

The SUPERspring II: A New Appliance for Non-Compliant Class II Patients

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Class II patients' lack of compliance with wearing elastics and headgear can add significantly to treatment time and practice overhead. In recent years, a number of devices have been developed that do not rely on patient cooperation. In designing such an appliance, my goals were that it would:

1. Be simple to insert, requiring no special arches, no removal of bicuspid brackets, and no labor-intensive laboratory procedures.
2. Require no more than the standard appointment time to insert, adjust, or replace.
3. Be minimally intrusive, allowing patients to eat comfortably and perform normal oral hygiene.
4. Produce a timely and predictable correction by applying continuous force without the active participation of the patient.
5. Be sturdy enough to have minimal breakage.

SUPERspring II Design

The SUPERspring II is a flexible spring element that attaches between the maxillary molar and the mandibular canine (Figs. 1A, 1B). It is designed to rest in the vestibule, making it impervious to occlusal damage and allowing for good hygiene. Only minor adjustments are needed for patient comfort, without any impingement on soft tissues.

The spring's open helical loop is twisted like a J-hook onto the mandibular archwire. On the maxillary end, a special oval tube (Fig. 2) serves as the maxillary first molar attachment; the spring can be secured to the tube with a stainless steel ligature, as a palatal bar or lingual arch would be retained in a sheath. This oval tube represents an improvement over the original SUPERspring, which used a standard headgear tube. The new tube simplifies adjustments by stabilizing the maxillary attachment and thus the position of the spring in the vestibule.

In opening and closing movements, the lower helical attachment hinges on the mandibular archwire through an arc of about 90°. The hinging action and the flexibility of the spring allow a reasonably full mandibular opening, which makes the appliance suitable for use in adults as well as children.

Because the length of the spring can be increased or decreased by simply bending the attachment wires (Fig. 3), only two prefabricated sizes are necessary (with left and right versions of each). The longer spring is recommended for nonextraction cases that have end-on or better molar relationships. The shorter spring is used for full Class II or extraction cases.

The SUPERspring II provides a moderate, continuous distalizing force with simultaneous intrusive mechanics over a wide range of mandibular movement. The anteroposterior force can be adjusted from about 0-5oz (with the teeth in occlusion) by extending the anterior attachment wire and/or changing the angle of the posterior attachment wire (Fig. 4). A horizontal configuration of the

attachment wire at the maxillary molar tube will produce a more horizontal force against the maxillary molar crowns, and less intrusion of the mandibular anterior teeth. Conversely, a more vertical adjustment of the wire will create more maxillary molar root distalization and more mandibular anterior intrusion.

Other Class II auxiliary devices tend to cause intrusion of the mandibular anterior segment whether it is desirable or not. Because they are connected to the maxillary molars by a ball joint, hinge, or swivel, their force vectors cannot be adjusted.

Patient Management

The key to the successful use of any Class II device lies in the orthodontist's ability to make it comfortable for the patient. The SUPERspring II's new maxillary oval tube prevents any lateral movement of the spring in the vestibule. Therefore, only minor adjustments for individual anatomical variations need to be made in the mouth.

With Class II elastics, there is usually a cycle of wear followed by discomfort followed by non-compliance. With the SUPERspring II, the initial dental discomfort disappears within about three days. Thereafter, the patient has little awareness of the device as the force continues. The compliance issue is a non-starter, and real progress can be seen as early as four to five weeks into treatment, and at every subsequent visit.

Clinical Applications

The SUPERspring II can be used in the entire range of Class II cases, from vertical facial patterns with shallow overbites to brachyfacial patterns with deep overbites. It can be used with fully bracketed appliances (Fig. 5), and it makes an ideal auxiliary for a variety of mechanical systems. The unique, unitary force couple applied by the spring against the maxillary molar allows a number of different applications. In the late mixed dentition, while the mandibular arch is fully bonded for anchorage, the maxillary molars can be distalized without bonding the adjacent teeth (Fig. 6). Other Class II auxiliaries tend to distalize only the maxillary molar crown, leaving the root in a mesial position that must be corrected later in treatment. The SUPERspring II moves both crown and root with a moderate, continuous force, and the adjacent teeth then follow the molar distally.

The same couple allows simultaneous bite opening and Class II correction in deep-bite cases. When a utility or lever arch is used to intrude the maxillary incisors, the SUPERspring's couple will support the intrusive effect of the utility arch while providing a distalizing force against the maxillary molar roots. A reciprocal force also helps intrude the mandibular anterior teeth on a continuous archwire.

The SUPERspring II has proven to be excellent for TMD patients who require orthodontic treatment after splint therapy. All orthodontists are familiar with the muscle splinting that occurs with the use of Class II elastics. Elastic wear must always be suspended for awhile after debonding to allow the mandible to return to a rest position and to differentiate between the tooth movement achieved and mere posturing of the mandible. I believe this effect is attributable to extrusion of the molars and consequent masseter and pterygoid hyperactivity. Because the SUPERspring II delivers an intrusive force to the maxillary molars, the muscles do not respond in the same fashion, and the mandible can easily be moved manually into a seated position for evaluation of tooth movement. If relapse is accommodated by overcorrection, it is dental relapse and not an effect of mandibular posturing.

