

A case of camouflage orthodontic treatment in a bilateral cleft lip and palate patient with skeletal class III and anterior open bite malocclusion

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Abstract

In an orthodontic treatment during the permanent dentition period of patients with skeletal class III malocclusion, it is sometimes difficult to decide which orthodontic treatment, with or without orthognathic surgery, is better. For patients with cleft lip and palate, we consider not only skeletal discrepancy between maxillary and mandibular morphology but also other factors including the number of congenitally missing teeth, abnormal morphology in permanent teeth, and soft tissue morphology. A 23-year-old female patient with bilateral cleft lip and palate had anterior crossbite and open bite malocclusion. The lateral cephalometric analysis found skeletal class III (ANB, 0.3°; Wits appraisal, -4.5 mm). After the treatment plans were thoroughly discussed with the patient, orthodontic treatment without orthognathic surgery was started, including the maxillary left lateral incisor and mandibular bilateral first premolars and third molars extraction using a standard edgewise system. The active orthodontic treatment lasted approximately 3 years, and the patient obtained proper overjet, overbite, and interdigitation. However, a slightly concave profile remained. Although camouflage orthodontic treatment is possible to prevent invasive surgery and improve malocclusion in patients, orthodontists should share with the patient the camouflage orthodontic treatment advantages and limitations relative to orthodontic-orthognathic treatment before starting treatment.

Key words :camouflage orthodontic treatment, bilateral cleft lip and palate, skeletal class III, anterior open bite

Introduction

The most common congenital anomaly of the human's craniofacial region is cleft lip and palate (CLP). CLP usually affects feeding, facial aesthetics, speech, hearing, and occlusion and can lead to psychological problems; thus, a multidisciplinary team treatment approach, such as surgical intervention, speech therapy, or orthodontic treatment, is required^{1,2}.

Patients with CLP often have a craniofacial morphology characterized by maxillary hypoplasia caused by palatoplasty^{3,4}. Furthermore, it was reported in some studies that patients with CLP often have dental abnormalities in the number of teeth

(e.g., hypodontia and supernumerary teeth), shape, permanent teeth eruption time, and location⁵⁻⁸.

In orthodontic treatment during the permanent dentition period in patients with skeletal class III malocclusion, often seen in CLP, it can be difficult to decide which orthodontic treatment, with or without orthognathic surgery, is better. For patients with CLP, we might consider not only the skeletal discrepancy between the maxillary and mandibular morphology but also other factors including the number of congenitally missing teeth, abnormal permanent tooth morphology, and operated soft tissue (lip and nose) morphology. Although various studies have reported the treatment decision for patients with typical malocclusions, such as skeletal class III, skeletal class II, and anterior open bite malocclusions, there remains controversy during the permanent dentition period when considering camouflage orthodontic and orthodontic-orthognathic treatment⁹⁻¹⁴.

In this case report, camouflage orthodontic

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treatment for an adult bilateral cleft lip and palate (BCLP) patient with skeletal class III and anterior open bite malocclusion was described to evaluate the treatment results.

Case report

Diagnosis

A 23-year-old female patient with BCLP visited the Department of Orthodontics, Showa University Dental Hospital, and presented with chief complaints of anterior crossbite and open bite. She had a history of cheiloplasty at 3 months, palatoplasty at 13 months, and alveolar bone grafting at 8 years, 7 months. She also had an orthodontic treatment history from 10 to 12 years old in a private dental clinic.

In the lateral view, the patient had a concave-type profile with retrusive upper lip and protrusive lower lip (Figure 1a). Intraorally, she had anterior crossbite and open bite. The overjet and overbite were -1.0

and -3.0 mm, respectively. Her maxillary dental arch showed a peg-shaped left lateral incisor, missing maxillary second premolars bilaterally sides, and the curve of Spee. By contrast, the mandibular dental arch showed anterior middle crowding and anterior gingival redness and swelling (Figure 1b). The patient also had a low tongue position and tongue thrusting when swallowing.

The panoramic radiograph revealed congenitally missing bilateral maxillary second premolars and right lateral incisor, as well as upper and lower third molar impaction on both sides. Caries was detected on the maxillary left first molar and mandibular right first molar (Figure 1c). The lateral cephalometric analysis indicated skeletal class III (ANB angle, 0.3° ; Wits appraisal, -4.5 mm) with a normodivergent pattern (MP; 279°) in her jaw relationship. Moreover, the maxillary incisors' inclination was in the normal range (U1-SN, 102.0°), whereas mandibular incisors were proclined (IMPA, 103.9°) (Table 1).

