Bonding in Lingual Orthodontics using Hiro system

Authors' Name

Alex C Abraham, B.D.S (M.D.S)
Post graduate student
Department of Orthodontics & Dentofacial Orthopedics
Coorg Institute of Dental Sciences
Maggula, Virajpet, Coorg district
e-mail: alexabraham09@yahoo.co.in
phone no.: 09342042727

P.P. Biswas, B.D.S, M.D.S
Professor & H.O.D
Department of Orthodontics & Dentofacial Orthopedics
Coorg Institute of Dental Sciences
Maggula, Virajpet, Coorg district
e-mail: ppbiswas@yahoo.co.in
phone no.: 09447062318

Abstract
The addition of lingual appliances to the world of aesthetic orthodontic appliances has provided the ultimate in esthetics because this is only treatment modality which is truly invisible. Patients with high aesthetic demands seem more interested in this approach and enjoy having confidence in their smiles before their braces are removed. A key factor for successful correction of a malocclusion with lingual orthodontics is precise and accurate bracket positioning. This case report describes a simple method of indirect bonding used in lingual orthodontics.

Key words: Lingual orthodontics, Indirect bonding

Introduction
Lingual orthodontics has come of age; its acceptance by both the profession and the patient population continues to grown internationally. The number of adult patients in orthodontic practice is increasing. The decision taken by adults to commit them to orthodontic treatment is a more complex matter than for the younger age groups, as they have their demands of their work and broader social needs to consider. Of those who would accept all other aspects of treatment there is a group that is not prepared to display their orthodontic appliances and lingual orthodontics has become the esthetic solution for meeting the esthetic needs of this patient. The addition of lingual appliances to the world of aesthetic orthodontic appliances has provided the ultimate in esthetics.

The importance of bracket positioning is due to difficulty of direct vision, variation in morphology of lingual surfaces of teeth, wide range of labiolingual thickness, transfer of labial and buccal torque on to lingual surface, and smaller inter bracket distances. Indirect bonding has become the established method of overcoming these discrepancies. Smith and coworkers reported 12 keys to success in lingual therapy in that the most important is bracket placement accuracy. At present, lingual bonding is done indirectly using the Slot Machine, the TARG system, the CLASS system or the lingual bracket jig. These procedures can be highly accurate, but they suffer from several drawbacks: it is expensive, complex laboratory procedures, bonding trays are flexible and gets easily distorted when transferred to the mouth, if neighboring teeth drift after extraction trays will no longer fit and must be remade and requires expertise to use them.
The most recent development made in lingual orthodontics is indirect bonding using Hiro system8,9. This system was invented by Dr Toshiaki Hiro in Japan and improved by Kyoto Takemoto and Giuseppe Scuzzo. The main advantages with this system are less expensive, simplified laboratory procedures and precise and accurate bracket positioning even in severely crowded cases. With this system, trays are fabricated for individual teeth so that a bracket can be bonded to each tooth without being affected by neighboring teeth.

**STEP-BY-STEP LABORATORY PROCEDURES**

**Impressions**
First and foremost it is essential that the impressions be as accurate as possible, which is why the best materials such as high quality alginate or silicon should be used.

**Models**
The impressions should be poured with hard plaster and articulated. The long axis of all the teeth should be marked on the buccal and lingual tooth surface and the teeth should be numbered for identification (Fig 1A).

**Set up model**
Prepare models in ideal occlusion (Fig 1B). Include some overcorrection, depending on the degree of malocclusion. The quality of the setup models will affect the treatment quality. Setup model is made by cutting individual teeth and replacing them on their base to simulate treatment results.

**Using full size arch wire**
Use full size rectangular arch wire 0.018 x 0.025 SS to fabricate an ideal arch wire (Fig 2A). To get the correct distance between the wire and the lingual surface of teeth it is helpful to place two central incisor brackets on the wire. Adjust the wire with a steep curve in the anterior segment and make inset bends between the canines and premolars so that part of the bracket base touches the tooth surface. Try not to make any adjusting bends such as step up or step down bends. In some cases it is necessary to make small insets between premolars and molars. Avoid adding undesired torque in any section of the wire (Fig 2B).

