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CASE REPORTS

# Orthodontic Treatment Combined with Condylectomy and Two-jaw Surgery in a Case with Condylar Hyperplasia

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*Unilateral condylar hyperplasia is characterized by dentofacial asymmetry, mandibular deviation, and malocclusion. We herein report improvements in mandibular deviation and malocclusion caused by orthodontic treatment combined with condylectomy and two-jaw surgery in a 17-year-old girl with unilateral condylar hyperplasia. Following orthognathic surgery combined with condylectomy, a Class I canine relationship with ideal overjet and overbite, tight interdigitation, and a satisfactory facial profile were achieved. After a retention period of two years and two months, the dental arch and occlusion remained stable, and the patient was fully satisfied with the treatment result.*

Key words : Two-jaw Surgery, Condylectomy, Condylar Hyperplasia

## 1. Introduction

Unilateral condylar hyperplasia is characterized by mandibular deviation, dentofacial asymmetry, and malocclusion[1]. It has been reported that unilateral condylar hyperplasia is usually caused by slow progressive growth of the mandible[2]. In adult patients who have condylar severe hyperplasia, it is necessary to diagnose the growth activity of the mandibular condyle using bone scintigraphy[3]. When condylar growth is active in adult patients, unilateral condylectomy is a treatment option.

A previous study reported that mandibular deviation is improved only by proportional condylectomy in a majority of patients, and some cases with dentofacial dysmorphism require combined orthodontic-orthognathic treatment[4]. The need for additional surgery is judged based on various factors, including the anteroposterior relationship between the maxilla and mandible, the degree of compensatory growth, the shape of the jaw, and the presence of dental problems.

In patients who have excessive downward growth, the maxillary molars extrude on the affected side as dental compensation[5]. In such patients, orthognathic surgery concomitantly with condylectomy is necessary to achieve favorable treatment outcomes[6]. However, there have been few reports documenting the outcomes of combined condylectomy and orthodontic-orthognathic treatment in adult patients with condylar hyperplasia[7,8].

The present study describes a patient with condylar hyperplasia who underwent condylectomy and orthodontic treatment combined with two-jaw surgery.

## 2. Case report

The patient, a 17-year-and-6-month-old girl, visited our clinic with a chief complaint of mandibular deviation and crowding of the upper and lower dentition. The frontal and lateral facial photographs showed mandibular deviation and a concave soft tissue facial profile, respectively (Fig. 1A). An intraoral examination (Fig. 2-1A, 2-2A) showed crowding in the upper and lower anterior regions (arch length discrepancy, upper, –0.6 mm; lower, –4.6 mm). The coronal arch width in the upper first molar region was 41.7 mm, and that in the lower first molar region

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was 30.7 mm, indicating constriction of the upper and lower dental arches. The patient had a Class III molar relationship bilaterally. No clinically discernible signs in the temporomandibular joints were present. A panoramic radiograph (Fig. 3A) revealed no congenitally missing teeth.

A frontal cephalogram (Fig. 4A) showed that the occlusal plane canted to the upper left, and the mandible deviated 20.0 mm to the left relative to the facial midline. The upper and lower dental midlines deviated 3.0 mm to the left in relation to the facial midline.

A lateral cephalometric analysis (Fig. 5A and Table 1) showed a skeletal Class III jaw base relationship (ANB=−1.5°). The mandibular plane with an SN-Mp of 29.5° was lower than +1 standard deviation (s.d.) of the normative mean for Japanese people[9]. The upper incisor inclination was within a range of +1 s.d. of the Japanese normative mean (U1-SN=113.0°). The lower incisor was lingually inclined (L1-FH=75.5°). A soft tissue analysis showed that the upper and lower lips were positioned 5.0 and 2.0 mm posterior to the E-plane, respectively.

### 3. Diagnosis

The patient was diagnosed with a mandibular deviation, a skeletal Class III jaw base relationship, a low mandibular plane angle, lingually inclined lower incisors, and anterior crowding in the upper and lower regions.

### 4. Treatment plan and progress

After bone scintigraphy was performed to diagnose the growth activity of the mandibular condyle, the right condyle was diagnosed as active. We planned surgical orthodontic treatment designed to improve the mandibular deviation and malocclusion. The treatment plan was as follows: (1) Condylectomy. (2) Preoperative orthodontic treatment that included alignment of the upper and lower teeth and dental arch width coordination. (3) Orthognathic surgery that included two-jaw surgery to improve the concave facial profile with mandibular deviation. (4) Postoperative orthodontic treatment with a goal of obtaining stable occlusion. (5) Retention.

