods and techniques have been evolved over the years with recent advances in indirect bonding techniques, which have mainly differed either in adhesive used to attach brackets to casts or in the transfer tray material.

A new method which is more simplified and routinely employed in our department with few expenses to invest has been followed with application of Erkogum (transparent blocking wax) as adhesive and glue gun material as transfer tray with minimal efforts and time duration to obtain a precise indirect bonding technique (Figs 1 and 2).

Erkogum, a block-out wax material, available in transparent and colored form is composed of hydrocarbons and titanium dioxide. It is generally used for the protection of residual teeth and for blocking out undercuts in denture preparation. This material can be stored indefinitely at room temperature in closed containers. Ignition temperature of 180°C helps it to withstand high temperature of molten glue gun material and is completely reusable. Glue gun is a molten polymer of ethylene vinyl acetate. It is Food and Drug Administration (FDA) approved as noncarcinogenic, nontoxic and dimensionally stable in its solid form.

PROCEDURES
1. Accurate impressions are made with alginate impression material and working casts are poured with dental stone.
2. Laboratory procedure involves initially drawing the reference lines with the help of gauges for determining the desired bracket position (Fig. 3). Erkogum block-out wax material, available in transparent and colored form, is then applied to the prepared casts to block out the undercuts. The casts are then placed in the glue gun and the material is melted and applied to the undercuts. The casts are then placed in the glue gun and the material is melted and applied to the undercuts. The casts are then placed in the oven to dry. The completed casts are then placed in the orthodontic setup and the brackets are bonded using the glue gun material as transfer tray material.

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wax can be kneaded to a sticky dough consistency, which aids in positioning the brackets on the predetermined position marked on the working casts (Figs 4 and 5). The orthodontist, when reviewing the bracket positions later, can easily reposition any bracket with the use of same Erkogum material. The same Erkogum material can be used to relieve the undercut areas and block the bracket slots (Fig. 6).

3. Separating medium is applied on the dentition, covering the entire crown and adjacent gingival areas (Fig. 7).

4. Molten glue gun material is flowed over the incisal and occlusal wings of the bracket and material extended over the palatal surfaces of dentition on the working cast (Fig. 8).

5. The fabricated tray is then placed in water for setting of hot tray material and later the excess material is removed with bard parker blade (Fig. 9).

6. The glue gun tray has the Erkogum adhesive at its bracket base which can be easily removed as flakes with the help of explorer and transfer tray with clear bracket bases are ready for use (Figs 10 and 11).

7. The clinical procedure includes preparation of the patient for the bonding with proper isolation and acid-etching (Fig. 12).

8. Fabrication of either single tray for entire arch or sectional trays depends on the degree of isolation of teeth, amount of crowding and imbrications of the teeth. While placing the tray, it is important to support the occlusal and labial surface of teeth to avoid any displacement (Fig. 13).

9. Curing of the light cure material is done initially from the gingival aspect followed by occlusal aspects of the brackets (Fig. 14).

10. After curing, the tray can be teased out easily with minimal effort from distal aspect, thereby completing the indirect bonding procedure (Figs 15 and 16).

**MATERIALS AND METHODS**

To evaluate the efficacy of our indirect bonding method (gum and gun), a study was undertaken to assess the shear bond strength of orthodontic brackets bonded with this method of indirect bonding. The study was conducted to compare the shear bond strength of brackets bonded with indirect bonding...
Table 1: Comparison of two groups (direct and indirect bonding) with respect to bond strength of brackets by independent t-test (*p < 0.000)

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct bonding (group 1)</td>
<td>9.1247</td>
<td>1.38085</td>
<td>4.765</td>
<td>0.000*</td>
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<tr>
<td>Indirect bonding (group 2)</td>
<td>7.2800</td>
<td>1.60902</td>
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</table>
DISCUSSION

Our results after trials with Erkogum and glue gun material have proved to be easier way of attaching brackets to the casts and fabrication of transfer tray for indirect bonding. Erkogum blocking out wax is a nonhazardous highly viscous material with pleasant odor. It is permanently kneadable, reusable material with high melting point (>200°C). The material is insoluble in water and recommended storage temperature is 10 to 25°C. Longer storage of the Erkogum will lead to hardening, but the original elasticity can be regained by kneading the material.

The technique described here has several advantages over the procedure originally described by White.13 The major advantage of Erkogum as an adhesive in our technique is its indefinite working time, whereas tacky glue used in White’s technique sets quickly and must be manipulated immediately to properly position the bracket. The use of same Erkogum to block the bracket slots helps to avoid the locking of slots with glue material during transfer tray preparation thereby the tray can be easily removed after bonding. Unlike in other techniques, where the sectional trays are routinely used to bond in mild-to-moderate crowded dentition cases, our method of indirect bonding facilitates the use of single tray only, because the undercuts can be blocked using Erkogum, which in turn reduces the clinical chair side time. The Erkogum material is reusable which can withstand high temperature without melting under hot glue gun material. A very thin layer of material will be left on the bracket base in the transfer tray because of its high viscous nature. Erkogum can be easily peeled off immediately once the hot glue tray sets, unlike the case of tacky glue where the tray has to be kept in water for almost 2 hours to both dissolve and remove it from bracket bases. The molten glue material as transfer tray has been proved to be more favoring in procedure and patient’s comfort. Curing of composite adhesive is not affected as transfer tray is transparent enough. Fabrication of tray incorporating only the incisal and occlusal wings of brackets helped in direct curing of composite gingivally during bonding. A firm hold on occlusal and labial aspect of the transfer tray is necessary while curing to overcome the flexible nature of the transfer tray.

CONCLUSION

Indirect bonding is considered to be useful and efficient approach that improves the clinical efficiency of accurate bracket positioning and decreases the chair side time. The technique described in this article using Erkogum as an adhesive provides an indefinite working time for precise placement of brackets on the cast, which is the main advantage of indirect bonding method. Success to this technique requires attention to detail but does not require excessive complexity.

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REFERENCES