CASE REPORT

Lingual Orthodontics Combined with Orthognathic Surgery in a Skeletal Class III Patient

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A 20-year-old female was referred to us by her general dentist with the chief complaints of anterior crossbite and mandibular prognathism. Because the patient wanted esthetic orthodontic treatment, we decided to use lingual brackets and mushroom archwires.

Diagnosis and Treatment Plan

The patient exhibited a concave, prognathic profile with no chin deviation, a Class III occlusal relationship, an overjet of –1mm, an overbite of .5mm, and a midline discrepancy (Fig. 1). The maxillary left first molar and the mandibular right first and second molars had been removed at an early age, presumably because of decay.

Cephalometric analysis relative to SN (Table 1) indicated that the maxilla was retrusive (SNA = 76.0°) and the mandible was normally positioned (SNB = 80.0°). However, the maxillary length was normal (46mm), while mandibular length was excessive (125.5mm). In profile, the patient displayed more overdevelopment of the lower face than underdevelopment of the midface. In addition, FH-SN (16.0°) was more than two standard deviations from the norm. FMA (26.5°) indicated a normal mandibular plane angle. The maxillary incisors were severely proclined (1-FH = 137.5°), and the mandibular incisors severely retroclined (IMPA = 79.0°).

We concluded that the anteroposterior assessment was unreliable when SN was used as a baseline. In fact, the negative convexity (–5.0°) and the 6.5° AB-facial plane angle indicated


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a skeletal Class III malocclusion with a prognathic mandible.

The treatment objectives were to:

1. Correct the mandibular prognathism.
2. Eliminate the incisor protrusion and the crowding in the maxillary arch.
3. Eliminate the incisor retrusion and the crowding in the mandibular arch.
4. Achieve archform coordination.

The decision was that the most favorable result could be achieved by a combined surgical-orthodontic approach. The maxillary first premolars were selected for extraction.

Treatment Progress

Fujita lingual brackets were bonded indirectly from first molar to first molar in both arches,[1,2] and .018" standard edgewise appliances were placed buccally on the first and second molars. The initial archwires were .0155" multistranded stainless steel (Fig. 2A).

Fig. 1 20-year-old female Class III patient before treatment.

After nine months of leveling and alignment, an .018" × .018" stainless steel closing-loop archwire was placed in the occlusal slots of the maxillary brackets to begin en masse retraction (Fig. 2B).

Before surgery, a setup of the maxillary and mandibular casts showed excessive buccal overjet in the first molar region. Therefore, a constricting .028" stainless steel transpalatal arch was inserted in the outer lingual slots of the maxillary first molars to reduce the interarch width (Fig. 2C).

The presurgical orthodontic phase lasted about 28 months. Achievement of the presurgical treatment objectives was confirmed by a progress lateral cephalogram (Fig. 3, Table 1).

Just before surgery, .018" × .018" stainless steel stabilizing lingual archwires were placed in both arches, and metal lingual buttons were bonded temporarily to the labial surfaces of the teeth for intermaxillary fixation (Fig. 4). A bilateral sagittal split ramus osteotomy was performed, with rigid internal fixation used to retain the skeletal segments.

Four weeks after surgery, orthodontic treatment was resumed. Appliances were removed after six months of postsurgical treatment and a total of 35 months. Maxillary fixed and mandibular circumferential retainers were placed after debonding.

Fig. 2 A. Initial .0155" multistranded stainless steel mushroom archwires in both arches. B. After nine months, maxillary .018" × .018" stainless steel closing-loop mushroom archwire combined with mandibular .016" stainless steel mushroom archwire. C. Constricting .028" stainless steel transpalatal arch inserted in outer lingual slots of maxillary first molars to reduce interarch width.

