A Precise and Predictable Laboratory Procedure for Indirect Bonding

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Indirect bonding seems to be gaining more widespread acceptance among orthodontists, due to improvements in bracket base design, adhesive technology, and transfer tray materials.[1-5] The latest bracket bonding bases require little if any recontouring, allowing the thinnest possible layer of adhesive to provide a clinically acceptable bond.

The adhesives used for indirect bonding setups have continued to be a problem, however. Bracket drift and mediocre bond strength are the major drawbacks of adhesives such as melted "Sugar Daddy" candy, wallpaper paste, school glues, alcohol-based adhesives, and light- and thermal-cured resins.[1-10]

A new ultra-viscous, water-soluble, and tenacious bonding adhesive, JC Endirect,* represents a major advance in indirect bracket placement. In a one-year field test conducted in our laboratory, this adhesive proved to have excellent viscosity, eliminating bracket drift on stone models. Bracket-to-cast bond strength was also consistently excellent. The adhesive demonstrated superior resistance to bracket displacement when vacuum-formed tray materials and polyvinyl siloxane trays were used. These properties were verified by independent university tests.

Using the advantages of JC Endirect, we have designed a unique approach to precision bracket placement, called the JC Endirect* Technique, which is based in part on the principles advocated by Silverman and Cohen since 1972.[1] Guidelines for successful implementation are presented in this article.

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Laboratory Procedure

High-quality crown-and-bridge impression materials are essential for constructing the precise working casts needed for indirect bonding. Stainless steel perforated impression trays offer excellent retention and stability, and polyvinyl siloxane impression material provides optimum accuracy, detail, and shelf life. A 14,000-18,000psi die stone with minimal setting expansion (<.015%) will ensure the required precision of detail.

The JC Endirect Technique is as follows:

1. Trim the working casts to habitual occlusion.

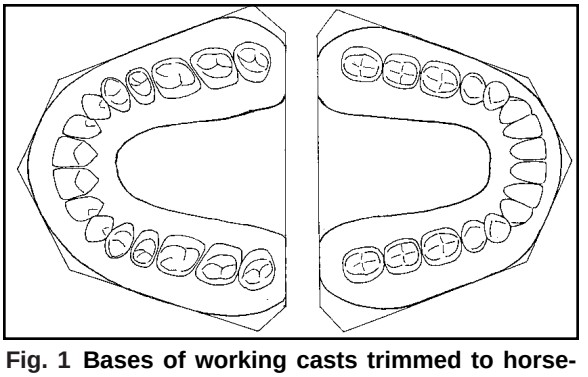

Fig. 1 Bases of working casts trimmed to horseshoe shape to allow maximum lingual detail.

Fig. 2 Tooth surfaces to be bracketed marked with fluorescent yellow pen.

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If the bite needs to be opened to eliminate occlusal interferences with the mandibular brackets, a fixed maxillary anterior biteplane or lingual composite shelves on the maxillary central incisors can be used. The working cast should be no higher than 2cm. Trim the bases to a horseshoe shape to allow maximum lingual detail (Fig. 1).

2. Paint the labial and buccal surfaces to be bracketed with a fluorescent yellow marking pen (Fig. 2). This eliminates the need for a separating medium while providing a visual aid to improve the accuracy of bracket placement.

3. Scribe the long axis of the crown of each tooth to be bracketed with a fine-line (.5mm) pencil (Fig. 3). Use the dominant vertical buccal grooves as the long axes of the molars. Inspect these vertical reference lines for accuracy under a desktop ultraviolet black light; the fluorescent yellow marking will make the lines stand out.

4. Using a bracket-height gauge, scribe horizontal reference lines at the appropriate bracket heights (Fig. 4). Inspect these horizontal reference lines for accuracy under the ultraviolet black light (Fig. 5).

Fig. 3 Long axes scribed with fine-line pencil.

5. Burnish or contour the metal bracket bases as necessary to closely approximate the tooth anatomy.

6. Block out any bracket posts or hooks and any severe undercuts on the working casts.

7. Place a 5cm bead of JC Endirect adhesive on a mixing pad. Press each bracket base against one end of the adhesive bead until most of the bracket base is covered with adhesive. Place the bracket firmly against the appropriate tooth on

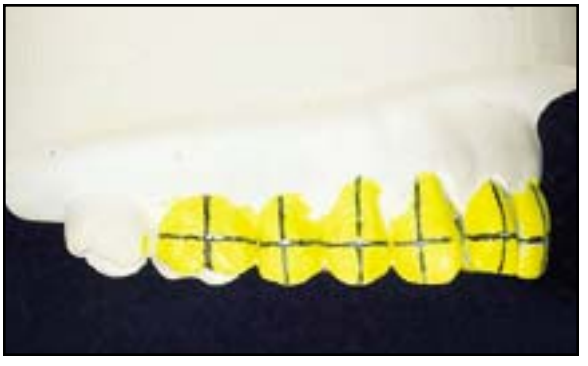

Fig. 4 Horizontal reference lines scribed at appropriate bracket heights.

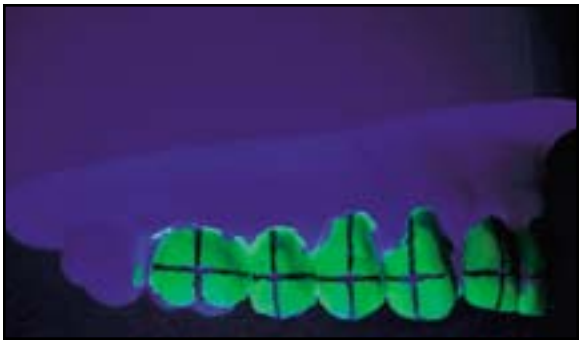

Fig. 5 Reference lines checked for accuracy under ultraviolet black light.

