

Orthognathic Surgery Using Three-piece Segmental Maxillary Osteotomy to Correct Severe Facial Asymmetry: A Case Report

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• Abstract

This case report presents a case that underwent three-piece segmental maxillary osteotomy and sagittal split ramus osteotomy on a patient with severe facial asymmetry accompanied by maxillary prognathism, severe left scissor bite, and chin point deviation. The resulting facial appearance and occlusion were improved, thereby three-piece segmental maxillary osteotomy is regarded effective method in treating severe facial asymmetry.

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Introduction

Although numerous reports have presented as to the correction techniques for dealing with dentofacial deformities, establishing a treatment plan and performing orthognathic surgery for severe facial

asymmetry or severe jaw protrusion remain very difficult. In numerous cases, LeFort I osteotomy or sagittal split osteotomy was used to treat facial asymmetry or jaw protrusion. Note, however, that facial asymmetry caused by severe arch discrepancy cannot be corrected by LeFort I osteotomy alone. On

the other hand, sagittal split osteotomy alone is contraindicated in cases of mandibular protrusion accompanying severe anterior open bite or cases requiring more than 15 mm of mandibular set-back Surgically, the maxilla can be segmented into two ~ four pieces¹⁾; the indications for such segmental maxillary osteotomies are to expand the arches to deal with the horizontal discrepancy between the arches, arrange the occlusal plane in vertical steps, and close the space in the maxillary arch (Fig. 1).

We report the case of a patient with severe facial asymmetry accompanying maxillary protrusion, severe scissor bite in the left molar area, and deviation of the chin point using bimaxillary surgery involving three-piece segmental maxillary osteotomy and sagittal split osteotomy. The case is presented together with a review of literature.

Case report

The patient was a 23-year-old woman who had a history of vascular anastomosis for the Moyamoya disease contracted 3 years earlier; she was taking aspirin at the time. No problems that contraindicated corrective surgery were

observed. She visited our hospital with chief complaints of maxillary protrusion and facial asymmetry. Before the surgery, she had been treated at the Department of Orthodontics of our hospital but was referred to our department for corrective jaw surgery.

The patient's face was severely asymmetric with the maxilla protrusion and a convex shape. Severe scissor bite in the left molar area and class II malocclusion of the right molars were observed. The midline of the maxillary teeth was displaced to the left by 1 mm, the midline of the lower teeth was moved to the right by 10 mm, and the point of the chin was displaced to the right by 6 mm. In addition, a 9mm overjet and a 2mm overbite were observed (Fig. 2).

Diagnostic summary

1. Maxillary prognathism
2. Convex facial profile
3. Molar relationships : severe left scissor bite, right Class II molar relationship
4. Upper dental midline : 1 mm shift to the left
5. Lower dental midline : 10 mm shift to the right

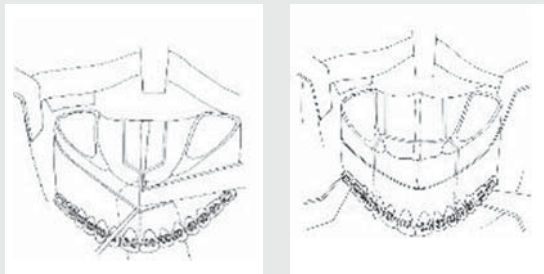


Fig. 1. Segmenting the maxilla. (a) Two-piece segmental osteotomy. (b) Three-piece segmental osteotomy.

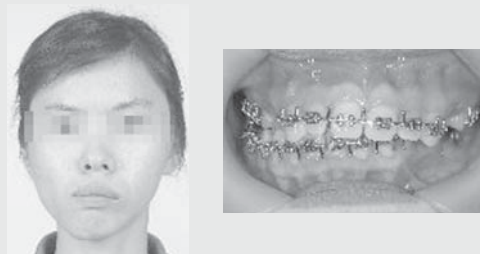


Fig. 2. Preoperative extraoral and intraoral view.



Fig. 3. Preoperative surgical model (RP model).

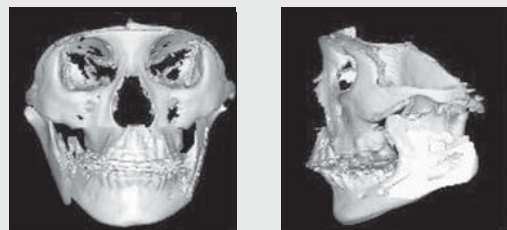


Fig. 4. SimPlant® software.

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Fig. 5. Three-piece segmental osteotomy.

