Indirect bonding: Digital technique vs conventional method

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One of the peculiar features of straight-wire techniques is the in-built tip, torque and in-out adjustments in the brackets, which reduces the need for making first-, second- and third-order bends on the arch. It follows that the precision in the positioning of the brackets is of fundamental importance for making the correct adjustments and for the consequent predictability of the result, thus making bonding one of the most important steps of the whole treatment.

Fig. 1: Dental studio-Ortho Studio Module.
With direct bonding, there is a high margin of error in bracket positioning, due both to the dental professional’s experience and to difficulty with visualisation. The positioning errors that can be made are on the horizontal, vertical and mesiodistal axes, and can create the need to reposition the brackets during orthodontic treatment, resulting in a waste of time. Over the years, indirect positioning techniques have been developed to make positioning more precise and to make the procedure as fast as possible. The aim of this study was to compare a new, digitally assisted method of indirect bonding (Transfer Bite Leone) with the conventional clear two-tray technique, using the split-mouth method to evaluate the amount of remaining composite around the base of the bracket in both procedures.

In order to avoid differences due to placement, we used the same dedicated programme for both methods. STL files, obtained from intra-oral arch scanning or stone model scanning, were loaded and processed with the Leone Maestro 3D Ortho Studio software (AGE Solutions). This digital tool permits the segmentation and width and height measurement of the teeth, and the subsequent determination of the long axis and the average height of the clinical crowns, in order to virtually arrange the brackets in the correct position. The

Fig. 2: Indirect bonding through Leone’s JIG and brackets. Figs. 3 & 4: Limitations of the conventional method, such as non-constant accuracy and excess of composite around the base of the attachment.
tist can later change the positioning height, the torque, the tip and the rotation to obtain an absolutely individualised and strategic positioning of the brackets for the case (Fig. 1).

Once the ideal position of the brackets had been obtained, we used the Maestro 3D software to obtain a file that allowed the 3-D printing of the model in which, in the left hemi-arch, the brackets were integrated to be able to use it to produce the conventional thermoformed clear trays that would contain the brackets to be placed in the mouth. In the right hemi-arch, using the software, we designed a Transfer Bite that permitted precise positioning of the brackets. The Transfer Bite is made of biocompatible material and is produced using a high-precision 3-D printer according to specific parameters.

Our split-mouth clinical investigation protocol was accepted by the American Association of Orthodontists committee for the table clinics that we presented at the 2017 annual congress in San Diego in the US (Fig. 2). This procedure clearly demonstrated the limitations of the conventional two-tray technique: inconsistent accuracy, an excess of composite around the base of the bracket that cannot be removed during the bonding step, and difficulty in removing the thermo-printed support (Figs. 3 & 4).

The Transfer Bite system with positioning devices was found to be better because it allows the clinician to have a complete view of the base of the brackets, optimising the removal of excess composite (Fig. 5). In addition, the Transfer Bite, compared with the thermoformed trays, has greater stability on the dental arches, with an even better precision result, and aids the dentist in repositioning the brackets in a detachment case.

Our experience of using the Transfer Bite system on 12 patients allows us to confirm that this new indirect bonding method is simpler, easier and more accurate than the conventional method. Furthermore, it proved to be a less operator-dependent technique, allowing even less-experienced clinicians to achieve optimal results.

Fig. 5: Leone’s Transfer Bite system.