When the patient was 18 years and 3 months old, following condylectomy, preoperative orthodontic treatment was begun with pre-adjusted edgewise appliances (0.022×0.028 inches). At 20 years and 9 months old, the patient's preoperative orthodontic treatment was completed. The maxilla in the left molar region had moved 2.0 mm downward, while that in the right molar region had moved 3.0 mm upward. Simultaneously, the mandible in the left molar region had moved 3.5 mm forward, while that in the right molar region had moved 1.0 mm backward and that rotated to the right with BSSO.

At 22 years and 8 months old, acceptable overjet and overbite had been obtained, and a Class I canine and molar relationships had been achieved. The edgewise appliances were removed, and retention was begun. A Begg-type retainer was used for retention in the upper and lower dental arches.

### 5. Treatment results

Judging from the frontal facial photograph, the mandibular deviation was improved. The crowding in both dental arches had been corrected and the patient now had Class I canine and molar relationships with an overjet of 2.0 mm and an overbite of 1.5 mm (Fig. 2-1C, 2-2C). Superimposed tracing of the pre- and pre-orthognathic-surgery frontal cephalometric radiographs indicated remarkable improvement of the mandibular deviation (Fig. 4A). Superimposed tracing of the pre-orthognathic-surgery and post-active treatment frontal cephalometric radiographs indicated additional improvement of the mandibular deviation (Fig. 4B). Superimposed tracing of the pre-treatment and pre-orthognathic-surgery lateral cephalometric radiographs indicated mandibular posterior-backward rotation (Fig. 5A). Superimposed tracing of the pre-orthognathic-surgery and post-active treatment lateral cephalometric radiographs indicated slightly backward movement (Fig. 5B).

A lateral cephalometric analysis showed that the patient had a skeletal Class I jaw base relationship after orthodontic treatment (Table 1). The L1-Mp increased from 77.5° to 86.0°, suggesting labial inclination of the lower incisors. Orthodontic treatment provided adequate interdigitation of the teeth.

After two years and two months of retention, skeletal stability was obtained, and the occlusion remained stable with normal overjet and overbite (Figs. 2-1D, 3-1D). The improvements obtained in the facial appearance and the dental arches during active treatment were preserved during the retention period. The patient was satisfied with the treatment outcome.

