Resin Bite Turbos

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Resin bite turbos, sometimes referred to as build-ups, are created by bonding composite material to the palatal or occlusal surfaces of teeth. Their primary purpose is to prevent heavy contact of the upper teeth with lower fixed appliances in patients with deep overbites, but they can also be beneficial in cases involving crossbites or hyperfunctional masticatory muscles.

Although the application of resin turbos is a well-known technique, there are differences of opinion about where to place them and what materials to use. This review is intended to improve the clinician's understanding of the rationale for such choices. The utilization of functional turbos will also be discussed.

Development of Bite Turbos

Orthodontists have historically corrected deep overbites with removable and fixed upper anterior acrylic bite plates. These appliances disarticulate the posterior teeth; deprogram the masticatory muscles; and allow for eruption, extrusion, and uprighting of the posterior teeth.[1] Removable bite plates require patient compliance, however, as well as frequent adjustments to account for orthodontic tooth movements. Banded bite plates provide a fixed alternative, but they are less accommodating of tooth movements and can cause soft-tissue irritation.

In 1994, Joe Mayes of Ormco Corporation created a metal bite turbo as an alternative to the acrylic bite plate.[2] Mayes's design was a simple modification of a lingual upper incisor bracket. After one to four turbos were bonded to the palatal surfaces of the upper incisors, the lower incisors occluded on the turbos' 44° occlusal ledges to prop open the bite. Mayes believed metal was a better material for deprogramming the muscles than the softer acrylic used in conventional bite plates.

Metal turbos largely replaced bite plates because of their durability, ease of hygiene, and simplicity, but they were not without problems. Most notably, metal turbos were sometimes difficult to place because of the variability of the upper incisors' lingual anatomy. Posterior metal turbos consisted of stainless steel crowns placed over otherwise normal molars. Common side effects of metal turbos included lisping and intolerable tooth vibrations. These issues prompted the creation of a resin alternative for use in overbite correction.

Overbite Correction

A patient with retrognathia or a reduced lower arch perimeter is prone to the development of a deep overbite and a steep curve of Spee (Fig. 1). The lower incisors erupt until they contact the opposing teeth or palatal soft tissue, forming the anterior component of the curve of Spee. The lower

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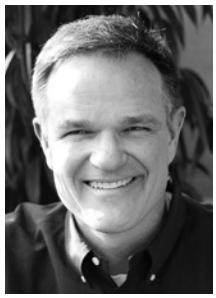

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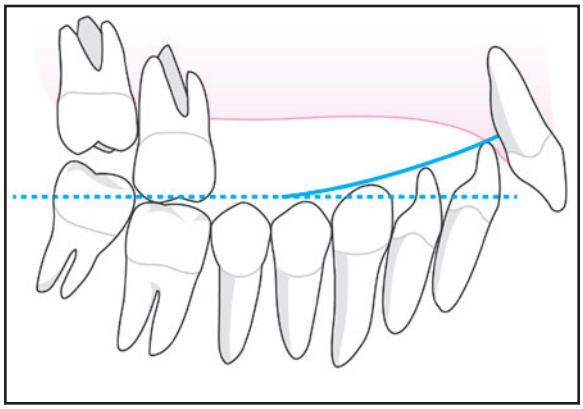

Fig. 1 Steep curve of Spee commonly seen in retrognathic, low-angle patients. Lower second molars erupt distal to upper first molars and prior to upper second molars, causing supraeruption. Bonding lower second molars is critical because they assist in extruding premolars and first molars for overbite correction.

second molars then erupt distal to the upper first molars and are unopposed until they contact the upper second molars, making up the posterior component.

Overbite correction requires a reversal of this process to level the curve of Spee. Specifically, the premolars and first molars are extruded, while the incisors, canines, and second molars are intruded. Complete leveling of the curve of Spee is difficult without bonding the lower second molars, because their inclusion provides a lever arm for extrusion of the lower posterior teeth.[1]

Because posterior extrusion and overbite correction can be particularly challenging in low-angle patients, the lower second molars should be bonded as early as possible. Light, vertical posterior elastics (2oz) can be prescribed to assist in premolar extrusion. In a patient with hyperfunctional masticatory muscles, as is commonly seen in low-angle cases, Botox* can be used in conjunction with bite turbos to facilitate posterior extrusion.[3] The posterior teeth are discluded by the resin turbos on the upper central incisors.

