CASE REPORT

Surgical Management of Laterognathia in Orthofacial Surgery

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Abstract

Introduction Each year around the world, various surgical procedures are carried out with the goal of correcting laterognathia; both the intraoral vertical ramus osteotomy (IVRO) and bilateral sagittal split ramus osteotomy (OSB) have been the most used techniques in mandibular surgery. These techniques have advantages and disadvantages; for example the advantages of the OSB include: increased coefficient of friction between bony segments, for both the forward and the reposition, as well as decrease in the time of intermaxillary fixation (IMF). Disadvantages include injury to the inferior alveolar nerve (IAN), hemorrhage, bad split, among others. The advantages of IVRO include decrease of possibility of injury to the IAN, ease of implementation of the technique, a lower incidence of hemorrhage and the short duration of the surgical procedure. Their disadvantages include: lower coefficient of friction between bony segments, requires a relatively long period of IMF. The combination between the techniques of mandibular osteotomy for the correction of minor 10 mm laterognathia is the ideal treatment, since it avoids potential recurrence.

Materials and methods We describe two cases of patients with laterognathia greater than 6 mm associated with maxilla deformity, which were treated with combined osteotomies. At Maxillofacial Surgery Service, Specialty

Hospital, National Medical Center XXI Century, we describe the advantages and disadvantages, pre and post-operative nosocomial, by comparing them with the reports of the literature.

Conclusion The combination of techniques in the correction of laterognathias greater than 4 mm (smaller than 10 mm) is the ideal treatment, eliminating problems of articular compression, recurrence and damage to the alveolar nerve.

Keywords Laterognathia · OSVI · OSB

Review of the Literature

Being attractive has become a cause for concern during childhood and adolescence, as there is a huge influence of the media that has entered our lives to give us a standard imposed on them of what “should be” attraction, giving us perceptions of health, beauty and vigor combined with concepts of intelligence, wealth, success and happiness. This makes the people become more careful with aesthetic aspect because, consciously or unconsciously, they know that the image given to the rest of the society has an impact directly proportional to its own social contribution [1].

Beauty is the quality of a person, object, place or idea that provides a perceptual experience of pleasure, affirmation, or welfare [2].

The oldest theory of beauty can be found in the work of the Greeks of the pre-Socratic period. Pythagoras found a strong connection between mathematics and beauty, noticed that the objects that had a perfect proportion were more appealing. Ancient Greek architecture is based on this definition of symmetry and proportion [3–5].

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Modern research suggests that people who have facial characteristics of symmetry and proportion are more attractive [5–8].

Orthofacial surgery, although serves to correct the functional, skeletal and dental discrepancies must be based on achieving the best aesthetic results for the patient. The levels of patient expectations for a perfect result have increased. We have to take fully into account the facial skeleton as described by Obwegeser “The profile is not the only objective. The correct function, occlusion and facial symmetry are very important” (Obwegeser and Luder 2000) [9–13].

Over the decades there have been significant advances in orthofacial surgery to improve the aesthetic and functional results of people with dentofacial deformities. The aesthetic is an important part for the success in the dental and facial reconstruction. The clinician must be able to incorporate the facial and dental evaluation. The evaluation begins with the soft tissues of the face and skeleton, followed by an intraoral evaluation and the relationship of the teeth with the lips [4, 11, 14].

The first orthognathic surgery was carried out in 1846 by Hullihen, however, the methods and techniques have evolved over the decades.

The OSB was first introduced by Schuchardt in 1942. Later in 1957 published with the modification of Trauner and Obwegeser, becoming more versatile. In 1959, with the modification of Dal Pont it became a procedure with greater application, designed to minimize morbidity and maximize stability. Bilateral Sagittal Split Osteotomy has held different modifications to enlist: Hunsuck (1968), Epker (1977), Wolford (1987), Markiewicz and Margarone in 2008, who introduced a new retractor to optimize the osteotomy. In 2009 an endoscopic technique to decrease the degree of trauma was submitted by Mommaerts [3, 5–7, 15].

