

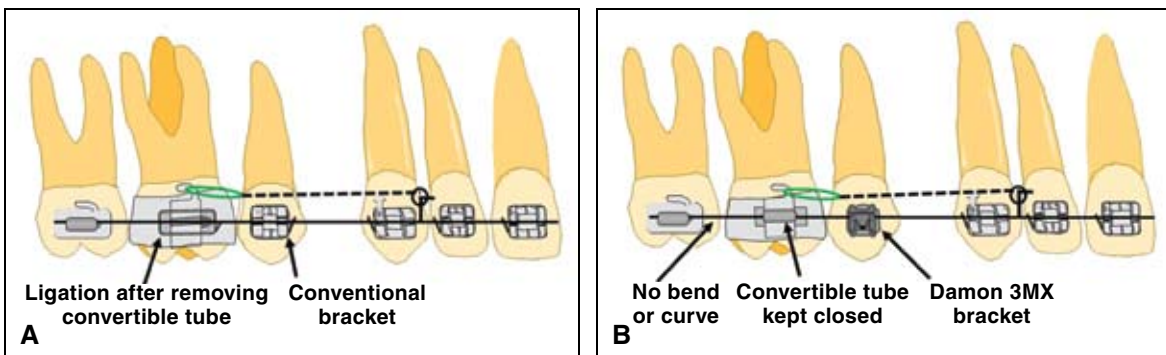
# Low-Friction Space Closure with a Hybrid Bracket-Tube System

CHEOL-HO PAIK, DDS, PHD  
HYO-WON AHN, DDS  
IL-HYUNG YANG, DDS, MSD  
SEUNG-HAK BAEK, DDS, MSD, PHD

**C**losure of extraction spaces is usually performed with either closing-loop or sliding mechanics (Fig. 1A). Although sliding mechanics can deliver more constant force, bracket-archwire friction becomes an important consideration.<sup>1-5</sup>

The frictional effects of self-ligating brackets (SLBs) have been studied in initial alignment and over the course of treatment,<sup>3,6-9</sup> but not specifically in terms of space closure. In general, passive

SLBs have been found to produce significantly less friction than active SLBs.<sup>10-13</sup> Rinchuse and Miles's proposed hybrid combination of conventional brackets or active SLBs in the anterior segments and passive SLBs in the posterior takes advantage of these properties.<sup>9</sup> We have recently developed a variation of this technique for use in premolar extraction cases, called Hybrid Sliding Mechanics for Low Friction (HSM/LF)—a combination of



**Fig. 1 A. Conventional sliding mechanics for extraction space closure. B. Hybrid Sliding Mechanics for Low Friction: conventional twin brackets on anterior teeth, passive self-ligating brackets on second premolars, and tubes on first and second molars.**



Dr. Paik



Dr. Ahn



Dr. Yang



Dr. Baek

Dr. Paik is a Clinical Assistant Professor, Dr. Ahn is a resident, Dr. Yang is a doctoral candidate, and Dr. Baek is an Associate Professor, Department of Orthodontics, School of Dentistry, Dental Research Institute, Seoul National University, Yeonkun-dong #28, Jongno-ku, Seoul, 110-768, South Korea. E-mail Dr. Baek at drwhite@unitel.com.



**Fig. 2** Case 1. 20-year-old female patient with mild anterior crowding and lip protrusion due to severe labioversion of upper and lower incisors.

passive SLBs on the premolars, conventional tubes on the molars, and conventional twin brackets on the anterior teeth (Fig. 1B).

## Appliance Placement

For space closure in a first-premolar extraction case, all anterior teeth are bonded with conventional twin brackets\* and the second premolars with passive SLBs.\*\* The first molars are bonded or banded with conventional convertible tubes and the second molars with non-convertible tubes.

An .019" × .025" posted stainless steel wire is used for en masse retraction. The force is delivered with active tie-backs (we use a gray elastomeric module and a long stainless steel ligature). To enhance the sliding mechanics, we do not open the covers of the convertible tubes or place wire bends, including a curve or reverse curve of Spee.

Two cases illustrate the HSM/LF technique.

\*Clarity ceramic brackets, .022" slot, MBT prescription. Clarity is a trademark of 3M Unitek, 2724 S. Peck Road, Monrovia, CA 91016; www.3Munitek.com.