Turbo Locations

The mandibular plane angle is always an important factor in choosing turbo locations. Anterior resin turbos are indicated in low-angle patients, while posterior resin turbos are better suited for average-angle cases.[1] Anterior turbos should be used with caution in high-angle cases because of the risk of undesirable posterior extrusion; instead, only the upper teeth should be bracketed until the overbite has been reduced enough for the lower teeth to be bonded.

The most common locations for anterior resin turbos are on the lingual aspect of the upper central incisors (Fig. 2). Both central incisors are customarily bonded to broadly distribute the occlusal forces. Upper lateral incisors are rarely used because of their shorter roots, although this could be an alternative location if the patient develops a lisp.

Posterior resin turbos are usually placed on the supporting cusps of the lower first molars (Fig.

*Registered trademark of Allergan USA, Madison, NJ; www.botox.com.

3). In a preadolescent patient, the lower second deciduous molars are another possibility. Some practitioners prefer placing turbos on the upper premolars and first molars for easier isolation during bonding. On the whole, however, posterior turbos are less effective in providing clearance for lower anterior brackets and may require excessive thickness in low-angle patients.

Material Choices

Many materials have been proposed for resin turbos, including acrylic gels, band cements, bracket adhesives, and lingual retainer adhesives. Each has advantages and disadvantages related to its color, placement and removal techniques, and glass filler content (Table 1).

Glass fillers such as quartz and silica are included in dental resins primarily to add hardness; they also help minimize polymerization shrinkage and improve handling characteristics. In orthodontic resins, fillers reduce the incidence of bracket debonding due to cohesive failure and of material washout under bands, and they add body to control bracket flotation. On the other hand, the use of a turbo material with high filler content increases the risk of abrasion on opposing teeth. Quartz is of particular concern because it is harder and more

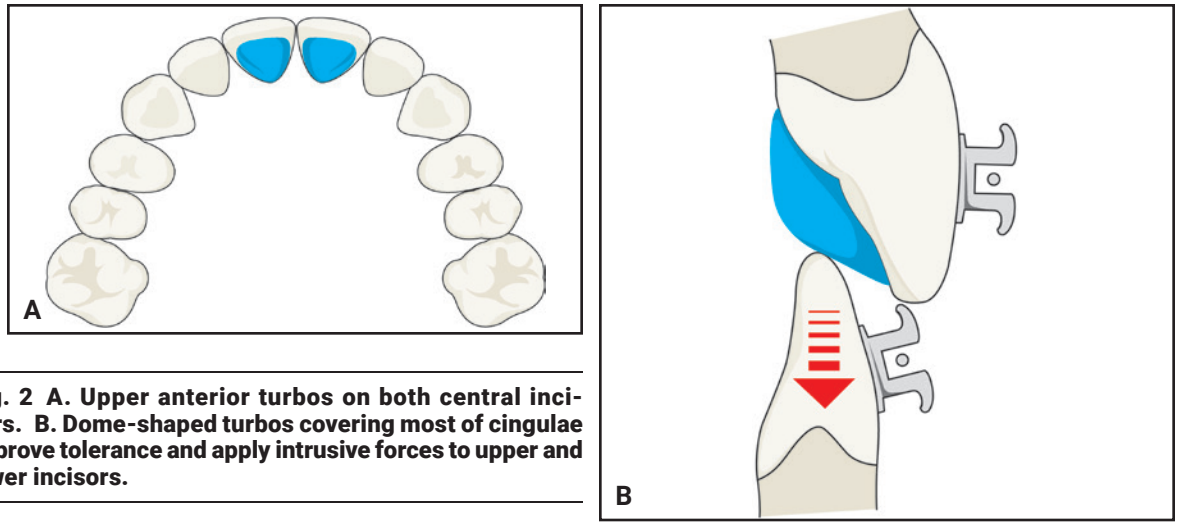

Fig. 2 A. Upper anterior turbos on both central incisors. B. Dome-shaped turbos covering most of cingulae improve tolerance and apply intrusive forces to upper and lower incisors.

