Molar Control Using Indirect Miniscrew Anchorage

SUNG WON YUN, DDS
WON HEE LIM, DDS, MS
YOUN SIC CHUN, DDS, MSD, PHD

Most of the methods for uprighting mesially tipped mandibular second molars[1-7] produce undesirable extrusion of the target molars and movement of the anchorage units, requiring interarch stabilization to minimize side effects. Recently, many clinicians have begun to use miniscrew implants for skeletal anchorage in such cases.[8,9]

Several authors have reported successful retraction of the upper anterior teeth and uprighting of the lower molars using miniscrew anchorage.[10-15] In most of these cases, however, the target teeth were directly connected to the implants by elastics or other means of traction, and finishing with fixed appliances was required.[16-20] The present article describes how mandibular molars can be more easily and precisely controlled using indirect miniscrew anchorage.[21]

Procedure

Only one miniscrew* is placed on the buccal side of each arch, relatively far forward for ease of access. The root axes are evaluated on the periapical and panoramic x-rays to determine the ideal sites for screw placement, and the screws are implanted between the roots if space allows.

A rigid .018" × .025" stainless steel wire is bonded to connect the screw and the buccal surface of the anchor tooth, after microetching of the bonding sites to ensure secure adhesion. Placing the connecting wire on the proximal side of the buccal surface leaves enough room to bond a bracket. The anchor tooth thus becomes similar to an ankylosed tooth, allowing conventional edgewise mechanics to be applied only on the target teeth without loss of anchorage.

Case 1

A 19-year-old female presented with the chief complaints of difficulty in chewing and sensitivity in the mandibular right molar area. The mandibular right second molar was partially impacted and tipped mesially (Fig. 1A). A miniscrew was implanted between the mandibular right second premolar and first molar, and a rigid .018" × .025" stainless steel wire was bonded between the screw and the mesiobuccal surface of the first molar.

Using a light-cured composite, a Peerless** single tube was bonded to the mandibular first molar, and a metal button to the occlusal surface of the second molar, as mesially as possible. Orthodontic traction was applied with an upright-

*1.6mm × 8mm OSAS self-drilling screw, Part No. 1D16109, EPOCH Medical, Seoul, Korea; www.osas.co.kr.

Dr. Yun is a third-year resident, Dr. Lim is an Assistant Professor, and Dr. Chun is a Professor, Division of Orthodontics, Department of Dentistry, Ewha Womans University, Mokdong Hospital, 911-1 Mok-dong, Yangcheon-ku, Seoul, South Korea; e-mail: yschun@ewha.ac.kr.


