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Case Report

Surgical Orthodontic Treatment for a Skeletal Class III and Asymmetric Patient: Case Report

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Abstract: The aim of this article is to describe the treatment of a skeletal Class III and asymmetric patient. Two treatment alternatives were explained: -conventional orthodontics to camouflage the skeletal anomaly and -traditional orthodontics/orthognathic surgery approach; the surgical option was selected. Pre-surgical orthodontics was applied for leveling, aligning and relieving dental compensations. A Bilateral Sagital Split Osteotomy was performed for mandibular setback. Post-surgical orthodontics was applied for finishing and detailing occlusion. Total treatment time was 10 months. Facial balance was enhanced and a good dental occlusion was achieved. Careful treatment planning by the ortho-surgical team, proper application of biomechanics and good selection of dental orthodontic materials, allow the orthodontist to delay less time in the pre and post-surgical stages in the traditional surgical orthodontic approach.

Keywords: Orthognathic Surgery, Pre-surgical Orthodontics, Post-Surgical Orthodontics, Skeletal Class III

1. Introduction

Skeletal deformity requires surgical orthodontic treatment for correction. The traditional approach for these patients requires a: 1. Pre-surgical stage: to level and align, relieve dental compensations and coordinate arches, 2. The surgical stage: to perform the orthognatic surgery procedures and 3. The post-surgical stage: to detail the occlusion. The new technology applied to the orthodontic systems and the new biological model allow the orthodontist to delay less time in the pre-surgical and post-surgical stages, condition appreciated by the patients, mostly because after relieving dental compensations there is a worsening of facial aesthetics and masticatory discomfort in the pre-surgical orthodontics stage.

2. Case Report

A female patient came to the University orthodontic department with chief complaint of a ”prognathic jaw and an anterior crossbite”. The patient was 14 years old and had had no significant medical history. The pretreatment records showed a Class III skeletal relation, dentofacial asymmetry (laterognathia) and severe proclined upper incisors and moderate proclined lower incisors (Table 1, Fig. 1), the carpal Rx showed an 8th maturation stage, which means growth has stopped and the panoramic radiograph showed lack of parallelism of the roots in the anterior segment and presence of all third molars (Fig. 2). The dental findings were an Angle Class III malocclusion, anterior cross bite of -4 mm, 0 mm of overbite, deviated mandible dentition to the right, unilateral posterior crossbite on the right side, moderate crowding in the upper and mild crowding in the

lower arch was present (Figs. 3, 4).

Table 1. *Cephalometric measurements.*

Measurement	Norm	Pretreatment	Post-treatment
SNA	82°	91°	91°
SNB	80°	94°	88°
ANB	2°	-3°	2°
Go Gn-SN	32°	26°	22°
1-1	130°	125°	121°
1-SN	102°	122°	122°
IMPA	90°	87°	96°

