

COMBINED ORTHODONTIC - SURGICAL TREATMENT OF SEVERE SKELETAL CLASS III MALOCCLUSION

Zorana Stamenković¹, Vanja Stojić^{1*}, Nemanja Marinković¹, Ivan Arsić¹, Jovan Marković¹, Nenad Nedeljković¹, Vladan Mirjanić², Vanja Krčić²

¹University of Belgrade, Faculty of Dentistry, Clinic for Orthopedics of the Jaws, Belgrade, Serbia

²University of Banja Luka, Faculty of Medicine, Study Program Dental Medicine, Banja Luka, Republika Srpska, B&H

*Corresponding author: dr.vanja.stojic@gmail.com

Abstract: Severe skeletal Class III caused by mandibular prognathism often requires a combined orthodontic and surgical treatment to ensure a stable therapeutic outcome. This case presents the therapeutic approach for a male patient who had a $1/2$ / Class III malocclusion, an anterior open bite of 3 mm, anterior crossbite and a concave profile before initiating orthodontic treatment. The initial lateral cephalogram indicated mandibular prognathism (SNB 83°), a skeletal Class III (ANB -1°) with a tendency towards an open bite (B 31°), proclination of the upper incisors (I/SpP 59°), and retroclination of the lower incisors (i/MP 92°). Additionally, an increased mandibular corpus length of 4 mm was observed. The second lateral cephalogram, taken immediately before surgical intervention indicated a skeletal Class III (ANB -3°), an increased mandibular corpus by 5.85 mm, and corrected inclinations of the upper and lower incisors. Pre-surgical treatment with fixed appliances lasted 36 months, followed by bimaxillary surgery. Postsurgical orthodontic treatment lasted 8 months, during which the patient wore vertical intermaxillary elastics to establish a stable occlusion. At the end of the treatment, Class I occlusion was achieved with proper overbite and overjet, and a harmonious facial profile. The post-surgical lateral cephalogram showed correction from Class III to Class I skeletal relationship, proper inclination of the upper and lower incisors, and corrected mandibular corpus length. Combined orthodontic - surgical treatment can effectively correct severe skeletal discrepancies caused by mandibular overdevelopment.

Keywords: mandibular prognathism, class III malocclusion, orthodontic - surgical treatment, lateral cephalogram.

1. INTRODUCTION

Skeletal Class III malocclusion represents a significant challenge in orthodontic practice, characterized by mandibular prognathism, maxillary retrognathism, or a combination of both, leading to a concave facial profile and malocclusion [1]. The implications of this condition extend beyond functional concerns, such as compromised masticatory efficiency and speech difficulties, to include substantial esthetic and psychosocial impacts [2]. The multifactorial etiology of Class III malocclusion encompasses

genetic predispositions, environmental influences, and developmental anomalies [3].

The management of Skeletal Class III malocclusion requires a nuanced approach, as treatment planning must address the complex interplay of achieving stable occlusal relationships, enhancing facial esthetics, and ensuring long-term stability [4]. Treatment modalities range from growth modification during the mixed dentition phase to orthodontic camouflage and combined orthodontic-surgical interventions [5]. The decision-making process is guided by a comprehensive evaluation of factors

such as malocclusion severity, skeletal maturity, and facial esthetics [6].

Without early intervention, Class III malocclusion may progress, necessitating orthognathic surgery in adulthood [7]. Growth modification, implemented during the mixed dentition phase, aims to correct sagittal skeletal discrepancies [8]. For patients beyond the pubertal growth spurt with mild Class III malocclusion, orthodontic camouflage offers a less invasive alternative, often involving fixed appliances and selective extractions [9].

In contrast, adult patients with severe Class III malocclusion typically require combined orthodontic- surgical treatment [10]. This approach addresses both the skeletal and dental components, providing a comprehensive solution. This paper will examine the diagnostic considerations and treatment strategies for managing Skeletal Class III malocclusion, under-

scoring the importance of individualized treatment planning to achieve optimal functional and esthetic outcomes [11].

2. MATERIAL AND METHOD

An 18-year-old male patient presented with a diagnosis of skeletal Class III malocclusion. A comprehensive diagnostic workup was undertaken, including clinical examination, study cast analysis, orthopantomogram (OPG), and lateral cephalometric radiograph.

The clinical examination revealed a concave facial profile with pronounced mandibular prominence, characterized by a protrusive lower lip and a prominent chin. The lower third of the face appeared disproportionately increased, with a flattening of the nasolabial and mentolabial sulci (Figure 1).

