

RESEARCH ARTICLE

ORTHODONTIC-SURGICAL TREATMENT OF CLASS III MALOCCLUSION WITH MANDIBULAR **ASYMMETRY: A CASE REPORT**

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Abstract

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Key words:-Class III Malocclusion, Facial Asymmetry, Orthognathic Surgery

..... Class III skeletal malocclusion may present several etiologies, among which maxillary deficiency is the most frequent. Bone shift may have an unfavorable impact on esthetics, which is frequently aggravated by the presence of accentuated facial asymmetries. This type of malocclusion is usually treated with association of Orthodontics and orthognathic surgery for correction of occlusion and facial esthetics. This report presents the treatment of a patient aged 19 years with Class III skeletal malocclusion, having narrow maxilla, bilateral posterior crossbite, accentuated negative dentoalveolar discrepancy in the mandibulary arch, and maxillary and mandibular midline shift. Clinical examination also revealed maxillary hypoplasia, increased lower one third of the face, concave bone and facial profiles and facial asymmetry with mandibular deviation to the left side. The treatment was performed in three phases: presurgical orthodontic preparation, orthognathic surgery and orthodontic finishing. In reviewing the patient's final records, the major goals set at the beginning of treatment were successfully achieved, providing the patient with adequate masticatory function and pleasant facial esthetics.

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Introduction:-

Class III skeletal malocclusion may result from mandibular prognathism, maxillary retrusion or a combination of both ⁽¹⁾. Maxillary deficiency is more frequent, accounting for 60% to 63% of the causes of this type of malocclusion ⁽²⁾. Maxillary skeletal deficiency can also be associated with deficiency of the middle third of the face, confirmed by the contour of the zygomatic bone, orbital ridge and subpupillary area ⁽³⁾. Reveal a class III with dentoalveolar compensation: a labial version of the maxillary incisors and a lingual version of the mandibular incisors in order to mask the true maxillomandibular divergence ⁽⁴⁾. Bone shift is reflected in the facial soft tissues, causing an unfavorable esthetic impact, which may be aggravated by the facial asymmetric present in most cases. Patients with these disharmonies are usually treated with a combination of Orthodontics and orthognathic surgery to improve occlusion and facial esthetics (5-6).

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Figure 1:- Frontal view and profile of patient beforetreatment.



Figure 2:- Pretreatment intraoral photographs: frontal, lateral and overjet.

This report presents the treatment of Class III skeletal malocclusion with transverse alteration and facial asymmetry, whose magnitude demanded an orthodontic-surgical treatment for reestablishment of normal occlusion and adequate facial esthetics.

Case Report Diagnosis

Diagnosis

A male patient aged 19 years came at the military hospital of instruction mohammed v rabat, with main complaint of a palatally displaced maxillary right lateral incisor.

Facial analysis revealed accentuated facial asymmetry, slightly concave bone and facial profiles, maxillary hypoplasia, malar deficiency, and augmentation of the lower third of the face. Clinical examination revealed a class III Angle malocclusion on the right and left sides, with a narrow maxilla, bilateral inverted posterior articulation, deviation of the mandibular midline to the left side and a diastema between 11-21 (Figure ^{1,2}).

Intraoral examination confirmed a narrow maxilla with a unilateral left posterior crossbite, negative dentoalveolar discrepancy in both arches, mandibulary midline shifted 2 mm to the left, negative overjet of 3.0 mm and absence of overbite.

The lateral cephalometric radiograph revealed Class III skeletal malocclusion (ANB = -7.0° , AoBo = -22mm, FMA = 33°), maxillary retrusion (SNA= 78°), slight mandible protrusion (SNB = 85°) in relation to the anterior skull base and predominance of vertical growth of the face (SNGoGn = 38°). The maxillary incisors presented a proclinationand were protruded in relation to their alveolar base (1. NA= 30° and 1-NA= 8 mm), while the mandibular incisors presented a rectrolinationand retrusion in relation to their alveolar base (1. NB = 16.5° and 1-NB=3 mm) (Table I).

