

CASE REPORT Treatment of Mandibular Alveolar Prognathism by a Lower Anterior Subapical Osteotomy

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Mandibular alveolar prognathism is often treated by orthodontic treatment without accompanying surgery, in cases where the malocclusion and protrusive profile are not severe enough to warrant sagittal split ramus mandibular osteotomy or two-jaw surgery. However, such treatment can produce excessive labial tipping of the maxillary incisors and lingual tipping of the mandibular incisors, while leaving the protrusion from lower lip to chin that is characteristic of mandibular prognathism.

An alveolar osteotomy, which involves relatively minor surgical invasion, can avoid these consequences. The orthodontist, using the space from premolar extractions, can then establish a good profile and a proper interincisal relationship.¹⁻³

This article reports the case of an adult male with a Class I anterior crossbite who was treated by lower anterior subapical osteotomy.

Diagnosis and Treatment Planning

A 25-year-old male presented with the chief complaint of anterior crossbite that was first detected at age 4. Previous premolar extractions and orthodontic treatment had not improved the condition.

Clinical evaluation from the front showed a slightly asymmetrical face; the profile was protrusive from the lower lip to the mentolabial sulcus (Fig. 1A). The mandibular midline was deviated to the right (Fig. 2A). The maxillary and mandibular molar widths and the mesiodistal relationship were normal, and the Angle classification was a bilateral Class I. The anterior ratio (79.6%) was in the normal range ($78.1 \pm 2.2\%$).

SNA (80°) and FH-MP (26°) were normal, but an excessive SNB (84°) and ANB (-4°) indicated a mild mandibular skeletal prognathism (Table 1). U1-FH (108°) and L1-MP (87°) were normal. The overjet, a -4mm crossbite, was accompanied by a deep (5mm) overbite⁴ (Fig. 3).

The panoramic x-ray showed the absence of both maxillary first premolars and the mandibular right first premolar (Fig. 4A). A root-canal treatment had been performed in the mandibular left second premolar. Both mandibular third molars were present, but the right one was impacted.

Although a metal shadow was noted in the center of the right mandibular ramus, the patient had no explanation for it.

A diagnosis of lower anterior alveolar prognathism was made. The following treatment plan was established:

1. Extract the mandibular left second premolar without altering the Class I molar relationship.
2. Gain space for correction of the anterior crossbite in the premolar area using an edgewise

appliance.

- 3. Perform a lower anterior subapical osteotomy and retract the mandibular incisors without changing the axial incisor inclinations, thus correcting the crossbite.

Treatment Progress

The mandibular left second premolar and impacted right third molar were extracted. An edgewise appliance was placed, and space was gained by widening the first premolar space on the right side. Because the maxillary incisors were narrow, the maxilla was slightly expanded to secure more space for the crossbite correction (Fig. 2B). Presurgical orthodontic treatment took about one year.

A lower subapical osteotomy (modified Köle method) was performed (Fig. 5), with an alveolar osteotomy of the mandibular premolar region and downward movement of the left mental foramen (Fig. 4B).

After about nine months of postsurgical orthodontic treatment, a fixed retainer was placed. The patient is still under observation.

Results

After treatment, the profile showed improvement in the posteroinferior position of the upper and lower lips, the configuration of the mentolabial sulcus, and the outline from the lower lip to the chin (Fig. 1B).

The overbite improved without lingual tipping of the mandibular incisors (Fig. 2C). No adverse changes in the maxillomandibular relationship, such as clockwise mandibular rotation or an increase in intermaxillary distance, were observed (Fig. 3). The roots were well aligned (Fig. 4C).

A slight lower-lip sensory disturbance developed in the left chin area after surgery, but this improved within a year. No further problems have been observed in more than three years, including the retention period (Fig. 4D). At present, the patient's facial expression is good (Fig. 1C), and his occlusion is stable (Fig. 2D).

Discussion

Anterior crossbite can be improved only by labial movement of the maxillary incisors or lingual movement of the mandibular incisors. Orthodontic treatment without surgery tends to produce a clockwise rotation of the mandible, lingual tipping of the mandibular incisors, and an adverse effect on the molar relationship. The mandibular apical base cannot be retracted by orthodontics alone. The formation of the mentolabial sulcus from the lower lip to the chin will remain inadequate, and esthetic results will sometimes be unsatisfactory (Fig. 6). On the other hand, a sagittal split mandibular ramus osteotomy would result in Class II molar relationships and excessive retrusion of the chin.

