Permanent Retainer Activation with the Self-Activated Loop System

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Conventional retainers with stainless steel labial bows require periodic tightening to maintain their activation. Without these adjustments, the activation loops at each end of the labial bow gradually open, reducing the force delivered by the appliance and often causing a relapse of anterior crowding. Since such relapse occurs gradually, the patient may be unaware of it until it has advanced to the degree that retreatment with fixed appliances is required.

Loosening of the looped ends of the labial bows can adversely affect retention of the appliance in the mouth as well. This may lead the patient to wear the retainer less—another significant factor contributing to the relapse of orthodontic treatment results.

Although the introduction of shape-memory wires in the early 1970s has revolutionized fixed appliance treatment,[1] these wires have been difficult to incorporate into custom-made removable appliances. Retainer fabrication requires adaptation of wires to the patient's dentition—something that is not easily accomplished with wires made of nickel titanium and other shape-memory alloys. Recently, however, the development of preformed nickel titanium retainer loops has allowed the successful use of such alloys to eliminate the need for periodic tightening of retainers.

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The SAL System

The Self-Activated Loop (SAL*) retainer system incorporates activation loops constructed of preformed sections of nickel titanium joined with straight sections of stainless steel (Fig. 1). The stainless steel segments, which cross the occlusion and are embedded in the palatal acrylic, can be bent to adapt to the dentition on the working cast. The nickel titanium portions, with their shape memory, provide the means of permanent activation.

Retainer fabrication using SAL loops is simple and straightforward, requiring only one additional step compared to conventional or spring retainers. The stainless steel ends of the loop modules are first formed and embedded in the palatal or lingual acrylic. The nickel titanium segments are normally positioned labial to the canines, with their activation arms inclined incisally (Fig. 2).

After the palatal acrylic has completely polymerized, the loops are activated by drawing

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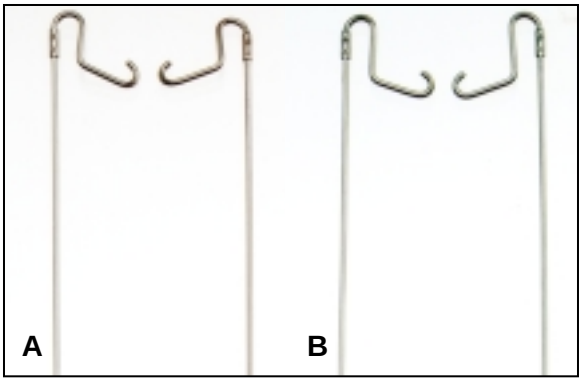

Fig. 1 Short (A) and long (B) versions of Self-Activated Loops. Long version is recommended for patients with relatively long clinical crowns.

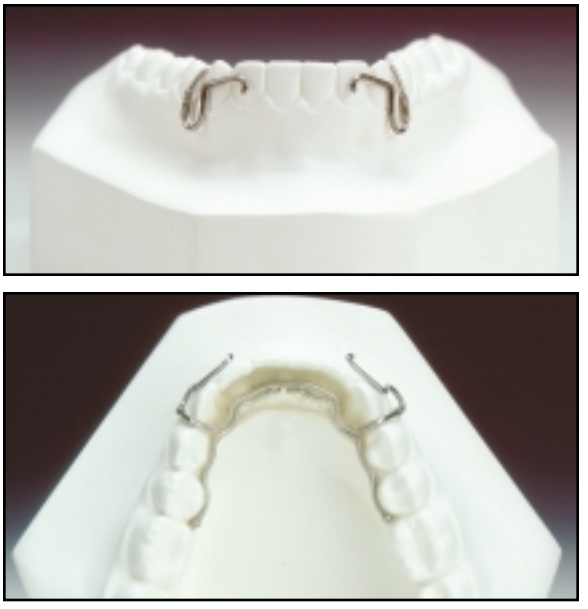

Fig. 2 Stainless steel ends of SAL loops adapted to lingual tooth surfaces and embedded in acrylic prior to activation of nickel titanium segments.

Fig. 3 Activation of SAL loops by drawing hooked ends toward each other with power chain or stainless steel ligature wire.

the nickel titanium ends together with either stainless steel ligature wire or a short segment of power chain (clear chain is recommended for esthetic reasons) and holding them in the activated position (Fig. 3). The acrylic portion of the retainer may need to be sticky-waxed to the cast to prevent it from lifting up during activation. Full activation is achieved when the horizontal sections of the loops are parallel with the incisal edges of the anterior teeth. The amount of activation can be adjusted, depending on the clinician's preference and the degree of crowding or spacing, by moving the loop ends closer together or farther apart. Overactivation should be avoided, however, as it may prevent full seating of the retainer upon delivery. Adams or other posterior clasps should be added for better retention if higher levels of activation are used.

After activation, the horizontal segments of the nickel titanium loops and the interconnecting ligature wires or power chain are covered in acrylic to form the labial bow (Fig. 4). Once the acrylic has completely polymerized, the labial loops will be permanently held in fully activated positions. From this point on, the force delivered by the labial bow will remain constant without reactivation. The system can be used with conventional retainers to maximize control of anterior alignment (Fig. 5).

Conclusion

The SAL retainer system significantly reduces the number of post-treatment retainer checks required. It is capable of re-aligning the teeth, however, if a patient neglects to wear it for a period of time. Permanent activation also permits earlier dismissal of retention patients, allowing more chairtime to be spent with patients in active treatment.

The SAL retainer system is the first to use the properties of shape-memory wire to improve the long-term retention of treatment results. No significant decline in the force exerted by the labial bow has been detected to date. Therefore, the permanent retainer activation achieved with

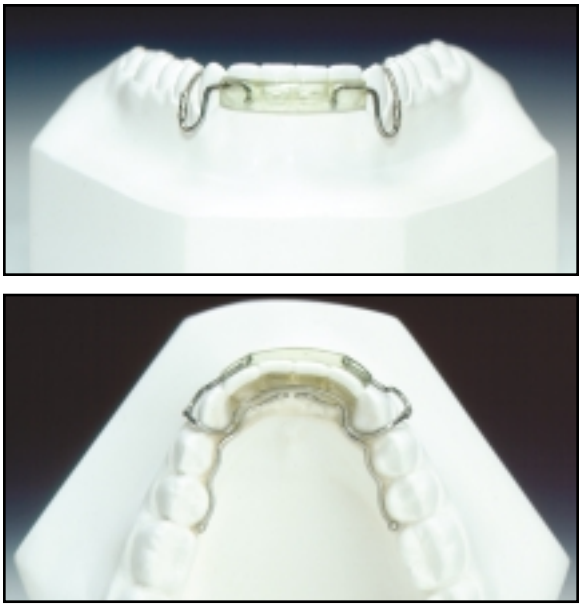

Fig. 4 Nickel titanium loop ends and power chain covered in acrylic to form permanently activated labial bow.

Fig. 5 SAL system can also be used with conventional retainers (without resetting any teeth) to maximize long-term control of anterior alignment.

the SAL appears to reduce the need for retreatment due to relapse of anterior crowding.

REFERENCES

1. Andreasen, G.F. and Hilleman, T.B.: An evaluation of 55 cobalt substituted Nitinol wire for use in orthodontics, J. Am. Dent. Assoc. 82:1373-1375, 1971.