

Class III Surgical Patient with Conventional Management

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Abstract

Introduction: The treatment of class III malocclusion in adults can be approached from dental camouflage to interdisciplinary surgical treatment. The selection of treatment will depend on the severity of the maxillary-mandibular bone discrepancy and symptomatology of TMJ problems. **Case Report:** A 19-year-old female patient shows up at the campus of the Autonomous University of Baja California (UABC) Tijuana, México requesting orthodontic treatment. **Diagnosis:** At the extraoral inspection, mandibular prognathism and TMJ pain, intraoral retroclination of lower incisors and proclination of the superior incisors are observed. **Treatment:** The orthodontic treatment of choice was to prepare the patient for the orthographic surgery, always having an interdisciplinary approach from the beginning with the maxillofacial surgeon. **Result:** The objectives set from the beginning were achieved, the TMJ problem was eliminated improving the masticatory functionality and the patient's facial appearance. **Conclusion:** The success of the treatment of this type of patients depended on the correct diagnosis, as well as the interdisciplinary approach.

Keywords: class III malocclusion, orthognathic surgery, mandibular prognathism.

Date of Submission: 11-03-2020

Date of Acceptance: 25-03-2020

I. Introduction

Class III malocclusion was defined by Edward H. Angle for the first time in the year 1889, as one in which the lower molar is located mesially in relation to the upper molar and the alignment (or lack thereof) of the teeth with reference to the occlusion line^{1,2}. Over time this definition was acquiring certain modifications, including data that were discovered as the relationship of the jaw with the maxilla and its growth pattern; therefore, in a mandibular class III relationship, it is in a more mesial location in relation to the maxilla and / or the cranial base². These malocclusions when they occur severely can alter or compromise the patient's state of health, causing for example speech disorders, masticatory dysfunction, poor oral hygiene, even a temporomandibular joint dysfunction, that is why the orthodontist must be able to diagnose and plan a treatment to treat the patient correctly³.

Within the diagnosis, the etiology of the malocclusion must be recognized, which is multifactorial (genes, ethnicity, environmental, habits, etc.), producing both skeletal and dental physiological compensation components, presented individually or in combination, which will be characterized by a mandibular prognathism, a maxillary retrognathism, retrusive mandibular incisors and protrusive maxillary incisors⁴. Producing in this way in some occasions a molar relationship class I but with a skeletal pattern class III². For a final and definitive diagnosis of a class III malocclusion we could rely on the following points:

- Presence or absence of a habitual predisposition.
- Cephalometer parameters, which include a decrease in ANS, negative ANB, mandibular length.
- Incisal relationship.

Once the diagnosis is established, it is necessary to carry out the patient's treatment plan, always taking into account the stage of facial skull development of the patient or if it is over and it is an adult patient¹. If we include the therapeutic methods of this type of malocclusion we find orthopedic devices either introral (modified Bionator III, Frankel III, etc.) or extraoral (facial mask, etc.) that will help us to an early modification of growth; dental compensation or orthodontic-surgical treatment in patients whose growth has ended (adults)³.

In order to define the treatment plan, it is necessary the authorization and consent of the patient who will be presented with the different alternatives of how to treat their case and the possible risks that each one of them implies. In a compensatory treatment with severe skeletal discrepancies, labial gingival recessions and increased mobility of the anterior teeth may occur⁵. However, this may be a treatment option in those patients who do not wish to undergo a surgical procedure and who have not so severe concave profiles which can be modified to make them straight improving the aesthetics, as they have been reported in certain studies⁶.

Orthodontic-surgical treatment is not absent from certain complications such as the absence of post-surgical stability for which a bimaxillary procedure (maxillary advancement and mandibular setback) is suggested to reduce recurrence that could occur in class III malocclusions with an alteration of the development of both components¹. This is the treatment of choice in adult patients who present various dentofacial anomalies and who wish to improve their facial appearance, having a high percentage of success taking the overjet and soft tissue profile to ideal ranges in class III malocclusions⁷. The main reported concern of pre-treatment patients is impaired masticatory function and dissatisfaction with their facial appearance, once the procedure has been performed, patients have reported being satisfied with the results, improving the quality of life related to oral health⁸.