**Bracket placement**
Bracket fixing starts with the anterior teeth, ligated to the full size arch wire with elastic ligatures. The wire with bracket should passively sit on the setup model with center of the clinical as reference point (Fig 2C).

**Making cores (individual hard trays)**
Apply Vaseline to the set up model for easy separation of cores. The arch wire with bracket is fixed on the cast with the help of sticky wax which is put in the lingual surface of molars. The cores can be made of using Ultra band lock, composite, light cured glass ionomer cement or chemical cure acrylic resin. The material chosen is applied with the help of plastic filling instrument on to the tooth and is light cured (Fig 2D). On the anterior the core should extend from occlusal margins of the bracket to few millimeters to the labial surface and in posteriors only the occlusal surface is covered. Once all the cores are ready the setup model should be put in cold water for easy removal of cores (Fig 3A). The arch wire with cores should be carefully removed from the setup model (Fig 3B). After separating the arch wire with brackets and cores from the setup model, cut individual ligatures for removal of brackets with cores from arch wire. The cores are numbered and axial lines are drawn.

**Customizing the bracket base**
To compensate for the space between the bracket base and the tooth surface first a primer was applied on to the mesh pad and a small amount of Pad lock composite was applied to all bracket bases (Fig 3C). The brackets with cores were transferred to the set up model and light cured. It was ready to be transferred to the patient's mouth (Fig 3D).

**Clinical bonding**
Before bonding the lingual surfaces were cleaned and polished (Fig 4A). Etching gel was applied to the lingual tooth surface. After rinsing and drying a thin coat of primer was applied both to the bracket base and lingual tooth surface. After applying Pad lock composite on the bracket base and it was transferred to the patient's mouth. Each tray was carefully seated on each tooth and it was light cured (Fig 4B).

**Removing cores**
The cores were removed with the help of high speed hand piece (Fig 4C).

**Rebonding**
It is important to preserve the ideal arch wire used for indirect bonding. The debonded bracket is sand blasted and is secured on to the arch wire with the help of
FIGURES

Fig 1A: Models are articulated

Fig 1B: Setup done & teeth are numbered for identification

Fig 2A: Arch wire contoured to lingual anteriors

Fig 2B: 0.018" x 0.025" SS ideal lingual archform

Fig 2C: Archwire should sit passively on the cast

Fig 2D: Cores are made using composite
Fig 3A: Each bracket with light cured core

Fig 3B: Archwire gently removed from the setup model

Fig 3C: Applying composite on bracket mesh

Fig 3D: Cores ready to be transferred on the patient's mouth

Fig 4A: Cleaning the tooth surface

Fig 4B: After bonding

Fig 4C: Removing cores using high speed handpiece

Fig 4D: Brackets ready for archwire placement
elastomers. The arch wire is reoriented in the setup model and a new core is made. The remaining procedures are same.

**Conclusion**

Compared to other indirect bonding techniques, the Hiro system has several advantages: less expensive, no electronic equipment is required for bracket positioning, no need to transfer brackets from the setup model to original malocclusion model, the accuracy of bonding is improved because of the rigid individual trays, bonding can take place at any time as the trays are not affected by positions of other teeth and rebonding is quick and accurate with the ideal arch wire and the setup model.

**References**


<table>
<thead>
<tr>
<th>Form of Declaration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title of the Newspaper</strong></td>
</tr>
<tr>
<td><strong>Language(s) in which it is (to be) Published</strong></td>
</tr>
<tr>
<td><strong>Periodicity of its publication</strong></td>
</tr>
<tr>
<td><strong>Retail selling price of the Newspaper Per copy</strong></td>
</tr>
<tr>
<td><strong>Retail price, please state the annual Subscription.</strong></td>
</tr>
<tr>
<td><strong>Publisher’s Name</strong></td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
</tr>
<tr>
<td><strong>Address</strong></td>
</tr>
<tr>
<td><strong>Place of Publication (Please give the complete Postal address)</strong></td>
</tr>
<tr>
<td><strong>Printer’s Name</strong></td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
</tr>
<tr>
<td><strong>Address</strong></td>
</tr>
<tr>
<td><strong>Name(s) of the printing press(es), where printing is to be conducted and the true and precise description of the premise on which the press(es) is / are installed</strong></td>
</tr>
</tbody>
</table>