

Case Report: Facial asymmetry and early condylar fracture

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Severe facial asymmetry can arise from several sources, including genetic imperfections and environmental influences.¹ Hemi-facial microsomia, a genetic defect, inhibits mandibular growth on the affected side.² The degree of facial asymmetry depends on the degree of hypoplasia or agenesis of the tissues involved. Some clefts of the lip and/or palate also result in facial asymmetry, with associated collapse of the maxillary dental arch.³ However, the most frequent cause of severe mandibular asymmetry may be functional ankylosis secondary to mandibular trauma at an early age.⁴ Restricted mandibular movement disturbs the normal development of the maxilla and mandible in the anteroposterior and vertical directions.⁵ In growing patients, deformities—including mandibular deviation and canted occlusal plane—often develop progressively until growth stops.⁶

For patients who have suffered condylar fractures, early orthopedic treatment is indicated to encourage subsequent condylar and soft tissue

growth.^{4,6,7,9} A hybrid functional appliance is known to be effective in preventing the worsening of deformities and, in some cases, correcting them.⁷ The hybrid appliance is designed to encourage growth on the affected side.⁹ Treatment success, however, depends on the severity of the damaged tissue. If condylar translation is restricted, surgical release of the ankylosis or the scar is necessary prior to the orthopedic treatment, otherwise the condyle will not respond to it.⁴ If the facial asymmetry develops progressively during orthopedic treatment, surgical reconstruction of the temporomandibular joint with a costochondral graft or the remaining ramus tissue might be considered.¹⁰ If the patient has finished growing, skeletal deformities are corrected by a combined surgical-orthodontic treatment or camouflage orthodontic treatment.¹⁰

In the present cases, medical histories showed that the patients had early condylar fractures. One patient had condylar ankylosis. The other patient did not, but normal maxillomandibular

Abstract

This report describes the surgical-orthodontic treatment of two adult females who exhibited dentofacial asymmetry. Their medical histories included early condylar fractures. Growth was disturbed on the fractured side, resulting in mandibular deviation and maxillary canting. Following the completion of growth, the asymmetries were corrected by combined orthodontic-surgical treatment. The treatment planning procedures and the results are presented.

Key Words

Facial asymmetry • Condylar fracture

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Figure 1A

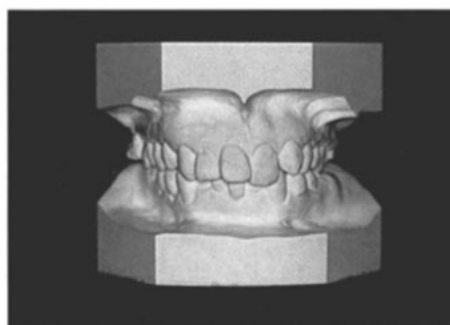


Figure 1B



Figure 1C

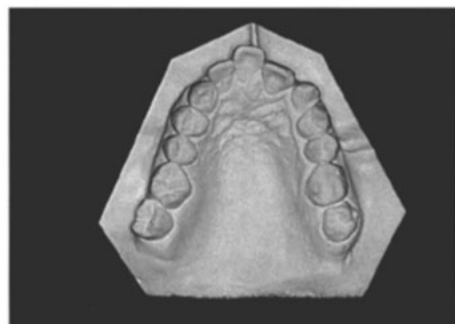


Figure 1D

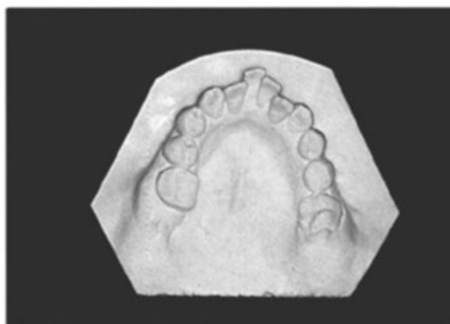


Figure 1E



Figure 2

Case 1

Figure 1A-E

Pretreatment study models. The maxillary left lateral incisor and the mandibular right first molar and left second molar had been extracted earlier. Crowding was observed in both arches and the maxillary incisors were protrusive. The mandibular dental arch was asymmetric and the dental midline was deviated to the right.

Figure 2

Pretreatment panoramic radiograph. This patient had an early condylar fracture on the left side. Note the dissected condyle, deformed ramus, and vast bony mass at the articular prominence.

Figure 3A-B

Pretreatment facial photographs showing severe facial asymmetry and a retrognathic facial profile. The chin is deviated to the left.