II. Case Report

A 19-year-old female patient shows up at the postgraduate orthodontic clinic of the Autonomous University of Baja California (UABC) Tijuana, México, referring as a reason for consultation "I have a bad bite and sometimes it hurts", anamnesis does not refer to suffering from any type of disease nor be under any type of medical treatment. (Fig. 1).



Fig. 1 Initial Photographs

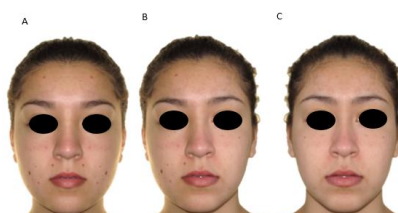


Fig. 2 A) Right halves, B) Original, C) Left halves

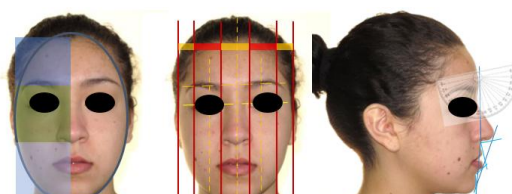


Fig. 3 Extraoral Analysis

Extraoral Analysis. A type of leptosomic face is observed presenting asymmetric superciliary and bipupillary line, as well as labial incompatibility. If we compare the right and left facial hemispheres, the asymmetry becomes evident (Fig. 2). On exam of facial proportions, we find an enlarged lower third (Fig. 3). In the profile view we see a concave profile in which the lower lip is protruded and 2mm ahead of the Ricketts E line, an acute nasolabial angle (88°), as well as a 2mm labial GAP.

Intraoral Analysis. It has an anterior cross bite of -2mm, horizontal fracture of mandibular left central incisor, incisal wear of the upper anterior incisors, lower dental midline 1mm deviated to the right, left and right canine and molar ratios class III, 10% overbite (Fig. 4). Rectangular upper and lower arch forms, multiple rotations and presence of lower third molars.



Fig. 4 Pre-treatment Photographs

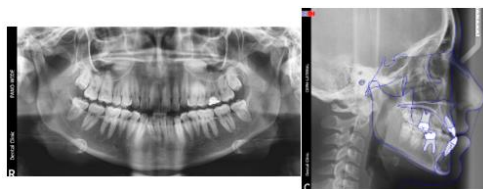


Fig. 5 Initial Panoramic Radiograph and Cephalometric Tracing

Among the routine pretreatment studies that are requested from the patient are the panoramic and lateral skull radiography, in which the cephalometric tracing is performed (Fig. 5) and the results are shown in Table 1.

Diagnosis. Based on the cephalometric results, they help us to support what is clinically evaluated in which the patient presents a class III skeletal pattern (ANB -2° and Witts appreciation -7°) due to mandibular prognathism (mandibular length 80mm), lower incisor retroclination (I1 / Go-Gn 87°), both molar and canine class III relationships, a vertical growth pattern (Go-Gn / SN 39°) and presence of upper third molars in eruptive process and lower ones already present in the mouth. Facial asymmetry presented on the right side is awarded to soft tissues. Upon palpation of the TMJ she presented moderate pain.

Treatment Plan. In order to meet the expectation of treatment, the decision was made together with the patient to carry out an interdisciplinary approach with the periodontist for the evaluation of the periodontal thickness and the maxillofacial surgeon, with which the sequence to be followed for conventional decompensation was defined by orthodontic treatment before submitting it to the surgical procedure which is summarized below:

- Placement of fixed appliances upper and lower MBT slot 0.018 (Pre-surgical)
- Alignment and leveling (turbo bites in posteriors) (Pre-surgical)
- Preoperative radiographic studies (lateral skull, panoramic and anteroposterior) and study models
- Orthognathic surgery. Sagittal osteotomy of the bilateral mandibular branch
- Arch re-leveling (Post-surgical)
- Torque and root parallelism (Post-surgical)
- Detailed. Restorations in anterior teeth
- Retention