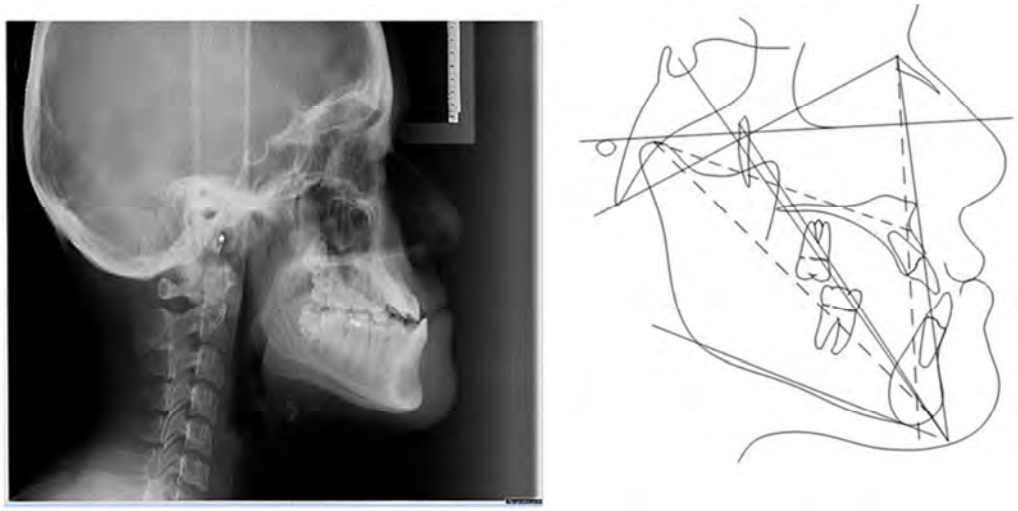

Figure 1. *Pretreatment cephalometry.*

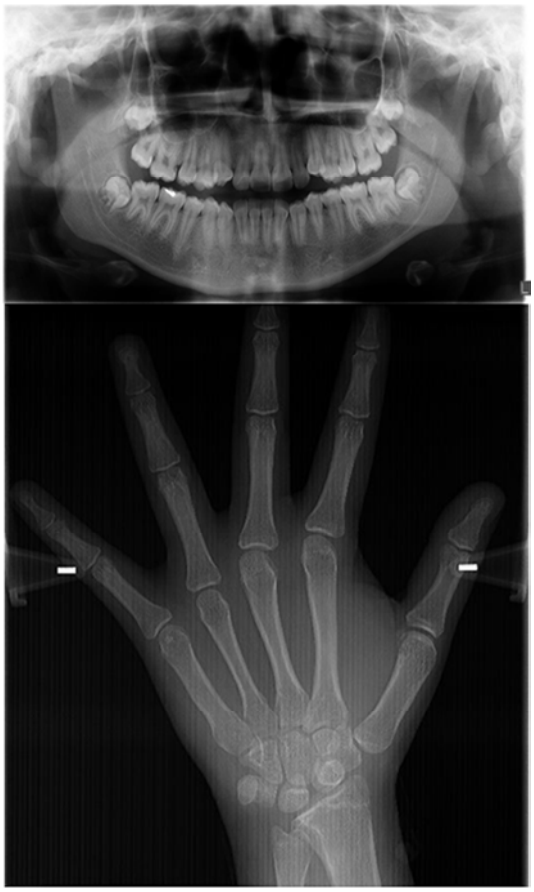

Figure 2. *Panoramic radiograph and Carpal radiograph.*

Figure 3. *Pretreatment facial and intraoral photograph.*

The treatment objectives were to (1) achieve better facial

balance (2) obtain a Class I functional dental relationship, (3) eliminate the anterior crossbite, (4) eliminate the mandible deviation, (5) eliminate the unilateral posterior crossbite, (6) eliminate dental crowding in both arches, (7) maintain the root length of the teeth.

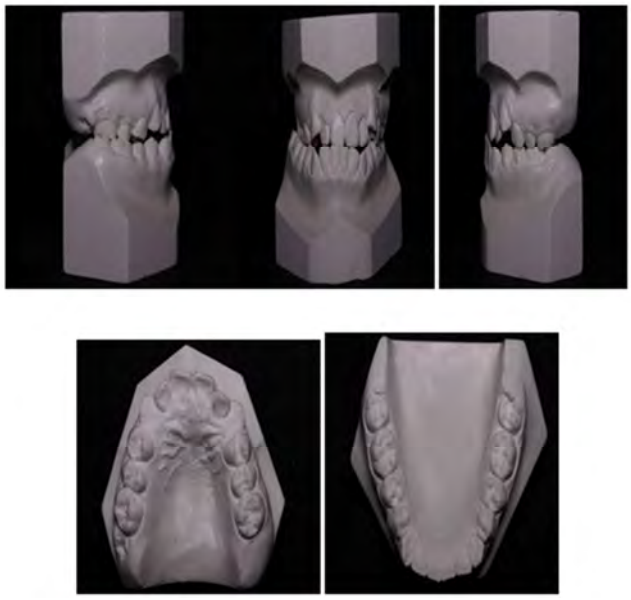

Figure 4. *Pretreatment study models.*

Two treatment alternatives were explained to the patient with advantages, disadvantages, risks and limitations. The first treatment alternative was a conservative non-surgical approach to camouflage de skeletal pattern; expansion in the upper arch and the extraction of the first lower first bicuspids and stripping of the lower incisors or an extraction of a central lower incisor could eliminate the anterior cross bite, but the posterior occlusion would not be ideal neither the future integrity of the periodontal tissue of the lower incisors. The second alternative was a traditional orthognathic surgical approach. A pre-surgical orthodontic phase to level and align, relieve dental compensations and coordinate de arches, the surgical procedure of mandibular setback and post-surgical orthodontic phase for detailing.

