

Midline Mandibular Osteotomy in an Asymmetric Patient

M. L. Anghinoni^a; A. S. Magri^b; A. Di Blasio^c; L. Toma^d; E. Sesenna^e

ABSTRACT

This case report shows the possibility of the application of a mandibular osteotomy to resolve mandibular asymmetry with independent and discordant movements of both bony segments. The authors report the case of a 25-year-old woman referred for mandibular asymmetry, with a transverse excess of the right hemi mandible and vertical defect of the left one. The patient underwent a bilateral sagittal split osteotomy, midline osteotomy, and genioplasty, which corrected the mandibular asymmetry with contraction of the entire right hemi mandible. A slight left vertical increase was also obtained through the surgically created lateral open bite. In the follow-up assessment, the patient's face appeared symmetrical with normalization of the bizygomatic-bigonial relationships, and the facial shape corresponded to ideal anthropometric features. This technique resulted in resolution of mandibular asymmetry. In addition, mandibular osteotomy permits the esthetic management of the shape of the entire mandibular body in relation to the other third of the face. (*Angle Orthod.* 2009;79:1008–1014.)

KEY WORDS: Mandibular asymmetry; Midline osteotomy; Dentofacial deformities

INTRODUCTION

The treatment of dentofacial deformities usually involves correcting the skeletal relationship between the maxilla and mandible without changing the transverse dimension of the mandibular arch. When a transverse discrepancy exists, it may be relative or absolute. A relative problem with the transverse diameter of the dental arches is a sagittal problem that can be corrected by repositioning the affected occlusion in a Class I relationship.^{1,2} When the discrepancy is absolute, a posterior unilateral or bilateral crossbite persists after sagittal model surgery, and modification of the transverse maxillary or mandibular arch is indicated.¹

Historically, the correction of transverse dishar-

nies involved altering the maxillary arch using dento-alveolar expansion of the maxilla, maxillary orthopedic expansion, surgically assisted expansion, or 2-3-4 piece Le Fort I expansion.³ When the problem involves the mandible, not the maxilla, it is possible to correct the transverse discrepancy with mandibular surgery.⁴

Surgical mandibular constriction using the mandibular symphysis osteotomy technique has been reported since the early 1960s.^{5–11} More recently, Brusati et al¹ provided details on a surgical technique involving midline mandibular osteotomy/osteotomy combined with sagittal split osteotomy of the mandibular ramus to allow for systematic control of the inferior third of the face. Alexander et al³ were the first to describe the stabilization of mandibular midline osteotomy with rigid internal fixation. Recently, Anghinoni et al² emphasized the esthetic indications for these procedures in the correction of transverse facial disharmony.

Mandibular constriction has the advantage that surgery is limited to one jaw in selected cases,³ which significantly reduces patient morbidity.¹² The limit of constriction is approximately 10 mm, without periodontal or temporomandibular joint function contraindications.⁴ This procedure also has excellent long-term stability.¹²

CASE REPORT

A 25-year-old woman was referred for mandibular asymmetry, with transverse excess of the right hemi

^a Chief Assistant, Maxillo-Facial Surgery Operative Unit, Head and Neck Department, University of Parma, Parma, Italy.

^b Resident, Maxillo-Facial Surgery Operative Unit, Head and Neck Department, University of Parma, Parma, Italy.

^c Full Professor, Operative Unit of Orthodontics, Head and Neck Department, University of Parma, Parma, Italy

^d Resident, Maxillo-Facial Surgery Operative Unit, Head and Neck Department, University of Parma, Parma, Italy.

^e Full Professor, Chief, Maxillo-Facial Surgery Operative Unit, Head and Neck Department, University of Parma, Parma, Italy.

Corresponding author: Dr A. S. Magri, Hospital of Parma, Head and Neck Department, via Gramsci, Via Abbeveratoia Parma, Parma, 43100 Italy
(e-mail: alicesaramagri@libero.it)

Accepted: December 2008. Submitted: October 2008.

© 2009 by The EH Angle Education and Research Foundation, Inc.