Conclusion

The SUPERspring II has eliminated nearly all Class II compliance problems from my practice – without premature debonding, and with cases finished to a satisfactory standard. The patients appreciate not being lectured, and the parents appreciate not having to nag their children about their behavior. The atmosphere in the office is much more upbeat, and with more cases finished on time I have more time to spend with new patients. □

FIGURES

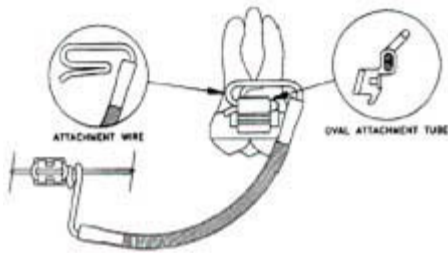


Fig. 1A SUPERspring II appliance.



Fig. 1B SUPERspring II appliance.

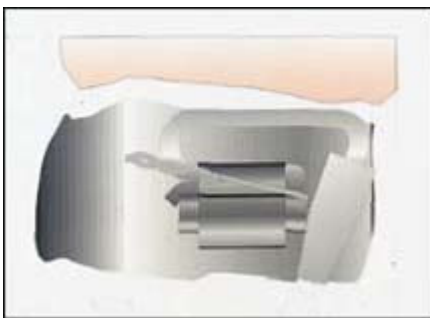


Fig. 2 Special oval attachment tube for maxillary molar.

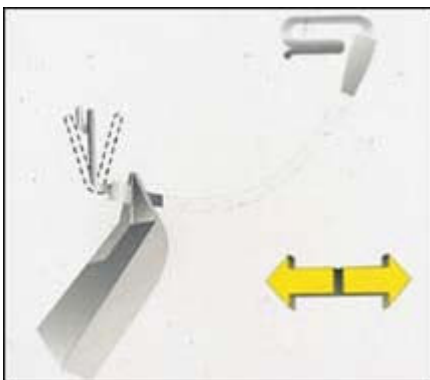


Fig. 3 Length of spring and magnitude of anteroposterior force can be adjusted by bending attachment wires.

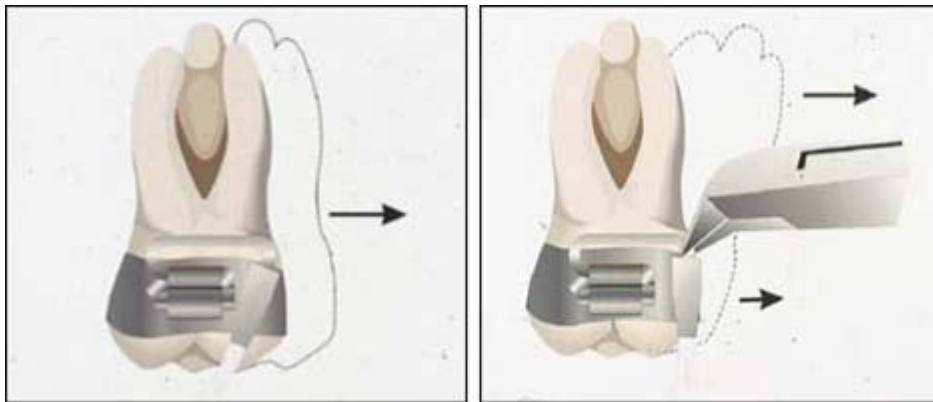


Fig. 4 Angle of anterior attachment wire affects distalizing force on maxillary molar and intrusive force on mandibular anterior segment.



Fig. 5 A. Fully bracketed Class II case with SUPERspring II in place. B. After Class II correction.

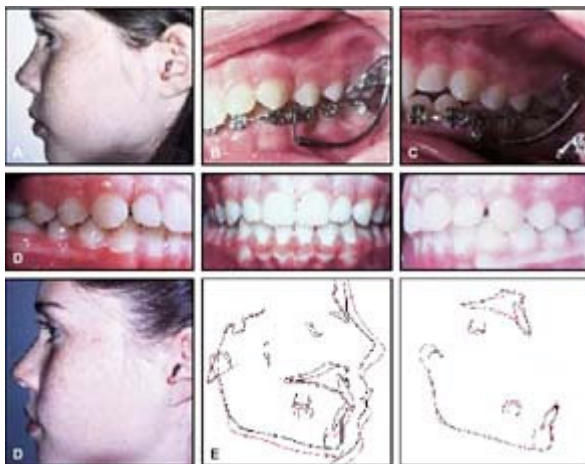


Fig. 6 Fig. 6 A. Female patient in late mixed dentition. B,C. SUPERsprings used for three months early in treatment. D. After 19 months of active treatment. E. Superimposition of pre- and post-treatment cephalometric tracings. SN-GoGn was unchanged (30°); NPo-A decreased from +5mm to +3mm; L1-APo increased from +2mm to +4mm.

FOOTNOTES

1 Trademark of ORTHOdesign, 744 Falls Circle, Lake Forest, IL 60045.