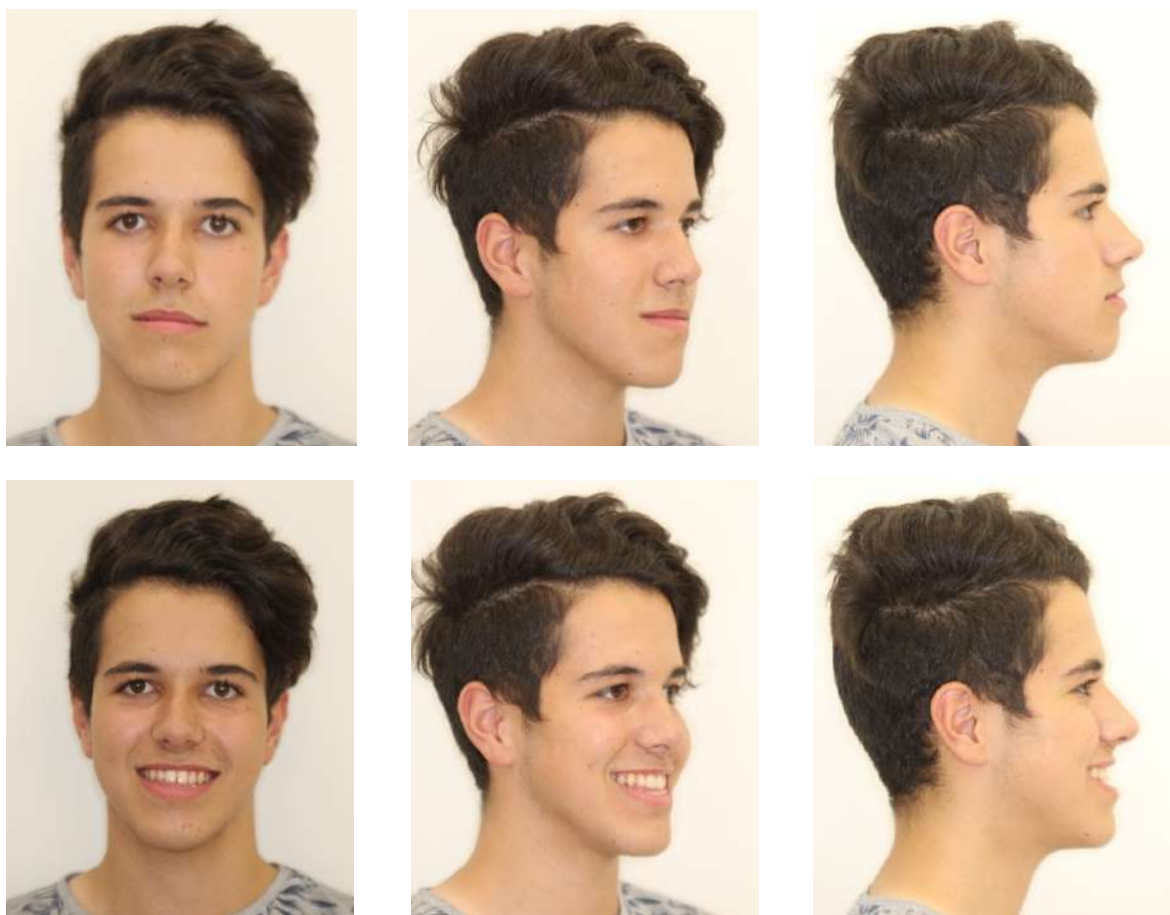


Figure 1. Extraoral photos before the treatment



Figure 2. Intraoral photos before the treatment

Intraorally, the patient exhibited a half cusp Class III malocclusion, characterized by a 3 mm anterior open bite and an anterior crossbite (Figure 2). At rest, the patient demonstrated an anterior tongue posture and a habitual tongue-thrust swallowing pattern. No symptoms indicative of temporomandibular joint disorder (TMD) were present during the initial examination. Additionally, the patient experienced difficulty with the articulation of the phonemes s, z, and c, suggesting potential involvement of the dentoalveolar structures affecting speech.



Figure 3. Initial lateral cephalogram

The initial lateral cephalometric radiograph revealed significant mandibular prognathism, as evidenced by an SNB angle of 83° . The cephalometric analysis confirmed a skeletal Class III relationship, with an ANB angle of -1° , and a pronounced tendency toward an open bite with a B angle of 31° . The analysis also highlighted proclination of the upper incisors, with an I/SpP angle of 59° , and retroclination of the lower incisors, with an i/MP angle of 92° . An increased mandibular corpus length of 4 mm was observed, indicating an excessive mandibular growth pattern (Figure 3).