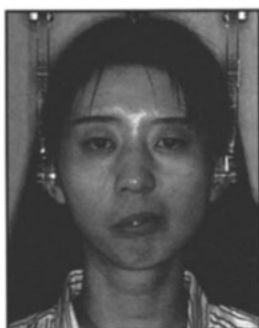


Figure 3A

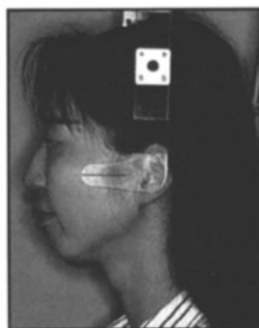


Figure 3B

growth was disturbed. Both cases showed consequent dentofacial asymmetries, including mandibular deviation and canting of the maxilla. The deformities in both cases were corrected by combined orthodontic and surgical treatment.

Case 1

Diagnosis and treatment plan

The patient was 30 years old when she was referred to our department for correction of facial asymmetry and maxillary and mandibular crowding. She had suffered a left condylar fracture when she was 6, and had been treated conservatively at the time. Three years after that treatment, she had difficulty opening her mouth. Surgery was performed to release the temporomandibular joint ankylosis at age 12. Jaw-opening improved, but later became progressively worse. At age 25, she was referred to the Department of Oral Surgery at Osaka University Hospital. A bony fusion was observed between the mandibular condyle and temporal bone on the

left side. After surgical release of the joint and placement of a silicone implant, maximum jaw opening increased to 35 mm.

The patient came to our clinic seeking correction of her facial asymmetry and crowding (Figures 1 and 2). A clinical examination revealed severe facial asymmetry and a retrognathic profile (Figure 3). The chin was deviated 7 mm to the left of the facial midline. Distinct mentalis contraction was observed at rest position. Facial nerve paralysis associated with the surgery was observed on the affected side, and the corner of the lip was contracted upward. Maximum jaw opening was 37 mm, but lateral jaw excursions were restricted to 3 mm to the right and 7 mm to the left. The mandibular left first molar had been restored with a short clinical crown due to decreased vertical dental space on the affected side. Moderate crowding was observed in both arches.

The patient had a Class II molar relationship on the left side. On the right side, the mandibular first molar had been extracted, resulting in mesial migration and tipping of the second molar. The maxillary dental arch was symmetrical, while the mandibular arch exhibited asymmetry. Posterior scissors-bite was observed in the left second molar area.

The lower dental midline deviated to the right of the upper by 4 mm. The maxillary left lateral incisor had been extracted and the midline was deviated 8 mm to the left of the facial midline on the PA cephalogram. A panoramic radio-