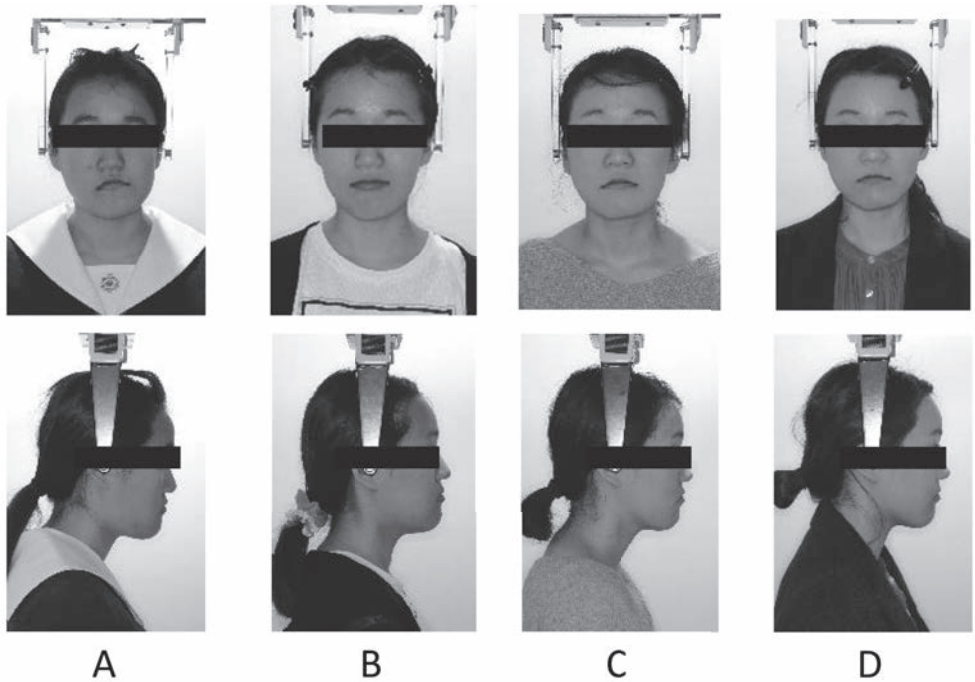


Figure 1. Facial photographs. A, pre-treatment (17 years 6 months old); B, pre-orthognathic-surgery (20 years 9 months old); C, post-active treatment (22 years 8 months old); D, post-retention (24 years 9 months old).

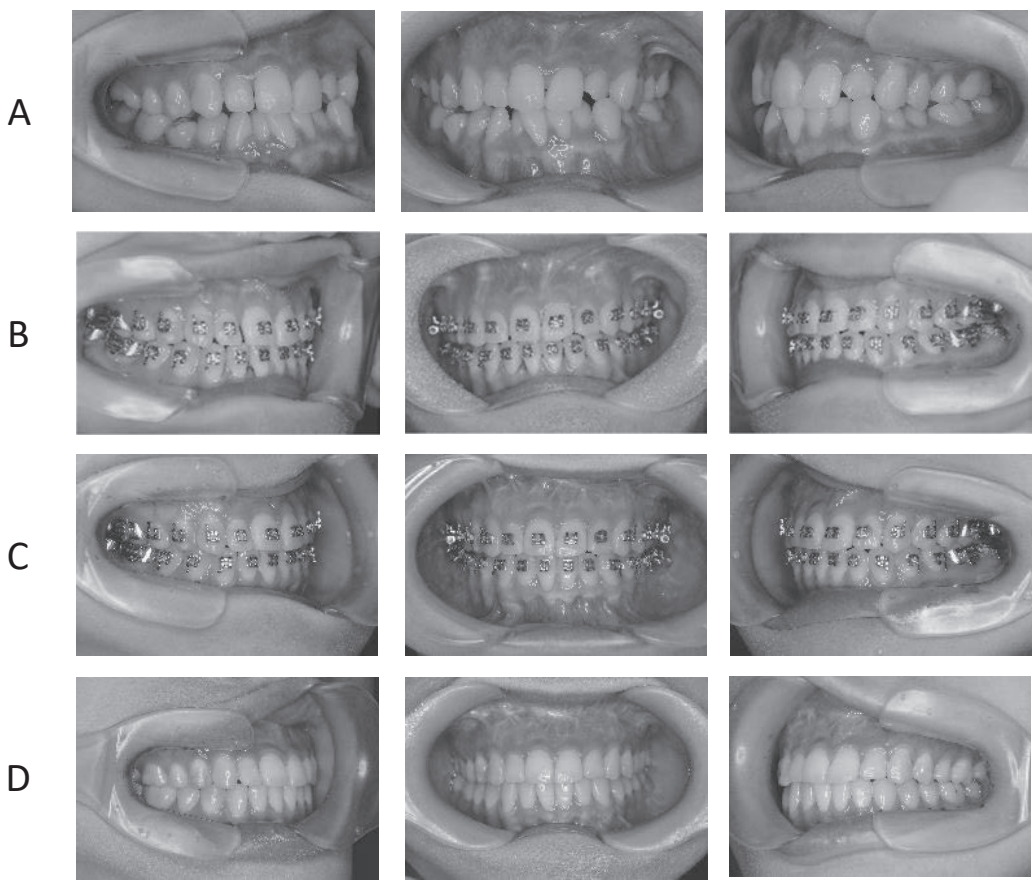


Figure 2-1. Frontal and lateral views of intraoral photographs. A, pre-treatment (17 years 6 months old); B, pre-orthognathic-surgery (20 years 9 months old); C, post-active treatment (22 years 8 months old); D, post-retention (24 years 9 months old).

