

Correction of Class III Malocclusion and Facial Asymmetry Without Surgery Neither Extractions

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Abstract

Introduction: Class III malocclusions occur throughout the world, it may have several causes, in most studies it is proposed that the etiology of malocclusion may be due to genetic, environmental and local factors. A mandibular and aesthetic functional change is usually a challenge for the orthodontist, especially when accompanied by a temporomandibular disorder and facial asymmetry. Suitable diagnosis and treatment plan are required to achieved stable, functional and aesthetic results.

Materials and Methods: This article describes the treatment that was carried out in a patient with skeletal and Dental Class III malocclusion. Dental problems included molar and cuspid Class III relationship, anterior crossbite and facial asymmetry. Orthodontics fixed appliances were selected, aesthetic self-ligation brackets with MBT prescriptions and 0.022” slot were used to treat this case and after eight months of treatment a 10mm length Temporary Anchorage Device (TAD) was implanted in lower left retromolar area to correct the asymmetry. During the treatment, stripping was performed in lower and upper anterior teeth. Additionally, lower left third molar was removed to continue the distalization of lower arch in that side without any pain to the patient.

Results: After 2 years 8 months of treatment, fixed appliances were removed, Class I molar and canine relationship were obtained, acceptable overjet and overbite were also achieved and facial asymmetry was improved.

Conclusion: The camouflage of Class III malocclusion has its limitations because it must resolve skeletal and dental problems of the patient, making only dental movements. However, in this particular case, aesthetic, functional and stable result was achieved practicing a very conservative treatment. It is important to remark, that the facial and dental results were excellent and both patient and her parents were very impressed and pleased with the treatment.

Abbreviations: TAD: Temporary Anchorage Device; ss: Stainless Steel; NiTi: Nickel Titanium. MBT, TMA, SL.

Keywords: Camouflage; Class III; Facial Asymmetry; Laterognathia; Self-ligation Brackets; TAD

Introduction

The malocclusions have several causes, in most cases it is not one cause, it could be several causes interacting each other, most of the research proposes that the etiology of malocclusion

may be due to genetic, environmental and local factors [1].

The prevalence of a Class III malocclusion in the Caucasian white population of Europe and North America is relatively low (2–5% and 1–4%, respectively), whereas the prevalence is twice as high in the Nigerian Negroid population (8%) and higher in Saudi Arabians, Egyptians, Syrians and Lebanese (5–14%). The Mongoloid population such as Koreans, Chinese and Japanese, exhibit the highest tendency of Class III [2,3]. Comparative studies have revealed that the prevalence of a Class III malocclusion and the underlying skeletal types vary among racial and ethnic groups,

but also within the same ethnic population. In general, increased mandibular size and its forward position are more often observed in individuals of Caucasian ancestry (White Americans, British, Saudi Arabs, Croats) while the Mongoloid population such as Koreans, Japanese, Chinese and Taiwanese, appear to develop Class III malocclusions most commonly because of a shorter anterior cranial base and maxillary deficiency, that is sometimes accompanied with a large mandible [4].

This kind of malocclusion presents more difficult solution than other kinds of malocclusions. For this reason, it is necessary to understand the concept of normal or ideal occlusion, which refers to the relationships that are established by putting the dental arches in contact [1].

Class III skeletal malocclusion occurs when there is a discrepancy in the size or position of the jaw; it can occur by alteration in the upper jaw, lower jaw or combination of both jaws. For any type of Class III skeletal malocclusion Proffit [1] points out that there are three possibilities of treatment.

- 1) Modification of growth, whenever possible. This option might be the best; nevertheless, is limited to growing patients.
- 2) Camouflage the skeletal discrepancy by means of dental movements, in such a way that the dental occlusion is corrected, even if the skeletal discrepancy is maintained.
- 3) Surgical correction.

