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COMBINED ORTHODONTIC AND SURGICAL TREATMEN IN PATIENT WITH MANDIBULAR PROGNATHISM

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Abstract: The aim of this case was to present a combined orthodontic-surgical treatment for a 30-year-old patient. The initial clinical examination revealed a Class III malocclusion, concave profile, 4.5mm overjet, and 2mm overbite. The treatment plan included orthodontic preparation with fixed appliances, surgical correction of skeletal discrepancies, and post-surgical orthodontic treatment. Lateral cephalograms were taken before the orthodontic therapy, just before the surgical intervention, and after the treatment, following the removal of fixed appliances. On the initial lateral cephalogram SNB angle was 88°, ANB -5°, SpP/MP 28°, total Bjork's polygon angle 405°, I/SpP 71°, i/MP 111° and mandibular corpus length was increased by +11mm. On the final post-surgical lateral cephalogram, after the intervention and appliance removal the SNB angle was 81°, ANB 3°, SpP/MP 25°, total Bjork's polygon angle 398°, I/SpP 64°, i/MP 96° and mandibular corpus length was increased by +3mm. The pre-surgical orthodontic treatment lasted 12 months, followed by bimaxillary surgery. The post-surgical orthodontic treatment lasted 12 months. After appliance removal, a retentive phase with night-time wear of retainers was implemented. The result was stable Class I occlusion, satisfactory profile appearance, 2.5mm overbite, and 2mm overjet.

Key words: skeletal Class III, mandibular prognathism, presurgical orthodontic treatment, bimaxillary surgery.

1. INTRODUCTION

For orthodontist, determining the diagnosis, prognosis, and course of treatment of Class III malocclusion has always been difficult.[1] Correct occlusal contacts in all space directions, long-term stability of the outcomes, and facial aesthetic enhancement are the primary aims of any orthodontic treatment.[2] Clinicians have three treatment methods at their disposal to meet these objectives in patients with Class III malocclusion: growth modification, orthodontic camouflage, and combined orthodontic- surgical treatment.[3] The severity of the malocclusion, the patient's primary complaints, the patient's chronological age, dental and skeletal development, facial aesthetics, dental cast and cephalometric analysis are just a few of the many variables that affect the final decision on which type of treatment to choose.[1]

Class III malocclusions typically develop during early childhood and may become worse as children grow. Orthognathic surgery is typically the only way to create a proper occlusion when no treatment is provided during childhood. Nevertheless, early detection of this malocclusion may give a chance to avoid or minimize the risk of surgery.[4]

Growth modification is usually applied to patients in the mixed dentition stage just before the pubertal growth spurt. This type of treatment involves

the application of mobile active or functional devices with the intention of primarily addressing sagittal skeletal abnormalities.[5]

Patients who are too old for growth modification treatment (the pubertal growth spurt has passed), who have a mild class III malocclusion, who have no or have only mild space problems in dental arches and who have good vertical facial proportions should be consider for camouflage therapy.[5] It can be performed during the period of permanent dentition and usually requires the use of fixed appliance and mandibular teeth extraction (incisor or premolars).[6]

Adult patients with severe Class III malocclusion need to be treated with combined orthodontic-surgical therapy.[7]

2. MATERIAL AND METHOD

Unattractive facial aesthetics and the inability to properly chew food were the main complaints of 30-year-old female patient who came at the Clinic for orthodontics, School of Dental Medicine, University of Belgrade. It was determined that the patient had no systemic diseases, congenital craniofacial anomalies, substantial head trauma or any previous orthodontic treatment. Furthermore, it was confirmed by patient that no near relatives had orthodontic anomalies of a similar nature.

An extraoral clinical examination revealed that the patient had a symmetrical face, an apparent mentolabial sulcus, an enlarged lower face height, a concave profile and acceptable lip contact in rest position (Figure 1). According to an analysis of the position of the soft tissue structures of the lower face in the biometrical field, the N vertical line was broken by the upper lip, lower lip, and chin.

