CASE REPORT

Treatment of Posterior Open Bite Using Distraction Osteogenesis

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Recent advances in orthognathic surgery have made it possible to treat even extreme cases of malocclusion with a combined surgical-orthodontic approach.[1-3] In particular, vertical distraction, introduced by McCarthy and colleagues, has been found to be an effective method of osteogenesis for developing alveolar bone.[4,5] The development of mini-distraction appliances, which are easily tolerated by patients, has made distraction osteogenesis an increasingly common procedure.[6,7]

The classic indications for distraction osteogenesis are local atrophy of the alveolar bone or partial osseous defects due to trauma or early loss of teeth. Another indication is an extreme posterior open bite, due to a pronounced reverse curve of Spee, that cannot be treated by conservative orthodontics alone.

The new bone produced by distraction provides solid anchorage for implants and thus can be a distinct advantage in subsequent prosthodontic treatment. Other advantages of distraction osteogenesis are[5,8-11]:

- Simple, reproducible surgical technique
- No need for bone transplantation
- Minimal risk of infection, since vital bone is distracted
- Simultaneous bone- and soft-tissue distraction, with less risk of dehiscence
- Less resorption
- Less overall morbidity

In contrast, the segmental osteotomy described by Schuchardt has several drawbacks:

- More mobilization of the periosteum, resulting in less blood circulation in the bone and a greater risk of resorption
- Greater risk of infection and bleeding
- Difficult soft-tissue coverage

The following case shows how a posterior open bite can be treated with orthodontics and distraction osteogenesis.

Diagnosis and Treatment Plan

A 21-year-old female patient presented with a hypodivergency, an extreme posterior open bite—with only the upper left

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Fig. 1 21-year-old female patient with extreme posterior open bite before treatment.

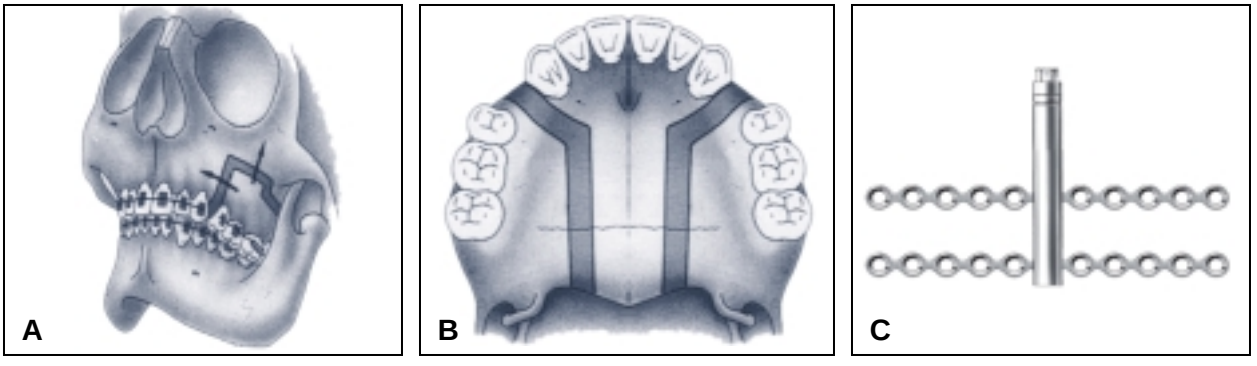

Fig. 2 A. Maxillary segmental osteotomy. B. Anterior segment advanced with modified Le Fort I osteotomy. C. Distraction appliance.*