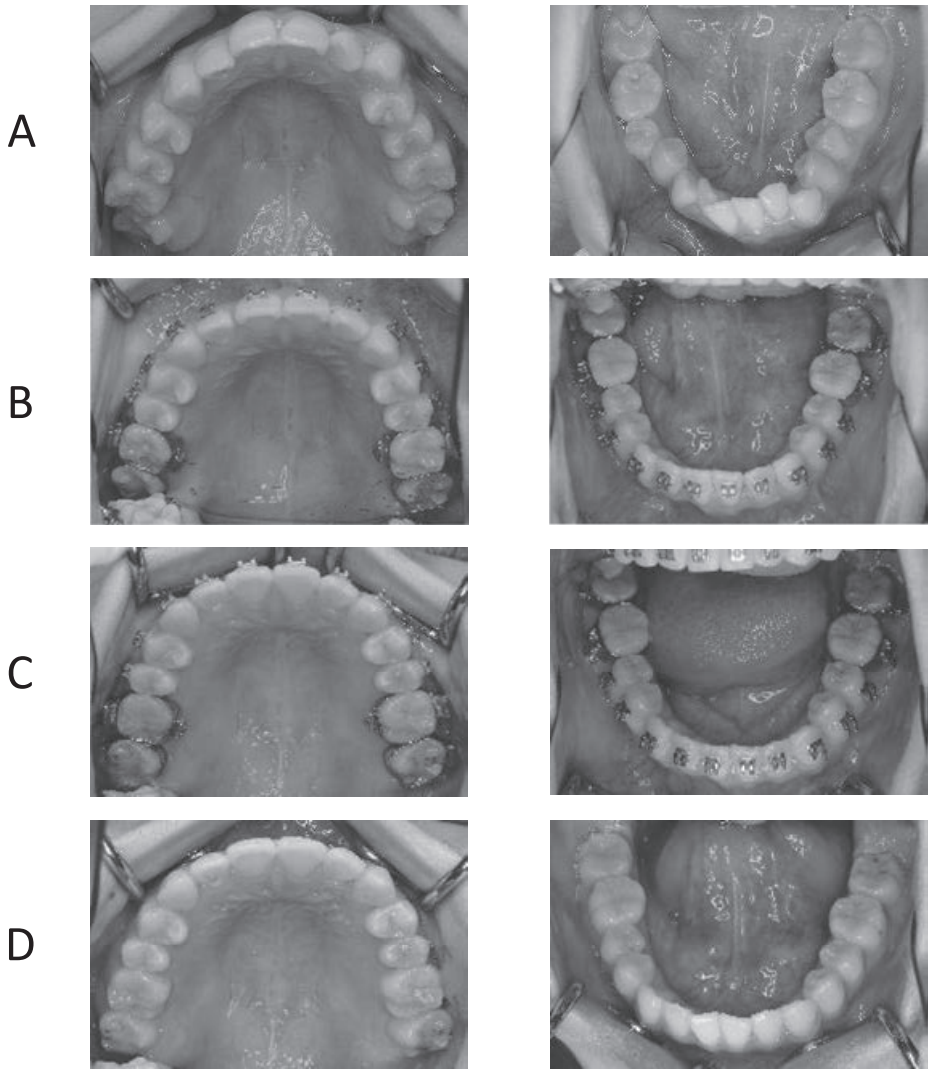


**Figure 2-2**. Occlusal views of upper and lower dental arches. A, pre-treatment (17 years 6 months old); B, pre-orthognathic-surgery (20 years 9 months old); C, post-active treatment (22 years 8 months old); D, post-retention (24 years 9 months old).