The intraoral clinical examination (Figure 2) showed Class III malocclusion on both sides, bilateral posterior cross-bite, 4,5 mm negative overjet and 2 mm overbite. There was a misalignment in the midline of the upper and lower dental arches. Dental plaque and calculus were visible on certain tooth surfaces due to poor oral hygiene.

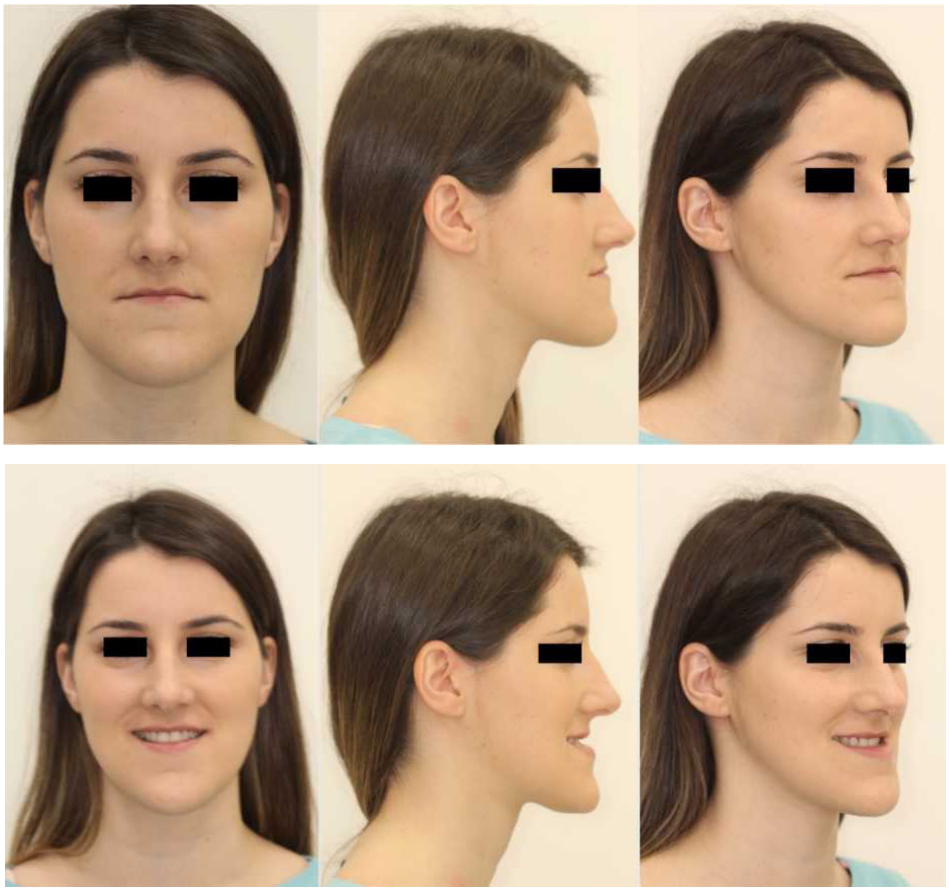

Figure 1. *Extraoral photography of a patient before orthodontic treatment.*

Figure 2. *Intraoral photography of a patient before orthodontic treatment.*

At rest, the patient's tongue was in an anterior position, and she swallowed with a tongue-trust pattern. The presence of temporomandibular joint disorder symptoms was not identified during initial examination. It was found that the patient had difficulty pronouncing the letters S, Z and C correctly.

From the analysis of dental casts, the maxillary and mandibular arches, respectively, showed a 1,5 mm and 5,5 mm space deficit.

Lateral cephalometric analysis indicated maxillary normognathism (SNA 83°), mandibular prognathism (SNB 88°), skeletal Class III (ANB -5°), normoinclinaction of maxilla (SN/SpP 8°), retroinclination of mandible (SN/MP 36°), increased B angle (SpP/MP 28°), vertical facial growth pattern (Bjork's sum 405°, Jarabak ratio 61.26%), normoclined upper incisors (I/SpP 71°), retroclined lower incisors (i/MP 111°) (Figure 3).

