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Case Report **Orthodontics**

Severe Skeletal Class II Division 2 Malocclusion Treated with Orthognathic Surgery: A Case Report

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Abstract

Class II division 2 malocclusion is an obvious category of Class II malocclusion with typical characteristics like retroclined maxillary incisors and severe deep over bite, caused by both skeletal and dentoalveolar factors. In fact, diagnosing class II division 2 maloclusion is quite simple; neverthless the treatment process and prognosis are complex and delicate. This case report illustrates a combined orthodontic-orthognathic surgical treatment of a 19-year-old female with permanent dentition, sagittal skeletal Class II pattern, hypodivergent facial type and both class II molar and canine relationship with class II division 2 incisor relationship. The treatment plan was divided into 3 consecutive phases: the dentoalveolar decompensation, which lasted 13 months, the surgery of mandibular advancement and the finishing stage. The treatment had successfully improved the smile arc, the masticatory functions, and the dental occlusion of the patient.

Keywords: Class II division 2; skeletal class II; hypodivergence, orthognathic surgery.

INTRODUCTION

Class II division 2 malocclusion represents a significant percentage of orthodontic cases. It is specifically characterized by pronounced retroclination of upper incisors, and a deep overbite. The interincisal angle is very obtuse [1]. When associated to skeletal discrepancy, the case becomes more difficult to manage.

Concerning patients with completed skeletal growth, there are only two different treatment options. The first approach involves only an orthodontic treatment. The aim of this option is to mask the skeletal discrepancy through dentolalveolar compensations. When extractions are required, they are generally done in the upper arch (first premolars) to correct the protrusion of the incisors. The second approach combines orthodontic and surgical treatment to correct the underlying skeletal class II deformity, and, in most of cases, only mandibular advancement surgery is required [2]. However, depending on the etiology, superior repositioning of the maxilla or bimaxillary surgery can be suggested.

This case report describes the combined orthodontic-orthognatic treatment outcomes of the class II division 2 female patient with an extreme deepbite and a retrognathic mandible. The treatment results were clinically acceptable, and improved facial esthetics was achieved.

PRESENTATION OF THE CASE

Clinical Examination and Diagnosis

A 19-year-old woman presented herself at the Dento-Facial Orthopedics Department of dental clinic of Monastir. Her demands were both esthetical and functional. She had a chief complaint of her retroclined maxillary anterior teeth and impingement of the palatal gingiva by the mandibular incisors. She was in good general health and had no history of major systemic diseases.

*Extraoral examination revealed a symmetric face, convex profile, decreased anterior facial height, and anterior facial divergence. The nasolabial sulcus is acute, and the labiomental fold is deep. When smiling, more then 4 mm of gumline is exposed (Figure 1 A).

*Intraoral examination revealed an Angle class II canine and molar relationships in both right and left

side. Furthermore, the maxillary and mandibular arch were U shaped with severely retroclined maxillary incisors and a medium crowding concerning lower anterior teeth. The overjet was irregular (0 to 6 mm), and a severe deep bite (7 to 14 mm) with a deep spee curve were mentioned (Figure 1 B).

Fig 1: Pretreatment photographs. A, facial photographs. B, intra-oral photographs, showing typical characteristics of Class II division 2 malocclusion

*Examination of the lateral cephalometric radiograph indicated a skeletal class II base, normal position of maxilla (SNA: 83∘) and mandibular retrognathia (SNB: 75, (ANB: 8∘). In addition, we noted a severe low vertical dimension GOGN SN: 25 with a decreased mandibular plane angle and a hypodivergent growth pattern.

*Initial panoramic radiographic evaluation showed no missing teeth including the third molars in all quadrants except the 48 and no root resorption.

Treatment Objectives

The treatment objectives for this patient were to (1) correct the skeletal class II pattern, (2) correct the inclination and position of the maxillary anterior teeth, (3) establish normal Class I canine and molar relationships with normal overjet and overbite (4) correct the crowding in maxillary and mandibular arches (5) reduce the depth of the curve of Spee, (6) improve profile and smile, and (7) obtain stable results.

Treatment Plan

The following treatment plan was discussed with the patient considering the treatment objectives and correlating with the patient's requirements.