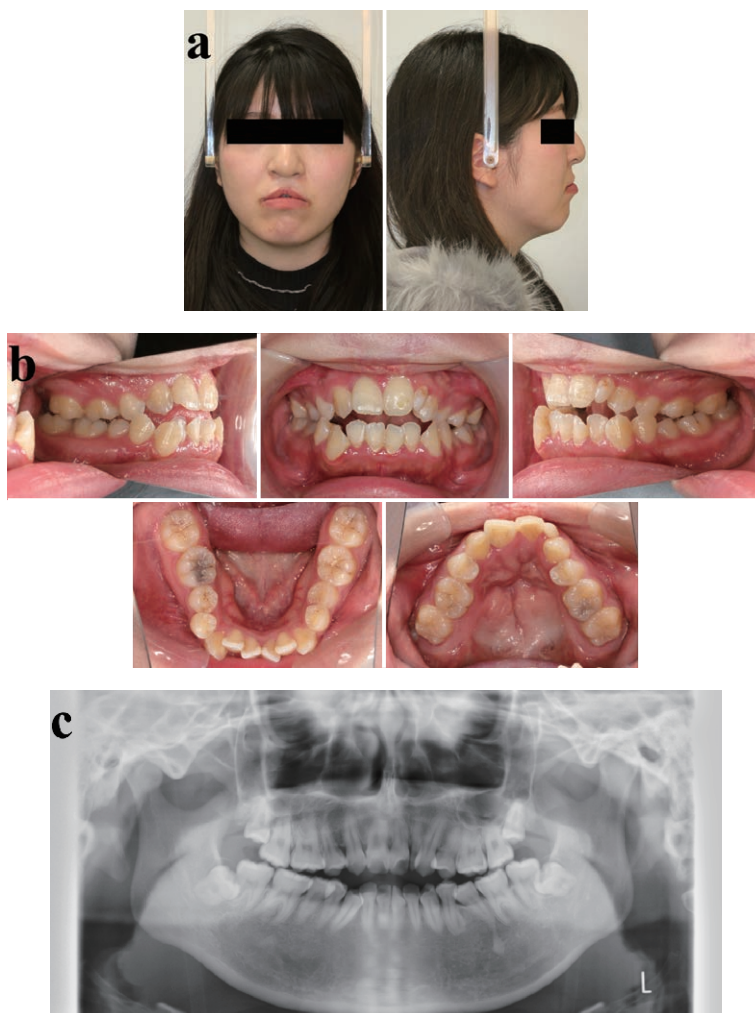


Fig. 1. Initial facial (a) and intraoral (b) photographs and panoramic radiograph (c).

Treatment Alternatives

After taking records and examinations, two treatment plans were provided for the patient. The first plan was orthodontic treatment with orthognathic surgery (Le Fort I osteotomy and bilateral sagittal split osteotomy) to correct the maxilla and mandible's skeletal discrepancy, and the second plan was nonsurgical camouflage orthodontic treatment with extraction. After a thorough discussion with the patient about the different treatment plans, it was decided to start camouflage orthodontic treatment without orthognathic surgery.

Treatment Progress

After finishing caries treatment and extraction of the maxillary left lateral incisor and bilateral mandibular first premolars and third molars, 0.018-inch slot standard edgewise brackets were directly bonded lower from the canine to the second molar on both sides with 0.016×0.016-inch stainless steel (SS) sectional wires, and using elastomeric chains, canine retraction was started. As lower canine retraction progressed, 0.018-inch slot standard edgewise brackets were also directly bonded to the lower anterior teeth and 0.014-inch nickel-titanium (NiTi) archwires on the upper to start the leveling and alignment stage. After upper and lower leveling and alignment with NiTi archwires, lower canine retraction was restarted with 0.016×0.016-inch SS archwire and elastomeric chains. Upper and lower anterior retraction was

then performed using loop mechanics with 0.016 × 0.022-inch SS archwires. Finally, occlusion finishing and detailing were adjusted with 0.016×0.022-inch SS archwires and anterior box elastics from the maxillary lateral to the mandibular lateral incisors. Myofunctional therapy (MFT) was also performed to improve the low tongue position and tongue thrust habit during active treatment with a brace. After the 35 month active treatment, the orthodontic appliances were debonded. Hawley removable retainers were provided to secure both arches' stability.

Treatment Results

Table 1 and Figure 2a, b, and c show the treatment results. Compared with the pretreatment and posttreatment lateral cephalometric analysis, SNA and SNB slightly decreased and ANB slightly increased. The maxillary and mandibular incisor inclinations (U1-SN and IMPA) decreased, and IMPA reached a normal range value (Table 1). The lateral cephalometric superposition showed that the mandible was slightly rotated counterclockwise owing to the intrusion of maxillary first molars (Figure 3).