The MBT 0.022" x 0.028" appliance (3M Unitek, Monrovia, CA.) was bonded from second molar to second molar upper and lower and NiTi 0.012" upper and lower were engaged to level and align, followed by NiTi 0.014" and 0.016" for this stage. The following archwires were used in posterior appointments for one month: NiTi-Cu 0.016" x 0.022" upper and lower, Niti 0.017" x 0.025", Niti 0.019" x 0.025", SS 0.019" x 0.025".

A Bilateral Sagital Split Osteotomy BSSO was performed for mandibular setback of 5mm and rigid fixation was used (Fig. 5); two autogenous bone grafts were fixed into the nasogenian areas and six temporal anchorage devices (TADS) were inserted in each cuadrant and in the middle line for the use of intermaxillary elastics after surgery (Fig. 6). The maxillofacial surgeon checked the recovery of the patient each week and three weeks later and orthodontic appointment was scheduled to start the post-surgical phase.

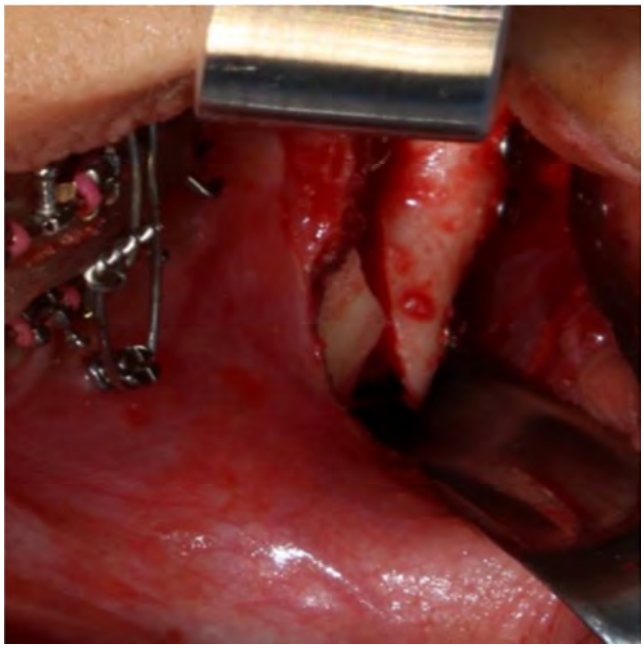

Figure 5. *Bilateral Sagital Split Osteotomy for mandibular setback.*

Figure 6. *Surgical phase finished.*

A panoramic radiograph was taken to check root alignment and bracket repositioning, Niti 0.016" x 0.022" upper and lower archwires were engaged followed by Niti 0.019" x 0.025" and SS 0.019" x 0.025" for finishing and detailing. The retention protocol was upper and lower circumferential retainers 24 hours a day.

The overall treatment time was 10 months and there were no surgical complications. Facial balance was improved and the final occlusal relationship was good. The patient was very happy with his smile the masticatory function was greatly improved and the treatment objectives were achieved. The panoramic film showed good root parallelism and no significant clinical root desorption (Figs. 7-9).