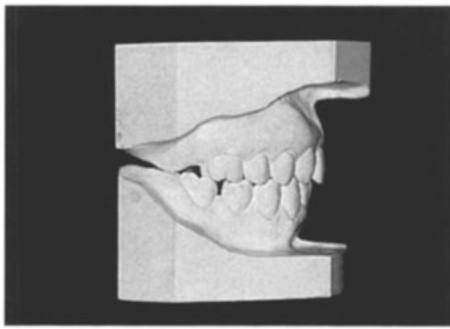


Figure 4A

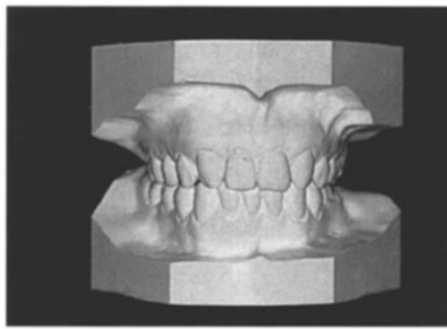


Figure 4B

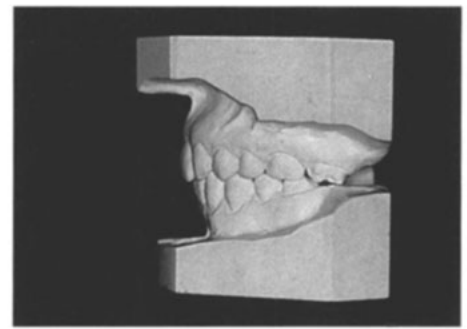


Figure 4C

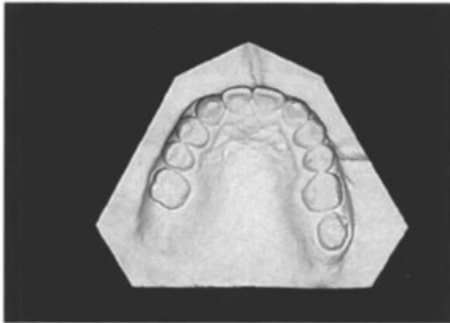


Figure 4D

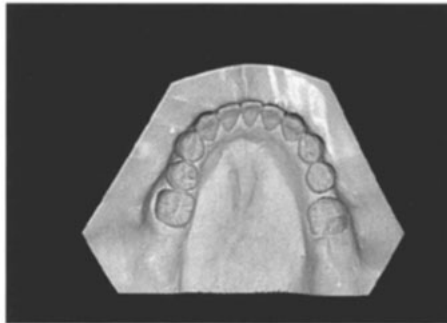


Figure 4E



Figure 5



Figure 6A

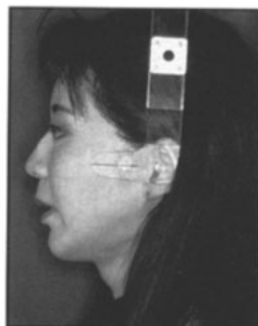


Figure 6B

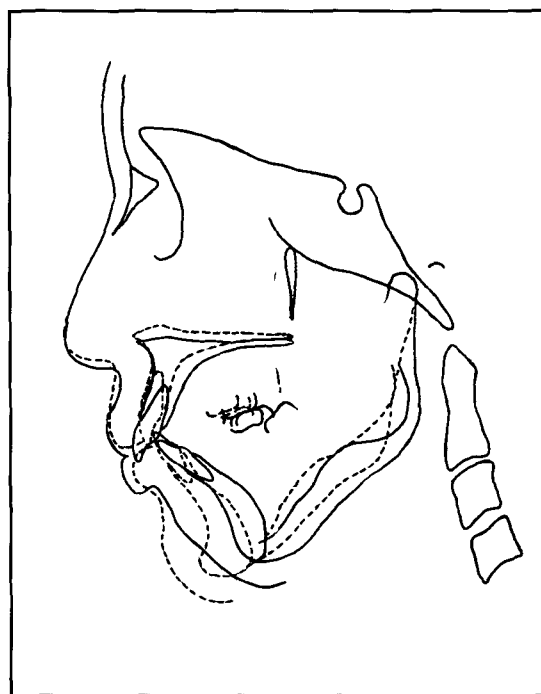


Figure 7

Figure 4A-E
Posttreatment study models. Crowding in both arches and the maxillary dental protrusion were eliminated. The mandibular arch became more symmetric.

Figure 5
Posttreatment panoramic radiograph.

Figure 6A-B
Posttreatment facial photographs. Facial asymmetry and retrognathic profile were improved.

Figure 7
Superimposition of pre-treatment and post-treatment radiographs.

graph revealed that the fractured condylar head had been dissected and the ramus was deformed on the left side. A vast bony mass was also observed at the articular prominence (Figure 2). A PA cephalometric radiograph showed canting of the maxilla and deviation of the mandible to the left side. Lateral cephalometric analysis revealed maxillary protrusion and mandibular retrusion.

Surgical repositioning of the maxilla and the mandible combined with a genioplasty was planned to correct the deformities. The upper dental midline deviated to the left due to early extraction of the maxillary left lateral incisor. Therefore, extraction of the right lateral incisor was planned to eliminate crowding and protrusion. Extraction of the mandibular left central incisor was also planned for correction of the dental crowding and incisor protrusions in the mandibular arch. The treatment plan was as follows:

1. Extraction of the mandibular left central in-

cisor and maxillary right lateral incisor, 2. Pre-operative orthodontic treatment to correct the maxillary dental protrusion, 3. Surgical repositioning of the maxilla and mandible, and 4. Post-operative orthodontic treatment.

Treatment progress

Edgewise appliances were placed on all teeth after extraction of the maxillary right lateral incisor and the mandibular left central incisor. The maxillary anterior teeth were retracted and man-