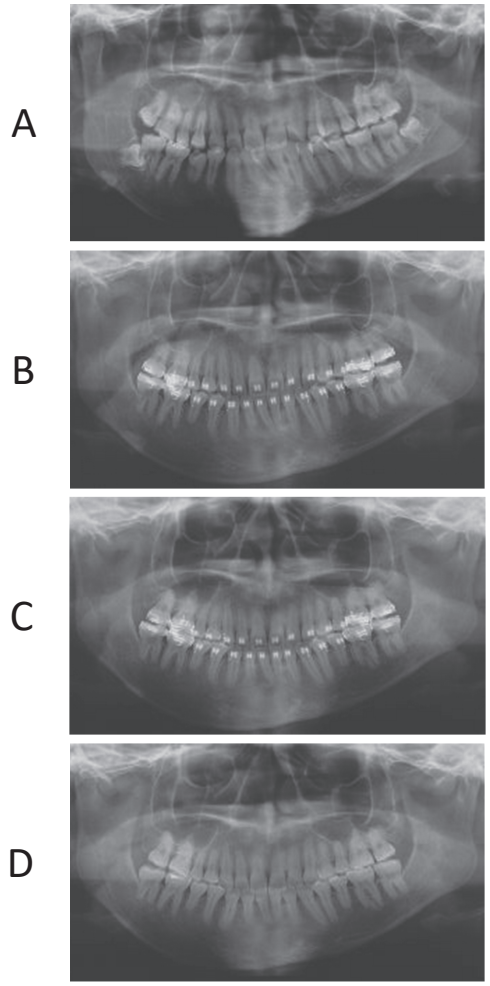


Figure 3. Panoramic radiographs. A, pre-treatment (17 years 6 months old); B, pre-orthognathic-surgery (20 years 9 months old); C, post-active treatment (22 years 8 months old); D, post-retention (24 years 9 months old).

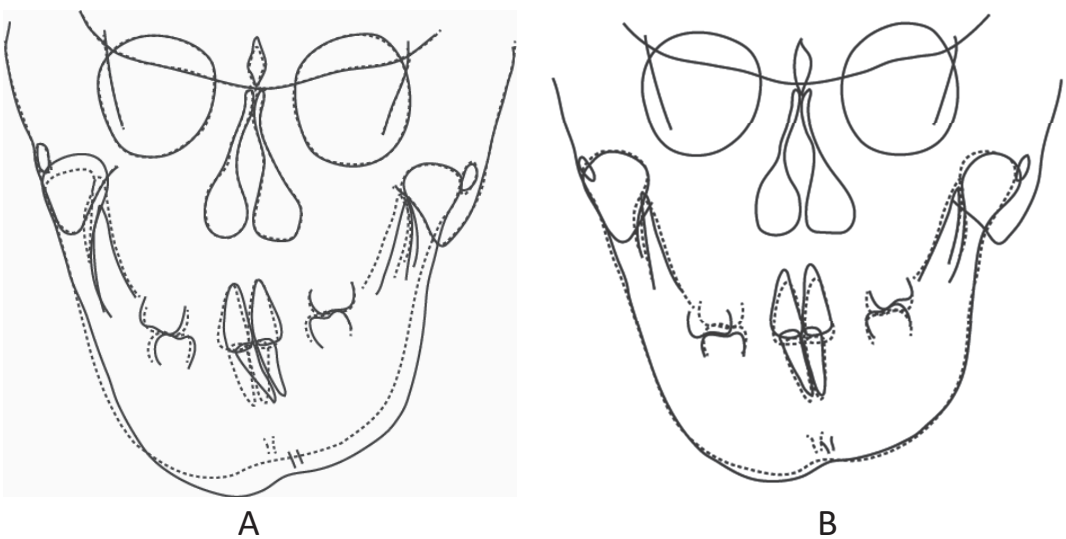


Figure 4. A, Superimposition of pre-treatment and pre-orthognathic-surgery frontal cephalometric tracings at 17 years 6 months and 20 years 9 months old; B, Superimposition of pre-orthognathic-surgery and post-active treatment frontal cephalometric tracings at 20 years 9 months and 22 years 8 months old.