Figure 7. *Post-treatment facial and intraoral photograph.*

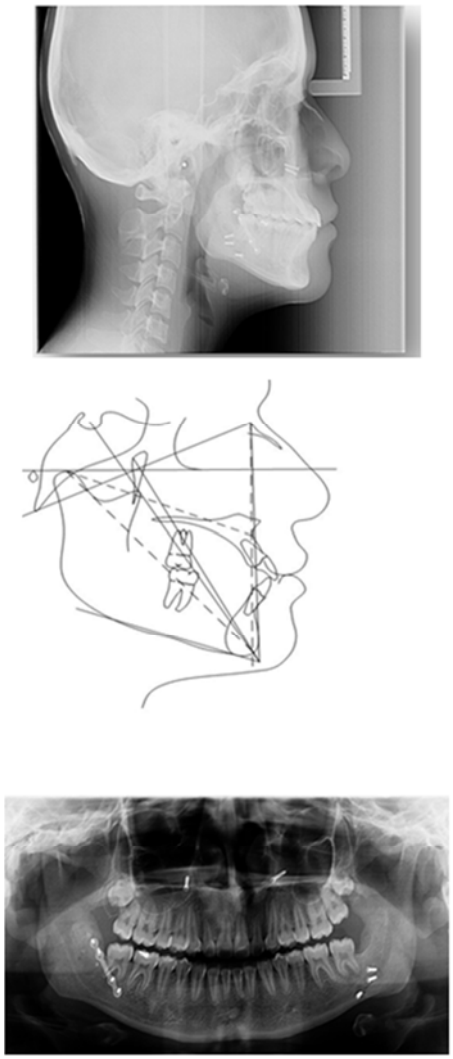

Figure 8. *Post-treatment Cephalometric and Panoramic Radiograph.*

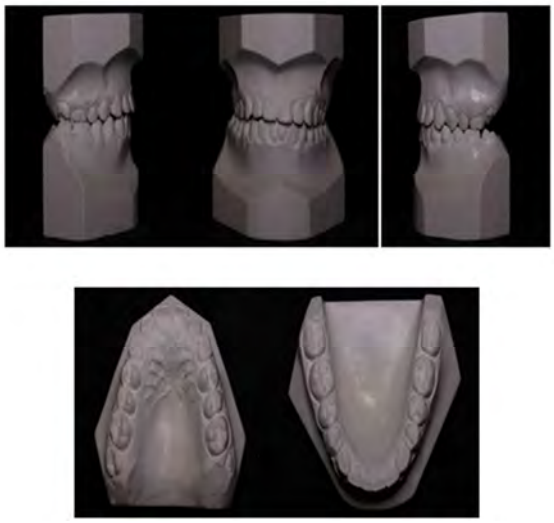

Figure 9. *Post-treatment study models.*

3. Discussion

Pre-surgical orthodontics stage in the traditional orthognathic surgery approach can be very long up to 32.8 months as reported by O`Brien K. et al., this was the mean length treatment duration at the end of a 5-year study of 71 orthodontic/orthognathic patient´s [1]. Luther et al. reported from their retrospective study that the median duration of post-operative treatment was 7.5 months with a range from 5 to 11 months [2]. The summatory of pre-surgical orthodontics treatment time, the convalescence time from orthognathic surgery and the post-surgical orthodontics treatment time can result in a very long overall treatment time.

The crucial and more difficult time to handle for the patients can be the pre-surgical orthodontic stage because there is a worsening of facial aesthetics and masticatory discomfort as a result of relieving the dental compensations. Rustemeyer J. et al. (2012), reported that the psychological factors and aesthetics exerted a strong influence on the patient´s quality of life [3].

These pre-surgical burdens are an excuse for the patients to delay or avoid surgical orthodontic treatment. Brachvogel P. et al. (1991) proposed surgery before orthodontic treatment [4] but are Nagasaka et al. (2009) who reported the “Surgery First” SF concept; they corrected a Class III skeletal malocclusion, without pre-surgical orthodontic preparation and postulated that the SF approach could be a standard procedure in orthognatic surgery [5]. Sugawara et al. (2010) [6], Yu C.C. et al. (2010) [7], Villegas C. et al. (2010) [8], Hernández-Alfaro F. et al. (2013) [9] and Aristizábal J. et al. (2015) [10] have reported the treatment of different cases successfully with this approach. The most important advantage for the patient with the Surgery First approach over the traditional one is the immediate correction of the dentofacial deformity; this benefit is well appreciated by the patients.

The traditional surgical orthodontic approach is easier to plan because after relieving dental compensations and coordination of the dentition, any dental movement required

or overcorrection needed, can be done before the orthognathic surgery increasing the stability of the final occlusion. On the other hand SF approach requires a careful case selection and predicting the final occlusion is very difficult; any surgical error can lead to failure, compromising the treatment result. In our opinion surgery first approach is a great therapeutic tool but must be executed by experienced orthodontists and maxillofacial surgeons. There is a higher case acceptance for orthognathic surgery with this approach so treatment guidelines must be established although some authors have suggested some of them as Sugawara J. et al. [6], Vipul K. et al. [11], Liou et al. [12], Jeong Hwan Kim et al. [13]. Success depends on the orthodontist and surgeon experience and treatment preferences.

The application of the new technology to the orthodontic systems allows the orthodontist to delay less treatment time in the pre-surgical and post-surgical stages. In the case reported the pre-surgical stage lasted 6 months, the convalescence period after orthognathic surgery one month and the post-surgical stage 3 months, for a total time of 10 months.

4. Conclusion

Careful treatment planning by the ortho-surgical team, proper application of biomechanics and good selection of dental orthodontic materials, allow the orthodontist to delay less time in the pre and post-surgical stages in the traditional surgical orthodontic approach, condition well appreciated by the surgical patients. New developments, trends and traditional approaches in orthognathic surgery and orthodontics must be applied to optimize clinical performance and achieve treatment goals.

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