The Panoramicradiograph (Fig.³) showed absence of the 25 and 16 and to complete the diagnosis the Initial lateralcephalometricradiograph (Fig.⁴) revealed the following cephalometric values (Table I) and cephalometric tracings showing: initial, orthodontic and surgical steps (Fig.^{5,6,7}).

Treatment Objectives:-

The objective of the pre-surgical orthodontic preparation was to correct the dental disharmonies and the transverse dimension, at the level of the mandibular arch a proclination of the mandibular incisors was carried out by increasing their axial inclination, thus accentuating the negative overjet in order to allow a skeletal correction, to reestablish the relations of class I between canines and molars, to obtain an effective functional anterior guiding, to restore the aesthetics of the profile, the labial relation and of the smile, and to insure the long term stability of these corrections.

The main goals of thesurgical treatment were to maxillary advancement and mandibular retrusion for correction of the dental relationship, Class III skeletal malocclusion and accentuated mandibular asymmetry with deviation to the left.



Figure 3:- Pretreatmentorthopantomogram.



Figure 4:- Initial lateralcephalometricradiograph.

Table I	Tableau I	
Pretreatment IBO values.	Valeurs IBO de debut de traitement.	
PRE-TX cefalometric values/Valeurs cephalometric		
		Value/Valeur
Maxillar position (SNA)/Position maxillaire (SNA)		78
Mandibular position (SNB)/Position mandibulaire (SNB)		85
ANB		-7
АоВо		-22
Mandibular inclination (SN/Go-Gn)/Inclinaison mandibulaire		38
Upperincisor inclination/Inclinaison incisives superieures		30/8
Lowerincisor inclination/Inclinaison incisives inferieures		16,5/3
FMA		32
FMIA		65
IMPA		83
Occ plane		7
Angle Z		90
Upperlip		18
Total chin		18
Post facial height		64
Ant facial height		87
Index Post/Ant		0,74



Figure 5:- Initial cephalometric tracing.



Figure 6:- Cephalometrictracing:orthodonticstep.



Figure 7:-Cephalometric profilset-up:surgicalstep.





Figure 9:- Profile teleradiographyduring the orthodontic presurgical preparation.

Table II	Tableau II	
IBO valuesduringtreatment	Valeurs IBO au cours du traitement .	
During-TX cefalometric values/Valeurs cephalomet		
		Value/Valeur
Maxillar position (SNA)/Position maxillaire (SNA)		77
Mandibular position (SNB)/Position mandibulaire (SNB)		85
ANB		-8
AoBo		-22
FMA		32
FMIA		58
IMPA	90	
Occ plane		10
Angle Z		83
Upperlip		17
Total chin		17
Post facial height		64
Ant facial height		85
Index Post/Ant		0,73



Figure 10:- Extraoral photographsafter surgical intervention.



Figure 11:- Right, front and leftvestibular intra-oral views at post-surgical preparation step.

Treatment progression

The treatment was approached by extraction of the upper and lower wisdom teeth which was performed 1 year prior to surgery (28,38,48) except 18 because 16 was absent.

-Maxillary:

A sequence of alignment and leveling of the Niti 014 to 018 arches, correction of the transverse dimension and then transition to the stainless-steel incisal retraction arch allowing correction of the maxillary midline on the basis of the medial sagittal plane were performed to also allow closure of the interincisal diastema. Next, closure of the spaces in the maxillary arch with an elastomeric chain.

-Mandibulary:

Alignment and leveling of the mandibular dental arch (arches from 0.014" to 0.018") and then incisor vestibulo-version was performed.

The mandibular arch was also aligned. Intercuspation was checked by periodically occluding the obtained plaster models until a satisfactory occlusion was obtained to perform the procedure. After satisfactory intercuspation of the plaster models was achieved, welded clasps were placed on 0.019×0.025 stainless steel surgical arches in all interarch spaces and the patient was referred for orthognathic surgery.