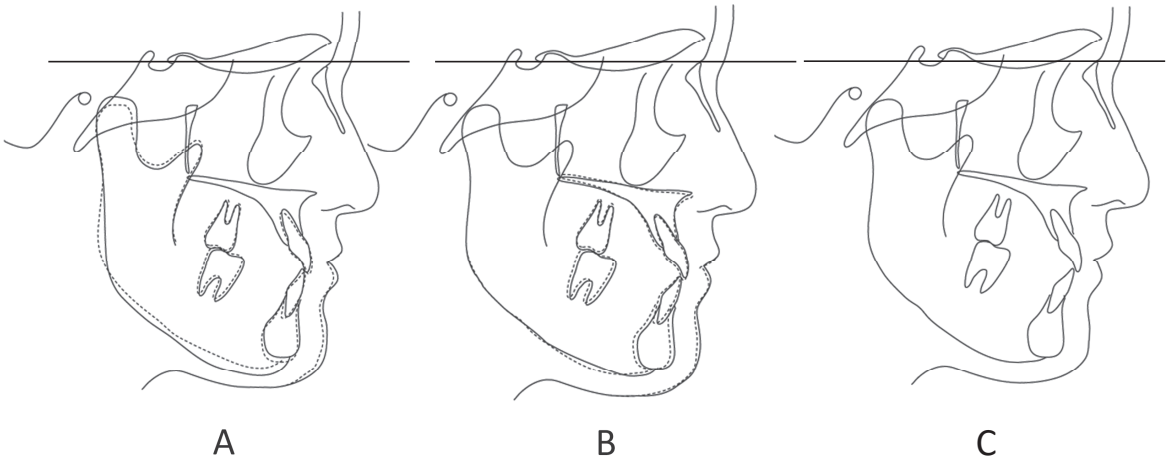


**Figure 5**. A, Superimposition of pre-treatment and pre-orthognathic-surgery lateral cephalometric tracings at 17 years 6 months and 20 years 9 months old; B, Superimposition of pre-orthognathic-surgery and post-active treatment lateral cephalometric tracings at 20 years 9 months and 22 years 8 months old; C, Superimposition of post-active treatment and post-retention lateral cephalometric tracings at 22 years 8 months and 24 years 9 months old (superimposed on the SN plane at S).

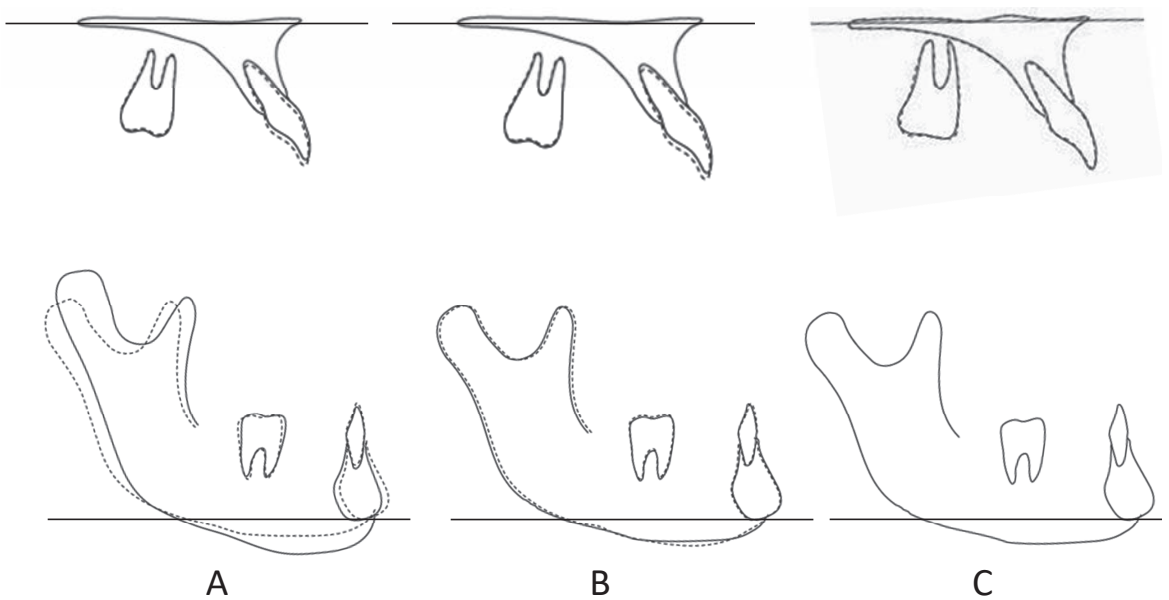


**Figure 6**. A, Superimposition of pre-treatment and pre-orthognathic-surgery lateral cephalometric tracings at 17 years 6 months and 20 years 9 months old; B, Superimposition of pre-orthognathic-surgery and post-active treatment lateral cephalometric tracings at 20 years 9 months and 22 years 8 months old; C, Superimposition of post-active treatment and post-retention lateral cephalometric tracings at 22 years 8 months and 24 years 9 months old (Upper, Superimposed on the palatal plane at ANS; Lower, Superimposed on the mandibular plane at Me).