Dr. Yun


Dr. Lim


Dr. Chun

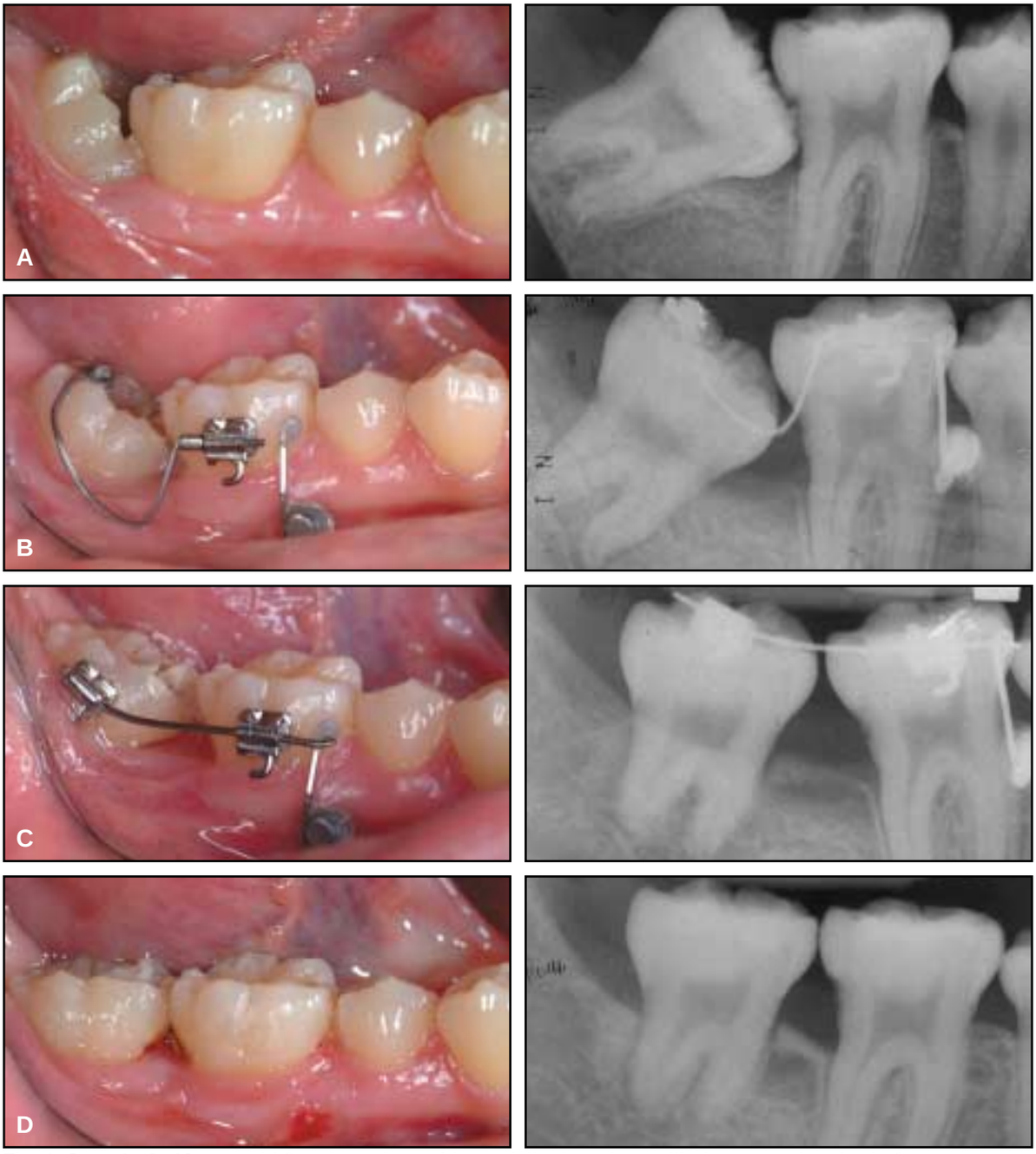

Fig. 1 Case 1. A. 19-year-old female patient with mesially tipped mandibular second molar before treatment. B. After three weeks of orthodontic traction with TMA uprighting spring. C. Second molar uprighted after two months of treatment, with brackets bonded for root alignment. D. Second molar uprighted and roots aligned after nine months of treatment.

ing spring made of .016" × .022" TMA** wire (Fig. 1B).

After the second molar had been uprighted, a tube was bonded to its buccal surface, and an .017" × .025" nickel titanium wire was engaged. A fixed appliance was used for final root alignment, with the archwire bent for root-tipback movement (Fig. 1C). The miniscrew was removed after eight months of active treatment, once the root alignment was completed. Total treatment time was nine months (Fig. 1D).

**Registered trademark of Ormco/"A" Company, 1717 W. Collins Ave., Orange, CA 92867.

Case 2

A 19-year-old female had been treated one year earlier with extraction of the upper first premolars and lower second premolars, but her treatment was interrupted for overseas study with space remaining between the mandibular left first premolar and first molar (Fig. 2A). Because she had a normal overjet, a Class I canine relationship, and a mild Class II molar relationship on