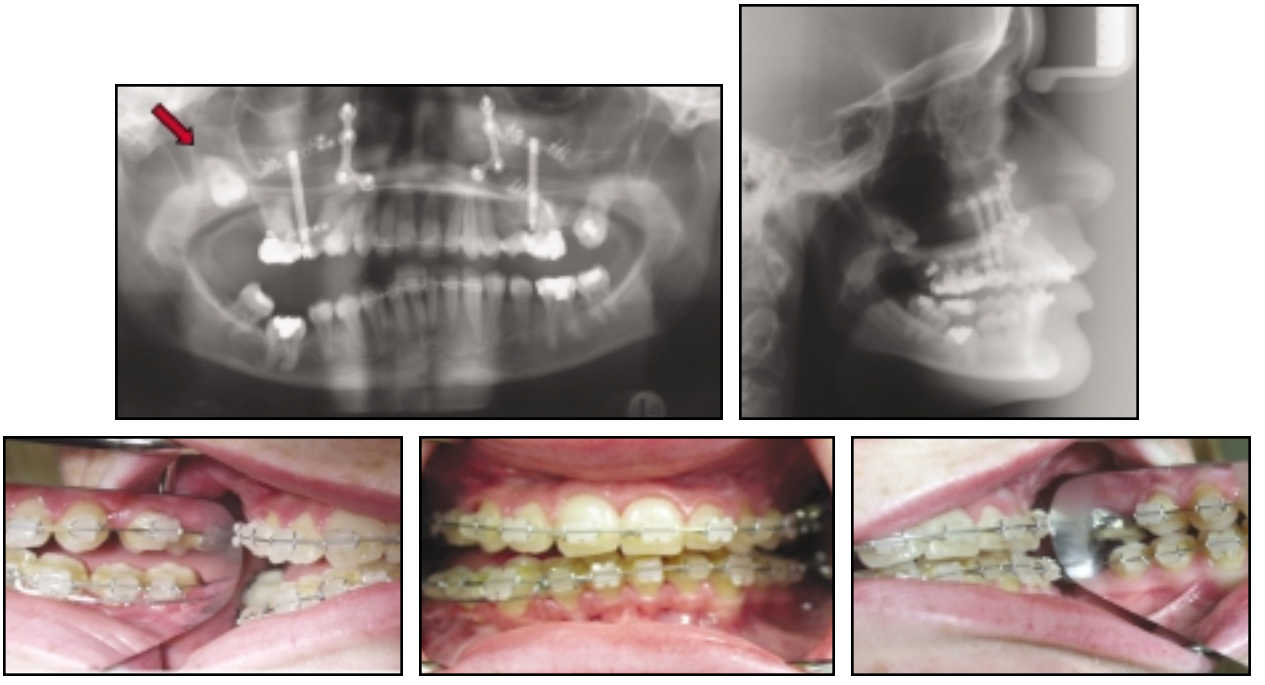

Fig. 3 After seven weeks of distraction. Ankylosed upper right third molar (arrow) was not mobilized.

central incisor making occlusal contact—and a Class III occlusion due to maxillary retrognathism (Fig. 1). All four first molars had been lost earlier, and the upper third molars and lower right second molar were partially impacted. All the teeth had extremely short roots.

The patient's chief complaints were typical of open-bite cases:

- Masticatory dysfunction
- Abnormal swallowing, with the tongue pressed between the teeth
- TMJ symptoms

She also had the following problems caused by the maxillary deficiency:

- Obstructed nasal breathing
- Tongue habit
- Unesthetic midface deficiency

Surgical treatment was elected to improve both function and esthetics. The presurgical orthodontic objective was to level the curve of Spee and form congruent dental arches with properly inclined anterior teeth, using full fixed appliances. Two weeks before the scheduled surgery, a model surgery was performed with an articulator, and splints were made.

Surgical Procedures

To correct the sagittal maxillary deficiency, the maxilla was surgically advanced in the Le Fort I plane. A segmental osteotomy was performed in the same session, and distraction appliances* (15mm long on the right side, 12mm on the left) were inserted for treatment of the vertical problem (Fig. 2).

During seven weeks of distraction, the upper posterior segments moved caudally. The ankylosed upper right third molar, which was not mobilized, remained stable (Fig. 3).

After distraction, another surgical intervention was needed to position the mandible in a Class I occlusion and to correct the skeletal vertical and midline discrepancies. The originally planned vertical distraction of the mandibular alveolar bone was not performed due to an unfavorable anatomy and the dan-

*Track 1.5 System, Gebruder Martin GmbH & Co., Tuttlingen, Germany; distributed by KLS Martin, 11239-1 St. Johns Industrial Parkway, Jacksonville, FL 32246; www.klsmartin.com.

Fig. 4 Patient after two years of treatment.

ger of damaging the nervus alveolaris inferior. Crowns were placed on the premolars and molars for correction of the remaining posterior open bite.

Results

After 24 months of total treatment (Fig. 4), the patient showed an obvious functional and esthetic improvement, with:

- Stable Class I occlusion
- Enhanced nasal breathing
- Reduced tongue thrust
- More harmonious facial profile
- Fuller upper lip

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