Orthodontic Correction with Camouflage of Skeletal Class III Patient

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ABSTRACT

Introduction: One of the main problems in orthodontics treatment with skeletal Class III patients is making the decision on how to carry out the treatment, deciding whether to perform surgery, or orthodontic camouflage with or without extractions. A 13-year-old female patient presents with Class III skeletal, anterior crossbite, straight profile, Class I molar, Class III canine left subdivision. **Objectives:** To present the orthodontic follow-up of a Class III patient who underwent orthodontic camouflage without extractions. **Case presentation:** Prescription MBT™ 0.022" appliances and

Essix retainer with acrylic planas direct track were used in the mandibular dental arch, to lift the bite and give the opportunity to vestibularise the antero-maxillary sector and correct the cross-bite. Starting with the alignment and levelling phase, using archwires. An orthopantomography was requested to verticalise roots and was completed with braided archwires and intermaxillary elastics for detailing. As a result, the anterior crossbite was corrected, the straight profile was maintained, we achieved Class I molar and canine, and the smile was improved. **Conclusions:** It is possible to successfully camouflage a Class III patient as long as we know the skeletal, facial, dental and functional limits of each patient.

Keywords: Class III skeletal, Camouflage, MBT prescription.

INTRODUCTION

The Class III skeletal relationship has been studied for a long time, and conflicts continue to exist regarding decision-making about the treatment to be performed. Many cephalometric analyses have shown that surgical treatment results in a better appearance of the facial profile. However, it is reported that only in 40% of cases is the ANB angle corrected, formed by the union of A point (A or subspinal), N (Nasion) and B point (B or supramental), while 52% report an excessive SNB angle formed by the intersection of S plane (sella)-N and N-B point. While dental inclinations are modified, the angle of the mandibular incisors ends with an average of 87° while the maxillary incisors can end up with an excess of proclination in a range of 115°. Not to mention that many times the profile does not achieve a radical change in the patient[1]. That is why we must be especially careful when deciding on the type of treatment we will carry out, and review the dental inclinations in advance, because during the treatment they could increase and cause unwanted effects. For this reason, several authors have established reference values to decide between surgery or orthodontic camouflage[1-7].

According to Kerr *et al*.,[8] if we have an ANB angle less than -4°, if the inclination of the mandibular incisor is less than 83° and the Holdaway angle between 7° and 14°, the most feasible treatment is orthognathic surgery. They also propose that the anteroposterior (A-P) distance, the inclination of the incisors and the dentofacial appearance are criteria that we should take as a reference. Stellzig-Eisenhauer *et al*., consider that the critical limit for performing orthodontic treatment is seen in a 2 mm maxillary incisor protrusion combined with a 3 mm mandibular incisor retrusion[3].

Orthodontic camouflage treatment is ideal in patients with mild dentofacial anomalies with the following inclusion criteria: no growth remnant, slight discrepancy in skeletal relationships, reasonably good dental alignment and no alterations in the vertical or transverse plane. Stabilization at the end of treatment is of utmost importance; otherwise, the Class III pattern resumes its growth[9,10]. One of the most worrying risks during camouflage is the thinning of the cortices, which is why Stellzig-Eisenhauer *et al*.,[3] point out that the labial and lingual cortices of the palate, and the symphysis, will be our barriers to dentoalveolar compensation.

Recent studies focus on the importance of using more 3D images as diagnostic methods, highlighting the variants that could affect the result of our treatments, taking into account factors such as dental inclinations; discrepancies in the vertical, transverse and anteroposterior sense, in addition to periodontal approaches such as the cortical bone dimensions, premature

contacts and condylar position, to ensure greater stability[4,11-13]. This paper presents the case of a patient who underwent orthodontic camouflage of a Class III skeletal without extractions.

