ARTICLES SCIENTIFIQUES

The ortho-surgical treatment of a skeletal class III malocclusion associated to a mandibular laterognathia: a case report

Traitement ortho-chirurgical d'une malocclusion de classe III associée à une latérognathie mandibulaire : à propos d'un cas clinique

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Abstract

Skeletal Class III malocclusion result from growth disharmony between the maxilla and the mandible. This malocclusion is very difficult to treat especially when it is associated with transversal and/or vertical anomalies.
Many therapeutic alternatives are proposed to treat this malocclusion but it depend on different factors such as the growth potential. For adult patients without facial growth potential, the suitable treatment is the ortho-surgical approach to improve facial esthetic and occlusion.
This case report presents a 18-year-old male patient who was referred to our orthodontic department with a chief complaint of facial asymmetry. The clinical examination and cephalometric analysis revealed a skeletal class III mainly caused by maxillary hypoplasia accompanied with mandibular laterognathism. The ortho-surgical approach was the best therapeutic alternative . The treatment objectives were obtained , providing a stable class I occlusion with functional overjet and overbite, coordinated midlines, resolving asymmetry and improving the facial esthetic and functions.

Key words
case report, class III malocclusion, laterognathia, orthodontics, surgical, treatment outcome

Résumé

La malocclusion squelettique de classe III résulte d'une dysharmonie de croissance entre le maxillaire et la mandibule. Cette malocclusion est très difficile à traiter, surtout lorsqu'elle est associée à des anomalies transversales et/ou verticales.
De nombreuses alternatives thérapeutiques sont proposées pour traiter cette malocclusion mais elles dépendent de différents facteurs tels que le potentiel de croissance. Pour les patients adultes sans potentiel de croissance faciale, le traitement approprié est l'approche ortho-chirurgicale pour améliorer l'esthétique faciale et l'occlusion.
Ce rapport de cas présente un patient de 18 ans qui a consulté notre service d'orthodontie pour une plainte principale d'asymétrie faciale. L'examen clinique et l'analyse céphalométrique ont révélé une classe III squelettique principalement due à une hypoplasie du maxillaire accompagnée d'une latérognathie mandibulaire. L'approche ortho-chirurgicale était la meilleure alternative thérapeutique. Les objectifs du traitement ont été atteints, une occlusion de classe I stable avec un overjet et un overbite fonctionnels, des milieux inter-incisifs coordonnés, en résolvant l'asymétrie et en améliorant l'esthétique et les fonctions oro-faciales.

Mots clés
malocclusion de classe III, latérognathie, orthodontie, chirurgie

INTRODUCTION

Skeletal class III malocclusion is one of the most difficult malocclusions to treat. The prevalence of Angle class III malocclusion ranged from 0% to 26.7%. Its etiology can be genetic or caused by environmental factors. Class III malocclusion is characterized by a mandibular prognatism and/or maxillary hypoplasia and retrognathism [1]. Skeletal and dental Class III are most often associated, but skeletal Class III can sometimes be encountered in Class I molars and canine relationships and vice versa [12]
Treatment options range from growth modification using orthopedics by protraction facemasks and, or a combination of orthodontics and orthognatic surgery procedures in order to achieve a functional, stable class I occlusion and improve facial esthetics[2–4].
Thus, skeletal class III associated with mandibular laterognathia in adult patients can complicate the malocclusion and requires an interdisciplinary

treatment approach. So the ortho-surgical approach is the efficient therapeutic alternative which need a complete collaboration between the orthodontist and a maxillo-facial surgeon .

Ortho-surgical treatment, in this case is the suitable treatment to resolve the functional, skeletal and dental discrepancies in order to improve the best aesthetic results for the patient. We have to fully take 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) [13-14].

In this article ,the clinical case shows the success of interdisciplinary treatment approach in the ortho-surgical treatment of a patient with skeletal class III malocclusion associated with mandibular laterognathia.

CASE REPORT

A 18-year-old male patient consulted the orthodontics department of Farhat hached hospital, with a chief complaint of forwardly placed mandibular front teeth, a deviated chin, and unsatisfactory facial esthetics. The patient had no relevant medical history. Family history revealed no similar maxillofacial deformity.

A clinical frontal examination showed an oval face, with a left deviation of the chin by 19mm from the sagittal line, increase in lower facial height, and erased naso-labial folds.

Extra-oral examination revealed a flat and ortho-frontal profile,an erased labio-chin line, and a closed naso-labial angle.