TABLE 1
CEPHALOMETRIC SUMMARY

	Normal	Pre-treatment	Pre-surgical	Post-Treatment
Skeletal				
SNA	81.6°	76.0°	76.0°	76.0°
SNB	79.2°	80.0°	79.5°	73.5°
ANB	2.5°	–4.0°	–3.5°	2.5°
Convexity	3.7°	–5.0°	–4.5°	5.5°
AB-NPo	-4.4°	6.5°	6.0°	–5.0°
FH-SN	6.2°	16.0°	16.0°	16.0°
FH-NPo	89.1°	95.0°	94.0°	89.5°
FMA	24.3°	26.5°	27.0°	29.5°
Maxillary Length	48.3mm	46.0mm	46.0mm	46.0mm
Mandibular Length	119.3mm	125.5mm	125.5mm	116.0mm
Dental				
Overbite	1.8mm	0.5mm	2.5mm	2.0mm
Overjet	3.5mm	–1.0mm	–6.0mm	2.5mm
1-FH	111.1°	137.5°	117.0°	119.0°
IMPA	95.9°	79.0°	86.0°	89.0°
Interincisal	123.8°	115.0°	129.0°	120.0°
Soft Tissue				
Upper Lip to E-line	–0.9mm	–2.0mm	–4.0mm	–1.5mm
Lower Lip to E-line	0.6mm	3.5mm	3.5mm	2.0mm

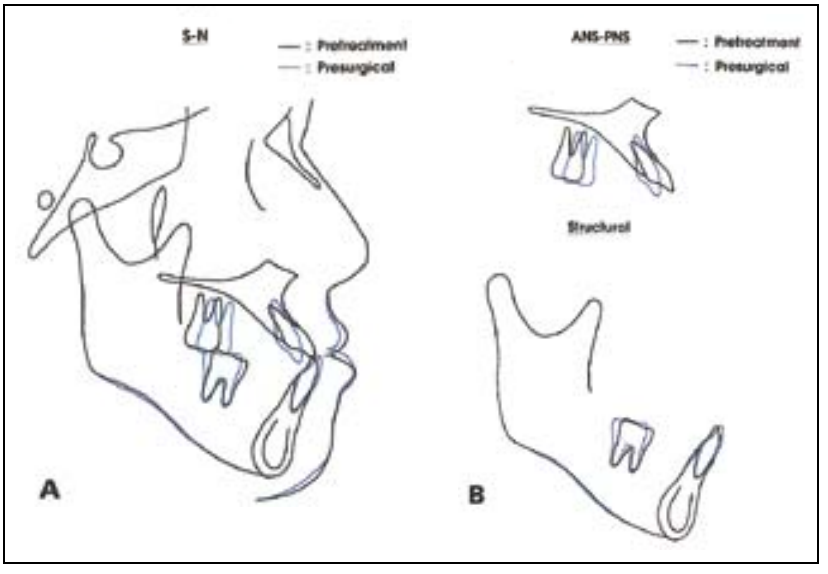

Fig. 3 Superimpositions of pretreatment and presurgical cephalometric tracings. A. Overall superimposition shows no mandibular rotation during presurgical orthodontic treatment. B. Regional superimpositions show good decompensation of maxillary and mandibular incisor inclinations.

Treatment Results

Dental changes resulted in a full-cusp Class II molar occlusion with a Class I canine relationship (Fig. 5). The pretreatment midline discrepancy was not completely corrected, due to closure of the pontic space on the left side of the maxillary arch. The patient declined any further treatment of the midline discrepancy that would prolong the postsurgical orthodontic phase. As a result, the upper dental midline is still 1.5mm left of the lower dental midline.

Cephalometric analysis showed that ANB improved from –4.0° to 2.5°, indicating a more favorable relationship of the denture bases to each other within an esthetic profile (Table 1). Relatively normal interincisal angle and maxillary and mandibular incisor inclinations were achieved. The superimposition showed that the mandible moved 11mm posteriorly (Fig. 6).

The post-treatment panoramic radiograph indicated proper root alignment with no root resorption. The patient was pleased with her function and overall facial changes, and the treatment seems to have had a positive impact on her personality and self-esteem.

Conclusion

Lingual appliances have previously been considered ill-suited for surgical orthodontics because it was almost impossible to stabilize the jaws at the time of surgery.[3] In this case, .018" ×

Fig. 4 Patient before surgery, with metal lingual buttons bonded temporarily to labial surfaces for intermaxillary fixation.

Fig. 5 After 35 months of total treatment time.

Fig. 6 Superimposition of cephalometric tracings before and after treatment show profile was improved by mandibular setback.

.018" stainless steel mushroom archwires were used for stabilization, and metal lingual buttons were temporarily placed on the labial surfaces of the teeth for intermaxillary fixation. No problems arose during surgery, demonstrating that a lingual appliance can be successfully used in surgical-orthodontic treatment.

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