CLINICAL CASE PRESENTATION

A 13-year-old female patient, with no relevant medical history, who came to the clinic with the complaint "*I have a bad bite*". Facially, her lower middle third was enlarged, with a round face and straight profile, a medium nose and thick lips (Figure 1. A). Intraorally, she had permanent dentition, anterior crossbite, Class I molar malocclusion, Class III canine left with Subdivision, medium and square teeth, deep bite, mandibular incisors protrusion and maxillary incisors retrusion, inferior midline deviated 1 mm to the right, diastema between teeth 33 and 34 (Figure 1. B). Square arch shapes, 4 mm overbite, -2 mm overjet, 0 mm curve of Spee, arch discrepancy with 5.5 mm mandibular excess.
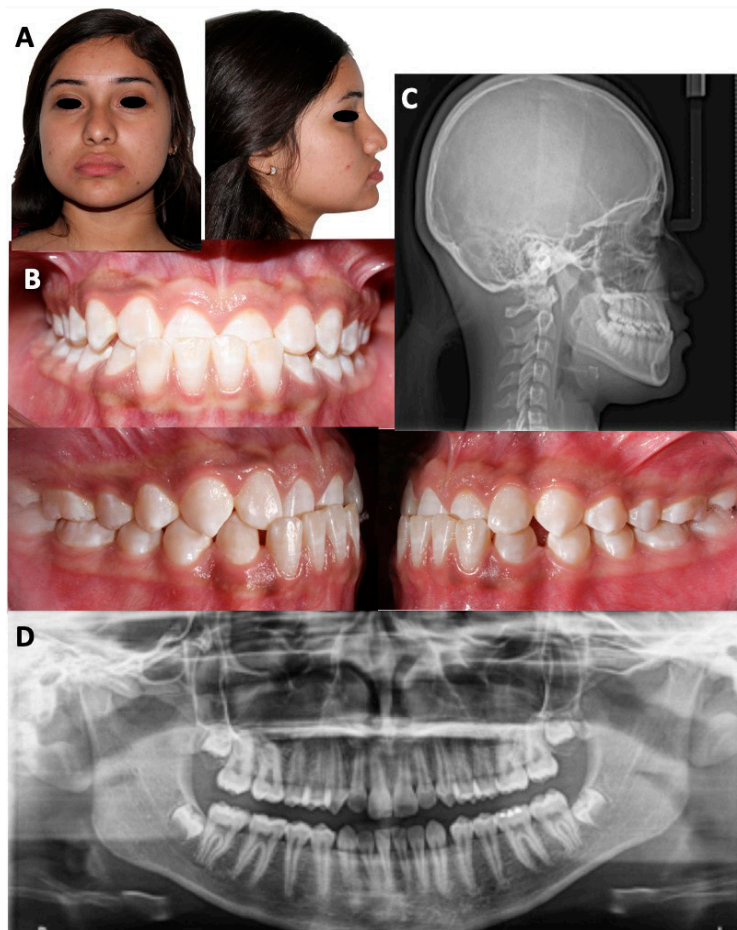

Figure 1. Initial photographs and radiographs. A. Initial extraoral photographs, augmented lower middle third with straight profile and round face. B. Initial intraoral photographs, anterior crossbite, Class I molar malocclusion, Class III canine left and Class I right, medium and square teeth, deep bite, protruded mandibular incisors and retruded maxillary incisors. C. Lateral radiography of the skull, the skeletal discrepancy is observed with a long mandibular body, in Lamparski analysis it is in stage 6 of Completion. D. Orthopantomography, patent airway, wider left mandibular ramus, asymmetric condyles, presence of 4 third molar germs.

Radiographic imaging showed a patent airway, wider left mandibular ramus, asymmetric condyles, presence of 4 third molar germs, 2:1 root ratio and healthy bone crest levels (Figure 1. C). On the lateral skull radiography, the skeletal discrepancy is observed, with a long mandibular body. In the Lamparski analysis it is in stage 6 of Completion (Figure 1. D).