Figure 1 Pre-treatment extra-oral photographs

Figure 2 Pre-treatment intra-oral photographs

The endo-buccal examination revealed a class III molar and canine relationship on the right side and class I of both molar and canine on the other side, and a negative overjet. The mandibular midline was misplaced to the left side by 5mm. We concluded that the patient has a sign of mandibular laterognathism.

A temporo-mandibular joint examination revealed no centric occlusion discrepancy with no history of any pain or discomfort in the temporo-mandibular joint or associated muscles.

A panoramic radiograph showed that all teeth were present excepted the lower third molars.

Cephalometric analysis (table 1) shows a class III skeletal relationship (ANB= -7°), AoBo =-13mm) with a retrognathic maxilla (SNA = 78°) and mandibular prognathism (SNB= 85°), with a normodivergent growth pattern (FMA = 24°), and retroclined lower incisors (IMPA= 80°) .

The soft tissue profile showed a flat profile (Figure 3) (tableau 1).

The diagnosis of the skeletal class III malocclusion maxillary hypoplasia and retrognathism, mandibular prognathism and laterognathia is confirmed by Coben and Ricketts's analysis (Figure 4).

Figure 3 Pre-treatment radiographs examination

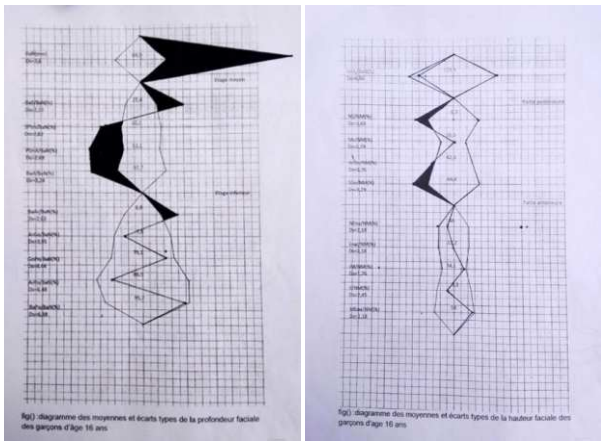

Figure 4 Pre-treatment Coben's Analysis

Table 1 Resumes pre-treatment cephalometric analysis of our patient

Valeurs céphalométriques	Début de traitement	Valeurs moyennes
SNA	78°	82° ± 2
SNB	85°	80° ± 2
ANB	-7°	02° ± 2
AoBo	-13mm	0 mm ± 2
FMIA	76°	68°
IMPA	80°	87°
FMA	24°	20°-30°
GoGn/Sn	29°	32°
I/i	149°	135°
I/F	113°	107°
Z	86°	78°

Treatment Objectives

The objectives of our treatment were to:

1. To establish class I canine and molar relationship on both sides and anterior guide function
2. To achieve optimal overjet and overbite
3. To correct the lower inter-incisal deviation
4. To create adequate arch length in the upper and lower arches.
5. To improve the patient's aesthetic profile and to correct its facial asymmetry

Treatment progress

<u>Pre-surgical orthodontic phase:</u>

A pre-surgical phase of non-extraction orthodontic therapy was performed for decompensation.

First of all, we started by preparing teeth with banding and bonding the upper and lower arches using (022*028) Roth prescription and straight wire bracket systems.

In the first months, initial leveling and alignment using a nickel-titanium arch wire was achieved.

Then, a palatal mini-screw was used in the maxilla to correct the vestibule-version of 17.

Before surgery, upper and lower coordinated 0.019 × 0.025' stainless steel wires were left passively in place for four weeks, following which pre-surgical records were taken. Two surgical splints were fabricated for the maxillary and mandibular arches (figure 6 and 7).

Figure 5 Pre-surgical extra-oral photographs

Figure 6 Pre-surgical intra-oral photographs

Figure 7 Two surgical splints were fabricated for the maxillary and mandibular arches

Surgical phase

The maxilla was first mobilized by Le Fort I osteotomy for 5 mm advancement.

A bilateral sagittal split osteotomy (OBWEGESER-DALPONT) was performed in the mandible associated to derotation to recenter it by 6 mm to the right.

The new position of the maxilla and mandible was stabilized using rigid internal fixation via bone screws.

Post-surgical orthodontic phase

Class I and II elastics were placed immediately and respectively on the right and left sides and maintained for the initial 4 weeks post-surgery to achieve maximum stability.

One month after surgery, the stabilizing wires were removed.

After a total treatment time of 32 months the patient was debonded, and a canine-to-canine lingual fixed retainer was bonded in the mandibular and maxillary arches.

