CASE REPORT

Micro-Implant Anchorage for Lingual Treatment of a Skeletal Class II Malocclusion

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The recent introduction of implants[1] and microscrews[2,3] into orthodontics has provided clinicians with reliable means of solving anchorage problems. In particular, microscrews have been shown to produce en masse retraction of the six anterior teeth with no loss of anchorage, thus reducing treatment time.[4,5]

No clinical cases have been presented to date in which microscrew anchorage was used in lingual orthodontic treatment. The present article will show a simple but efficient method of controlling anchorage with microscrews in lingual sliding mechanics (Fig. 1).

TABLE 1
CEPHALOMETRIC ANALYSIS

	Pretreatment	Post-Treatment
SNA	82.5°	81.5°
SNB	75.5°	76°
ANB	7°	5.5°
FMA	39.5°	40.5°
PFH/AFH	57% (44°/77°)	55% (43°/78°)
FH-OP	11°	15°
FH-UI	124.5°	107°
IMPA	87.5°	82°
Z-angle	57°	67°
Upper lip to E	5mm	0.5mm
Lower lip to E	6.5mm	3mm

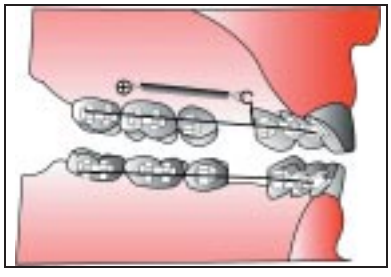

Fig. 1 Lingual sliding mechanics with micro-implant anchorage.

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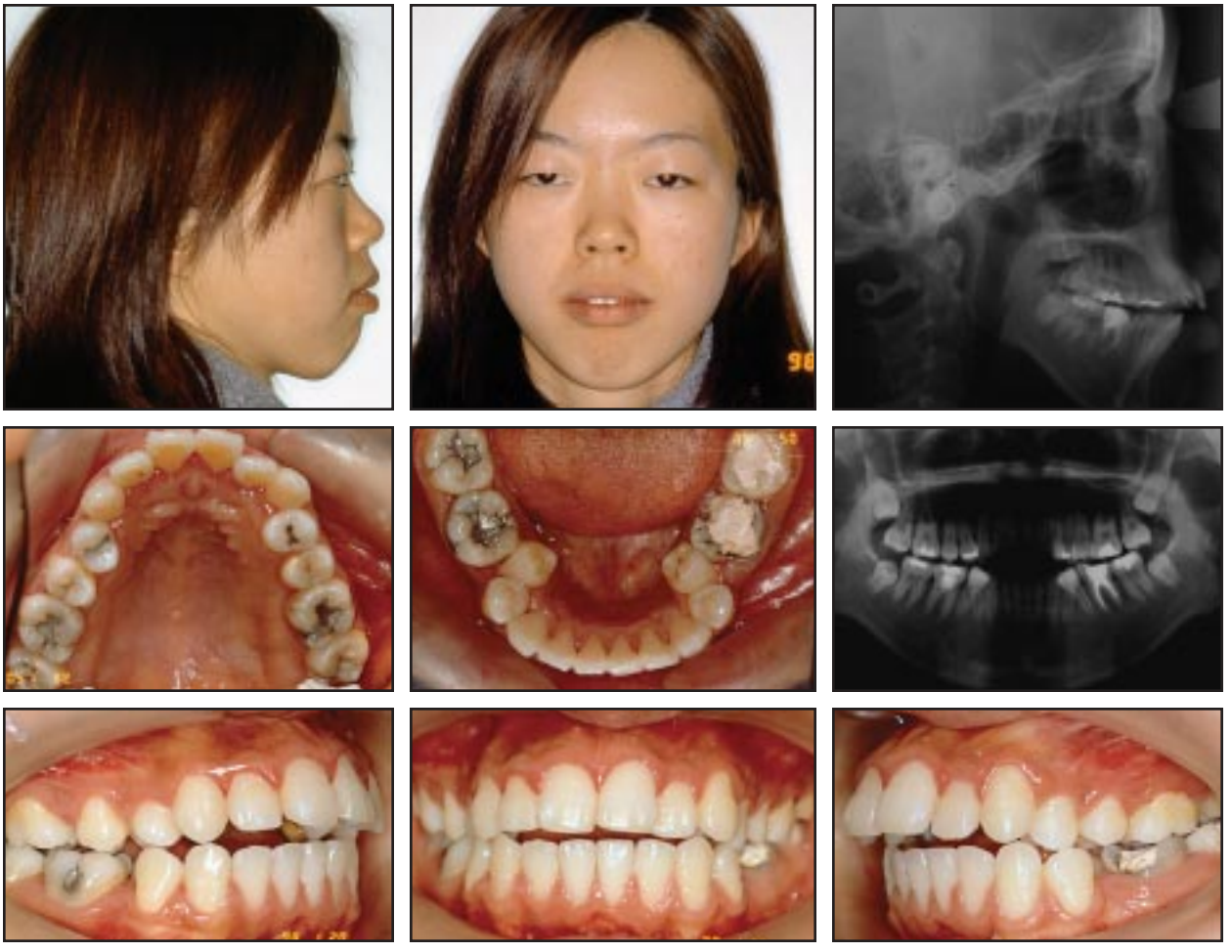

Fig. 2 19-year-old female with skeletal Class II malocclusion before treatment.