Due to the fact that in the adult patient growth has ceased, treatment options are reduced to two possibilities: camouflage or orthognathic surgery. The key question in treatment planning for an adult patient with a Class III skeletal malocclusion is to find out if camouflage is a realistic option or not. The answer must be based on the required orthodontic movements, the stability of these changes and whether or not the probable esthetic outcome complies with the patient's expectations. On the basis that in the adult patient there is no growth, the therapeutic decision is easier than in a teenager but we should always keep in mind that the psychological factors are more complex in adult patients looking for orthodontic treatment. Therefore, it becomes extremely important to have a clear idea of what are the wishes and expectations of our patient [2,5,6].

Case Report

A 24 years old female patient who comes to consultation because of the position of her anterior teeth and her facial appearance.

(Figure 1), shows initial photographs at the beginning of the treatment of the patient, who presented an oval face type, facial asymmetry, her lower facial area was increased in proportion to the middle and upper facial area, a concave profile. Intraorally the

patient presented appropriate oral hygiene, the shape of the upper arch was oval and lower arch was square, presented Class III molar and canine relationship with minimal crowding, overjet of -2mm and overbite of 2mm, the mandibular midline was deviated 3mm to the right, anterior cross bite and Spee's curvature of 0mm (Figure 2 and 3).



Figure 1: Initial extraoral photographs.



Figure 2: Initial intra-oral photographs.



Figure 3: Initial models.

The initial panoramic radiograph showed the missing of the right lower third molar. In both maxillary and mandible jaws there were good height of the alveolar crests, a good bone trabeculate and bone density, an asymmetry in the condyles was also observed, the right-side condyle is 2mm smaller and the left mandibular ramus is thinner than the opposite side (Figure 4).



Figure 4: Initial panoramic radiography.

Cephalometrically, the patient had SNA angle of 76°, SNB angle of 81°, and ANB angle of -5° (skeletal Class III). The upper incisors had a 113° angle relative to SN plane (upper incisor protrusion) and lower incisors had 102° angle relative to the mandibular plane (proclined lower incisors). FMA angle was 29°, indicating a vertical growth pattern (Table 1 & Figure 5). It is important to mention that the patient and her mother refuse any surgical option to correct facial asymmetry.

Angle	Value
SNA	76°
SNB	81°
SN-Go-Gn	35°
FMA	29°
ANB	-5°
UI to NA	12mm
UI to SN	113°
LI to NB	5mm
LI to Go-Gn	102°
Línea estética	-1mm

Table 1: Initial cephalometric values.



Figure 5: Initial lateral skull radiography.

Diagnosis

- Skeletal: Class III (ANB -5°), high angle case (FMA 29°).
- Dental: Class III molar and canine, anterior crossbite with asymmetry.
- Facial: Asymmetry in the lower facial area and concave profile and mandibular deviation.

Treatment Plan

Correct the malocclusion with orthodontics aesthetic fixed appliance 0.022" slot and MBT prescription (Clarity SL, 3M UNITEK, Monrovia Calif., USA). Furthermore, a 10mm length temporary anchorage device (TAD) was implanted in lower left retromolar area to correct the asymmetry (A1 Bio-Ray Biotech Instrument, New Taipei City, Taiwan). Stripping, power chain and intermaxillary elastics were planned to use during active treatment.

Treatment Objectives

- Try to increase SNA making suitable arch form and gingival optimal root torque of the upper anterior teeth.
- Keep value of SNB and keep vertical dimension while correcting asymmetry.
- Establish bilateral cuspid and molar Class I relationship.
- Correct anterior crossbite and asymmetry by using intermaxillary elastics.

- Created appropriate overbite.
- Keep intermolar width in 44mm.
- Consolidate inferior arch form and control relationship with optimal torque in anterior teeth, correct anterior crossbite using intermaxillary elastics and placing 1 TAD in retromolar lower left area to retract the hole dentition.

Treatment Alternatives

There were three treatment alternatives for this Orthodontic case. In all alternatives orthodontic fixed appliance was required in combination with the following possibilities:

1. Bimaxillary surgery but the patient and her mother refused any surgical option to correct facial asymmetry.
2. Asymmetrical extractions of the lower bicuspid.
3. 1 TAD in retromolar lower left area.