Figure 1. Pretreatment facial photographs and radiograph.

mandible and a nearly correct position of the left one. An esthetic analysis of the patient in the frontal view showed a square shape to the right side of the face, with the angle between the zygoma-gonion line and the vertical line near 0° (N.V. 7°). The left hemi face had a normal triangular shape, with a good zygomatic-gonial relationship, despite a slight vertical deficiency of the mandibular angle. The absolute biangular ex-

cess was most obvious in the submental view, with the right mandibular angle more lateral than the left (Figure 1).

The upper jaw was in a normal anteroposterior position, but with a mild vertical deficiency on the left. The occlusion was essentially normal Class I, with dental axial compensation of the mandibular transversal excess on the right (Figure 2).



Figure 2. Pretreatment intraoral photographs.



Figure 3. Cross elastics and torque control with a rectangular wire to create presurgical crossbite.

Our esthetic goal was to correct the transverse hemi mandibular excess on the right and the mild vertical deficiency on the left. To obtain these surgical results, the dental arches had to undergo presurgical orthodontic treatment.

Apart from leveling and aligning the teeth, the orthodontist had two specific goals. The first was to create a presurgical crossbite on the right to allow the surgical contraction of the right hemi mandible. Then, the orthodontist needed to correct the postsurgical open bite on the left side of the occlusion by maxillary teeth extrusion, thus achieving orthodontic leveling of the maxilla. The presurgical goal was obtained using asymmetrical orthodontic mechanics involving both torque control with a rectangular 0.016 × 0.022" Cr-Co wire and cross intermaxillary elastics on the right side (Figure 3).

To avoid possible damage during midline mandibular osteotomy, the orthodontist was also required to separate the roots of the lower incisors, which was performed by mild preinclination of the brackets on the lower central incisor (Figure 4).

An important challenge in this case was to obtain the correct angular symmetry in the transverse plane. Therefore, after orthodontic treatment, two different surgical splints were created. Consequently, two lower dental casts were prepared: one with a 5-mm contraction and the other with a 7-mm contraction. The two splints were different in contraction value because, from an esthetic point of view, it was difficult to decide between 5 and 7 mm of contraction in the presurgical phase (Figure 5). Both of these two contraction values were suitable for the correction of the transverse canine relationship, simplifying the postsurgical phase for the orthodontist (Figure 6).

In this way, the surgeons could decide the amount of linear contraction during surgery simply by looking

at the esthetic result obtained with the different splints. If necessary, the surgeon could also add a rotational component to the contraction of the hemi mandible, modifying the final esthetic result.

The patient underwent a bilateral sagittal split osteotomy (BSSO), midline osteotomy, and genioplasty, which corrected the mandibular asymmetry with contraction of the entire right hemi mandible using the 7-mm splint. A slight left vertical increase was also obtained through the surgically created lateral open bite (Figures 7 and 8).

Postoperatively, the orthodontist corrected the surgically created left open bite, ground out the surgical splint on the maxillary side, and used vertical elastics. The lower arch was stabilized with a rigid full-sized ss wire to prevent extrusion, and the maxillary teeth were left free from the orthodontic arch during extrusion (Figure 9).

The final occlusal result is shown in Figure 10. At



Figure 4. Preinclination of the lower central brackets to separate roots of the lower incisor.