Figure 8A

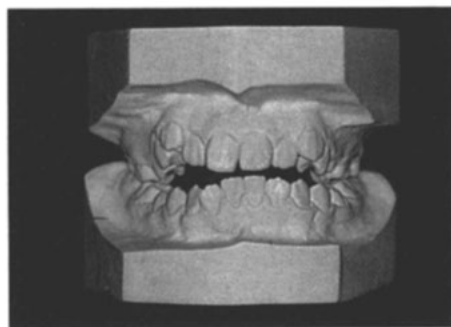


Figure 8B

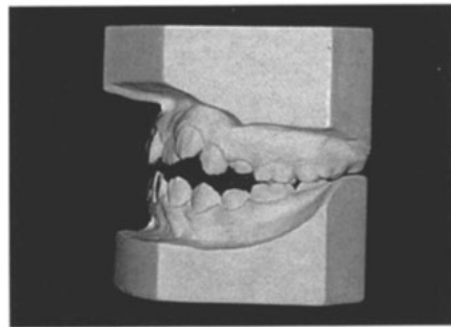


Figure 8C

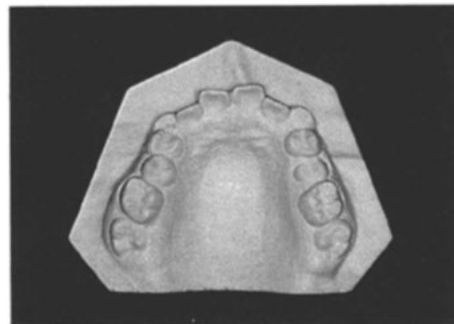


Figure 8D

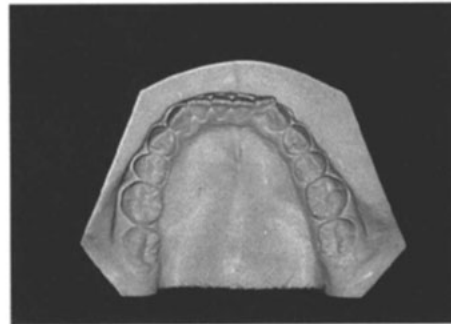


Figure 8E



Figure 9

Case 2

Figure 8A-E

Pretreatment study models. Note anterior openbite and moderate crowding in both arches. The shape of the mandibular arch was asymmetric.

Figure 9

Pretreatment panoramic radiograph. The fractured condylar head was not clearly identified and the shape of the neck was deformed.

Figure 10A-B

Pretreatment facial photographs. Note mild facial asymmetry, with the chin deviated to the left.

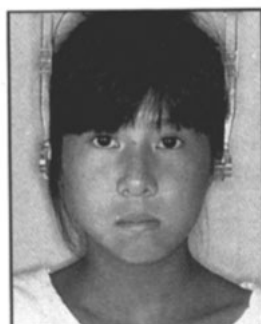


Figure 10A



Figure 10B

dibular crowding was eliminated during the preoperative orthodontic treatment, which lasted 10 months. A Le Fort 1 osteotomy and an inverted L-osteotomy were performed to reposition the maxilla and the mandible, respectively. The maxilla was moved superiorly 6 mm on the posterior right side, 0 mm on the posterior left side, 5 mm on the anterior right side, and 3 mm on the anterior left side. The mandible was moved anteriorly 3 mm on the right and 1 mm on the left. The chin was also repositioned anteriorly 5 mm, with an inferior border osteotomy. Two weeks later, maxillomandibular fixation was released. Orthodontic treatment over the next 15 months provided good intercuspation and improved facial esthetics. Total treatment time was 25 months.

Retention consisted of Hawley-type retainers for both dental arches, which were worn 12 hours per day.

Results

Maxillary dental protrusion and crowding in both arches were eliminated (Figures 4 and 5) and facial asymmetry and the retrognathic profile were improved (Figure 6A-B). The cant of the occlusal plane was reduced (Figure 7), although the lip remained canted because of the residual facial nerve paralysis. Jaw opening was maintained at 35 mm, with a restricted mandibular shift to the right.

Case 2

Diagnosis and treatment plan

The patient was referred to our clinic at age 12 for treatment of dentofacial asymmetry and open bite. She had sustained a left condylar fracture when she was 9. At the initial consultation, her chief complaint was a bad bite. The condylar fracture had been treated conservatively and jaw opening had not been disturbed. She had mild facial asymmetry and a convex facial profile. Her chin was deviated to the left of facial midline by 2 mm (Figure 10). The vertical range of jaw opening was normal, but lateral jaw excursion to the right was restricted. Anterior openbite and crowding in both arches were observed. The maxillary dental arch was symmetric, while the mandibular arch exhibited asymmetry (Figure 8). The lower dental midline was deviated 4 mm to the right, the upper 3 mm to the left. A panoramic radiograph showed that the fractured condylar head was not clearly identified and the shape of the neck was deformed (Figure 9).