The Steiner Analysis was performed in the Dolphin Imaging software Version 11.8, projecting a Class III skeletal with a normal maxilla and mandibular prognathism, proclined mandibular incisors, retroclined maxillary incisors, counterclockwise growth (Table 1). The objective of the treatment was to correct the anterior crossbite, maintain a straight profile, maintain Class I molar, achieve Class I canine, establish an anterior guidance and improve smile, without performing extractions. Fixed prescription appliances MBT slot 0.022" bands with upper double tubes MBT 0.022", Essix retainer were placed in the mandibular dental arch with an acrylic planas direct track in the posterior, to be replaced by appliances. The alignment and levelling phases, occlusion detailing and final retention (circumferential plate in the maxilla and fixed lingual retainer in the mandible) continued.

Table 1.
Steiner analysis values before and after treatment.

	Standard	Initial	Final
SNA	82°	83°	83°
SNB	80°	86°	86°
ANB	2°	-3°	-3°
GO-GN-SN	t	31°	31°
SN-Occlusal Plane	14°	17°	14°
Is-NA	22°	13.5°	33°
Is-NA Sec	4mm	3mm	9mm
Is-Plane S-N	103°	97°	116°
Ii-NB	25°	26°	17°
Ii-NB sec	4mm	3mm	1mm
Ii-Mandibular plane	90°	89°	81°
Interincisal	131°	143°	132°

It began only with brackets on the maxillary dental arch with 0.014" Nickel Titanium (NiTi) archwires, beginning the alignment phase, with stops on maxillary first molars to lift the bite (Figure 2. A). The alignment continued and a 60-gauge rigid acetate plate with an acrylic planas direct track was placed on the mandibular dental arch at the posterior level to increase the bite, facilitating the correction of the anterior crossbite (Figure 2. B).

Once aligned, a 0.016" x 0.022" NiTi archwire was placed. Correction of the anterior crossbite was achieved after three months, the acetate plate was removed, and tubes and brackets were placed in the mandibular dental arch with a 0.014" NiTi archwire. Subsequently, a sequence of 0.016" x 0.022" NiTi archwires was followed in the mandibular dental arch and 0.017" x 0.025" stainless steel (ss) in the maxillary dental arch, the molar-to-molar chain was changed 3 times, once per month to close gaps (Figure 3).

Once the gaps were closed, the 0.010" metal ligature was placed to prevent them from opening again. An orthopantomography was taken in order to see parallel roots, the brackets on teeth 12, 22, 45, 44 and 43 were replaced and 0.017"x0.025" 8-wire braided upper and lower archwires were used (Figure 3. B). For detailing, 0.017" x 0.025" ss upper and lower archwires

Figure 2. Alignment and levelling. A. Start of treatment, alignment and levelling of maxillary teeth with a 0.014" NiTi archwire, with use of bite stops to release the anterior teeth. B. 60-gauge rigid acetate plate with an acrylic addition to correct anterior crossbite, bite stops removed.

Figure 3. Treatment progress. A. 0.017" x 0.025" ss upper archwire, chain from molar to molar. B. 0.017" x 0.25" ss archwire and metal ligature from molar to molar to stabilise after having closed the interproximal gaps and chain from upper left centre to upper right centre to close diastema.

and vector class III 3/16" 4.5 oz intermaxillary elastics were placed. It was concluded with 0.017" x 0.025" braided archwires of 8-strand and continued with ¼" 4.5 oz settling elastics. Finally, orthodontic appliances were removed. Retention was done with a maxillary circumferential plate and fixed lingual retention in the mandible.