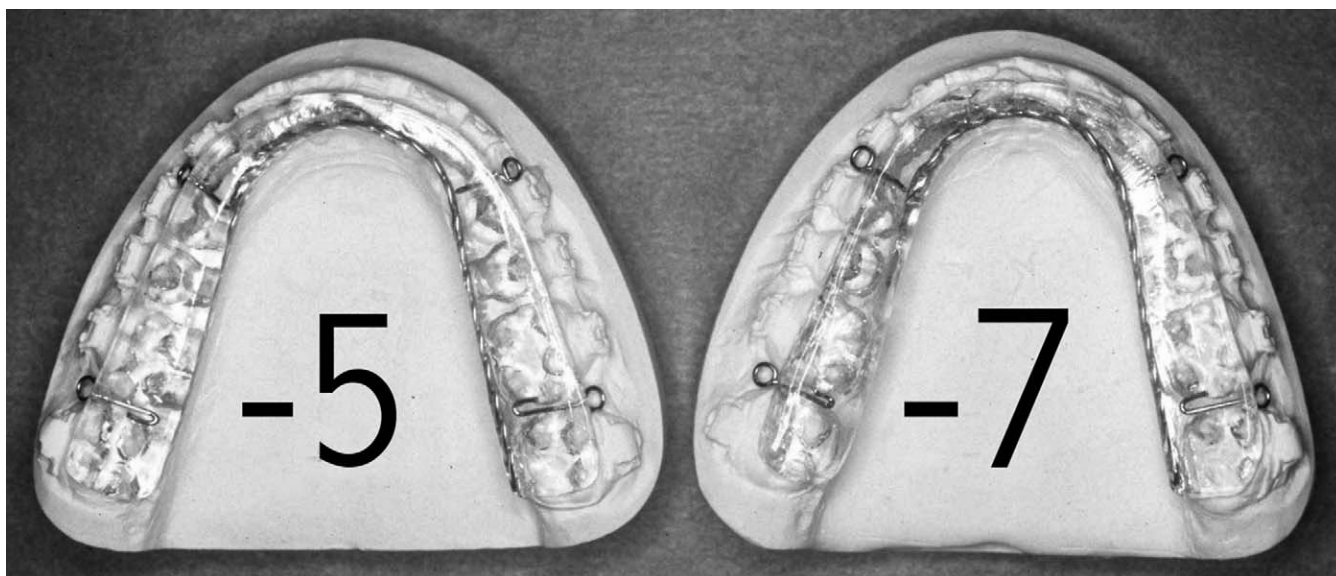


Figure 5. Left, 5-mm contraction splint; right, 7-mm contraction splint.

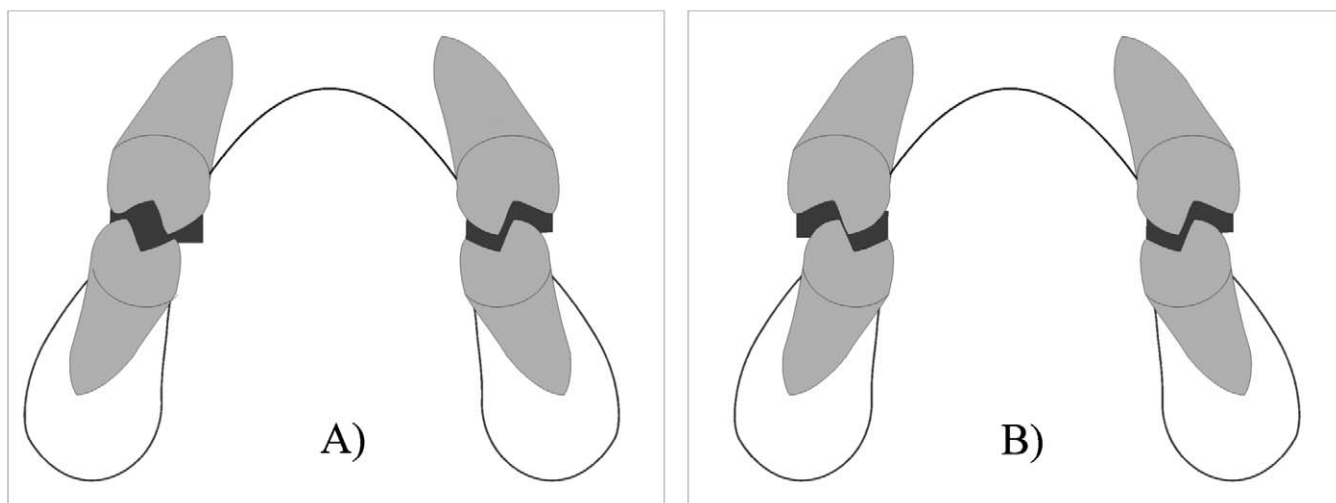


Figure 6. Both linear contractions were compatible with the future occlusion because the main cusps of the lower molar are in a correct relation with the opposite teeth in both the situations. (A) 5-mm contraction; (B) 7-mm contraction.