The pre-surgical orthodontic phase, which lasted 36 months, aimed to achieve dental alignment and leveling across both arches using fixed orthodontic appliances. This phase was crucial for preparing the dental arches for subsequent surgical intervention (Figure 4). A control lateral cephalometric radiograph, taken prior to the initiation of orthognathic surgery, revealed a persistent skeletal Class III relationship with an ANB angle of -3° . The mandibular corpus length increased further to 5.85 mm, and notable improvements were observed in the inclinations of both upper and lower incisors (Figure 5).

The second phase of treatment involved bi-maxillary orthognathic surgery, designed to correct both sagittal and vertical skeletal discrepancies between the maxilla and mandible. This surgical intervention aimed to reposition the maxilla and mandible to achieve a more harmonious occlusal and skeletal relationship.



Figure 4. The pre-surgical orthodontic phase



Figure 5. Control lateral cephalogram prior to orthognathic surgery

Following the surgical phase, the patient entered the post-surgical orthodontic phase, which lasted for 8 months. This phase focused on the stabilization of occlusion and refinement of dental alignment using vertical intermaxillary elastics to ensure optimal occlusal stability and interdigitation. Adjustments were made to the positioning of the teeth in both the upper and lower arches to achieve a functional and aesthetically pleasing outcome (Figure 6).



Figure 6. The postsurgical orthodontic phase

3. RESULTS AND CONCLUSION

Upon completion of the comprehensive orthodontic and surgical intervention, the patient achieved a stable Class I occlusion with optimal overbite and overjet parameters. The final clinical and radiographic assessments confirmed a harmonious facial profile, indicating significant aesthetic and functional improvements (Figure 7).

The post-surgical lateral cephalometric radiograph demonstrated a successful correction of the initial skeletal Class III relationship to a Class I skeletal relationship. The radiographic analysis revealed appropriate alignment of the upper and lower incisors, with improved angulations that facilitated ideal incisor positioning. Additionally, the mandibular corpus length was effectively normalized, addressing the previously observed mandibular prognathism.

The combined orthodontic and surgical treatment approach proved to be highly effective in addressing and correcting severe skeletal discrepancies, particularly those stemming from mandibular overdevelopment. The integration of pre-surgical orthodontics with precise bimaxillary orthognathic surgery allowed for comprehensive management of the malocclusion and provided the patient with a functional, esthetically pleasing outcome. This case underscores the efficacy of an interdisciplinary treatment strategy in achieving optimal skeletal and dental alignment in patients with complex orthodontic needs.



Figure 7. Extraoral and intraoral photos after the treatment

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ТЕРАПИЈА ИЗРАЖЕНЕ III СКЕЛЕТНЕ КЛАСЕ КОМБИНОВАНОМ ОРТОДОНТСКО-ХИРУРШКОМ ТЕРАПИЈОМ

Сажетак: Изражена III скелетна класа узрокована мандибуларним прогнатизмом често захтева комбиновану ортодонтско-хируршку терапију, да би се обезбедио стабилан терапијски резултат. Приказан је терапијски поступак код пацијента мушког пола, код ког је била присутна оклузија $1/2$ / III класе, отворен загрижај у пределу фронталних зуба од 3 mm, обрнут преклоп секутића и конкаван изглед профила пацијента пре отпочињања ортодонтске терапије. Почетни телерендгенски снимак указао је на мандибуларни прогнатизам (SNB 83°) и III скелетну класу (ANB -1°), уз тенденцију отварања загризаја (B 31°), проклинацију горњих секутића (I/SpP 59°) и ретроинклинацију доњих секутића (i/MP 92°). Такође, уочена је повећана дужина корпуса мандибуле за 4 mm. Други телерендгенски снимак урађен је непосредно пред хируршку интервенцију и указао је на присуство III класе (ANB -3°), повећан корпус мандибуле за 5,85 mm, уз корекцију инклинације горњих и доњих секутића. Терапија фиксним апаратима трајала је 36 месеци, након чега је урађена бимаксиларна хирургија. Након хируршке интервенције, у постхируршкој ортодонтској терапији, која је трајала осам месеци, пацијент је носио интермаксиларне гумице за вертикалу, ради успостављања стабилне оклузије. На крају терапије присутна је обострано I класа, правилна дубина преклопа и инцизални размак и хармоничан изглед профила лица пацијента. На профилном телерендгенском снимку урађеном након хируршке интервенције уочава се корекција III скелетне класе у I, правилна инклинација горњих и доњих секутића и корекција вредности дужине корпуса мандибуле. Комбинованим ортодонтско-хируршким третманом веома успешно се може кориговати изражен скелетни несклад узрокован преразвијеношћу мандибуле.

Кључне речи: мандибуларни прогнатизам, малоклузије III класе, ортодонтско-хируршки третман, профилни телерендгенски снимак.

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