The initial treatment plan for this patient was nonextraction orthodontic treatment combined with orthognathic surgery of mandibular advancement (Obwegeser osteotomy) : A dentoalveolar decompensation to increase overjet followed by the surgical phase.

Due to the severity of the skeletal descrepancy, it would be safer to the dentoalveolar complex to avoid the compensation option.

Treatment Progress

The treatment options were accurately explained and discussed throughly with the patient. Fortunately, she preferred combined orthodontic and orthognathic surgical correction.

The treatment plan was carried out in three phases :

- Presurgical phase - Alignment and Decompensation.
- Surgical phase.
- Postsurgical phase – Finishing and settling.

***Presurgical Phase**

After obtaining the patient's consent, bands and preadjusted 0.022*0.028-in brackets were placed to the maxillary teeth. A 0.014-in nickel-titanium wire was engaged as the initial archwire to start leveling and aligning. Then .016 NiTi, .018 NiTi, and .017*.025 NiTi were used successively. Then a .018*.025-in SS followed by 0.019*0.025-in SS accentuated curve stainless steel wire were placed in the maxillary arch for two months to level the remaining curve of Spee (Figure 2).

After proclination of the retroclined maxillary incisors, the mandibular arch leveling was started while keeping a vertical level between the incisal sector and the lateral sector. The following sequence of archwires were used: 0.014", 0.016" then 0,018"NiTi with a molar elevation splint.

Gradually, rigid stainless steel archewires, 0.018, 0.017*0.025", 0.018*0.025", and 0.019*0.025" were used with a step down between (43,42) and between (33,32). The mandibular dental arch was intentionally incompletely leveled, leaving some curve of Spee uncorrected. At that phase, a surgical simulation was needed. Therefore, alginate impressions were done and a semi adjustable articulator was used to perform simulation. The mandibular was advanced by 7 mm and the final splint was fabricated using the simulated mock surgery protocol (Figure 3).

Fig 2: A: Maxillary views of the leveling phase with 018 NiTi archwire. B : Mandibular frontal and occlusal views showed the leveling sequence using the elevation splint

Fig 3: Upper and lower surgical archwires for intermaxillary fixation

Surgical Phase

This phase was assured by Professor R.M. The operation performed under general anesthesia. A mandibualr advancement of 7 mm with bilateral sagittal split osteotomy was performed. The osteotomy cuts were placed on the lateral border of ramus. The separated bony segments were repositioned to the desirable position under the guidance of the acrylic plaque. The mandible was fixed and then stabilised with titanium plates and screws on right and left sides. The entire operation lasted 3 hours. Later, class II elastics were placed to hold the corrections in place, and to protect the jaws against the muscle forces. This phase lasted approximately 1 month.

Postsurgical Phase

The main objective of this phase involved the finishing and settling stage where 0.018" SS wire was placed in both upper and lower arch with bracket repositioning and settling elastics. The mandibular Spee curve was completely leveled by extrusing premolars and molars. Minor bends were placed in .018*.025 SS archwire for detailing both alignment and occlusion. After 5 months of finishing and detailing, the appliance was debonded. Maxillary and mandibular retainers were given and final record were taken.

Treatment Results

All the predefined objectives were fulfilled : a significant improvement in the soft tissue profile indicated by the position of the upper lip, lower lip and the chin. Her smile esthetics were significantly improved. Intraorally, A class I bilateral angle canine and molar relation was achieved with good interdigitated occlusion, crowding was corrected, and an adequate Overjet and Overbite were achieved. The upper and lower dental midline coincidence was obtained (Figure 4).

The post treatment cephalometric evaluation and superimposition confirmed a positive change in the profile. There was also a significant change in skeletal measurments in both sagittal and vertical dimension (Table 1), (Figure 5).