Figure 7. Immediate presurgical intraoral occlusal status.



Figure 8. Immediate postsurgical intraoral occlusal status.

the 4-year follow-up, the patient's face appeared symmetrical with normalization of the bizygomatic bigonial relationships, and her facial shape corresponded to the ideal anthropometric features (Figure 11).

DISCUSSION

Various authors have used mandibular midline osteotomy to treat mandibular excess.^{6,8,9} Obwegeser¹³ popularized mandibular midline osteotomy/ostectomy in combination with other osteotomies of the anterior mandible to correct various types of malocclusion. Bell et al¹⁰ and Jacobs et al¹⁴ described a midline osteotomy combined with a BSSO to reduce the transverse dimension, in association with mandibular setback or advancement. More recently, Brusati et al¹ recommended this procedure for systematic control of the lower third of the face, which is esthetically advantageous when mandibular advancement would otherwise produce an excessively square face. Bloomquist¹² reported using mandibular midline osteotomy in two clinical situations: (1) in patients with mandibular retrognathia who developed a transverse discrepancy with mandibular advancement and (2) in patients with a slightly constricted maxillary arch requiring a mandibular osteotomy.

A mandibular midline osteotomy/ostectomy associated with a BSSO is a useful surgical technique when dealing with transverse maxillo-mandibular discrepancies.^{1,2} These two techniques modify the esthetic and orthodontic parameters in different ways, based on the requirements suggested in the surgical plan.² A midline osteotomy is advisable if a major contraction is necessary in the molar and angular areas. A midline osteotomy is generally indicated when there are ortho-

dontic problems such as diastemata, tooth size disharmony, indications for mandibular incisor removal, or supernumerary incisors. With this technique, the intercanine diameter is always decreased, whereas the intermolar contraction can be modulated according to the occlusal and esthetic indications.

The wedge midline osteotomy² permits the esthetic management of the transverse diameter of the mandibular angles and the shape of the entire mandibular body due to surgical torsion of the two hemi mandibles. The dental arch diameter can be reduced posteriorly only or maintained according to the occlusal requirements.²

Nevertheless, we wish to emphasize that maxillary surgery (Le Fort I segmental osteotomy or surgically assisted expansion) is necessary in all cases of transverse maxillary contraction. In fact, the systematic use of midline mandibular osteotomy in a transverse occlusal discrepancy could result in (1) an undesirable smile because of persistent excessive dentolabial posterior space (lateral corridors) or (2) an undesirable decrease in the intergonial diameter with facial disharmony.¹⁵ For these reasons, we think that a mandibular midline osteotomy/ostectomy is indicated when the transverse discrepancy between the superior and inferior dental arches is in accord with actual excessive mandibular width.

Several authors have described the use of these techniques when the transverse excess involves both hemi mandibles symmetrically, allowing equal and symmetrical movement after the midline mandibular osteotomy and BSSO.^{1,4-12} In patients with mandibular asymmetry, it is possible to perform this technique while moving the two hemi mandibles independently.

Our patient had mandibular asymmetry resulting from an excess of transverse diameter on the right side, with a square hemi face. Moreover, we observed a slight vertical defect of the left angle corresponding to the vertical asymmetry of the maxillary occlusal plane with the correct transverse dimension of this hemi mandible.

After appropriate presurgical orthodontic treatment, the patient underwent a BSSO and midline osteotomy to contract the right side only while simultaneously cre-



Figure 9. Leveling the maxillary occlusal plane.



Figure 10. Posttreatment intraoral photographs.

ating a lateral left open bite to correct the vertical asymmetry. This was associated with an advancement genioplasty.

The splitting of the mandibular arch into two free segments allowed us to contract the right hemi arch while decreasing the transverse diameter. On the left side, we made the height of the angle symmetrical,

creating a lateral open bite maintained with an intra-surgical splint, which was subsequently corrected through balanced dental extrusion (Figure 12). Our esthetic goal was achieved in terms of transverse symmetry of the mandible, reducing the absolute biangular size with a unilateral contraction, and providing better support to the soft tissues on the left side.