Figure 11A



Figure 11B



Figure 12A

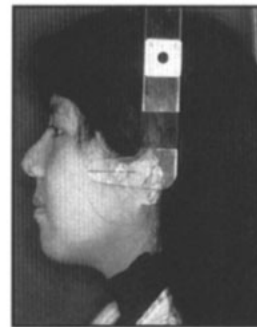


Figure 12B

Figure 11A-B
Presurgical facial photographs showing facial asymmetry and increased lower facial height.

Figure 12A-B
Posttreatment facial photographs. Facial asymmetry was improved.

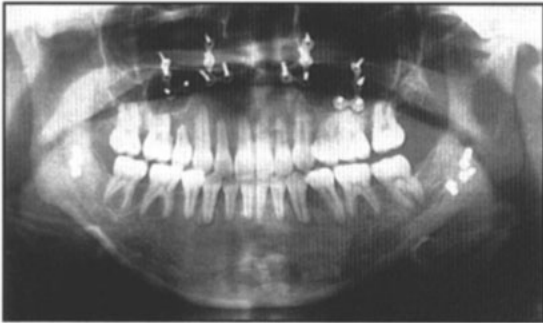


Figure 13

Figure 13
Posttreatment panoramic radiograph.

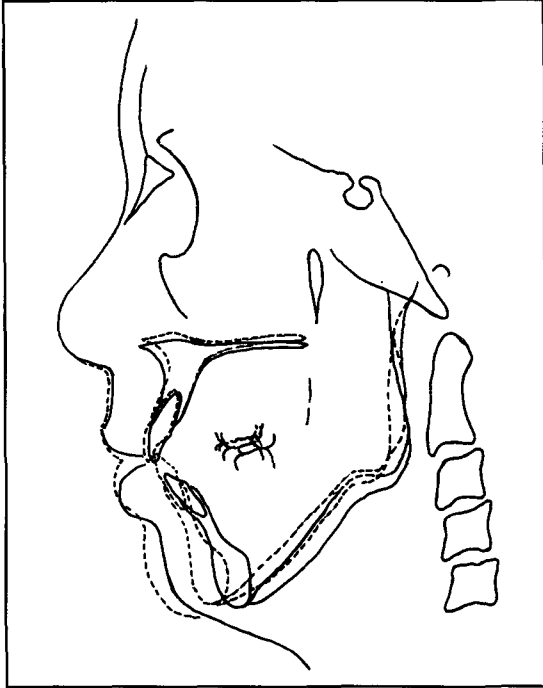


Figure 14
Superimposition of pretreatment and posttreatment radiographs.

Analysis of a PA cephalogram revealed that the maxilla was canted and the mandible deviated to the ankylosed side. The lateral cephalogram showed mandibular retrusion with a high mandibular plane angle.

A hand-wrist radiograph indicated the patient had further growth potential, so conventional orthopedic treatment was planned until growth was complete. High-pull headgear and a removable functional appliance were used to keep the openbite and facial asymmetry from worsening. To eliminate the severe crowding in both arches, edgewise treatment with maxillary and mandibular first premolar extraction was necessary. To correct the dentofacial asymmetry and openbite, surgical repositioning of maxilla and mandible was inevitable. The treatment plan was as follows: 1. Orthopedic treatment until completion of growth; 2. Maxillary and mandibular first premolar extraction; 3. Preoperative orthodontic treatment; 4. Surgical repositioning of the maxilla and mandible; and 5. Postoperative orthodontic treatment.

Treatment progress

A functional appliance and a high-pull headgear were used for 2 years, until the patient finished growing. At age 15, combined orthognathic and orthodontic treatment was planned, to start at age 17. Edgewise appliances were placed on the maxillary and mandibular teeth following extraction of the four first premolars. Preoperative facial examination showed that lower facial height had increased relative to total facial height

Figure 14

(Figure 11). Using a Le Fort 1 osteotomy, the maxilla was repositioned 2 mm superiorly on the posterior left side and 6 mm on the posterior right, and 3 mm superiorly on the anterior left side and 5 mm on the anterior right. Using a bilateral sagittal split osteotomy, the mandible was repositioned anteriorly 6 mm on the left side and 2 mm on the right. Postoperative orthodontic treatment provided good intercuspation of the teeth and improved facial esthetics. Total treatment time was 25 months. Retention consisted of Hawley-type retainers for both arches, worn 12 hours per day.

Results

Clinical examination revealed that facial asymmetry was improved and the facial profile was changed from a convex pattern to a straight one (Figure 12). Crowding in both dental arches was corrected, along with the openbite (Figure 13). Jaw opening was maintained at 40 mm, with restricted lateral excursion to the right, as observed before treatment.

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