Distraction osteogenesis and orthognathic surgery for a patient with unilateral cleft lip and palate

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Maxillary deficiency is a common feature in patients with repaired cleft lip and palate. Orthognathic surgery has been the conventional approach for the management of cleft-related maxillary hypoplasia. However, for patients with a severe maxillary deficiency, orthognathic surgery alone has many disadvantages, such as high relapse rates of 25% to 40%, instability, limited amount of advancement, and a highly invasive surgical technique. As an alternative treatment method, distraction osteogenesis has been used successfully in the distraction of the mandible, the maxilla, the entire midface, and the orbits as well as the cranial bones, with stable outcomes. The type of distraction device, either external or internal, can be chosen based on the surgical goals set for the patient. In this study, we report on the use of a rigid external distraction device for maxillary advancement in a 22-year-old woman with a repaired unilateral cleft lip and palate and severe maxillary hypoplasia. After the distraction osteogenesis, 2-jaw surgery was performed to correct the maxillary yaw deviation and the mandibular prognathism. (Am J Orthod Dentofacial Orthop 2015;147:381-93)

Cleft lip and palate (CLP) are common congenital deformities in the oromaxillary area.[1] Patients with orofacial clefts commonly have maxillary hypoplasia that is caused by the cleft itself, the patients' genotype, or scarring from early surgical intervention.[2] Early surgical corrections usually are performed to improve esthetics and function, but these early surgeries tend to result in poor skeletal and dental growth in the transverse and anteroposterior planes in the maxilla. Moreover, the maxillary dentition is often collapsed because of missing teeth.[3] A systematic approach is thus required for patients with CLP; these often include surgery, growth modification, and comprehensive orthodontic treatment.

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The selection of a proper treatment method for patients with CLP and severe maxillary hypoplasia is complicated because of palatal scar contracture, upper lip tension, and decreased postoperative stability from large anteroposterior discrepancies.[4] Distraction osteogenesis (DO) has become an alternative technique for the correction of craniofacial skeletal dysplasias.[2] Since the initial clinical trials on humans by McCarthy et al,[5] in which a hypoplastic mandible was elongated, Figuero and Polley[6] have reported success using DO to advance the maxilla in growing patients with CLP with no significant complications. More recently, the mandible and the maxilla, the entire midface, and the orbits have been successfully distracted.[2,7-9]

The purpose of this article was to report the use of a rigid external distraction (RED) device for maxillary advancement in a 22-year-old woman with CLP and severe maxillary hypoplasia. The 2-jaw surgery was performed after the DO to correct the maxillary yawing and the mandibular prognathism.

DIAGNOSIS AND ETIOLOGY

The patient was a Korean woman whose chief complaints were a concave profile and mandibular prognathism. She was born with a complete unilateral CLP and received a cheilorrhaphy and a palatorrhaphy when she was 10 years old. There was no history of

Fig 1. Pretreatment photographs.

orofacial congenital anomalies or deformities in her family. She had no other relevant medical history.

The extraoral examination showed a midface deficiency and an increased mandibular body length. Lower facial height was comparatively longer than midfacial height. The length of the mental region was much greater than that of the upper lip (Fig 1). The intraoral examination showed an Angle Class III molar relationship with an anterior crossbite and a maxillary yaw deviated to the right. She was missing her maxillary second premolars, and her maxillary right first premolar had a palatal ectopic eruption. Her maxillary dental midline was deviated by 3 mm to the right of the facial and mandibular dental midlines. She had peg laterals (Fig 1). Her study models showed an anterior Bolton ratio of 82.41% and a 1.54-mm mandibular excess (Fig 2). The panoramic radiographs showed that the original cleft defect was in the maxillary left lateral incisor area (Fig 3). The cephalometric analysis showed a skeletal Class III relationship with a retrusive maxilla and a hyperdivergent skeletal pattern. The Z-angle indicated a concave profile with a retrusive upper lip. Both the maxillary and the mandibular incisors were retroclined (Fig 4, Table).

TREATMENT OBJECTIVES

The treatment objectives were to correct (1) the midface anteroposterior deficiency, (2) the maxillary yaw deviation to the right, (3) the skeletal Class III relationship and improve the facial profile, and (4) the Class III molar relationship and the anterior crossbite.

TREATMENT ALTERNATIVES

Based on those objectives, 2 treatment options were suggested.

1. Combined orthodontic and surgical treatment that included maxillary advancement with posterior impaction and mandibular setback.
2. Combined orthodontic and distraction osteogenesis treatment with orthognathic surgery. The maxillary advancement would be performed with DO followed