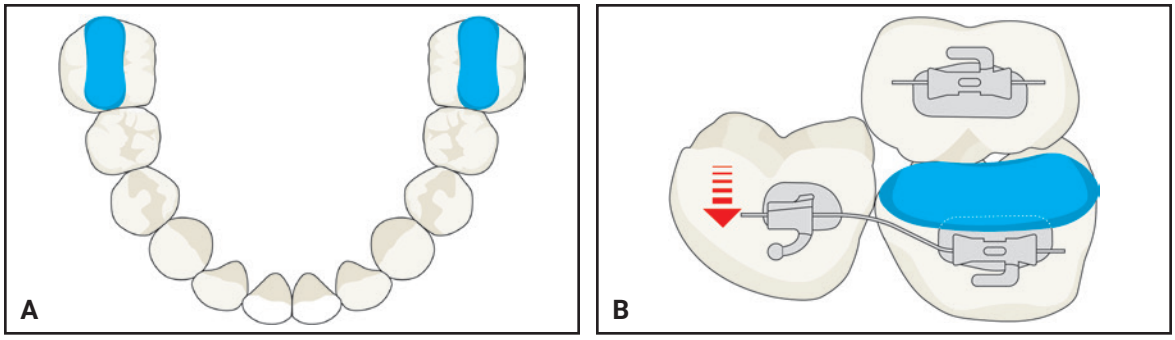

Fig. 3 A. Lower posterior turbos on first molars. B. Tube-shaped lower first-molar turbos placed along supporting cusps. Archwire helps apply intrusive forces to lower second molars and extrusive forces to premolars and first molars. Resin can be extended over bracket pad for added bracket retention.

TABLE 1
POPULAR MATERIAL CHOICES

Product	Original Purposes	Type	Advantages	Disadvantages
Triad Gel**	Bite plates, cast modification	Acrylic gel	Soft, light color	Polymerization shrinkage, hyperemia
Ultra Band-Lok***	Band cement	Compomer paste	Bonds to metal, distinct color	Casts a blue shade
TruLock Light Cure Band Adhesive†	Band cement	Compomer paste	Bonds to metal, distinct color, fluoride releasing	Casts a blue shade
Ketac‡	Band cement, permanent restorations	Glass ionomer cement	Moisture insensitive, fluoride releasing	Difficult to remove
Blugloo, Grengloo††	Bracket adhesive	Resin paste	Color change	Potential for wear
Transbond LR‡	Lingual retainer adhesive	Resin paste	Bond strength	Potential for wear
Flow Tain‡‡	Lingual retainer adhesive	Flowable resin	Easy application	Potential for wear
Twinky Star§	Pediatric restorations	Compomer paste	Easy application, distinct color	Potential for wear

abrasive than silica. Acrylic gels and band cements, which have lower quartz contents, are therefore most commonly used to make resin turbos.

Triad Gel** is an acrylic resin liquid designed for fabricating bite plates and modifying dental casts (Fig. 4). Its composition is primarily methacrylate mixed with silica glass (1-10% by weight). Because its formula is similar to that of an acrylic bite plate, it carries little risk of tooth abrasion. The small tubes of resin are available in four colors: clear colorless, clear pink, clear blue, and clear red. These light colors are acceptable to patients but visible enough to aid placement and removal by the orthodontist. After the teeth are etched and primed, Triad Gel can be applied with a microbrush or a repurposed adhesive syringe