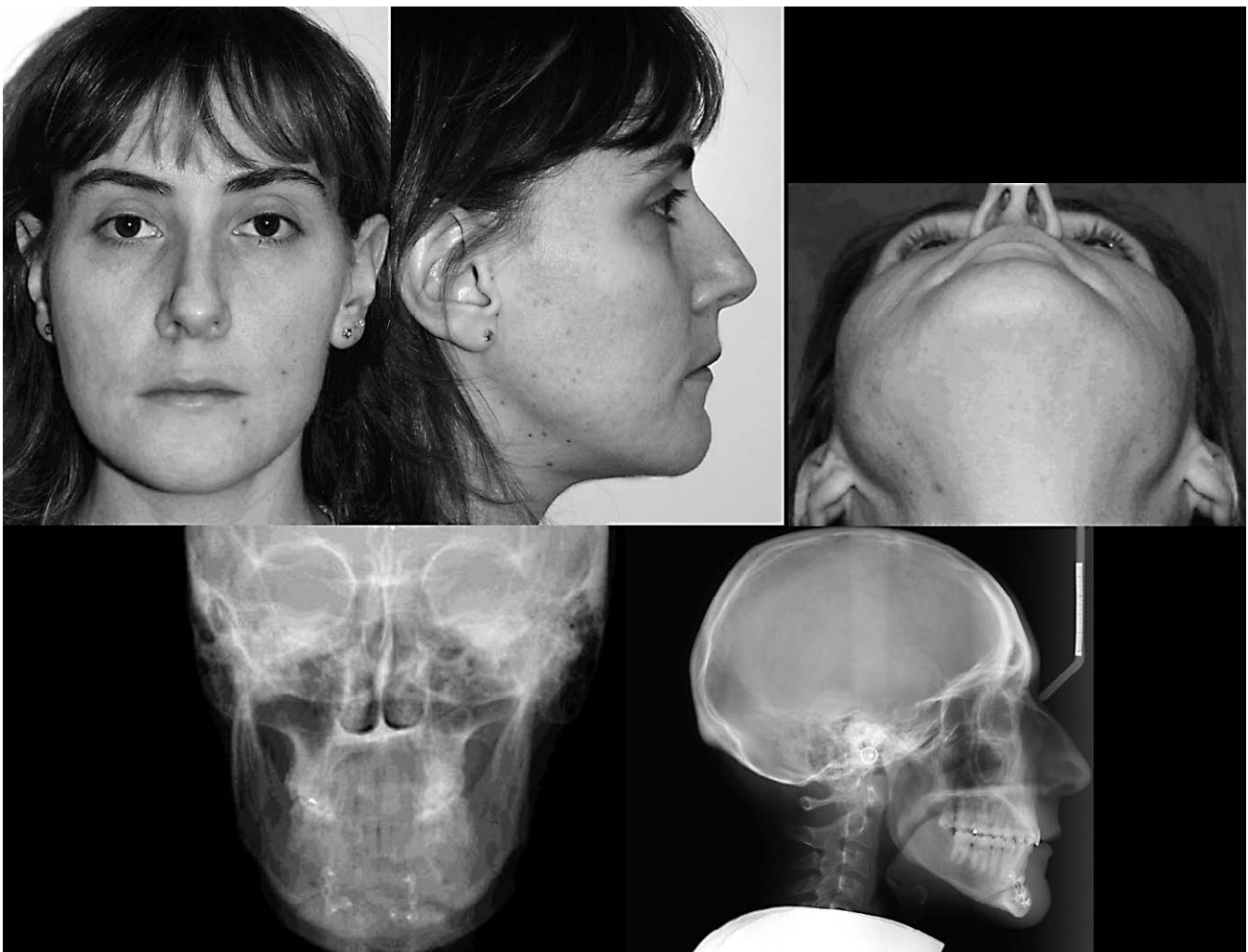


Figure 11. Posttreatment facial photographs and radiograph.