Fig 4: Post treatment photographs. A: facial photographs. B: intra-oral photographs

Table 1: Cephalometric analysis (changes between initial and final records)

Valeurs céphalométriques	Début de traitement	Fin de traitement
SNA	83°	83°
SNB	75°	80°
ANB	8°	3°
AoBo	8 mm	1 mm
IMPA	84°	99°
I/F	82°	119°
FMA	13°	18°
GoGn/SN	25°	29°
Occ/SN	9°	13°

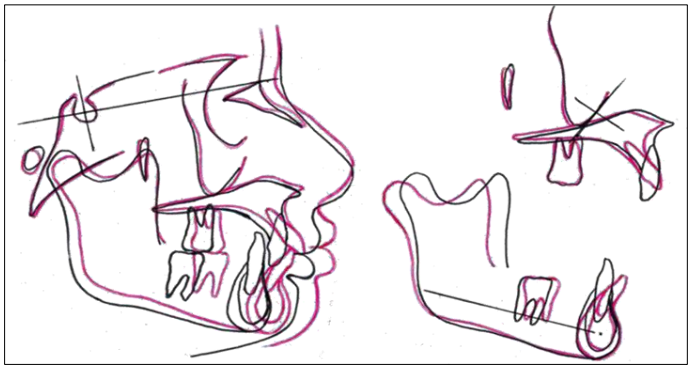

Fig 5: Total and partial cephalometric superimpositions

The panoramic radiograph showed no signs of significant root or bone resorption, and a good root parallelism was observed.

DISCUSSION

The characteristics and features of class II division 2 malocclusions are specific and unique. The diagnosis is simple, counter to the treatment plan.

Age and malocclusion severity predict the clinician's choice of treatment, but they do not predict the success or failure of case outcomes [3].

For example, in growing patients, wide range of functional appliances proved its effectiveness to stimulate mandibular growth by forward posturing of the mandible [4]. It is mainly known that prevention is better than cure, so taking preventative measures at an early age, for potential patients is the best means of treatment [5, 6]. However, with adults, there would be only two therapeutic options [2]. The first is camouflage, which can be attempted by extraction of both first upper premolars. In this case it was not suitable since the patient had a severe deep-bite and it could worsen both occlusion and profile. The second is surgical which is adopted after a thorough study of the case and the patient's requests.

This patient was 19 years old at the begining of treatment. She came looking for a solution for her unesthetic facial appearance.

Combined orthodontic and orthognathic surgery was determined as treatment. The decompensation phase was divided in two main stages. Leveling of maxilla Spee curve was used and

transitioned to maintaining some Spee curve in the mandibular arch. The purpose of the second step was to avoid lower incisors protrusion and to increase the lower facial height by extrusion of mandibular premolars and molars after surgery.

The dentoalveolar changes were evident at both maxillary and mandibular arches (Table 1). Upper and lower incisors demonstrated protrusion and intrusion movement. We expected that the remaining curve of Spee could be totally corrected by extrusion of posterior teeth. However, some mandibular incisors intrusion occurred due to strong masticatory force, a well-known feature in class II division 2 patients. Skeletal anchorage devices such as miniscrews could be used in conjunction with fixed appliances to enhance extrusion mechanics [7]. In the other hand, the overall superimposition highlighted a remarkable improvement in profile, especially the chin and the deep labiomental fold which present for this patient a major esthetic problem that could be treated in several other cases only through genioplastic surgery. In addition, the mandibular advancement is more suggested nowadays, because of its interest in the airway dimensions. In our case, this was observed and it was in favor of better respiratory function.

In fact, the achievement of treatment objectives was clinically and radiologically confirmed.

Although we tried to avoid the protrusion of mandibular incisors, it happened due to the curve of spee leveling. In contrast, with a good control of torque, they were maintained in a quite stable position (IMPA= 95 °). Thus being aware of the potential limitation of incomplete maxillary and mandibular incisor decompensation on skeletal outcomes is essential.

However, the major challenge for class II division 2 malocclusion treated with orthognathic surgery was the long-term stability. To ensure this objective, surgery might be done within the limits of neuromuscular adaptation [8]. Therfore, it is mandatory for all orthodontists to diagnose the case correctly, and plan the treatment and retention initially.

CONCLUSION

In the present case report, the management of class II division 2 skeletal malocclusion owing to mandibular retrognathia was shown successfully. To fulfill the treatment objectives, combined orthodontic-surgical treatment was suggested. Indeed, good facial esthetics, functional and occlusal results were achieved. For this reason, an interdisciplinary approach was indispensable for adult patients with severe skeletal class II malocclusion [9]. However, the maintenance of stable results is thus influenced by muscle adaptation, the establishment of a good interincisal angle, and a good interdigitation of the occlusion [10].

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent.

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