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6. Chin point deviation : 6 mm shift to the right
7. Overjet : 9 mm; Overbite : 2 mm
8. No occlusal canting
9. Mouth opening : 40 mm
10. Upper incisor exposure : 5 mm at rest
11. Left temporomandibular joint clicking sound

To establish a surgical plan, we measured the radiological images of the head and used Rapid Prototype (RP) model preparation, model surgery, and SimPlant[®] software (Materialise NV, Leuven, Belgium). We planned to correct the maxillary protrusion and occlusal plane using LeFort I osteotomy by relocating the depression and three segments separately. In addition, we planned to correct the mandibular occlusion and chin point using sagittal split osteotomy and to use genioplasty with Medpor[®] (Porex Surgical, Inc., College Park, GA) to improve the facial feature (Figs. 3, 4). We performed bilateral jaw surgery. After LeFort I osteotomy was applied, the right side was shifted upward by 3 mm, and the left side, by 4.5 mm. Among the three

segments, the anterior segment was shifted 6 mm posteriorly, the right segment, toward the center by 5.5 mm, and the left segment, toward the center by 4.5 mm. These were fixed using a metallic plate and an occlusal splint (Fig. 5). The splint was removed, and sagittal split osteotomy was applied to obtain posterior setback (right : 3.5 mm; left : 11.5 mm), which was fixed using a metallic plate. Finally, we performed augmentation genioplasty using the 5-mm slim-type Medipore[®]. Intermaxillary fixation was applied for 3 weeks (Fig. 6).

Postoperatively, we observed a normal pattern with no special problems. With regard to the occlusion, we obtained a Class I molar relationship. Her periodontal health was good, with the teeth remaining viable in all segments. Most importantly, from an aesthetic perspective, her facial feature and occlusion were improved (Fig. 7). Comparing the presurgical and postsurgical skull PA view, we noted an improvement in the relationship of the teeth and skeleton and a change in the location of the point of the chin (Fig. 8).



Fig. 6. Orthopantomogram after 3 weeks (postoperative).



Fig. 7. Postoperative view of the face and intraoral view.

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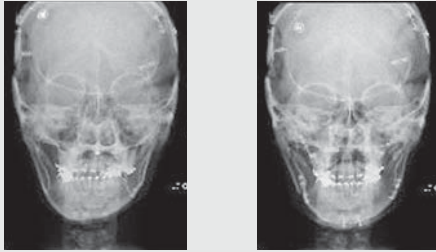


Fig. 8. Preoperative (a) and postoperative (b) skull PA.

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Discussion

LeFort I osteotomy and sagittal split ramus osteotomy are the most common methods for dentofacial correction²⁾. Note, however, that severe facial asymmetry or severe jaw protrusion cannot be corrected using one such method alone.

With the improvement in surgical techniques, and to obtain

better results than those from performing surgery on the mandible alone as was done in the past, surgery on both jaws is now considered^{3,4)}. Lines and Steinhauser⁵⁾, Lew et al⁶⁾, and Nadkarni⁷⁾ reported a change in the soft tissues between the incisal teeth following segmental osteotomy and recommended a technique to minimize complications and prevent recurrence after surgery for jaw protrusion⁸⁾. The maxilla was segmented into three pieces, which had no effect on the viability of the teeth⁹⁾. For the ultimate improvement in facial feature, augmentation using synthetic materials is also very simple and effective.

Many factors should be taken into account when considering surgery to correct severe facial asymmetry accompanying severe malocclusion, and relatively complex techniques are required. In this case, three-piece segmental maxillary osteotomy proved to be very effective. To treat such patients, careful surgical planning is extremely important; The model surgery and simulation software as SimPlant[®] may also be helpful. In addition, close cooperation between orthodontists and oral and maxillofacial surgeons is expected to contribute greatly to an excellent surgery outcome.

References

1. Brooks BW, Buschang PH, Bates JD, Adams TB, English JD. Predicting upper lip response to 4-piece maxillary LeFort I osteotomy. *Am J Orthod Dentofacial Orthop.* 2001; 120 : 124-133.
2. Kwon TG, Mori Y, Minami K, Lee SH, Sakuda M. Stability of simultaneous maxillary and mandibular osteotomy for treatment of class III malocclusion : an analysis of three-dimensional cephalograms. *J Craniomaxillofac Surg.* 2000; 28 : 272-277.
3. Proffit WR, Phillips C, Turvey TA. Stability after surgical-orthodontic corrective of skeletal Class III malocclusion. 3. Combined maxillary and mandibular procedures. *Int J Adult Orthodon Orthognath Surg.* 1991; 6 : 211-225.
4. Takahashi S, Tsuruki T, Obwegeser II method for correction of mandibular prognathism. Case reports. *J Maxillofac Surg.* 1980; 8 : 288-293.
5. Lines PA, Steinhauser EW. Diagnosis and treatment planning in surgical orthodontic therapy. *Am J Orthod.* 1974; 66 : 378-397.
6. Lew KK, Loh FC, Yeo JF, Loh HS. Profile changes following anterior subapical osteotomy in Chinese adults with bimaxillary protrusion. *Int J Adult Orthodon Orthognath Surg.* 1989; 4 : 189-196.
7. Nadkarni PG. Soft tissue profile changes associated with orthognathic surgery for bimaxillary protrusion. *J Oral Maxillofac Surg.* 1986; 44 : 851-854.
8. Park JU, Hwang YS. Evaluation of the soft and hard tissue changes after anterior segmental osteotomy on the maxilla and mandible. *J Oral Maxillofac Surg.* 2008; 66 : 98-103.
9. Ogasawara T, Kitagawa Y, Ogawa T, Yamada T, Nakamura M, Sano K. Treatment of severe mandibular prognathism in combination with maxillary hypoplasia : case report. *J Craniomaxillofac Surg.* 2002; 30 : 226-229.