Fig. 3 Microscrew implanted in palatal alveolar bone between maxillary first molar and second molar.

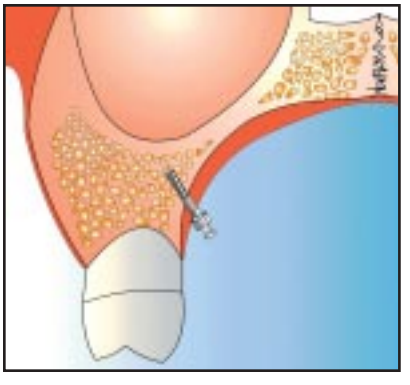

Fig. 4 Palatal microscrew should be implanted into alveolar bone at 30-40° to bone surface to avoid root damage (pictured screw is Absoanchor).**

Diagnosis and Treatment Planning

A 19-year-old female presented with the chief complaint of lip protrusion. She displayed a severe overjet (10mm) and anterior open bite (–2mm), and was diagnosed as a skeletal Class II malocclusion with open bite and bialveolar protrusion (Table 1). The dental relationships were Class II in the canine region and a mild Class III in the molar region, due to linguoversion of the mandibular second premolars (Fig. 2). The dental midline was deviated to the right because of rotation of the right maxillary first premolar.

The treatment plan involved maxillary first and mandibular second premolar extractions, followed by Class II mechanics with a high-pull J-hook headgear. The patient preferred to be treated with lingual appliances.

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**No. AP12-110, Dentos Co., Taegu City, Korea.

Treatment Progress

The Class II canine relationship and overjet proved difficult to correct due to poor cooperation with the headgear. We therefore decided to implant microscrews* (1.2mm in diameter, 10mm in length) in the palatal alveolar bone between the maxillary first and second molars (Fig. 3). Because of the thick palatal mucosa, a palatal micro-implant must be longer than a buccal micro-implant.

To avoid root damage, the microscrews were implanted at a 30-40° angle to the bone surface (Fig. 4). A palatally extended brass separating wire can be used as a marker to determine the midpoint of the interdental bone for microscrew implantation.

Fig. 5 Periapical film used to assess relationship between micro-implant and roots of adjacent teeth.

After surgery, periapical radiographs were used to assess the relationship between the micro-implant and the roots of the adjacent teeth (Fig. 5). Two weeks after implantation, nickel titanium coil springs were attached between the microscrews and hooks on the anterior part of the archwire (Fig. 6).

Seven months after microscrew implantation, a Class I ca-

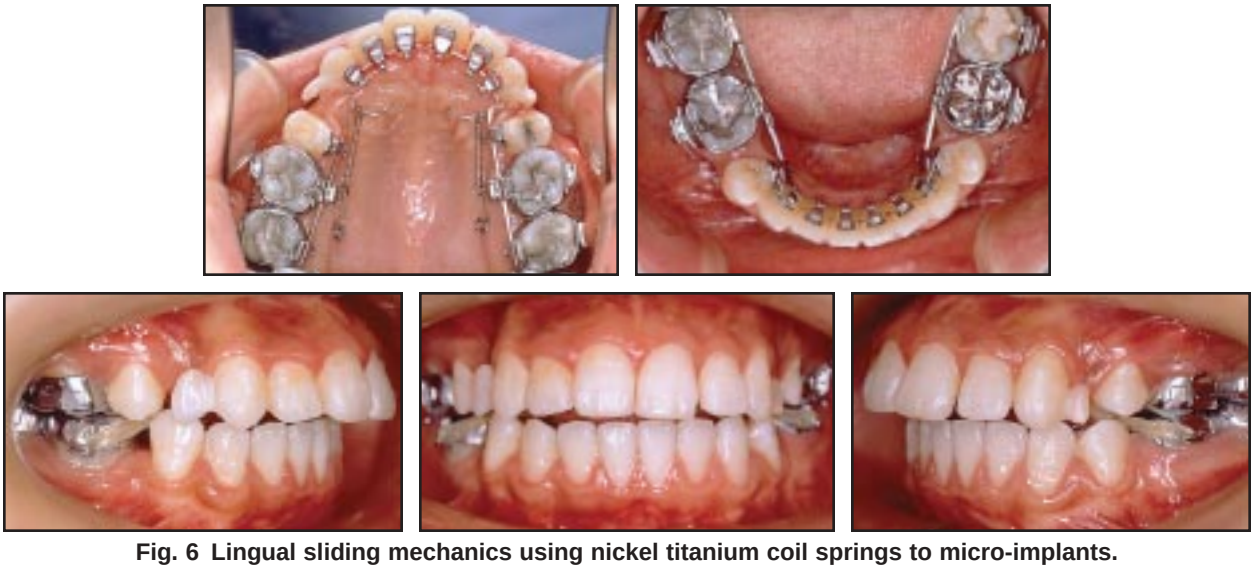

Fig. 6 Lingual sliding mechanics using nickel titanium coil springs to micro-implants.