Musich referred to Steiner's "acceptable compromise", noting that osteotomies have been increasingly performed in recent years in patients with ANB angles of less than -2° . In the case reported here, the osteotomy-osteotomy of the mandibular apical base allowed a correction of the anterior crossbite without changing the molar relationship. The mentolabial sulcus was formed from the new posteroinferior position of the upper and lower lips, and the patient was satisfied with the resulting profile.¹

Conventional orthodontic treatment would have required time for lingual movement of the mandibular incisors and canines. This was not necessary in our presurgical treatment, because the space for distal movement of the mandibular incisors was secured during leveling of the dental arches, and the surgery then set back the entire mandibular incisor-alveolar area. Thus, the combined surgical-orthodontic treatment was shorter than orthodontic treatment would have been by itself.

In Japan, hospitalization is required for a lower anterior subapical osteotomy, although the surgical invasion is confined to the alveolar area. The surgery sometimes causes transient sensory disturbances in the lower lip and chin. Of course, successful surgery requires an accurate estimation of treatment, including the amount of movement of the mandibular incisors and the amount of setback of the alveolar bone. When the estimated retraction of the mandibular incisors cannot be obtained during surgery, the surgeon sometimes tries to forcibly produce an overbite or interdigitation. This can create occlusal interferences of the maxillary and mandibular incisors, resulting in excessive mandibular retrusion and sometimes temporomandibular arthrosis.

As long as patients are carefully selected and the above precautions are observed, better results can be expected from this combined surgical-orthodontic method than from orthodontic treatment alone.

□

FIGURES

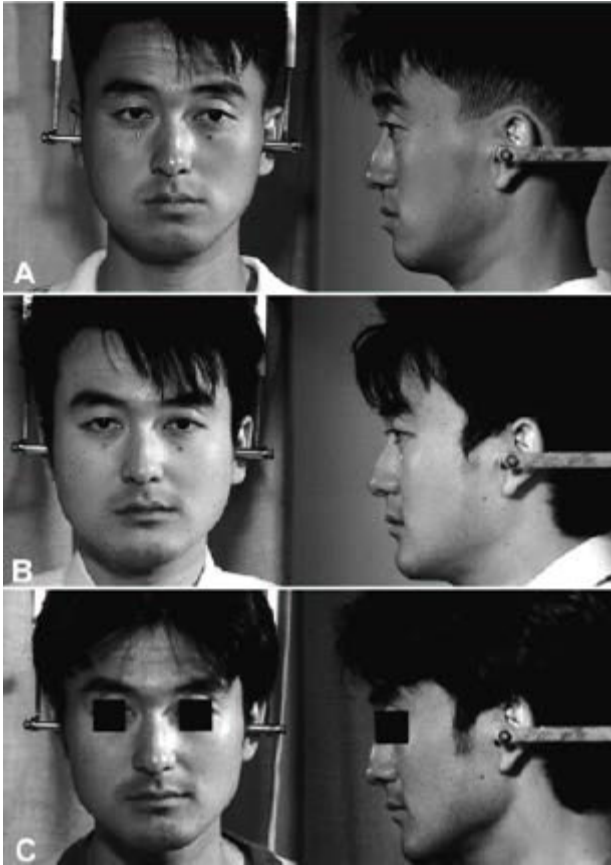


Fig. 1 Facial photographs. A. Before treatment. B. After treatment. C. Three years later.



Fig. 2A Intraoral photographs, Before treatment.

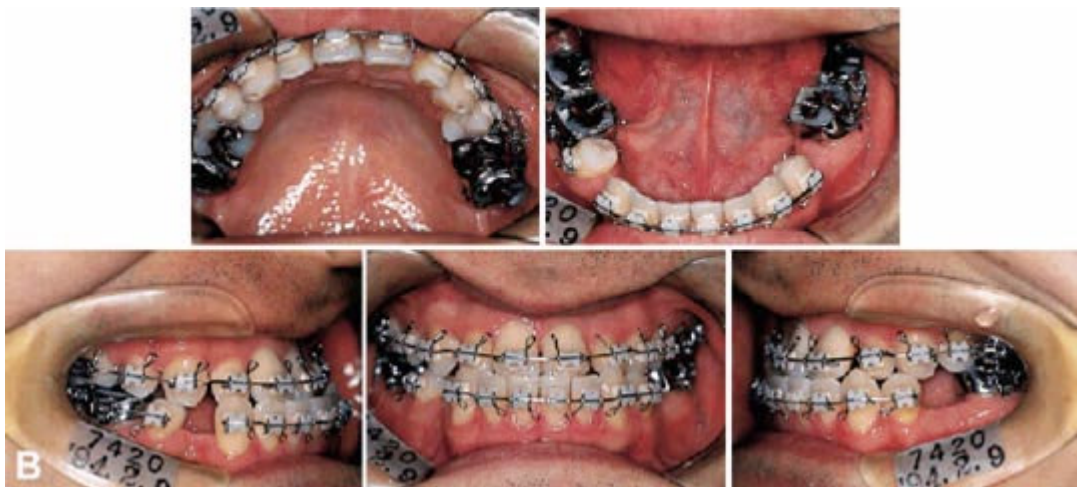


Fig. 2B Intraoral photographs, After presurgical orthodontic treatment.