In the facial profile's lateral view, the concave-type profile was improved relative to the profile pretreatment (Figure 2a). Intraorally, she acquired proper interdigitation, overjet, and overbite (+2.5 and +2.5 mm, respectively). The maxillary first premolars' dental arch width increased by 4.0 mm compared with that before treatment. Conversely, the

Table 1. Cephalometric measurements

Measurements	Norm (± SD)	Pretreatment	Posttreatment	Difference
SNA (°)	82.3 ± 3.5	71.4	71.2	0.2
SNB (°)	78.9 ± 3.5	71.1	70.6	0.5
ANB (°)	3.4 ± 1.8	0.3	0.6	0.3
Facial angle (°)	84.8 ± 3.1	82.9	83.2	0.3
Y-axis (°)	65.4 ± 5.6	67.1	66.9	0.2
Mandibular plane (°)	28.8 ± 5.2	27.9	27.5	0.4
Gonial angle (°)	121.2 ± 4.6	117.3	117.3	0.0
Wits (mm)	-1.7 ± 2.3	-4.5	-3.5	1.0
U1 to SN (°)	104.5 ± 5.6	102.0	101.1	0.9
IMPA (L1 to MP) (°)	96.3 ± 5.8	103.9	92.0	11.9
FMIA (°)	54.6 ± 6.5	48.3	60.5	12.2
Interincisal angle (°)	124.1 ± 7.6	115.2	128.4	13.2

SD = standard deviation

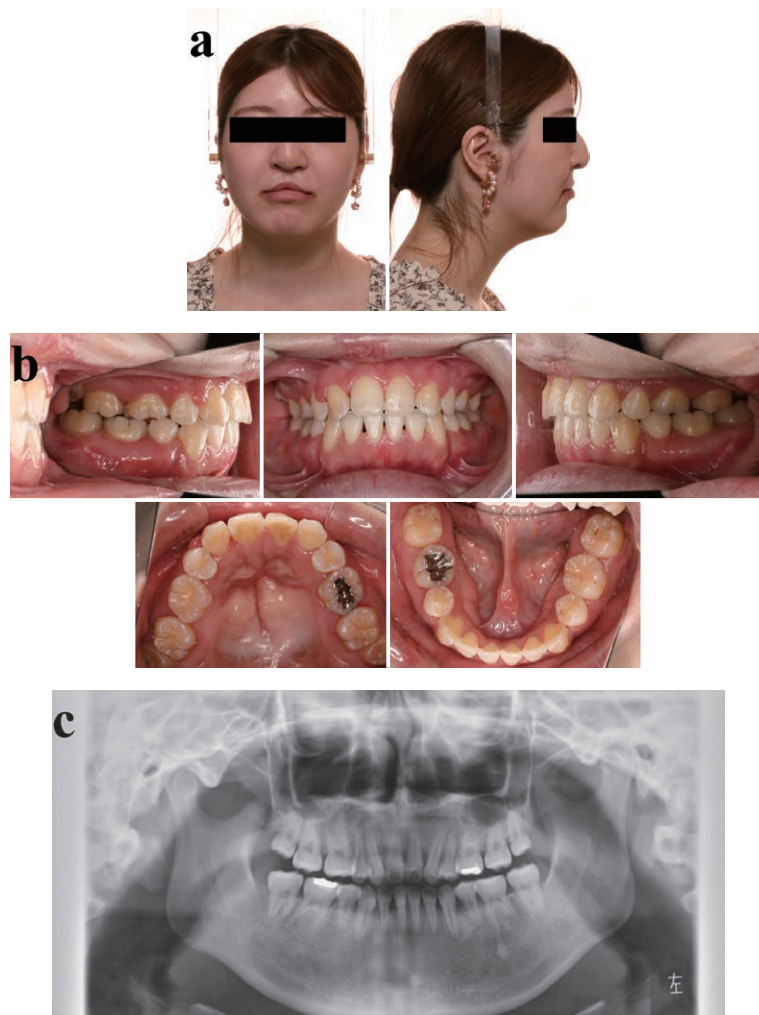


Fig. 2. Posttreatment facial (a) and intraoral (b) photographs and panoramic radiograph (c).