Treatment Progress

Patient refused extractions of bicuspid as well as any kind of orthognathic surgery. In this sense, 3rd option was selected. This was the most conservative alternative and 1 TAD was placed in retromolar lower left area. Orthodontics fixed appliances were bonded in both arches 7 to 7. The arch sequence was the following: 0.014" NiTi, 0.016" NiTi, 0.017x0.025" TMA, 0.017x0.025" ss and 0.019x0.025" ss.

In both arches stripping was performed to improve interproximal contacts and spaces were closed by using a power chain 7 to 7 in 0.017x0.025" ss arch wire. After eight months of active treatment in lower left retromolar area a 10mm TAD was implanted to correct asymmetry and midline, this was carried out by activating a mild force close coil (13 mm), intermaxillary elastics were prescribed to correct midline. During treatment lower left third molar was removed to retract more the hole dentition without any discomfort to the patient (Figure 6).



Figure 6: Treatment accomplished.

Finishing

After 2 years and eight months of active treatment; brackets were debonded and in the upper arch wraparound retainer was placed; whereas in lower arch a fixed retainer was bonded from 33 to 43 (Figure 7).



Figure 7: Retainers after finishing treatment.

Treatment Results

SNA angle was increased 6°, SNB angle was slightly increased after treatment (Table 2), a Class I molar and canine relationship were established, anterior crossbite and asymmetric were corrected by using intermaxillary elastics and one TAD, appropriate overbite was created, the hole dentition was retracted and the problem was solved without surgery neither extractions. The patient and parents are highly satisfied with the final results (Figure 8 and 9).

Angle	Before treatment	After treatment	Differences
SNA	76°	82°	6°
SNB	81°	83°	2°
SN-Go-Gn	35°	31°	4°
FMA	29°	28°	1°
ANB	-5°	-1°	4°
UI to NA	12 mm	7 mm	5 mm
UI to SN	113°	108°	5°
LI to NB	5 mm	4 mm	1 mm
LI to Go-Gn	102°	93°	9°
Línea estética	-1 mm	-2	1 mm

Table 2: Cephalometric summary.



Figure 8: Final intra-oral photographs.



Figure 9: Final radiographs.

Discussion

A Class III malocclusion is an anomaly that is difficult to correct, especially only using orthodontic fixed appliances. This malocclusion is a common clinical problem in patients of Asian or Mongoloid descent. These skeletal abnormalities are the result of the disharmony of growth between the jaw and the maxilla and this

produce a concave facial profile. The patients with skeletal Class III malocclusions exhibit maxillary retrusion, mandibular protrusion, or a combination of both [7].

The orthodontic camouflage of skeletal Class III malocclusions has been a controversial subject due to the limitations that this treatment has. However, with the adequate knowledge and diagnosis, the objectives are able to achieved at the end of the treatment [8,9].

A skeletal Class III malocclusion is one of the most difficult problems for an orthodontist in daily practice but if young patients and adolescents are diagnosed on time (in growth and development), can be easily treated with growth-modifying devices unlike patients whose growth potential has been completed, these must be camouflaged by orthodontic dental movements with fixed devices or surgically treated. The camouflage treatment is the movement of the tooth in relation to its supporting basal bone to compensate for the dental position [10].

The most important decision that the orthodontist should take, it is between camouflage and surgery, this decision should be based on whether the aesthetic and dentofacial improvement achieved with surgery is worthwhile or not, the increase in the cost of treatment and the risk to the patient. Obviously, the risk of a surgery is much greater than that the patients treated with camouflage [11].

Sadao [9] mentioned that in a camouflage of dental and skeletal Class III it is important that this decision is totally dependent on the diagnosis made for each patient.

Conclusion

The camouflage in a Class III malocclusion has its limitations because it must resolve the skeletal and dental problems of the patient by performing only dental movements.

The success of the camouflage treatment in this patient required a combination of elements such as: a good diagnosis, a carefully sequenced treatment plan and patient cooperation.

It is important to point out that the patient did not receive any surgery to correct facial asymmetry and the treatment time was for 2 years and 8 months where the correction of the crossbite and Class III malocclusion was achieved.

In this particular case, aesthetic, functional and stable result was achieved practicing a very conservative treatment. It is important to remark, that the facial and dental results were excellent and both patient and her parents were very impressed and pleased with the treatment.

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