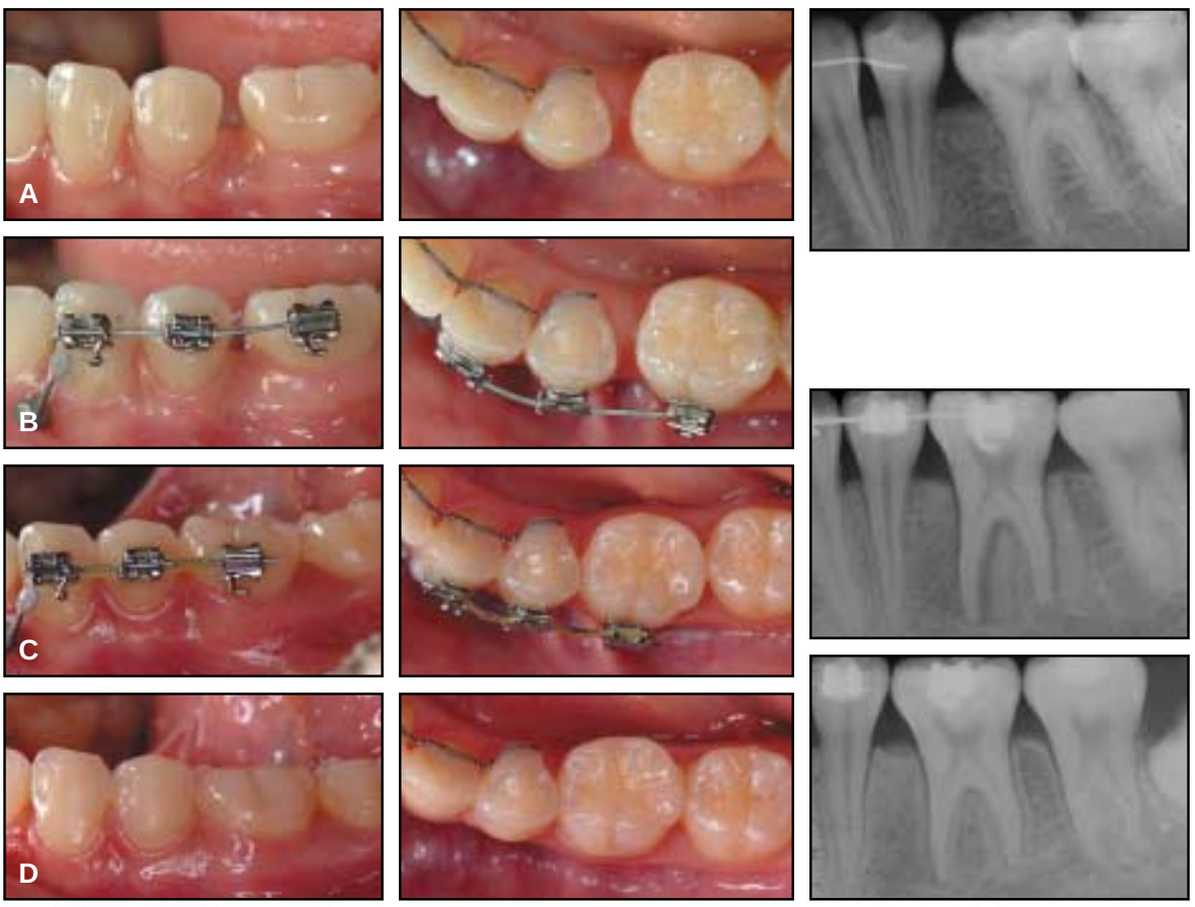

Fig. 2 Case 2. A. 19-year-old female patient with space remaining between mandibular left first premolar and first molar. B. Conventional edgewise brackets, with indirect anchorage on mandibular left canine. C. Space closed by root movement of first molar in five months of treatment; radiograph shows new bone formation during molar protraction. D. Molar protraction and root alignment after 11 months of treatment.

the left side, continuation of treatment involving protraction of the mandibular left molars was planned.

A miniscrew was implanted between the mandibular left lateral incisor and canine, and a rigid .018" × .025" stainless steel wire was bonded between the screw and the labial surface of the canine. Conventional edgewise brackets were bonded from canine to first molar, and a curved .017" × .025" nickel titanium archwire was engaged (Fig. 2B).

After the space was closed, a curved .017" × .025" TMA wire was inserted to align the roots (Fig. 2C). Proper root alignment was achieved in 11 months of treatment (Fig. 2D).

Discussion

The most critical factors in achieving molar control are preparation of anchorage and precision of force application. Complicated orthodontic mechanics have been devised to avoid unwanted rotation or transverse displacement during molar uprighting.[16-20,22-26]

In Case 1, only one miniscrew was used for this purpose. The anchor teeth were barely affected by the orthodontic tooth movement. In Case 2, the mesially tipped mandibular molars needed to be protracted with root alignment. Periapical radiographs showed the formation of new bone during the protraction, and normal periodontal tissue was found after treatment.

If a screw becomes loose in this indirect anchorage system, there may be a chance of displacement of the anchor tooth. Regular monitoring of the miniscrew's mobility can minimize that risk. Indirect anchorage with miniscrews can achieve precise molar movement easily and effectively while reducing the need for fixed appliances.

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