The third molars were extracted 1 year before orthognathic surgery to allow bone formation in the extraction wounds. Fig8 shows the presurgical orthodon ticpreparation.

The surgical procedure included a 3mm advancement and a 2mm posterior maxillary impaction as well as a 7mm retraction and counterclockwise rotation and centering of the mandible to correct the laterognathy and symmetrization of the median incisors.

The sagittal bimaxillary osteotomy allowed correct intercuspidation of the dental arches with the repositioned maxilla and the reduction of the mandibular plane angle, thus reducing the lower third of the face.

Surgery was planned based on facial analysis, predictive cephalometric tracing, and surgical guide preparation (fig.⁷).

After surgery, the patient returned for orthodontic finishing to complete the case in class I on the left and on the right (fig. 10,11).

The patient had a normal incisal overjet and overbite and coincident midlines. After the active treatment phase, a fixed retainer was used in the maxillary and mandibular arch from canine to canine.

Treatment Results:-

At the end of treatment, it was observed functional occlusion, normal overjet, and overbite, and adequate intercuspation, with Class I molar and canine relationship on the right side and therapeutic class II on the left side, coincident midlines, normal lateral and protrusive excursions. Mandibular prognathism and asymmetry were eliminated, and facial esthetics was considerably improved. The cephalometric measurements showed maxillary advancement, contributing to improve the patient's profile: values during treatment (ANB= -8°, FMA=32°, AoBo=-22mm) Table II; Posttreatment values (ANB= 3°, FMA=33; AoBo=-7mm) Table III.

The maxillary incisors were retruded and the mandibular incisors were protruded and had their axial inclination increased. Figures 12 and 13show the results obtained with the orthognathic surgery and orthodontic finishing stage.

IBO values demonstrate the correction of the skeletal Class III. The cephalometric parameters all reached normal limits (Table III).



Figure 12:- Extraoral photographsat end of treatment.





Figure 13:- Right, front and leftvestibular intra-oral views at end of treatment.

Table III	Tableau III	
Posttreatment IBO values.	Valeurs IBO apres traitement.	
Post-TX cefalometric values/Valeurs cephalometriq		
		Value/Valeur
Maxillar position (SNA)/Position maxillaire (SNA)		77
Mandibular position (SNB)/Position mandibulaire (SNB)		74
ANB		3
АоВо		-7
FMA		33
FMIA		59
IMPA		88
Occ plane		12
Angle Z		79
Upperlip		9
Total chin		13
Post facial height		47
Ant facial height		78
Index Post/Ant		0,6



Figure 15:-Total and partial superimposition of initial and final cephalometric tracings revealed the changes occurred with the treatment.

Discussion:-

Class III is a sagittal direction anomaly, it is though to affect more the Asian and African-American population. It maybe the consequence of eithermandibularexcess (20-25% of Class III cases), or of insufficient maxillary development (20-25% of cases) or of a combination of these two anomalies (50-60% of cases) (16). It can be manifested either by the mandible being advanced in relation to the maxilla (mandibular prognathia) or the maxillabeing retracted in relation to the mandible (maxillary retrognathia) (16) Cephalometrically, class III corresponds to a Riedel ANB of less than 0° or an AoBo of less than -2 mm.

Orthognathicsurgeryisintended for patients with :

- Asevereskeletal class III that has not been or could not bereducedduringgrowth;
- Significantaesthetic and psychologicaldamage ;
- -An associated significant transverse or vertical anomaly;
- Markedalveolar compensations that compromise the possibility of orthodontictreatment.

It isperformedoutside of growth in order to avoidanyrisk of postoperativerecurrence due to mandibulargrowthrebound. However, the indication for surgeryismostoften made early : at the time of the diagnostic workup, in view of the severity of the discrepancy and itshereditarycharacter; afterfailure of orthopedictherapy or afterfailure or recurrence of orthodontictreatment.

