

Early Orthosurgical Treatment of a Skeletal Class III: Can the Self-Esteem Be Improved?

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ABSTRACT

Young patients with a skeletal Class III malocclusion with a strong psychological and appearance impact may require surgical correction during their growth. This case report describes the orthosurgical treatment of a 11-year-old boy with history of bullying, presenting severe Class III skeletal malocclusion, anterior cross-bite and mandibular prognathism. He also had significant vertical and anteroposterior discrepancies and a concave profile with prominent lips. The treatment plan included extraction of the first premolars, a maxillary LeFort I osteotomy and a mandibular bilateral sagittal split osteotomy. The orthodontic treatment combined with the two-jaw surgery improved his jaws alignment, occlusal function, and the most important: his self-esteem and quality of life.

Keywords: Class III Treatment, Orthodontic Treatment, Orthognathic Surgery, Quality of Life, Treatment Timing

Introduction

Skeletal class III has always been a challenge for dentists. This malocclusion is described as a sagittal discrepancy between the jaws due to maxillary skeletal retrusion, mandibular skeletal protrusion, or the combination of both. The class III syndrome is related to anterior cross bite, class III relationship and mandibular prognathism. This facial may lead to significant psychosocial impact, that can be specially undesirable to young ones (Ngan and Moon, 2015; Xue *et al.*, 2010; Rongo *et al.*, 2017).

The life expectation and self-esteem of individuals can be affected by their appearance, and this is the main reason to choose the orthodontic-orthognathic approach to treat severe skeletal Class III malocclusion in teenagers. Of course, in border line cases, patients with unfavorable growth patterns, the surgical treatment can be the best choice compared to orthopedics, promoting better facial results and reasonable stability along the years (Stojanović *et al.*, 2013; Eslami *et al.*, 2018; Woon and Thiruvengkatahari, 2017; Maspero *et al.*, 2012; Rezaei *et al.*, 2019; Miguel *et al.*, 2014; Ghorbani *et al.*,

2018). This impact on the self esteem is the main motivation to pursue surgical correction especially in teenagers.

The following case report illustrates an early orthosurgical treatment of a severe Class III young boy, and discusses the benefits related to this therapeutic choice.

Case Presentation

The patient was a 11-year-old boy whose main complaints were related to his unpleasing anterior cross bite with a history of being bullied for his appearance. In his own words he said: “I always wanted to see my front teeth together”. A facial evaluation showed an asymmetric, elongated face with a concave profile and typical Class III pattern with mandibular protrusion (Fig. 1). He had a bilateral Class III malocclusion with a negative 6-mm overjet, and moderate lower midline deviation (Fig. 2). Space analysis showed a negative discrepancy in the mixed dentition in both arches (Fig. 3). Cephalometry analysis showed a skeletal Class III relationship (ANB angle, -9° ; WITS, -11mm) with mandibular protrusion (SNB angle, $93,5^\circ$), retrusive lower incisors (13° from mandibular incisor to NB angle; 4 mm from mandibular incisor to NB), and a vertical growth pattern with a steep mandibular plane (FMA, 30° ; SN-GoGn, 32°).



Figure 1: Pretreatment facial photographs.



Figure 2: Pretreatment intraoral photographs show bilateral Class III.

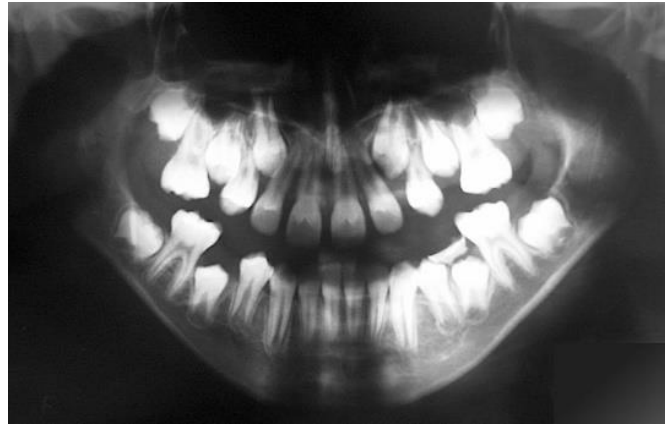


Figure 3: Initial panoramic radiograph.

The primary objective of treatment was to eliminate the anterior cross-bite, obtain better canine and molar relationships with ideal overjet and overbite, with improvement in facial esthetics. The complementary treatment objectives were to: (1) correct the axial inclinations of the maxillary and mandibular anterior teeth; (2) avoid extrusion of the molars and clockwise rotation of the mandible during presurgical treatment, (3) establish good functional occlusion; (4) enhance the facial profile and lip closure; and (5) improving smile characteristics and dental esthetics.

Three different approaches were considered. Because the skeletal discrepancies, an orthopedic treatment was an option, with maxillary disjunction and protraction associated with a camouflage procedure, but the craniofacial features observed were predictive of unfavorable results. The second approach would be to wait and postpone the treatment until the end of growth to perform orthognathic surgery, in order to have more stable results. The third option would be an early orthosurgical treatment, even considering the risks of the need of an eventual second surgery in the future after the end of the growth period.