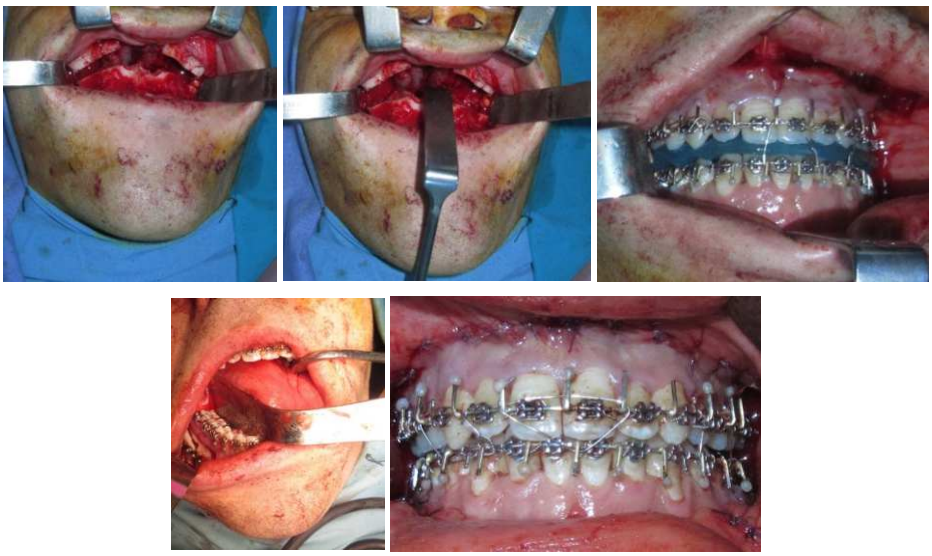

Figure 8 Surgical intra-oral photographs

Figure 9 Post-surgical intra-oral photographs

Treatment results

Figure 10 Post-treatment exo-buccal photographs

Figure 11 Post-treatment endo-buccal photographs

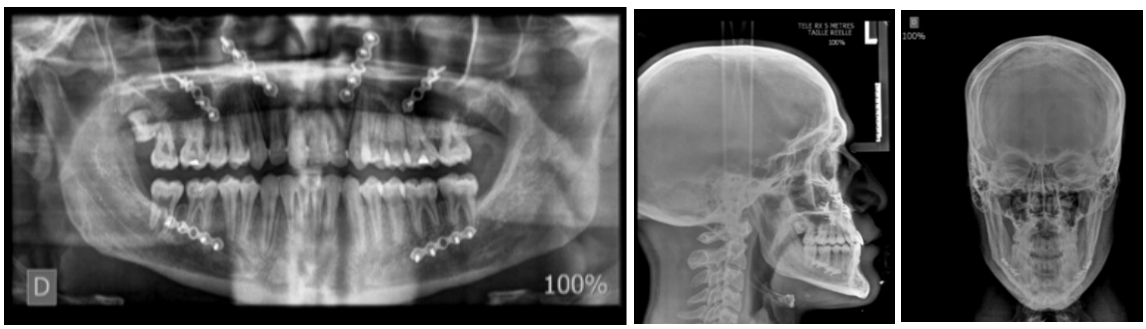

Figure 12 Post-treatment radiographs

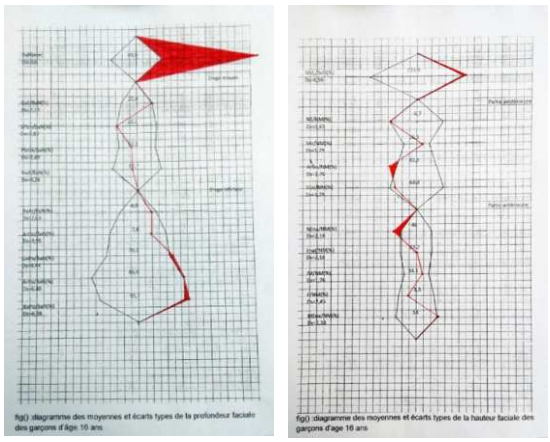

Figure 13 Post-treatment Coben's analysis

Table 2 Resumes post-treatment cephalometric analysis of our patient

Valeurs céphalométriques	Début de traitement	Fin de traitement	Valeurs moyennes
SNA	78°	82,5°	82° ± 2
SNB	85°	84°	80° ± 2
ANB	-7°	-1,5°	02° ± 2
AoBo	-13mm	-5 mm	0 mm ± 2
FMIA	76°	71°	68°
IMPA	80°	84°	87°
FMA	24°	25°	20°-30°
GoGn/Sn	29°	29°	32°
I/i	149°	137°	135°
I/F	113°	115°	107°
Z	86°	80,5°	78°