Fig. 6 Bracket positioned on working cast.

Fig. 7 Maxillary brackets in place.

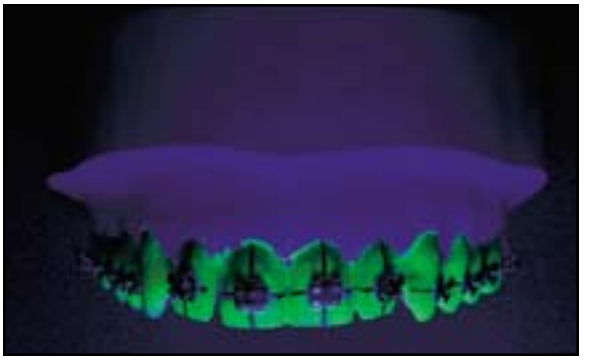

Fig. 8 Bracket positions checked under ultraviolet black light.

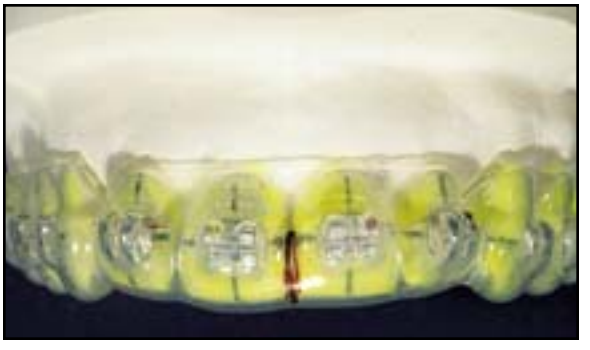

Fig. 9 Midline of second transfer tray marked with indelible pen for reference.

the working cast, guided by the reference lines (Fig. 6). Check the bracket positions (Fig. 7) under the ultraviolet black light (Fig. 8).

8. Allow the adhesive to bench-cure for 20 minutes, then remove any excess adhesive from around the bracket bases.

9. Vacuum-form a 1mm soft plastic mouthguard sheet over each bracketed cast, and immediately spray it with a coolant spray for ideal plastic-to-cast adaptation. Remove the bracketed cast from the vacuum-forming machine; soak it for 15 minutes in a bowl of warm water to dissolve the adhesive. Using a curved utility scissor, trim any excess plastic from around the base of the cast.

10. Wedge a sharp-bladed instrument between the cast and the soft plastic to gently pry the plastic away. Trim the soft plastic to the cervical line of the teeth with a utility scissor. Clean off any excess adhesive remaining on the bracket bases and working casts with liquid soap, warm water, and a toothbrush.

11. Trim the transfer tray into sections, depending on whether a one-, two-, or three-piece transfer tray is needed. Return the bracketed soft transfer tray to the cast, then spray the exterior surface of the tray with a silicone release agent.

12. Vacuum-form an .040" rigid clear plastic sheet over the bracketed soft transfer tray, and spray it with coolant to speed up setting and improve the adaptation of the second transfer tray over the first. Remove the cast from the vac-

Fig. 10 Transfer trays after final cleaning.

uum-forming machine; trim the excess rigid plastic from around the base of the cast with the utility scissor.

13. Trim the second transfer tray to the index line, and section it as with the first tray. Place the trimmed second transfer tray on the cast over the first transfer tray. Mark the midline on the second transfer tray with an indelible pen to ensure accurate delivery of the dual-tray system (Fig. 9).

14. Clean the bracket bases and trays again with liquid soap, warm water, and a toothbrush (Fig. 10). Check the dual-tray system under the ultraviolet black light, which will identify any remaining fluorescent tags of adhesive for removal (Fig. 11). To avoid distortion and contamination of the bracket bases, do not try in the transfer trays or place them on the casts prior to bonding the brackets in the mouth.

Conclusion

The JC Endirect Technique meets the four essential requirements of an indirect bonding laboratory procedure:

1. Precise bracket locations must be reproduced. In this technique, they are verified under the black light.
2. Bracket placement must not be compromised by drifting during the setup procedure.[1-10] JC Endirect has the necessary viscosity to prevent bracket drift.
3. Bracket-to-cast adhesive bond strength must be adequate for transfer tray fabrication. JC Endirect has shown more than adequate strength in our laboratory testing.
4. Contamination of the bracket bases by bracket-to-cast adhesive must be completely eliminated. The black light identifies any remaining adhesive tags in the final inspection.

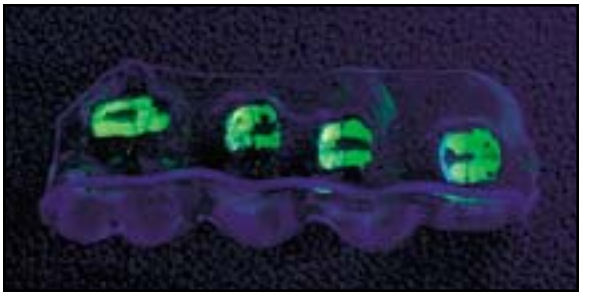

Fig. 11 Transfer tray checked under ultraviolet black light to identify any remaining adhesive tags.

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