The IVRO remains a surgical procedure to treat existing jaw deformities. The intraoral approach was introduced by Moose and Winnstanley in 1968. Herbert in 1970 introduced the osteotomy with an oscillating saw, the use of Bauer separators at the level of the sigmoid notch as well as the Levasseur-Merill retractor in the posterior region of the branch, with the purpose of expanding the visibility of the surgical field. In 1999 a modification of the technique described by Epker and Wolford was used, respective to the approach to IVRO [16–18].

The advantages of IVRO, to mention a few: it is an easy surgical technique and thus there is a considerable reduction in the surgical time, lower incidence of damage to the alveolar nerve, decreases articular damage because it allows the functional condyle repositioning. The disadvantages of this technique is the prolonged intermaxillary fixation in the patient, provides less surface area of contact

between the bony segments and has restricted application, apply to movements of retroposition and laterality (Tables 1, 2, 3).

The advantages of performing the OSB is that it provides an immediate postsurgical mouth opening, a rapid

Table 1 IVRO annual recurrence [3, 5–10, 12, 15–47]

%	MM	Author	Patient
1–28	0.2–0.4	Nyström [37]	40
		Johanson (1979)	112
	1.2	Greebe [41]	41
	0.5	García y Sánchez [35]	110
	0.1–1.0	Lai (2007)	41
	1.3	Chen (2008)	25
	0.5	Ayoub (2008)	10
	0.3	Chen [39]	25
	0.8	Hwi-Dong (2013)	94
	0.3	Kaban (2013)	17
Media	0.5	Total	515

Table 2 IVRO incidence of alveolar nerve damage [3, 11, 21, 34, 41]

Author	Damage (%)
William Bell (1991)	<1
Zaytoun (1986), August (1998), Troulis (2001), Robiony (2007), Resnick (2009)	0–35
Yoshioka (2007)	<1

Table 3 TMJ changes with the IVRO technique [33, 34]

Author	Changes
Bell [33]	Condylar decompression condyle repositioning
Epker [34]	Improvement or elimination of problems of TMJ dysfunction

Table 4 OSB annual recurrence [37, 39, 41, 45, 47]

%	MM	Author	Patient
2–91	2.7	Kobayashi (1986)	44
24–51.4	>2.0	Costa (2001)	312
65	2.5–3.0	Villa (2005)	57
10–70	2.5	Ayoub (2008)	20
55	2.6	Proffit [46]	121
Media	2.5	Total	554

Table 5 OSB incidence of the alveolar nerve damage [3, 11, 21, 34, 41]

Author	Damage (%)
William Bell (1991)	2–85
Zaytoun (1986), August (1998), Troulis (2001), Robiony (2007), Resnick (2009)	09–85
Yoshioka (2007)	>85

Table 6 TMJ changes with the OSB technique [32–34, 43]

Author	Changes
Bell [33]	Condylar chronic compression condylar reabsorption
Epker [34]	Condylar hipomobility
Hoppenreijns (1998)	In 50 Px, 3.3 %
Borstlap (2004)	222 px, 4 %

Fig. 1 **a** Frontal view of the patient, **b** lateral view of the patient showing right laterognathia and labial incompetence **Fig. 2** Orthodontics, pre-treatment

stabilization, greater contact surface bone, allowing movements of retroposition, laterality and mandibular advancement. The disadvantages of the technique include a greater potential for damage to the alveolar nerve, high likelihood of bleeding because of a greater osteotomized area of the coronoid process, you can submit a bad split, there is greater harm to the temporomandibular joint as well as a higher rate of recurrence (Tables 4, 5, 6).

Materials and Methods

We describe two cases of patients of Maxillofacial Surgery Service, Specialty Hospital, National Medical Center XXI Century, Mexico, with laterognathia greater than 6 mm associated with maxilla deformity, who were treated with combined osteotomies. The advantages and disadvantages, pre and postoperative, were studied by comparing them with the reports of the literature.

