

A Miniscrew-Assisted Transpalatal Arch for Use in Lingual Orthodontics

HYUN SANG PARK, DDS, MSD

Although various skeletal systems have been introduced to improve anchorage control for retraction of the upper anterior teeth,¹⁻³ these methods are difficult to use with only one miniscrew. The present article shows how a single miniscrew can be effective in supporting a transpalatal arch (TPA) during lingual orthodontic treatment.

Appliance Design

On the working cast, solder an .036" round stainless steel wire to the first molar bands and to an .028" round stainless steel connecting wire (Fig. 1). Solder brass hooks to the TPA for appli-

*OSAS self-drilling screw, 2.5mm x 1.6mm x 7mm, part No. 1K16108; registered trademark of EPOCH Medical Corp., #1015 Olympia Center Building, 828-10, Yeoksam-Dong, Gangnam-Gu, Seoul 135-080, Korea; www.osas.co.kr.

**Heliomolar, registered trademark of Ivoclar Vivadent, 175 Pineview Drive, Amherst, NY 14228.

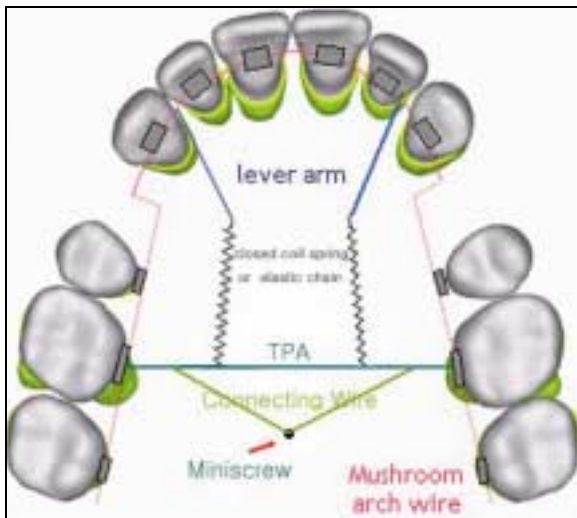


Fig. 1 Basic design of miniscrew-assisted transpalatal arch (TPA) for anterior retraction with lingual fixed appliance.

cation of the anterior retraction force. This is supplied by closed-coil springs or elastic chain attached to anterior lever arms,⁴ which are connected to the lingual archwire.

After inserting a palatal miniscrew,* sandblast the screw head for better mechanical retention (Fig. 2A). Bond the connecting wire directly to the screw head with composite resin** (Fig. 2B). The appliance should be checked in the mouth to ensure that it does not cause discomfort or gingival irritation and that it will not compro-



Fig. 2 A. Screw head before sandblasting; rubber dam protects palatal soft tissue. B. Connecting wire bonded directly to miniscrew.



Dr. Park is in the private practice of orthodontics at Mi Dental Clinic, Sung Gang B/D, Onepyeong 1 dong, Kumi City, Kyung Buk 730-923, Korea; e-mail: parkjune99@paran.com.

mise oral hygiene.

Even if the point of retraction force application and the line of action of the force are asymmetrical, most of the reactive force will be transmitted to the miniscrew rather than to the first molars (Fig. 3). If the bond fails during treatment, a ligature wire can be added between the miniscrew and connecting wire before rebonding.

Case Report

A 23-year-old female presented with the chief complaint of lip protrusion (Fig. 4). She displayed 2mm of maxillary crowding; the lower dental midline was deviated 4mm to the right. The lower left second deciduous molar was re-

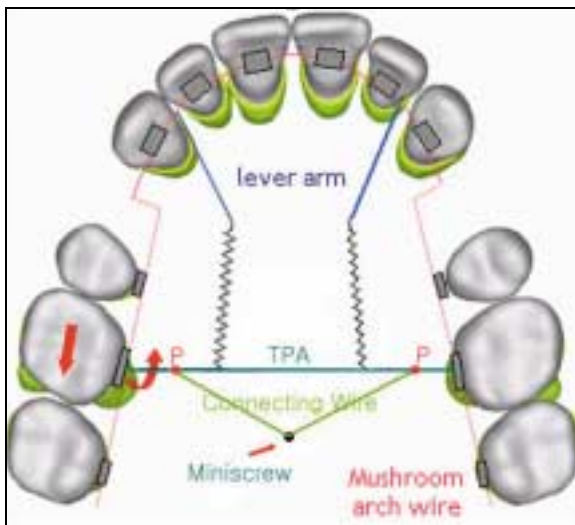


Fig. 3 During anterior retraction with lever arms attached to soldered hooks on TPA, reaction force is transmitted to miniscrew by connecting wire. Fulcrums at points P (where connecting wire is soldered to TPA) produce small moments on first molars, allowing minor tipback or distal crown movements.

tained, and 1mm of space remained between the lower right canine and second premolar due to a congenitally missing first premolar.

Cephalometric analysis indicated a Class II skeletal discrepancy ($ANB = 5.9^\circ$) with mild maxillary retrusion ($SNA = 79.7^\circ$), a steep mandibular plane ($SN-GoMe = 47.3^\circ$), and significant retrognathia relative to the cranial base ($SNB = 73.9^\circ$). Both lips were protrusive in relationship to the Ricketts E-line (Table 1). The diagnosis was a skeletal Class II malocclusion with bialveolar protrusion.

Extraction of both upper first premolars and the lower left second primary molar was planned, followed by maximum retraction of the upper anterior teeth. After initial dental alignment, a miniscrew-assisted TPA was placed as described above (Fig. 5). The lever arms were connected to an $.018" \times .025"$ stainless steel lingual archwire for sliding mechanics.