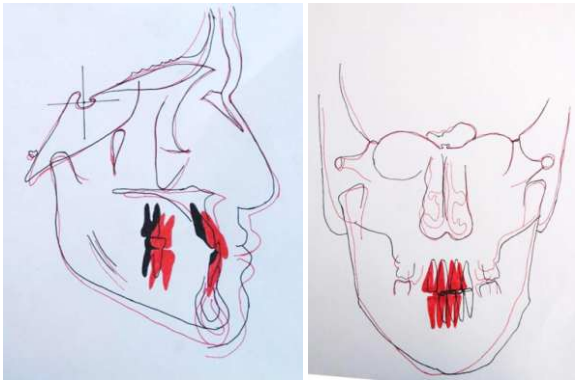

Figure 14 Superimpositions of pre and post-treatment cephalometric radiographs

-Most of our treatment objectives were achieved. Facial esthetics was improved; the patient was satisfied.

-Class I molar and canine relationships with adequate amounts of overbite and overjet were obtained.

-No root resorption was observed in the panoramic-radiograph and root paralleling was therefore achieved.

-Class I occlusion was achieved, the maxillary, and mandibular arches were aligned with coordinated midlines, and a correlating chin with the sagittal midline giving a symmetric appearance. The overjet and overbite and the anterior guide were established.

-Cephalometric superimposition shown in (figure 14) reveals an excellent esthetic balance between the hard and soft tissue with harmonious facial profile.

-The post-treatment cephalometric analysis shown in (Table 2) resulted in an increased maxillary basal length, decreased mandibular body length, and reduced maxilla-mandibular differential resulting in an overall increase in the ANB angle, thereby achieving a skeletal Class I relationship.

DISCUSSION

A Class III malocclusion is a challenging anomaly to correct, especially with only orthodontic means.

These skeletal abnormalities result from growth disharmony between the maxilla and the mandible, and thus produce a concave facial pro l.

There are 3 main treatment options for skeletal Class III malocclusions: growth modi cation, orthodontic therapy, and orthognathic surgery combined with orthodontic treatment.

Regarding cases of skeletal class III malocclusion combined with different vertical or transversal discrepancies such as mandibular laterognathia represents always a challenge for the orthodontist. Thus, orthognathic surgery is the best solution to provide better fonctionnal, occlusal and aesthetic results. This article is about a case report of an adult male patient with a skeletal and dental class III relationship associated with mandibular laterognathia treated in our orthodontic department . A non-extraction pre-surgical orthodontic treatment was indicated . After leveling both arches, Surgical-orthodontic treatment was engaged, a bi-jaw procedure of maxillary advancement, mandibular repositioning, and setback was performed. However , during postsurgical orthodontics, the use of intermaxillary elastics was necessary to improve the occlusion and the intercuspation . After removal of the orthodontic appliance, the patient is satisfied with the final esthetic results with more confident self-esteem ,functional occlusion. However, long-term follow-up is necessary and were planned in this case. Usually, when the skeletal problem comprises facial esthetics, the patient's self-esteem represent the

chief complaint. So, the main objective of orthognathic surgery for the patient is to improve facial, dental esthetics to an acceptable clinical result and establish normal function with a harmonious facial appearance. It is mainly indicated for adult patients with facial asymmetry and without facial growth potential [9]. In the other hand, different studies are written about long-term stability such as a comparative study performed by Al Delayme [10] on 24 class III patients proved after one year follow-up, that bimaxillary surgery presents more stability compared to those who received a single-jaw procedure. Furthermore, Jakobsone[11] in a 3 years follow-up found that all patients who were treated with bimaxillary surgery releaved better occlusal stability. To conclude, skeletal class III malocclusion associated to mandibular laterognathia is difficult to treat and the suitable therapeutic alternative depends on the patient's chief complaint. When facial- esthetics is compromised, an orthodontic treatment is not enough. In these cases, the collaboration between the orthodontist and the maxillofacial surgeon is the best way to improve functional and esthetic results.

CONCLUSION

The ortho-surgical approach for treating severe skeletal class III malocclusion associated with asymmetry is an interdisciplinary treatment for bone discrepancies. It is a real challenge for the orthodontist and the association between orthodontic and surgery is very hard for the patient, but the facial changes and the occlusion that were obtained are satisfactory and had a very positive impact on his personality and his self-esteem.

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