	Means	Initial	PRE-Surgery	POST-Surgery
SNA	82°	76°	75°	79°
SNB	80°	78°	79°	78°
ANB	2°	-2°	-4°	1°
Ang 1s / SN	104°	105°	109°	110°
I1 / Go-Gn	90°	87°	90°	91°
Mandibular Length (Go-Me)	71 mm	80mm	80mm	80mm
Anterior Cranial Base (S-N)	71 mm	66mm	66mm	66mm
Mandibular Length / BCA	1:1	LM>LBCA	LM>LBCA	LM>LBCA
Go-Gn / SN	32°	39°	39°	36°
Witts	0 mm	-7 mm	-9 mm	-2 mm

Table 1. Cephalometric Measurements

Sequence of Pre-Surgical Orthodontic Treatment. Once the prophylactic procedure has been carried out, which is divided into a periodontal phase (prophylaxis) and an operative phase (review of present seals, restoration of those with caries and extraction of 3rd molars), the fixed appliance with MBT prescription was cemented slot 0.018 X 0.025 and turbo bites were placed at the level of the second lower molars for greater expression of the arches. The sequence of arcs both at the top and bottom during the alignment and leveling stage was: .014 NiTi, .016 NiTi, .016X.016 NiTi, .016X.022 NiTi, .016X.022 SS, .017X.025 NiTi and .017X.025 SS. Arrived at SS arches, the patient is asked for pre-surgical radiographs (panoramic, lateral of the skull and anteroposterior) in which cephalometric traces are made to assess the progress of the treatment (Table 1) and impressions are taken to assess inter-occlusal contacts, as well as perform surgical simulation on the models (Fig. 6). Interconsultation is requested with the maxillofacial surgeon who suggests with the studies provided, which include extraoral photographs (Fig. 7), that the patient is in optimal conditions to proceed to the surgical step, which was programmed as a mandibular retraction of - 5mm using the sagittal osteotomy technique of the bilateral mandibular branch and the removal of the Bichat fat ball from the right side to improve facial asymmetry.

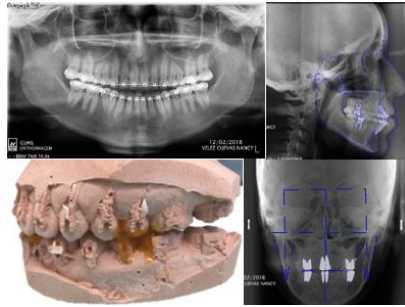


Fig. 6 Radiographic and Pre-Surgical Model Studies



Fig. 7 Pre-Surgical Photographs

The study models are assembled in a hinge articulator in the ideal mandibular position on sagittally correcting both arches, increasing the overjet and bringing the molar relationship almost to class II in case some type of post-surgical recurrence occurs. The interocclusal splint is constructed on this assembly (Fig. 8) which will be used as a guide during surgery.

In the orthodontic part, the patient was prepared by placing upper and lower surgical arches .017X.025 SS with interdental welded hooks (Fig. 9).



Fig. 8 Interocclusal Splint



Fig. 9 Pre-Surgical Intraoral Photographs

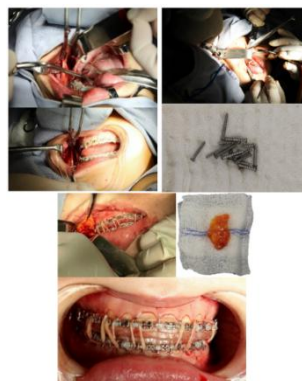


Fig. 10 Surgical Procedure

Surgical Procedure. In summary, bilateral sagittal osteotomy of the mandibular branch is performed with the help of a reciprocating saw and burs to achieve the planned -5mm recoil, once performed, the

interocclusal splint is placed with garters intermaxillary supported by welded hooks to help stabilize the jaw which at the moment is a free body and fixation which was done using an intermediate fixation using 3 monocortical screws on each side of the mandibular branch⁹. After the osteotomy, bichectomy was continued on the right side only, leaving the interocclusal splint with the elastics during the first healing phase¹⁰ (Fig. 10).

Post-Surgical Orthodontic Treatment Sequence. This lasted approximately 8 months which was oriented to achieve root parallelism by repositioning several brackets, therefore had to return to light arches and subsequently follow the aforementioned sequence of arches, at this point the reconstruction of the incisal edges of the anterior superior teeth is planned. Once in .017X.025 SS arch, work was done to improve the intercuspitation, midline and control of the overjet by means of intermaxillary elastics CIII of the right side and CII of the left side, achieving the closure of residual spaces by means of elastomeric chain. Once the treatment objectives have been achieved, it is decided to remove the fixed appliance and place the upper and lower removable retention (Fig. 11).