Fig. 7 Patient after 16 months of active treatment.

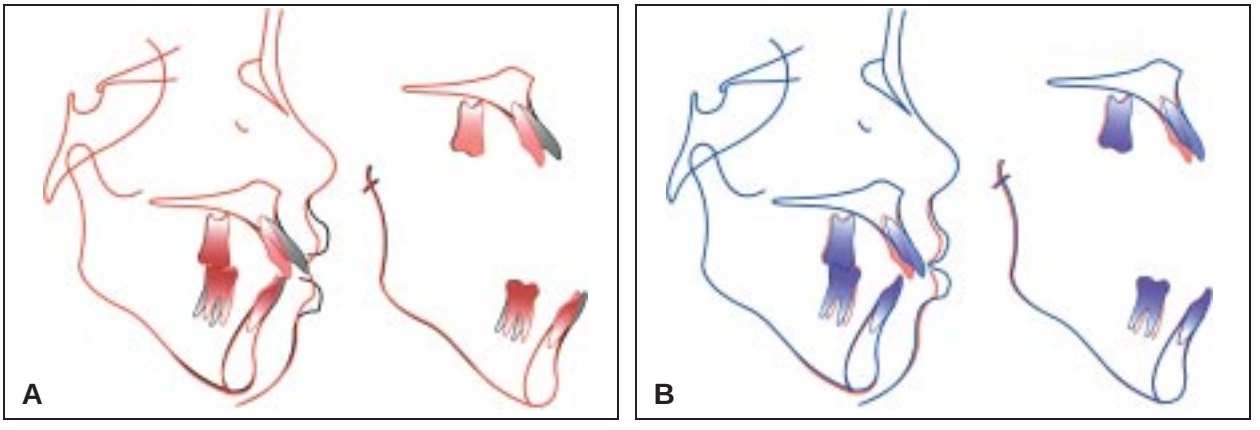

Fig. 8 Superimpositions of cephalometric tracings. A. Before and after treatment. B. After microscrew implantation and after treatment.

nine relationship had been achieved (Fig. 7). Total active treatment time was 16 months.

Results

Normal overjet and overbite were achieved (Table 1). The profile was helped by the retraction of the maxillary anterior teeth, although further improvement was required. If mandibular micro-implants had been used, a more pronounced profile change might have been expected because of better vertical control of the mandibular posterior teeth.[5-7]

Discussion

Although a transpalatal arch was used during the initial stages of treatment, the patient felt more comfortable with the micro-implants than with the transpalatal arch.

Anchorage requirements are even more critical in lingual orthodontics than in labial treatment because of the anatomical relationship between the tongue and cortical bone.[8] The maxillary posterior teeth, which are used for anchorage in conventional mechanics, were actually moved distally in this patient, while the anterior teeth were retracted simultaneously (Fig. 8).

This case demonstrates that micro-implants can provide reliable, absolute anchorage for lingual orthodontic treatment as well as labial treatment.

REFERENCES

1. Roberts, W.E.; Nelson, C.L.; and Goodacre, C.J.: Rigid implant anchorage to close a mandibular first molar extraction site, J. Clin. Orthod. 28:693-704, 1994.
2. Kanomi, R.: Mini-implant for orthodontic anchorage, J. Clin. Orthod. 31:763-767, 1997.
3. Costa, A.; Raffini, M.; and Melsen, B.: Microscrews as orthodontic anchorage, Int. J. Adult. Orthod. Orthog. Surg. 13:201-209, 1998.
4. Park, H.S.:The skeletal cortical anchorage using titanium microscrew implants, Kor. J. Orthod. 29:699-706, 1999.
5. Park, H.S.; Bae, S.M.; Kyung, H.M.; and Sung, J.H.: Micro-implant anchorage for treatment of skeletal Class I bialveolar protrusion, J. Clin. Orthod. 35:417-422, 2001.
6. Gebeck, T.R.: Analysis: Concepts and values, Part I, J. Tweed Found. 17:19-48, 1989.
7. Merrifield, L.L.: Analysis: Concepts and values, Part II, J. Tweed Found. 17:49-64, 1989.
8. Takemoto, K.: Anchorage control in lingual orthodontics, in *Lingual Orthodontics*, ed. R. Romano and G. Scuzzo, B.C. Decker, London, 1998, pp. 75-95.