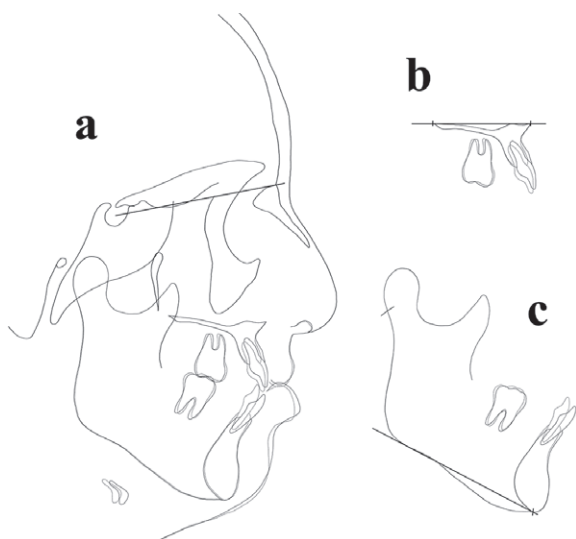


Fig. 3. Cephalometric superimpositions. (a) Total superimposition of initial (solid line) and posttreatment (dotted line) lateral cephalometric tracing. (b) and (c) Partial superimpositions of initial (solid line) and posttreatment (dotted line) lateral cephalometric tracing.

maxillary second molars' dental arch width decreased by 1.0 mm. Lower anterior crowding, as well as low tongue position and tongue thrusting habit, was corrected (Figure 2b). The posttreatment panoramic radiograph revealed that there was no significant root resorption, and the overall root paralleling was acceptable (Figure 2c).

Discussion

In adult patients, some malocclusion types caused by a skeletal discrepancy between maxilla and mandible and/or deformity usually require orthodontic treatment with orthognathic surgery. However, in patients with mild-to-moderate skeletal discrepancy and/or deformity or in those who refuse orthognathic surgery, camouflage orthodontic treatment is sometimes performed by orthodontists. The greatest camouflage orthodontic treatment advantage over

combination treatment is the avoidance of surgical intervention. Moreover, camouflage orthodontic treatment usually cannot lead to a dramatic facial profile change¹⁵.

In this case report, camouflage orthodontic treatment was reported for an adult patient with BCLP who had skeletal class III and anterior cross and open bite malocclusion. Before treatment was started, two different treatment plans (i.e., camouflage or orthodontic-orthognathic treatment) were discussed with the patient. After the plans were discussed and written informed consent for orthodontic treatment was obtained from the patient, camouflage orthodontic treatment was selected to improve her malocclusion.

Compared with the pretreatment and posttreatment cephalometric measurements and superimpositions, the maxillary and mandibular incisors were retroclined and extruded. Moreover, the maxillary and mandibular first molars were upright. The mandible was slightly rotated counterclockwise owing to the maxillary first molars' intrusion (upright). The treatment results showed that the anterior crossbite and open bite correction were mainly caused by a change in the anterior teeth. The change (i.e., the establishment of proper overjet and overbite) was thought to have been achieved by removing the curve of Spee from the maxillary dental arch, anterior retraction of the mandible using loop mechanics, and extrusion of maxillary and mandibular incisors using anterior box elastics. To achieve successful camouflage orthodontic treatment results, patient cooperation in using elastics independently is a key factor. Furthermore, the patient underwent MFT to improve her low tongue position and tongue thrusting during brace treatment. Generally, tongue habits are the main environmental factors caused by an anterior open bite¹⁶, and it is known that MFT is an effective therapy to improve anterior open bite¹⁷. Patient cooperation for orthodontic treatment contributed to the treatment results.

The results also showed that the patient acquired proper interdigitation with class II molar relationships and a good-aligned dental arch in the maxilla and mandible with a well-collected midline. Although the concave profile type was also improved relative to pretreatment, a dramatic profile change was not achieved. Nevertheless, the patient was satisfied with the overall camouflage orthodontic treatment results.

To improve their malocclusion and profile, each patient has various orthodontic treatment requests. One patient might want to completely improve skeletal discrepancy and deformity and dramatically

change their profile. Another patient might want to avoid surgical intervention as much as possible in orthodontic treatment, even though after treatment, the profile might only be changed a little. The treatment decision is sometimes difficult in adult patients with malocclusion caused by skeletal discrepancy and/or deformity, especially class III malocclusion. It is very important that orthodontists discuss the treatment goal with the patients before the treatment starts and should thoroughly explain each treatment's advantages and disadvantages.

The controversy continues to the present day: Which is the inferior treatment, camouflage, or orthodontic-orthognathic treatment? The accumulation and sharing of treatment results following camouflage orthodontic treatment in various cases will contribute to the future planning of orthodontic treatment during the permanent dentition period in cases where both camouflage and orthodontic-orthognathic treatment are feasible options.

Conflict of Interest Disclosure

The authors declare that they have no conflicts of interest.

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