Fig. 11 Removable Retention

Results. Through the interdisciplinary approach and the cooperation of the patient we managed to meet each of the objectives set at the beginning of the treatment. We solve the TMJ pain that the patient presented due to occlusal interferences. In the intraoral aspect we corrected the dental crowding, we obtained a broad and consonant smile, as well as the upper dental midline with the lower one. The molar and canine class I were reached and with them the laterality and protrusive functional movements without subsequent interference. If a -2mm negative overjet was achieved, it was positively improved to 2mm by solving the anterior cross bite (Fig. 12). In the extraoral part we managed to solve the mandibular prognathism, obtaining a facial harmony, a lower lip in a better position in relation to the Ricketts E line and the reduction of the frontal asymmetry of the right side (Fig.13,14). In panoramic radiography we can observe the root parallelism which will help us to the stability of the long-term occlusion (Fig. 15).



Fig. 12 Post-treatment Intraoral Photographs



Fig. 13 Comparative Pre-Surgery and Post-Surgery



Fig. 14 Post-treatment Extraoral Photographs

On the lateral radiograph we can observe the skeletal and dentoalveolar changes that occurred during the treatment. The cephalometric tracing (Fig. 16) shows a proinclination of both the upper and lower incisors, as well as a relationship between the maxilla and the positive jaw (see data in Table 1). In the superposition of the pre and post treatment cephalometric tracings we can observe the improvement of the profile, as well as the mandibular recoil that was carried out (Fig. 17).



Fig. 15 Final Panoramic Radiograph



Fig. 16 Final Cephalometric Tracing



Fig. 17 Superimposition: Green (Pre-treatment), Blue (Post-treatment)

III. Discussion

Interdisciplinary treatment in adult patients is of utmost importance at the time of making the diagnosis and subsequently the treatment plan prioritizing the sequence according to the level of importance¹¹. When the case was analyzed in this way, the decision of an orthodontic - surgical treatment was taken from the beginning due the TMJ problem and the skeletal maxillary-mandibular discrepancy that the patient present. The initial inclination of the lower incisor and thin periodontium made other ways of addressing impossible, to name a few, a camouflage couldn't be an option in which the distalization of the lower arch would be considered to solve the problem of the anterior cross bite, which is one of the initial reasons for consultation, but the periodontium would be compromised.⁶ First surgery is another of the possible approaches since there are conditions to carry it out, but for economic reasons at the time and the possibility of a second intervention was ruled out^{12,13}.

In this case, only the sagittal osteotomy of the mandibular branch was performed, which has a good long-term stability, because the nasogenian region was not depressed and followed a uniform contour, this helped us to reduce the pre-surgical movements preventing damage the periodontium and avoiding the extraction of the first upper premolars if the decision of a maxillary advancement had been made^{1,14}.

IV. Conclusions

Surgical treatment in adult patients with a skeletal CIII malocclusion should be planned based on a correct diagnosis, for the reasons why they go first to consultation, as well as be approached interdisciplinarily by specialists with knowledge and skills (orthodontist –periodontist–maxillofacial surgeon) to obtain predictable, satisfactory and stable results in the long term.

In patients with this type of malocclusion in which there is no physiological compensation and skeletal patterns show us a maxilla without alterations of growth, zygomatic bones with good proportions and a prognata jaw, a surgical treatment called sagittal osteotomy of the branch can be chosen mandibular, which helps us solve the protrusion by improving aesthetics and functionality, thereby increasing people's self-esteem, safety and oral health. Sometimes some patients will require psychological therapy to help them accept facial changes.

When performing these surgical procedures, the limitations of both mandibular and maxillary displacement should be taken into account and realistic when making predictions or considering treatments for patients whose prognosis is not favorable.

Another point to consider is that these surgical movements help us to relieve TMJ pain due to the establishment of a correct occlusion, eliminating premature contact points caused by bone discrepancies already mentioned.

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