

# Changes in Profile after Orthognatic Surgery in Skeletal Class III Patients

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## Abstract

**Background:** Treatment of skeletal Class III malocclusion in growing patient with an anterior crossbite and open bite is challenging due to unpredictable results and potentially unfavorable growth. Growth modification in adult patients is not an alternative approach. **Objective:** Case report of a patient with Class III malocclusion in adult and anterior crossbite and open bite was treated with combine fixed appliances and orthognatic surgery. **Treatment procedure:** Treatment of anterior cross bite and open bite was completed in two phases. The first phase was to correct the dental alignment align and arch coordination with fixed orthodontic appliance. The second phase was to correct the skeletal discrepancy with orthognatic surgery. **Conclusions:** Orthognatic surgery is a good approach in treating anterior cross bite and open bite relating to skeletal problems in adult period. Changes in profile and occlusion were very obvious.

## Keywords

Malocclusion, Orthognatic Surgery

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## 1. Introduction

Class III malocclusion is easy to identify but often quite difficult to treat. This type of malocclusion can be recognized, not only by dental specialist but also by lay person. The appearance of dental anterior cross bite and open bite often stimulates the parent to seek orthodontic treatment for the child. Besides the functional appearance of the person is also a problem.

According to Angle, a Class III molar relationship refers to a condition where the mesiobuccal cusp of the upper first molar occludes between the mandibular first and second molar. Although this definition represents a typical Class III relationship, the lower molar can be mesial to the upper molar in a varying degree [1] [2]. Class

III malocclusion can involve maxillary skeletal retrusion, mandibular skeletal protrusion, or a combination of both. Patients with Class III malocclusion usually present with a Class III molar relationship, posterior cross bite, and/or anterior cross bite [3].

The upper arch is usually narrow and short, and the upper teeth are commonly crowded. The lower arch is broad and the mandibular teeth are often spaced. Dental compensation might include maxillary dentoalveolar protrusion and mandibular dentoalveolar retrusion. In addition to a prominent chin that causes a concave profile, a midface deficiency is often apparent as well as increased mandibular incisor display and a prominent lower lip [2] [3].

A type of Class III malocclusion that refers to pseudo-Class III malocclusion or functional cross bite is characterized by the presence of occlusal prematurity in centric relation, which results in a habitual forward positioning of the mandible (faulty habitual occlusion). The shift may occur in an anterior and/or in a lateral direction. Patients can actually reach an incisor edge to edge relationship in central occlusion. These patients may exhibit a forward path of closure. This type of cross bite is often seen in children, typically because of interferences caused by lack of wear of their deciduous canines. Dental functional cross bite can later manifest as skeletal Class III malocclusion [1] [2].

There are several possible etiologies that may cause Class III malocclusion. True skeletal Class III malocclusion is usually inherited and may have a very strong genetic basis. The Hapsburg jaw, the prognathic mandible of this European royal family is a well-known example. Other possible etiologies are congenital defects, trauma, and premature contact that lead to a functional cross bite [4]. With the limited ability to influence mandibular growth and the malleability of maxillary growth well established, treatment modalities to influence mild to moderate Class III alveolar base discrepancies have shifted to a maxillary protraction paradigm. Maxillary protraction is one of the main treatment modalities in Class III maxillary retrognathic preadolescent and adolescent patients [5]-[7]. If the patients come after the growth done, the options of treatment are camouflage or orthognathic surgery.

Treatment modalities for Class III patients always depend on patients' age, whether they are still growing or not. When an adult patient is diagnosed with skeletal Class III malocclusion, treatment options are limited. Treatment options would involve comprehensive orthodontic therapy, either combined with extraction and/or orthognathic surgery. Orthognathic surgery designed to balance the skeletal components could involve a mandibular set back (for mandibular prognathism) and/or a Le Fort I procedure for maxillary skeletal retrusion. A surgically assisted rapid palatal expansion (RPE) is sometimes necessary [2] [4] [8]. There are several treatment modalities that can be considered in treating a young Class III patient in late deciduous or mixed dentition, which includes the following: inclined bite plane, exercising with tongue blades, enameloplasty of the deciduous canine, removable plate to expand the maxillary dental arch or to procline the upper teeth, functional regulator III from Professor Fraenkel, chin cup, and facial protraction mask (with or without RPE). These treatment options have their own indication and benefits that need to be considered before used [2] [4] [8].

## 2. Objectives

The objective of this case report is to describe a patient treated in our clinic using a combination of fixed orthodontic appliance and orthognathic surgery.

## 3. Case Report

A 24-year-old girl came to our clinic with her parents. The chief complaint was that her lower jaw was too far forward, crooked teeth in the upper jaw and anterior open bite causing eating difficulty. Anamnesis showed that a genetic predisposition runs in the family with her father and grandmother also having the same type of facial profile. Extra oral examination revealed that the maxilla was retrognathic and the mandible was slightly prognathic. She had symmetric, mesofacial face and concave profile.

Intraoral examination permanent dentition phase, with anterior open bite. No posterior cross bite was found. Over jet was -6 mm and over bite was -5 mm. Molar relationships in both side was full Class III. Cephalometric analysis indicated a Class III malocclusion with retrognathic maxilla and prognathic mandible. Temporomandibular joint function was normal (Figure 1 and Figure 2). The treatment plan was fixed appliances and continue with orthognathic surgery (Figures 3-6).

Patient is suggested to consult to an oral surgery for evaluation. After the evaluation, patient and her parents



Figure 1. Initial panoramic.



Figure 2. Initial cephalometric.