Fig. 3 Intraoral view: right diversion of the jaw (*blue line*) and maxilla (*yellow line*) of the facial midline (*red line*)

Fig. 6 Radiographic post operative control

Fig. 4 Treatment plan

Fig. 7 **a** Presurgical frontal image and **b** postsurgical view with a proper symmetry

Fig. 5 Mandibular osteotomies with *right OSB* and *left IVRO*

Fig. 8 **a** Presurgical lateral view, **b** postsurgical view showing proper lip competence

Fig. 9 **a** Presurgical occlusion, **b** postsurgical occlusion, 2 years control without relapses

Fig. 10 **a** Vertical excess, right laterognathia, **b** labial incompetence, **c** gummy smile

Fig. 11 Orthodontics pre-treatment

Case Report 1

Female 18 years (Fig. 1) goes for valuation to the service by presenting a large jaw. With orthodontics pre-treatment (Fig. 2), enters our protocol for orthognathic surgery. The necessary clinical Cephalometric and tomographic analysis were performed setting the following diagnostics:

1. Maxillary vertical excess with transversal defect.
2. Laterognathia 7 mm (right deviation) (Fig. 3).
3. 1.5 mm right deviation of the maxilla.

The selected treatment to which she was subjected for the correction of facial asymmetry was: (Fig. 4) left rotation

Fig. 12 Treatment plan

and impaction Le Fort I osteotomy for the correction of the transverse defect, left IVRO (Bell W. technique) and right OSB (Epker technique) for the correction of the laterognathia (Fig. 5).

Intermaxillary fixation was done for 4 weeks. The postop control of the patient shows an adequate measure of stability of the osteotomies (Fig. 6) carrying a postsurgical

Fig. 13 Mandibular osteotomies for the correction of the laterognathia *right OSB and left IVRO*

Fig. 14 a Postop TC *right OSB*, b *left IVRO*

Fig. 15 a Preoperative view, b postoperative view with a proper symmetry

Fig. 16 a Preoperative lateral view, b postoperative view with labial competence

Fig. 17 a Preoperative gummy smile, b correction of the gummy smile

control 2 years without orthodontic treatment without relapse (Figs. 7, 8, 9).

Case 2

Female 21 years who enters protocol of orthognathic surgery by presenting vertical excess, gummy smile, labial incompetence, right laterognathia (Fig. 10a–c) with orthodontics pre-treatment (Fig. 11).

The selected treatment to which she was subjected for the correction of facial asymmetry was: (Fig. 12) impaction Le Fort I osteotomy for the correction of the transverse defect, left IVRO (Bell W. technique) and right OSB (Epker technique) for the correction of the laterognathia (Fig. 13).

Fig. 18 **a** Cross bite right diversion of the jaw, **b** 4 intraoral view 2 years control without relapses

Table 7 Advantages and disadvantages of the techniques

OSB	IVRO
<i>Advantages</i>	
Immediate postsurgical oral opening	Time reduction
Rapid stabilization	Simplified technique
Larger contact surface	Less damage of the alveolar nerve
Retroposition, laterality and forward movements	Less damage of the TMJ
	Condylar repositioning
<i>Disadvantages</i>	
Relapse	Just for retroposition
Bad split	Intermaxillary fixation
More incidence for damage of the alveolar nerve	Less contact surface
More damage for the TMJ	
TMJ resorption bleeding	

Intermaxillary fixation was done for 4 weeks, post operated control of the patient shows an adequate measure of stability of the osteotomies (Fig. 14) carrying a post-surgical control 2 years without orthodontic treatment without relapse (Figs. 15, 16, 17, 18).

Discussion

The report in the literature for the correction of laterognathias is little, using either OSB or IVRO bilaterally. Both techniques with advantages and disadvantages (Table 7).

It is of great importance to the analysis of soft tissues and the correct clinical examination of the patient, to determine the precise diagnosis and type of facial deformity, also the use of cephalometric will only use as a method of diagnostic support and not as standard surgical. Another important point is to achieve an optimal occlusion, and finally mention that the harmony between clinic-facial aesthetics are specific to each patient and they depend on the surgical correction.

Conclusion

The combination of techniques in the correction of laterognathias greater than 4 mm (smaller than 10 mm) is the ideal treatment using the advantages and versatility of

the OSB, and the benefits of the IVRO eliminating problems such as articular compression, recurrence and damage to the alveolar nerve, without relapses.

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