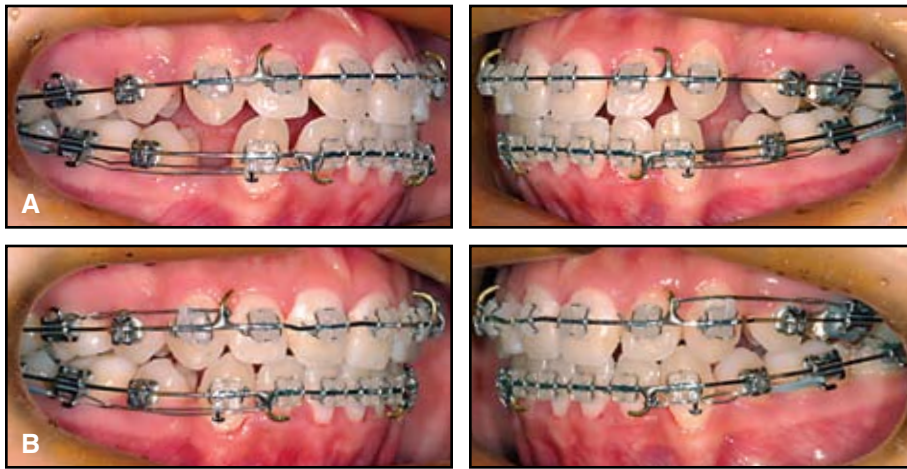
\*\*Damon 3MX, .022" slot. Damon is a registered trademark of Ormco, 1717 W. Collins Ave., Orange, CA 92867; www.ormco.com.

## Case 1

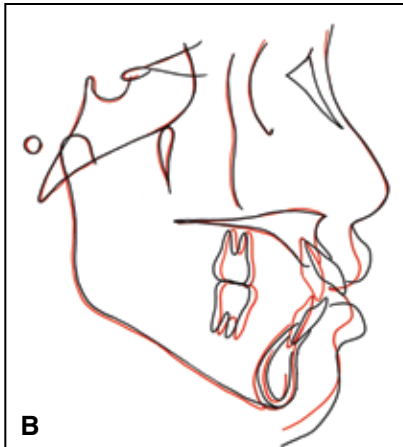
A 20-year-old female presented with the chief complaint of lip protrusion. Clinical examination showed labioversion of the upper and lower incisors ( $U1-FH = 125.4^\circ$ ,  $IMPA = 98.1^\circ$ ), an open-bite tendency, and mentalis action (Fig. 2). The treatment plan called for extraction of the four first premolars and space closure using maximum anchorage. The possibility of using miniscrews was presented to the patient, but she declined this option. Therefore, we considered HSM/LF the best choice for maximum anchorage and controlled tipping of the anterior teeth.

After six months of leveling and alignment with a progression of round and rectangular nickel titanium archwires, space closure was completed in five months (Fig. 3). Total treatment time was 14 months. Favorable changes were seen in the patient's profile; cephalometric analysis demonstrated successful controlled tipping of the upper and lower incisors ( $U1-FH = 105^\circ$ ,  $IMPA = 85^\circ$ ) without significant extrusion, as well as space closure with minimal anchorage loss (Fig. 4).