Pre-surgicaldecompensation of class III :allows a vestibulo-version of the mandibularincisors and a repositioning by palato-version of the maxillaryincisors. Decompensation leads to an increase in the negative overjet of class III teeth and thus to an aggravation of aesthetics and functional problems. Extractions maybenecessary to eliminate the compensations : extractions of the maxillary first premolars to correct the vestibulo-version of the maxillaryincisors and those of the mandibular second premolars to increase the class III molar. In case of severecrowding, extractions are indicated in one or both arches.

It is very important to understand the components of facial asymmetry in order to outline an accurate and effective treatment plan ^{(17).} A asymmetry is make this case more difficult.

Most studies have demonstrated that transverse dental compensation is correlated with skeletal asymmetry ^(18,19,20). Inclinations of the occlusal plane and mentum deviations observed in the posteroanterior cephalograms are important characteristics to determine the presence and extension of facial asymmetry ^{(21).}

The patient of this case presented significant facial asymmetry with mandibular asymmetry and mentum deviation to the left. Haraguchi et al. ⁽¹⁶⁾ and Severt and Proffit ⁽¹⁵⁾ have reported that in patients with dentofacial deformities with mandibular deviation, lateral excursion to the left was present in over 85% of the studied population. According to Haraguchi et al. ⁽¹⁶⁾, the mandible is more asymmetrical than the maxilla because of its greater growth potential. While the mandible is a movable bone, the maxilla is rigidly connected to the adjacent skeletal structures by means of sutures and synchondroses ⁽²¹⁾.

Taking into consideration the absence of the 25 and the 16, the 17. Therapeutic class II was a best choice in order to correct the problem of the jawbone and adjust the patient's occlusion.

The vestibulo-version of the mandibular incisors was increased to promote a satisfactory post-surgical interincisor relationship.

The objectives of the presurgical orthodontic treatment were achieved and skeletal offset correction were necessary by surgery, obtaining adequate functional occlusion and pleasant facial esthetics. The orthodontic treatment may provoke some undesirable alterations such as root resorptions.Despite the presence of the aesthetic deficitin the present case, root resorptions were not observed .

Eighteen months after removal of the orthodontic appliance, the treatment can be considered as successful. The goals of the orthodontic-surgical treatment, namely having coincident the maxillary and mandibular midlines, correlating the mentum with the sagittal midline, and obtaining ideal anteroposterior, transverse and vertical occlusion, overjet and overbite, get a balanced profile were completely achieved.

When the skeletal problem compromises the facial esthetics, the surgical-orthodontic treatment is the most indicated for patients who do not present facial growth potential and mainly for those who have facial asymmetry. A correct diagnosis and set-up as well as an appropriate execution of the treatment plan are determinant factors for having success and long-term stability. In the case presented in this report, the orthodontic-surgical treatment was well indicated for correction of the Class III skeletal malocclusion and the patient's facial asymmetry, to regain adequate masticatory function and pleasant facial esthetics ^(18,21).

Conclusion:-

Skeletal Class III malocclusion can have several etiologies, maxillary deficiency being the most frequent. Skeletal discrepancies can have unfavorable aesthetic impact, often aggravated by the presence of marked facial asymmetries. This type of malocclusion is usually treated with the association of orthodontics and orthognathic surgery to correct occlusion and facial aesthetics. This case report presents the treatment of a 19-year-old patient with a skeletal Class III malocclusion, maxillary atresia, anterior crossbite and unilateral posterior crossbite, marked negative dento-alveolar discrepancy in the mandibulary arch and lower midline shifts. On clinical examination the patient also presented maxillary deficiency, increased lower facial third, concave facial and bony profile and facial asymmetry, with deviation of the mandible to the left side. The treatment was performed in three phases: presurgical orthodontic preparation, orthognathic surgery and orthodontic finishing. Analyzing the patient's final records, the main goals set at the beginning of treatment were successfully achieved, providing the patient with adequate masticatory function and pleasing facial aesthetics.

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