Fig. 2C Intraoral photographs, After treatment.



Fig. 2D Intraoral photographs, Three years later.



Fig. 3 Superimposition of initial (solid line) and post-treatment (hatched line) cephalometric tracings.

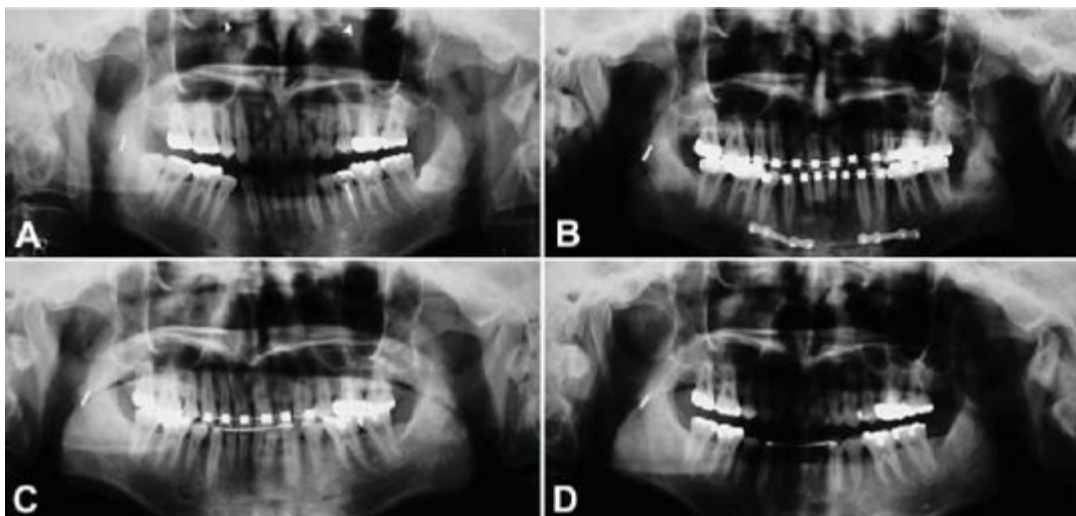


Fig. 4 Panoramic x-rays. A. Before treatment. B. After surgery. C. After treatment. D. Three years later.

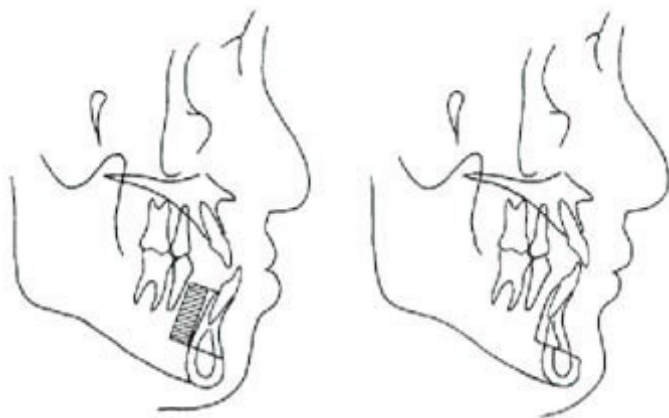


Fig. 5 Diagram of modified KÖle method of lower anterior subapical osteotomy.



Fig. 6 Superimposition of initial cephalometric tracing (solid line) and simulated treatment with orthodontics only (hatched line).

TABLES

**TABLE 1
CEPHALOMETRIC MEASUREMENTS (°)**

	Pretmt.	Post-Tmt.	Post-Ret.	Norm	S.D.
SNA	80.0	80.5	80.5	83.0	2.0
SNB	84.0	81.0	81.0	80.0	2.0
ANB	-4.0	-0.5	-0.5	3.0	1.0
SN-FH	3.0	3.0	3.0	6.0	4.0
FH-NP	88.0	88.0	88.0	87.0	3.0
FH-MP	26.0	26.0	26.0	24.0	6.0
Go	121.0	121.0	121.0	121.0	6.0
$\underline{1}$ -FH	108.0	116.0	116.0	112.0	4.0
$\bar{1}$ -MP	87.0	90.0	90.0	101.0	1.0
$\underline{1}$ - $\bar{1}$	139.0	128.0	128.0	123.0	4.0
Overjet (mm)	-4.0	3.0	3.0	2.0	1.0
Overbite (mm)	5.0	3.0	3.0	3.0	1.0

Table. 1

REFERENCES

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FOOTNOTES

1 Speidel, T.M.; Marine, K.M.; and Worms, F.W.: Soft tissue changes associated with mandibular subapical osteotomy, *Angle Orthod.* 49 56-64, 1979.

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