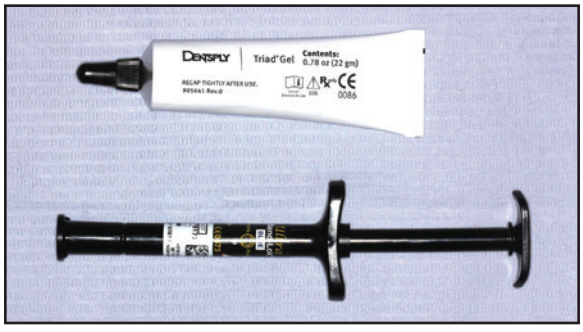

Fig. 4 Tube of Triad Gel and push syringe of Ultra Band-Lok.*****

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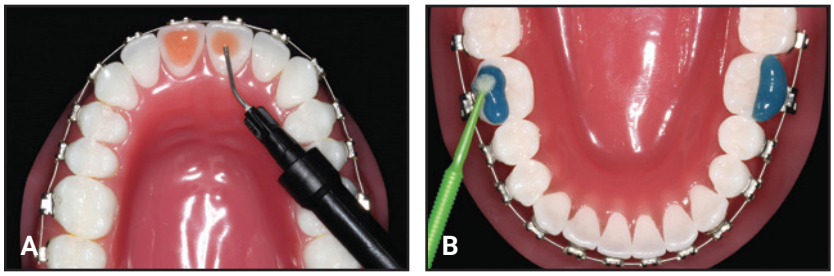

Fig. 5 A. Application of Triad Gel using repurposed opaque syringe with 18-gauge Luer lock tip. B. Application of Ultra Band-Lok with microbrush.

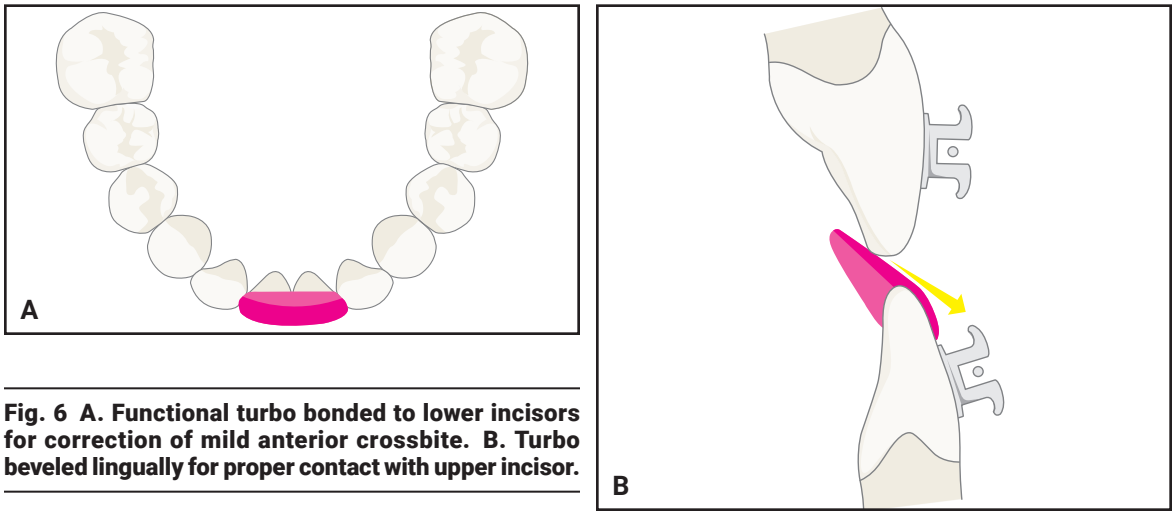

Fig. 6 A. Functional turbo bonded to lower incisors for correction of mild anterior crossbite. B. Turbo beveled lingually for proper contact with upper incisor.

(Fig. 5). One disadvantage is that the exothermic reaction created by light curing can cause hyperemia and discomfort. This is often observed when turbos are placed on the upper incisors. The resin also undergoes substantial polymerization shrinkage, so the clinician should verify the marginal seal to avoid decalcification under the turbos.

Ultra Band-Lok*** is a compomer paste—a hybrid of dental resin and glass ionomer—used for securing orthodontic bands and large acrylic appliances (Fig. 4). Its composition includes a glass filler (50-75% by weight), methacrylate, and acid monomer. The product is packaged in a push syringe; after the teeth are etched and primed, it can be applied with a microbrush or directly from the syringe tip (Fig. 5). Ultra Band-Lok has the handling properties of dental resin and the bonding advantages of glass ionomer. Its acid monomer allows it to bond chemically to metal alloys, which is particularly beneficial for turbos placed on lower first molars with buccal or occlusal amalgam restorations. Ultra Band-Lok's bright blue color facilitates placement and removal, but can also cast a dark shade through thin upper incisors. Most important, because the glass filler contains some quartz, the opposing teeth should be checked periodically for abrasion, particularly if the material is used to construct functional turbos.