Treatment was interrupted twice because of the patient's personal problems, but anterior retraction took a total of about eight months (Fig. 6). After about 23 months of treatment, the patient showed Class I canine and molar relation-

TABLE 1
CEPHALOMETRIC DATA

	Pre-treatment	Post-Treatment
SNA	79.7°	78.4°
SNB	73.9°	73.1°
ANB differential	5.9°	5.3°
Wits	-2.5	1.0
1-SN	112.4°	95.0°
IMPA	99.5°	90.2°
SN-GoMe	47.3°	45.8°
Upper lip to E-line	2.0mm	-2.5mm
Lower lip to E-line	5.0mm	-1.8mm

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Fig. 4 23-year-old female patient with bilateral protrusion before treatment.



Fig. 5 Miniscrew-assisted TPA placed for upper anterior retraction, using closed-coil springs to .018" × .025" stainless steel lingual archwire.



Fig. 6 Patient after eight months of anterior retraction.

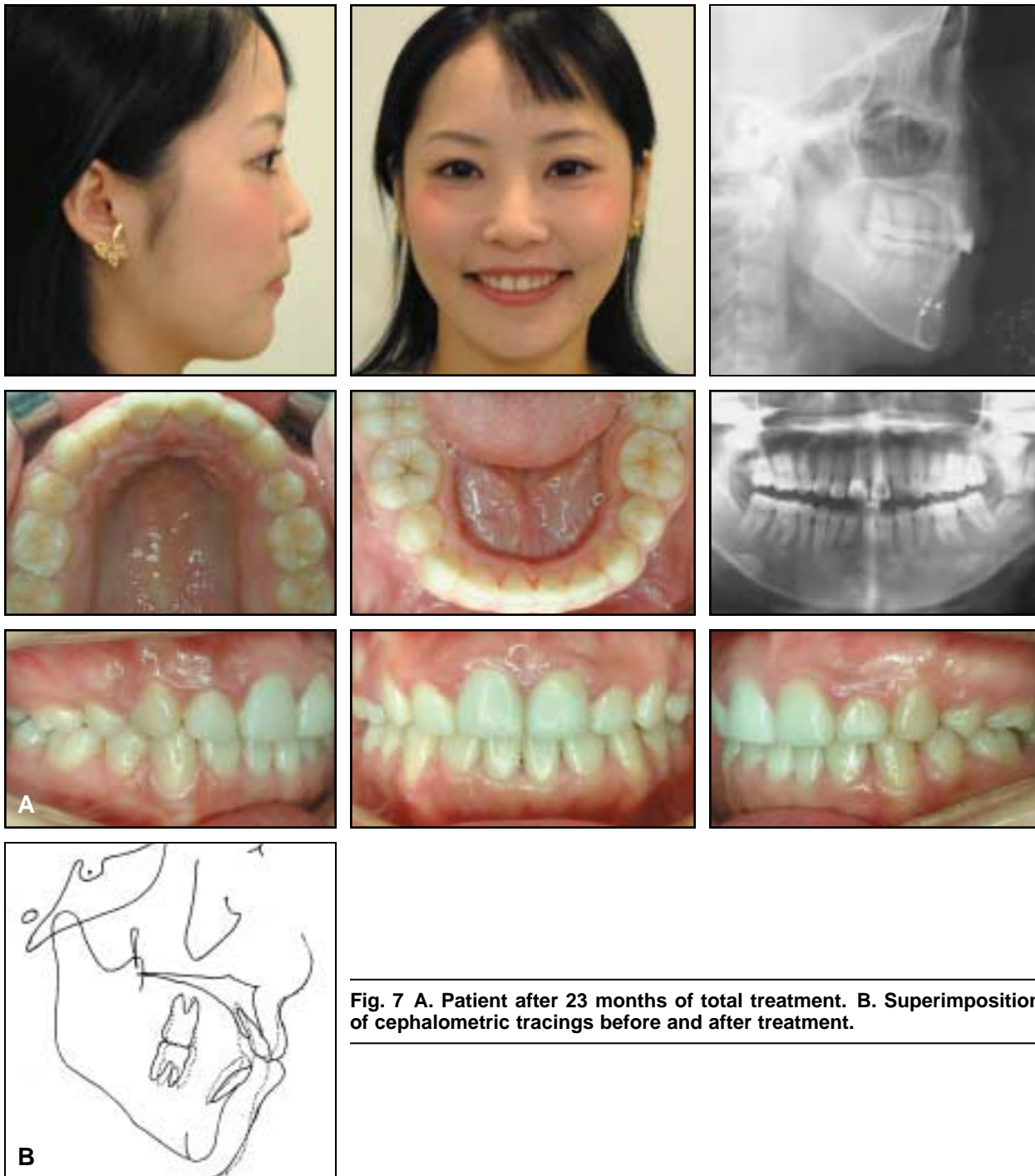


Fig. 7 A. Patient after 23 months of total treatment. B. Superimposition of cephalometric tracings before and after treatment.

ships, 2mm of overbite, and 3mm of overjet (Fig. 7). The dental midlines were coincident with the facial midline; the upper lip was retracted 4.5mm and the lower lip 6.8mm (Table 1), so that the patient's appearance improved dramatically. A lower lingual fixed retainer and an upper wrap-around retainer were delivered.

Discussion

In the patient shown here, the single miniscrew provided effective anchorage during anterior retraction with lingual orthodontics. The connecting wire remained attached to the miniscrew throughout treatment. Since the patient presented with minor mesial tipping of both first molars, the reactive force was used for tipback movement (Fig. 3). In my experience, locating the miniscrew behind the TPA provides a better biomechanical point of retraction force application than when anchorage is supported extraorally.

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