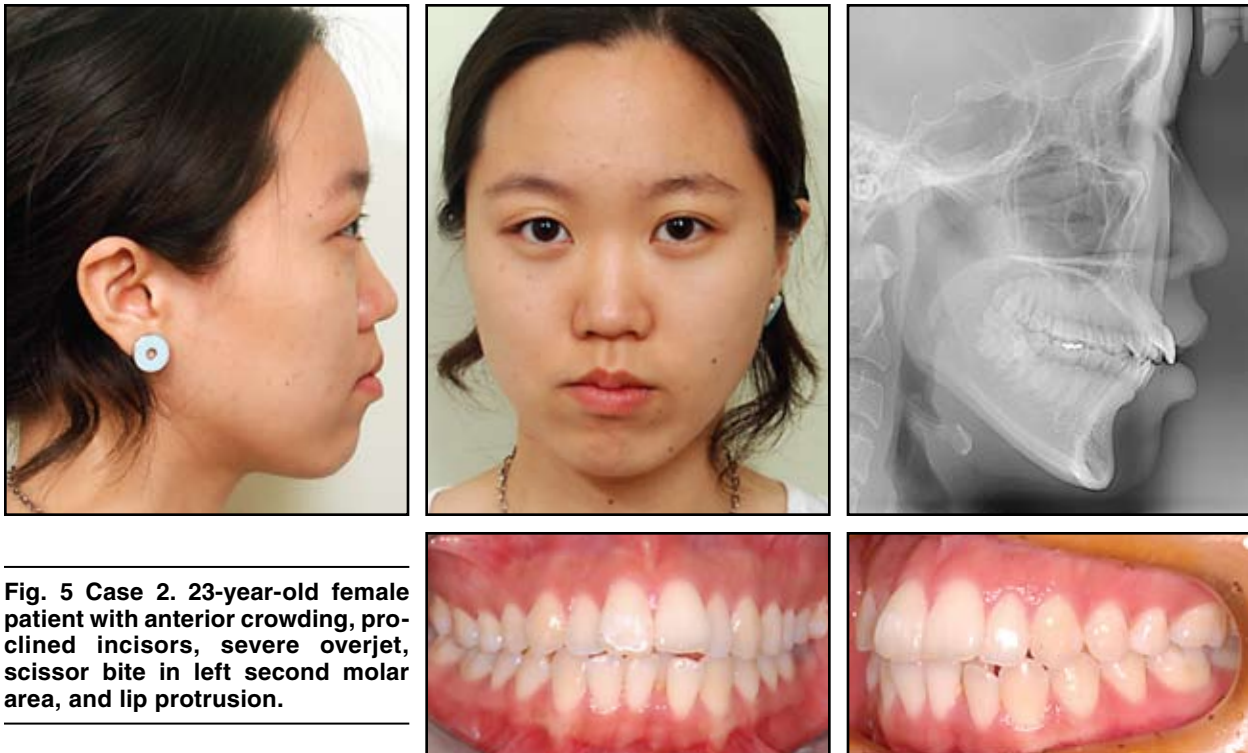
*(continued on p. 626)*



**Fig. 3 Case 1. A. Initiation of first-premolar space closure, six months after bonding. B. Patient after five months of space closure.**



**Fig. 4 Case 1. A. Patient after 14 months of treatment. B. Superimposition of pre- and post-treatment cephalometric tracings.**



**Fig. 5 Case 2. 23-year-old female patient with anterior crowding, proclined incisors, severe overjet, scissor bite in left second molar area, and lip protrusion.**

### Case 2

A 23-year-old female presented with anterior crowding, proclined incisors ( $U1-FH = 124^\circ$ ,  $IMPA = 98^\circ$ ), a severe overjet, a scissor bite in the left second molar area, and lip protrusion (Fig. 5). Because the case required controlled tipping and maximum retraction of the anterior teeth, the treatment plan involved extraction of the four first premolars and space closure using the HSM/LF technique.

Space closure was accomplished in five months; the total treatment duration was 16 months. The soft-tissue profile and dental relationships ( $U1-FH = 109^\circ$ ,  $IMPA = 90^\circ$ ) were substantially improved (Fig. 6).