Figure 3. Initial extra and intra oral photos.

decide to start with the treatment. Fixed appliance was on for 12 months to coordinate both arches align teeth (Figures 4-6) and followed by orthognatic surgery. The surgery went well with no complication. Le forte I, mandibular set back and chin surgery was done (Figures 7-9). After the surgery, fixed appliance continues to finish up the case. When fixed appliances were removed, beside profile changes, occlusion changes were observed. The result of cephalometric analysis showed that the ANB angle was noticeably improved (from  $-5.7^\circ$  to

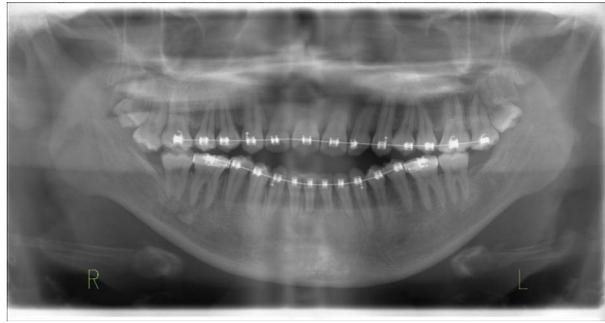


Figure 4. Intermediate panoramic.



Figure 5. Intermediate cephalometry.



Figure 6. Intermediate intra and extra oral photos.

1.3°) with the maxilla moving forward (SNA angle changed from 77.2° to 82°). The extrusion of the mandibular incisors and the lingual inclination compensation were apparent. The records of 2 years past surgery showed good and stable result.

#### 4. Discussion

Patient came in with severe anterior open bite, moderate crowding and Class III skeletal. The treatment for a



Figure 7. Final panoramic.



Figure 8. Final cephalometry.



Figure 9. Final intra and extra oral photos.

skeletal Class III with open bite case is the most challenging. These patients have vertical face growth pattern that manifest clinically as length discrepancy between the maxilla and the mandibular in the sagittal direction. Patients with a Class III skeletal malocclusion are often advice to wait until adult hood for combination treatment orthodontic and orthognatic treatment.

The first alternative treatment was to make used of her growth period by directing of her potential growth of the jaw in different development periods. Face mask therapy for maxillary protraction and the sagittal relation between the maxilla and the mandibular could be coordinated.

The second alternative of treatment was combined between orthodontic and orthognatic treatment in adult patients. Pre surgical decompensatory treatment could be used to relief minor dental crowding. A normal inclination angle of maxillary and mandibular anterior teeth could be achieved. The position maxillary could be reset to improve the mid facial concave profile through orthognatic surgery. She will get full benefit from orthognatic surgery instead with fixed appliance only. Patient who had undergone orthognatic surgery showed significant changes in their profile and occlusion. The result of cephalometric analysis showed that the ANB angle was noticeably improved (from  $-5.7^\circ$  to  $1.3^\circ$ ) with the maxilla moving forward (SNA angle changed from  $77.2^\circ$  to  $82^\circ$ ). The witt measurement become smaller ( $-18.1$  to  $-8.3$ ). The mandibular plane angle decrease but the gonial angle increase (Table 1). The extrusion of the mandibular incisors and the lingual inclination compensation were apparent. Change in the shape of the lips is quite consistent and could have been predicted at the time of original treatment planning. Genioplasty procedure is done also to help reduce the position of the chin. A 2-stage orthognathic surgery with a mandibular step osteotomy is an effective treatment option in adult patients with an excessive anteroposterior skeletal Class III discrepancy. The surgeries could reduce the need for a large amount of mandibular setback, reduce a stretched pterygomasseteric sling, and minimize pharyngeal airway space narrowing [9]. According to the literature review of Hunt *et al.*, orthognatic patient experience psychosocial benefits as a result of orthognatic surgery, including improved self-confidence body and facial images and social adjustment. Postoperatively, all patients graded themselves as more attractive, as did their relatives and friends; the increase was more pronounced in Class III patients [10]. Patient undergone orthognathic surgery could improve the speech function [11]. Two-jaw surgery is necessary from the perspective of satisfaction when patients are being treated for skeletal Class III malocclusion with dentofacial deformities, such as maxillary deficiency and long facial height causing a turned-up upper lip, even if the amount of the setback is less than 10 mm [12].

**Table 1.** Analysis cephalometry.

No	Measurement	Norm	Pt1	Pt2
1	SNA ( $^\circ$ )	80	77.2	82.2
2	SNB ( $^\circ$ )	77	82.9	80.8
3	ANB ( $^\circ$ )	3	(5.7)	1.3
4	MX1-NA (mm)	4	11.6	8.36
5	MX1-NA ( $^\circ$ )	23	38.7	30.9
6	MD1-NB (mm)	5	7.7	7.7
7	MD1-NB ( $^\circ$ )	26	28.9	29.4
8	GO-GN-SN ( $^\circ$ )	34	42.1	36.4
9	Inter Incisal ( $^\circ$ )	128	117	118.3
10	Witts (mm)	1.1	(18.1)	(8.3)
11	ANS-ME (mm)	62.8	77.8	70.5
12	NA-ME (mm)	113.9	139.1	130.4
13	ANS-ME/NA-ME	55.0	55.9	54.0
14	Lower Lip-E Line (mm)	2	3.3	.26

## 5. Conclusion

Orthodontic treatment of adult should be directed to eliminating patient's complain and achieving phycologic and functional occlusion with acceptable esthetic. In this patient esthetic factor is more important than the functional factor, because of the poor profile. Orthognathic surgery allowed complete esthetic and functional reestablishment of facial harmony. The patient profile was corrected beside her open bite.

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