At the end of the treatment, the straight profile was maintained. Figure 4. A shows improvements in smile, correction of the anterior crossbite. Figure 4. B shows Class I molar and canine corrections. Good root parallelism (Figure 4. C), maxillary incisors proclination and mandibular incisors retroclination were obtained (Figure 4. D) (Table 1). In the superimposition, the clockwise rotation of the mandible, the downward projection of the chin, the change in the position of the molars and incisors to achieve compensation can be seen, accompanied by a change in the position of the lips, improving the profile.
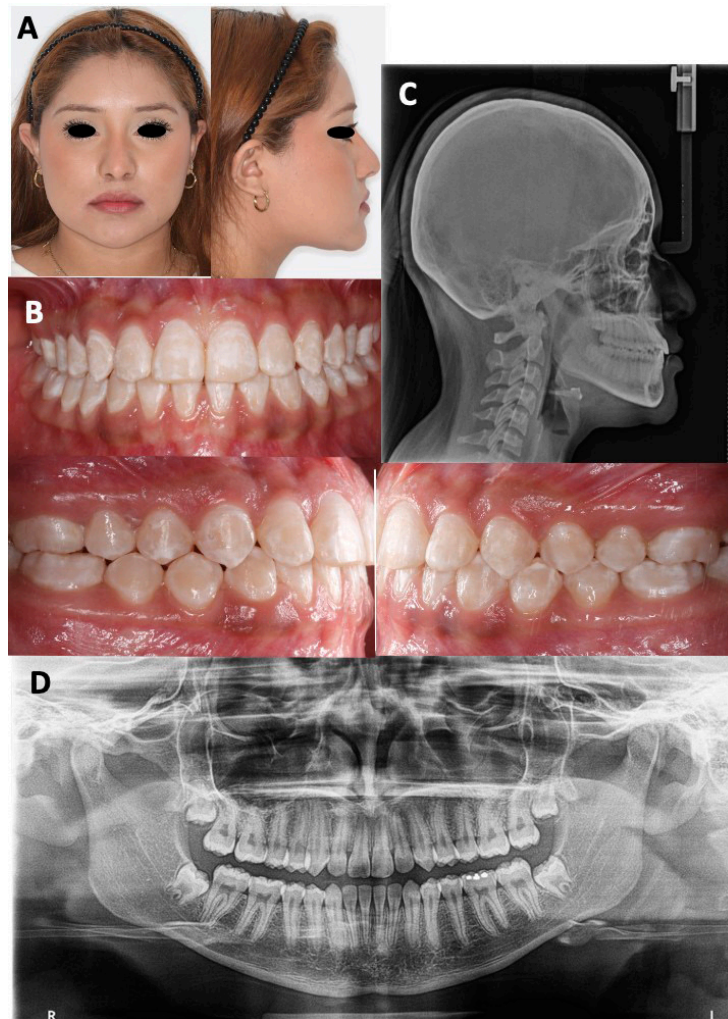
Figure 4. Final photographs and radiographs. A. Final facial photographs from the front and side. B. Final intraoral photographs showing Class I molar and canine with good occlusal seating. C. Final lateral skull radiograph: maxillary incisors proclination, mandibular incisors retroclination, good labial projection. D. Final orthopantomography with good root parallelism.

DISCUSSION

It was decided to treat the patient with camouflage due to the initial clinical characteristics, making dentoalveolar changes that allowed Class III skeletal to be compensated. Vertical growth, anteroposterior relationship, inclination of the incisors and facial profile were taken into account, as some authors recommend[4,9,10,14].

The Steiner analysis results showed an ANB of -3, which is therefore within the values to avoid surgical treatment according to Kerr *et al*.,[8] It is important to highlight that we also use a slight expansion of the dental arches and use the small spaces in the dental arches to make the necessary compensation movements. The patient has no remnant of growth, however, the discrepancy is slight, so it was decided to perform compensation treatment as suggested by Eslami *et al*.,[2] To establish a correct treatment, it is necessary to analyse the age of the patient, recommending surgery in patients who have no remaining growth and compensation when the discrepancies are very slight.