### Discussion

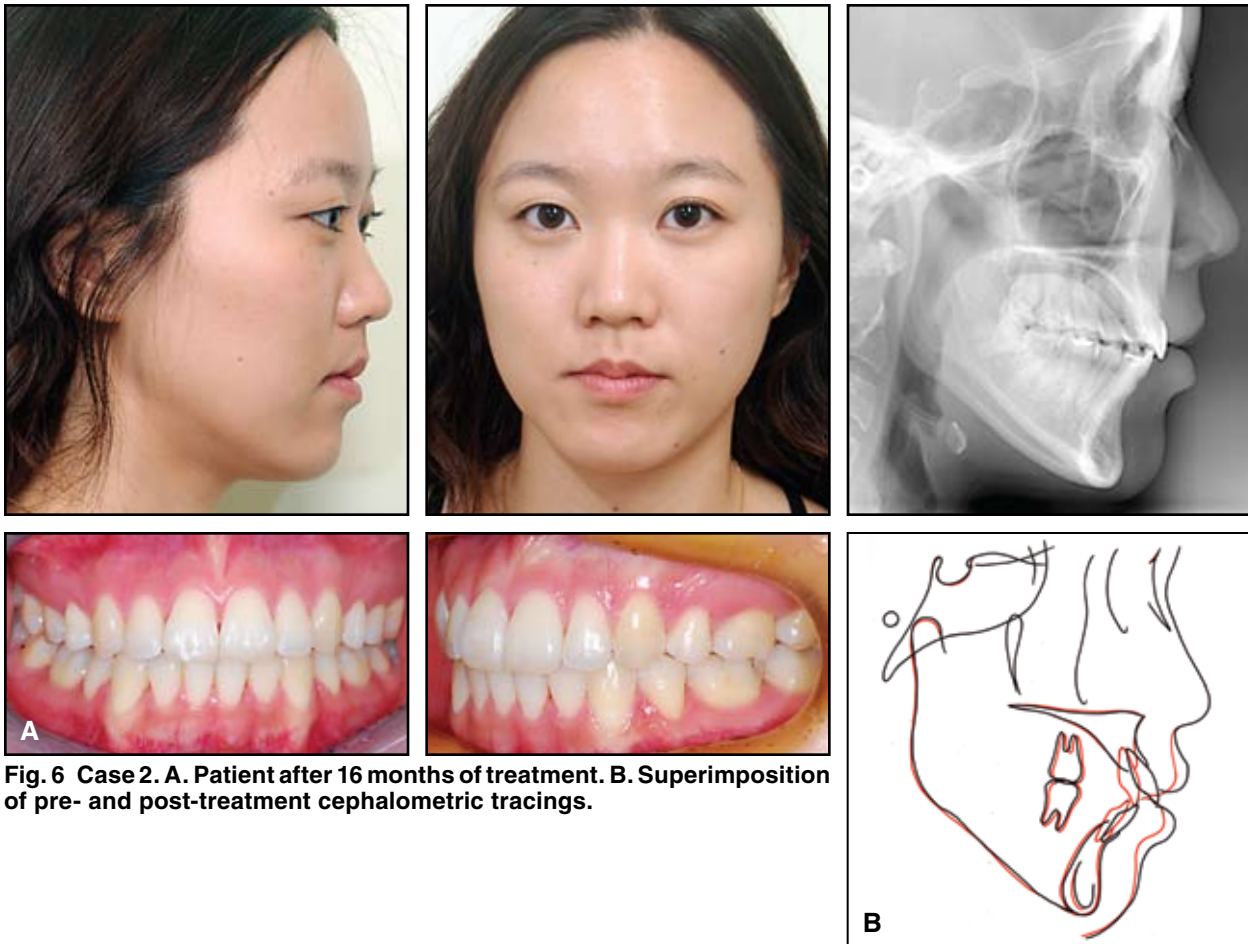
Anterior torque control can be difficult to achieve with SLBs during space closure.<sup>14</sup> The combination of conventional twin brackets on the anterior teeth, passive SLBs on the second premolars, and buccal tubes on the first and second molars has produced good results in our practice, especially as an alternative to miniscrews in cases needing controlled tipping of the anterior teeth with maximum retraction. The technique does

require a modest increase in inventory of specific brackets.

Passive tie-backs are unnecessary in the leveling and alignment stage, because the passive SLBs and buccal tubes will bind only minimally with the archwire. Extraction space closure is often a slow process, however, especially in the narrow alveolar ridge. Since the temporary increase in localized tissue remodeling lasts only three or four months after tooth extraction,<sup>15</sup> it is important to complete leveling and alignment and progress to the space-closure stage as soon as possible.<sup>16</sup> We use strategic lace-backs and small bonded tubes\*\*\* for rapid leveling. Active tie-backs or nickel titanium closed-coil springs with 150g or 200g of force can be used for faster space closure.<sup>17,18</sup>

To enhance sliding properties, any barriers that might create frictional resistance of the tubes and self-ligating brackets (plaque, acquired pellicle, calculus, corrosion, or food particles) should be periodically removed. In addition, before application of the active tie-back or nickel titanium closed-coil spring, a sliding test should be performed to check the mobility of the archwire.

\*\*\*Victory Series Mini Tube. Victory Series is a trademark of 3M Unitek, 2724 S. Peck Road, Monrovia, CA 91016; www.3Munitek.com.



**Fig. 6 Case 2. A. Patient after 16 months of treatment. B. Superimposition of pre- and post-treatment cephalometric tracings.**

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