Figure 12. Different movement of two hemi mandible. Left: transversal contraction of the right hemi mandible. Right: vertical inferior repositioning of the left hemi mandible.

At the 4-year follow-up, we observed no periodontal problems in the midline osteotomy site (gingival attachment and osseous interincisal lining) and no specific physiological or subjective changes in the temporomandibular joints.¹² The patient's face appeared symmetrical with normalization of the bizygomatic bigonial relationships and a facial shape corresponding to the ideal anthropometric features. These observations demonstrate the esthetic potential of this type of surgery.

Mandibular contraction midline osteotomy has esthetic value and is required in cases in which it is necessary to correct disharmony of the face and to alter the occlusion. Traditionally, the literature reports the resolution of asymmetrical dentofacial deformities through bimaxillary osteotomy and discrepancies between maxillo-mandibular dental arches with maxillary expansion. More recently, several authors have proposed the use of midline mandibular osteotomy with only symmetrical movement of a hemi mandible to correct dental transverse discrepancies without emphasizing the esthetic implications. In our case, and based on the strength of the clinic-esthetic evaluation, we applied a different surgical strategy.

CONCLUSIONS

- Asymmetry resolution was obtained through a mono-maxillary osteotomy.
- In particular, the midline mandibular osteotomy with

BSSO allowed totally discordant movements of both bone segments, following different vectors.

- This case report shows the possibility of application of this technique in the treatment of mandibular asymmetry.

REFERENCES

1. Brusati R, Sesenna E, Mannucci N, Gamoletti R. The midline mandibular osteotomy-osteotomy in the correction of dentofacial deformities. *Int J Adult Orthod Orthognath Surg*. 1987;2:37–50.
2. Anghinoni ML, Di Blasio A, Sesenna E. La gestione del diametro trasversale della mandibola. Implicazioni estetiche e occlusali. *Mondo Ortodontico*. 2006;4:247–262.
3. Alexander C, Bloomquist D, Wallen T. Stability of mandibular constriction with symphyseal osteotomy. *Am J Orthod Dentofacial Orthop*. 1993;103:15–23.
4. Joondeph D, Bloomquist D. Mandibular midline osteotomy for constriction. *Am J Orthod Dentofacial Orthop*. 2004;126:268–270.
5. Trauner R. Kinvergroberung und Kinverkleinerung. *Fortsich Kieferorthop*. 1952;13(2):80–90.
6. Plumpton S. Surgical correction of unilateral mandibular prognathism by intra-oral osteotomy of the symphysis. *Br J Plast Surg*. 1967;33:386–389.
7. Sowray JH, Haskell R. Osteotomy of the mandibular symphysis. *Br J Oral Surg*. 1967;5:97–102.
8. O'Driscoll PM. Osteotomy at the midline of the mandible. *Br J Plast Surg*. 1971;24:71–77.
9. MacDonald GB, Choukas NC, Skuble DF. Treatment of minimal prognathism by midline mandibular osteotomy. *J Oral Surg*. 1975;33:386–389.
10. Bell WH, Proffitt WR, White RP. *Surgical Correction of Dentofacial Deformities*. Philadelphia, Pa: WB Saunders; 1980.
11. Dufetelle JD. Osteotomie mediane de la mandible. *Rev Stomatol Chir Maxillofac*. 1983;84:50–53.
12. Bloomquist D. Mandibular narrowing: advantage in transverse problems. *J Oral Maxillofac Surg*. 2004;62:365–368.
13. Obwegeser H. Die Bewegung des unteren Alveolarfortsatzes zur korrektur von Kieferstellungsanomalien. *Deutsch Zahnarztl Z*. 1969;24:5–15.
14. Jacobs JD, Bell WH, Williams CE, Kennedy JW III. Control of the transverse dimension with surgery and orthodontics. *Am J Orthod*. 1980;77:284–306.
15. Anghinoni ML, Di Blasio A, Strozzi F, Sesenna E. Lo zigomo nel riequilibrio dell'armonia faciale. *Mondo Ortodontico*. 2004;4:289–299.