In order to promote aesthetics and functional improvements for a young patient with clear psychosocial problems due to his severe skeletal discrepancy, the third option was chosen: the early surgical-orthodontic alternative. The molars were banded and the remaining teeth bonded with .022-in edgewise fixed appliances. The upper first premolars were chosen for extraction in order to allow canines eruption, proper alignment in the maxillary arch and incisors decompensation. Initial leveling was accomplished with .016-in nickel-titanium arch wires in both arches (GAC, Bohemia, NY). The remaining space in the maxillary arch was closed, and the incisors retracted with a .017x.022-in stainless steel (SS) archwire by using sliding mechanics with a power chain. The mandibular arch was aligned with a .016-in progressing to a .020-in SS archwire. Presurgical rectangular archwires were placed, both arches received a .019 x .025-in SS. The presurgical orthodontic phase lasted approximately 11 months. Surgical hooks

were then soldered to the SS archwires and placed in both arches. After decompensation and space closure in the upper arch, the negative overjet was increased to 12-mm allowing better surgery results (Fig. 4-5).

The surgery involved a high LeFort I osteotomy allowing maxillary advancement of 6mm, bilateral intracapsular condilectomy with resection of 4 mm of condylar cartilage, and bilateral sagittal split osteotomies for mandibular retraction of 10 mm to allow overjet reduction, eliminating the anterior crossbite. Three months after surgery, .018 SS archwires were placed in both arches and intermaxilar elastics were used to enhance the interdigitation between posterior teeth. Nineteen months after initial bracket placement, the teeth were in acceptable positions, and the appliances were removed.

For retention, the patient was instructed to wear a maxillary circumferential Hawley retainer 24 hours a day for 2 years and at night for another 6 months. In addition, a fixed lingual mandibular retainer was bonded from canine to canine.



Figure 4: Pre-surgical extraoral photographs.



Figure 5: Pre-surgical intraoral photographs.

Because of the skeletal pattern and the surgical approach that was chosen, excellent facial and occlusal results were achieved. Esthetically, facial concavity decreased, the face became less prognathic, and lower face height decreased. Lip competency was improved significantly, and the patient was satisfied with the results of treatment. Well-established Class I canine and Class II molar relationships were obtained, rotations were corrected, and the teeth were aligned. The maxilar and mandibular midlines were centered with the face, ideal overjet and overbite were established, and the spaces were closed (Fig. 6-7).

Cephalometric analysis and radiographs showed the mandibular retraction, the maxillary advancement and profile improvement (Fig. 8). The ANB angle improved (from $-8,5^{\circ}$ to 3°), WITS, and Frankfurt mandibular plane angle were all reduced (Table 1).



Figure 6: Post-treatment extraoral photographs.



Figure 7: Post-treatment intraoral photographs.



Figure 8: a) Pre-surgical cephalometric radiograph; b) Post-surgical cephalometric radiograph.

Table 1: Summary of cephalometric analysis.

	Standard	Initial	Presurgical	Posttreatment
SNA	82°	85°	88°	90°
SNB	80°	93,5°	97°	87°
ANB	2°	-8,5°	-9°	3°
FMA	25°	30°	31°	26°
WITS	-1mm	-11mm	-20mm	-1,5mm
1.NA	23°	30°	26°	22°
1-NA	5,5mm	6mm	6mm	4mm
1.NB	26,5°	13°	31°	21°
1-NB	5,5mm	4mm	8mm	4,5mm

Discussion

Orthodontists are aware of the difficulties related to the treatment for class III skeletal malocclusions in growing patients. The use of orthognathic surgery in these cases to correct dentofacial deformity is a controversial topic. Orthosurgical treatments are usually timed in the beginning of the adult life, when growth is near completion. When the choice is an early orthosurgical treatment, the need of an eventual second surgery in the future is always real, and it should be carefully considered (Teixeira *et al.*, 2007; Haryani *et al.*, 2016).

In order to achieve favorable long term results with early surgery in skeletal Class III cases, this approach should be selected only in cases who are unlikely to succeed with the orthopedic therapy (Baccetti *et al.*, 2004). In this case the discrepancy between maxilla and mandible was so severe that the orthopedic option was a not appropriate. In order to avoid relapse, compensating the future mandibular growth, during the presurgical phase the incisors decompensation were slightly excessive resulting on a negative overjet of 12mm, allowing higher surgical advancement of the maxilla, and mandibular retrusion, focusing on an anteroposterior skeletal overcorrection (Villegas *et al.*, 2010).

The facial appearance can be an important factor in child development. It is well documented that aesthetics plays a major role in determining interpersonal relationships. Consequentially, orthodontic treatment can have a positive impact on the psychosocial well-being of patients who are bullied about dentofacial features (O'Keefe and Sinnott, 2016; Ryan *et al.*, 2012; Abreu, 2018). In this case, the patient was used to be insulted in the school because his teeth and facial features, causing anxiety and depression. This scenario motivated his parents to pursue the early surgical option. The final outcome of the treatment was a great improvement in function and esthetics, although the stability is questionable. After surgery, dramatic improvements were observed not only in the patient's appearance, but also in his self-esteem and quality of life (Olate *et al.*, 2018; Hirjak *et al.*, 2020; Zaroni *et al.*, 2019; Helm *et al.*, 1985).

Conclusion

In cases of early orthognathic surgery, the choice of this therapeutic option should be considered carefully. Parents should be aware of all risks involved. This decision should be made only under exceptional circumstances, like the need for significant and immediate psychological improvement of the child.

Conflict of Interest: There is no financial interest or any other conflict of interest.

Consent: Written informed consent was obtained from the patient.

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