Table 1. Cephalometric measurement at pre-treatment, pre-orthognathic-surgery, post-active treatment, and post-retention.

| | Pre-treatment (17 years 6months) | Pre-surgery (20 years 4 months) | Post-active treatment (22 years 6 months) | Post-retention (24 years 8 months) | Normative mean (adult, female) | |
|---|---|---|---|---|---|---|
| | | | | | Mean | SD |
| Angular (degrees) | | | | | | |
| SNA | 84.5 * | 84.5 * | 84.5 * | 84.5 * | 80.8 | 3.6 |
| SNB | 86.0 * | 84.0 * | 82.5 * | 82.5 * | 77.9 | 4.5 |
| ANB | -1.5 # | 0.5 | 2.0 | 2.0 | 2.8 | 2.4 |
| SN-Mp | 29.5 # | 33.0 | 34.0 | 34.0 | 37.1 | 4.6 |
| FH-Mp | 27.0 | 30.5 | 31.5 | 31.5 | 30.5 | 3.6 |
| Go.A. | 127.0 | 126.5 | 126.5 | 126.5 | 122.1 | 5.3 |
| U1-SN | 113.0 | 116.0 * | 114.0 | 114.0 | 105.9 | 8.8 |
| U1-FH | 115.5 | 118.5 | 121.5 * | 121.5 * | 112.3 | 8.3 |
| L1-FH | 75.5 * | 64.0 | 62.5 | 62.5 | 56.0 | 8.1 |
| L1-Mp | 77.5 # | 85.5 | 86.0 | 86.0 | 93.4 | 6.8 |
| IIA | 140.0 * | 138.0 * | 123.5 | 123.5 | 123.6 | 10.6 |
| Linear (mm) | | | | | | |
| S-N | 69.0 | 69.5 | 69.5 | 69.5 | 67.9 | 3.7 |
| Ptm'-A' | 51.5 * | 51.5 * | 51.5 * | 51.5 * | 47.9 | 2.8 |
| Ar-Go | 48.5 | 45.0 | 45.0 | 45.0 | 47.3 | 3.3 |
| Go-Me | 79.0 * | 79.0 * | 78.0 * | 78.0 * | 71.4 | 4.1 |
| Ar-Me | 115.5 * | 113.5 * | 112.0 | 112.0 | 106.6 | 5.7 |
| Soft tissue profile (mm) | | | | | | |
| Upper lip to E-line | -5.0 | -3.5 | -3.5 | -3.5 | | |
| Lower lip to E-line | -2.0 | -1.0 | -2.0 | -2.0 | | |
| Model (mm) | | | | | | |
| Overjet | 2.0 | 2.5 | 2.5 | 2.5 | | |
| Overbite | 2.0 | 1.5 | 1.5 | 1.5 | | |

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## 6. Discussion

The present patient had unilateral hyperplasia of the mandibular condyle at the pre-treatment examination. The right condyle was severely increased compared with the left one, so bone scintigraphy was performed to diagnose the growth activity of the mandibular condyle. The right condyle was then diagnosed as active, and condylectomy was performed. The treatment plan for patients with a severely increased condyle has been thought to depend upon whether or not the condylar growth is active[10].

The present patient had an active condyle, mandibular deviation, and occlusal plane canting. After primary condylectomy, occlusal seating was performed for 1.5 years. However, canting of the occlusal plane, which might have been due to the maxillary dentoalveolar compensatory growth caused by the condylar vertical excess, remained. Accordingly, the present patient was deemed to require secondary additional orthognathic surgery. It has been reported that active condylar hyperplasia can be treated with condylectomy alone in some cases[4], whereas secondary orthognathic surgery is needed in other cases[5]. The treatment plan in such cases has been condylectomy and orthognathic surgery for condylar hyperplasia with excessive growth in the vertical vector[6].

In the present patient, after condylectomy, the maxillary occlusal plane in the left molar region canted upward, so two-jaw surgery was selected. The maxilla in the left molar region moved 2.0 mm downward, while that in the right molar region moved 3.0 mm upward, and the mandible in the left molar region moved 3.5 mm forward, while that in the right molar region moved 1.0 mm backward. A previous study showed that two-jaw surgery is generally required for cases with mandibular deviation and occlusal plane canting[11].

The treatment results are summarized as follows. The present patient showed improvements in mandibular deviation and malocclusion. This was achieved by orthodontic treatment combined with two-jaw surgery after condylectomy. The treatment

results suggest the significance of a re-evaluation to determine whether or not secondary additional orthodontic treatment is necessary after first performing condylectomy[6].

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