Currently, most specialists recommend the use of three-dimensional images for a better diagnosis, because more points and measurements can be located that help with the skeletal and soft tissue relationship[4,11-13,15,16]. However, a two-dimensional image, as in this case, yields sufficient values to choose the treatment properly. Treating patient with anterior crossbite at an early age will avoid wear on the incisal edges of the antero-maxillary teeth, as mentioned by Jang *et al*.,[12] Regarding the wear of teeth in orthodontic treatment, they reveal that among patients treated with camouflage, adults presented greater wear than adolescents, although this difference was not significant. There is significance in treating patients without camouflage at an early age even if the treatment is longer. However, the age at which the patient reached seeking crossbite correction had already completed their growth. This directly influences treatment decisions and possibilities.

Koo *et al*.,[13] conducted a study to evaluate the width discrepancies in the estimated dental arch at the centres of resistance; they compared normal occlusion with Class III skeletal malocclusion. They found differences in a transverse direction, attributing in part to the position of the tongue which, as they explain, does not allow the lingual inclination of the molars, thus changing the arch shape and causing interference when trying to correct Class III, in addition to the collapse of the palatal vault. So, they suggest rapid palatal expansion to compensate for these discrepancies and use 3D images for diagnostics. For this reason, it is important to classify and measure the dimensions of the basal bone, dental inclinations, contact points and gingival phenotype of patients. These factors may adversely affect treatment, causing side effects besides movements such as dehiscence, joint pain, opening the bite, with transverse and vertical effects. In our case, it was considered that the patient did not present a significant transverse discrepancy, without the presence of a posterior crossbite, with a favourable gingival phenotype without the need to create rapid palatal expansion, observing good inclination of the molars where no unfavourable changes were found at the time of decompensation.

Lee *et al*.,[4] evaluated the position of the lips in the Class III skeletal relationship, where they demonstrated that the most effective way to correct these discrepancies is surgical treatment of either the maxilla or mandible, or both, and that treatments with camouflage do not achieve favourable results. Therefore, one of the objectives is to correct the facial profile, we must keep in mind that the changes are limited when deciding on a camouflage treatment. In the present study, the aim was to maintain the dimensions with which the patient presented herself, without modifying the position of the soft tissues, and this was one of the reasons why it was decided to compensate without making extractions.

According to a study carried out by Kim *et al*.,[5] compensation for a Class III skeletal is obtained by proclination of the maxillary incisors and a flattening of the occlusal plane to obtain a positive overbite. In this case it begins with an occlusal plane of 17° and ends at 14°, changing the retroclination of the maxillary incisors to a proclination, thus achieving a positive overbite. De Oliveira *et al*.,[17] presented a clinical case of Class III skeletal that was treated with a self-ligation braces system and intermaxillary elastics. The results obtained coincide with our case, although the 0.022" MBT technique was used, so it can be said that a self-ligation braces system is not mandatory to meet the objectives of Class III skeletal compensation.

Recently, microscrews and miniplates have been used to provide Class III camouflage and avoid surgery[15-18]. However, as shown by Ferret *et al*.,[18] this is done in patients with an ANB angle less than -5 and although the compensation objectives are achieved, the mandibular incisors end up with greater retroclination, as in their clinical case the incisor mandibular plane angle ended with 74°. In our case it ended with 81°, which gives us a better prognosis in the stability of the treatment.

Park *et al.*,[19] recommend using palatal expansion and a protraction mask at night in Class III patients with a flat mandibular plane angle to induce downward and backward rotation of the mandible, without the need for extractions. The angle of the mandibular plane presented in this case is 1° below the norm, so this type of treatment was not considered, avoiding the discomfort that could be caused by the use of the palatal expander and the protraction mask.

CONCLUSION

Camouflage treatment is a very good option if we know how to accurately diagnose and predict dental inclinations due to the treatment mechanics that we apply, with good functional and aesthetic results without the need to extract or perform surgery, reducing treatment time, post-surgical pain and the additional costs that they represent for the patient.

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