Functional Turbos

Beveled resin turbos, also referred to as functional turbos, are constructed with beveled occluding surfaces that guide the opposing teeth toward the desired positions. Their most common application is in the correction of a mild anterior crossbite (Fig. 6). Resin turbo material is bonded to the incisal edges of two or more lower incisors and

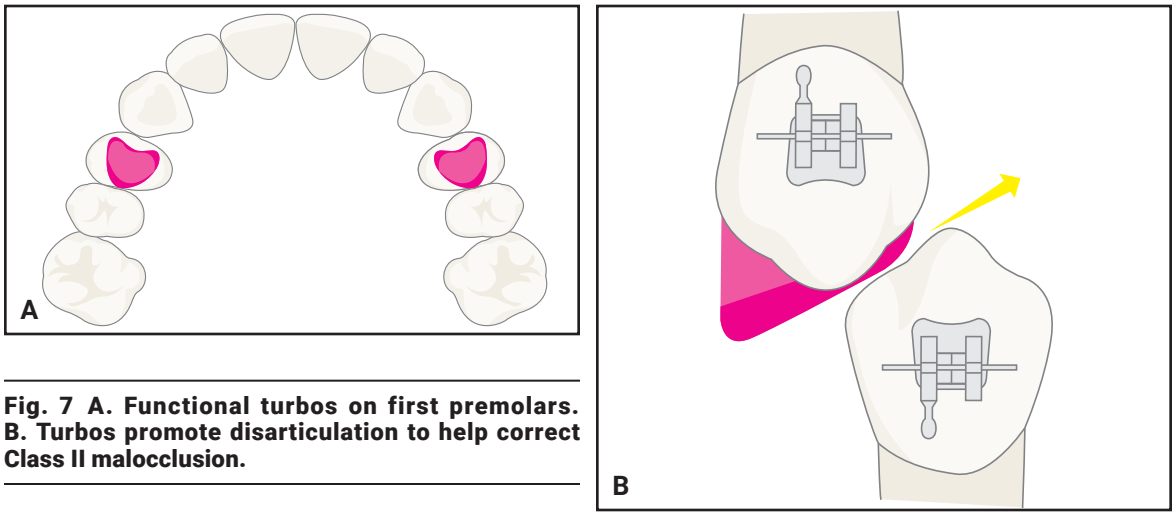

Fig. 7 A. Functional turbos on first premolars. B. Turbos promote disarticulation to help correct Class II malocclusion.

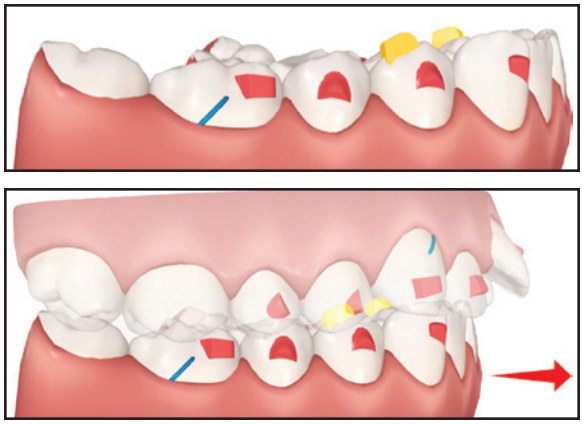

Fig. 8 Invisalign§§§ functional turbos created with unfilled occlusal attachments (yellow) on first premolars.

then beveled lingually. Upon contacting the beveled surface, the upper incisors are nudged forward and the lower jaw is directed posteriorly.[4] The dental crossbite will usually be corrected in about three months.

Functional turbos can also be placed on premolars to improve disarticulation in Class II patients (Fig. 7). These turbos essentially operate like a bonded Twin Block§§ appliance: the mandible is disarticulated and repositioned as the occluding premolars slide along the beveled surfaces. The same technique can be applied in Invisalign§§§ patients by adding unfilled rectangular attachments to the occlusal surfaces of the aligners (Fig. 8).

Conclusion

Resin bite turbos are usually placed on the upper central incisors or the lower first molars, depending on the mandibular plane angle. Although we have suggested using an acrylic gel or band cement, many other materials are acceptable as long as the quartz filler content is low enough or the duration of use is short enough to avoid occlusal wear on the opposing teeth.

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