Figure 3*. Lateral cephalogram before the pre-orthodontic treatment.*

Figure 4. *Intraoral photography's of upper and lower fixed appliance at the beginning of pre- orthodontic treatment.*

The first phase of the treatment (Figure 4) was to align and level the teeth in both dental arches with fixed appliances. The aim of the pre-orthodontic treatment was to eliminate any dental compensations that the patient may have.

The pre-surgical orthodontic treatment lasted for 12 months. Control lateral cephalogram were obtained prior to orthognatic surgery, and the parameters were: SNA 82°, SNB 86°, ANB -4°, SN/SpP 8°, SN/MP 35°, SpP/MP 27°, sum of angles of Bjork's polygon 401°, Jarabak ratio 61%, I/SpP 65°, i/MP 97° (Figure 5).

Figure 5. *Control lateral cephalogram.*

The second phase consists of a comprehensive surgical intervention to correct skeletal sagittal, transversal and vertical discrepancies between the maxilla and mandibulae.

The patient underwent post-surgical orthodontic treatment in the third phase, which required wearing vertical intermaxillary elastics. Additionally, the position of teeth in the upper and lower dental arches was adjusted (Figure 6).

3. RESULTS AND CONCLUSION

After therapy, the final lateral cephalogram was analyzed, and it showed maxillary normagnatism (SNA 82°), mandibular normognathism (SNB 79°), skeletal Class I (ANB 3°), retroinclinaction of maxilla (SN/SpP 13°), retroinclination of mandible (SN/MP 35°), B angle (SpP/MP 22°), neutral facial growth pattern (Bjork's sum 396°, Jarabak ratio 64%), normal inclination of upper incisors (I/SpP 65°), retroclined lower incisors (i/MP 97°) (Figure 7).

The face's appearance has been substantially improved, the mentolabial sulcus is slightly pronounced, the profile was straight, and the face's vertical thirds are aligned (Figure 8).

Class I intercuspidation overjet of 2 mm, overbite of 2,5 mm and the correct relationship of the posterior teeth in the transverse direction was achieved (Figure 9). The midline of the upper and lower dental

Figure 6. *Intraoral photography's of upper and lower dental arches with fixed appliances after orthognathic surgery.*

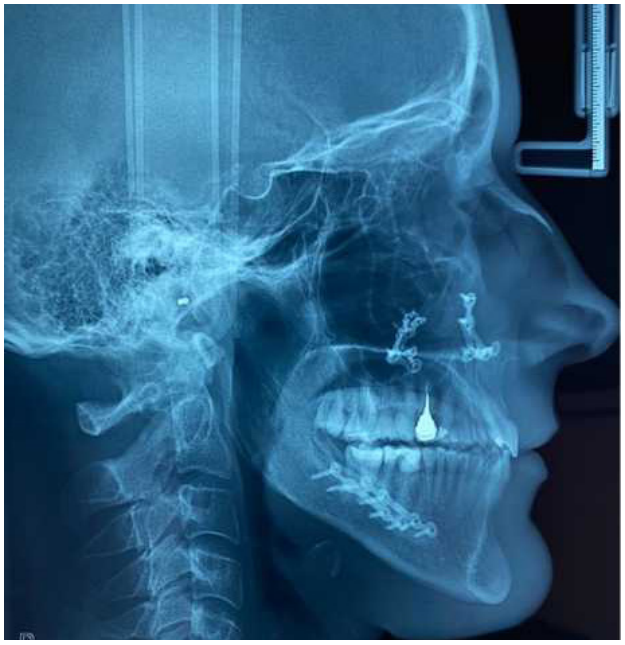

Figure 7. *Final lateral cephalogram.*

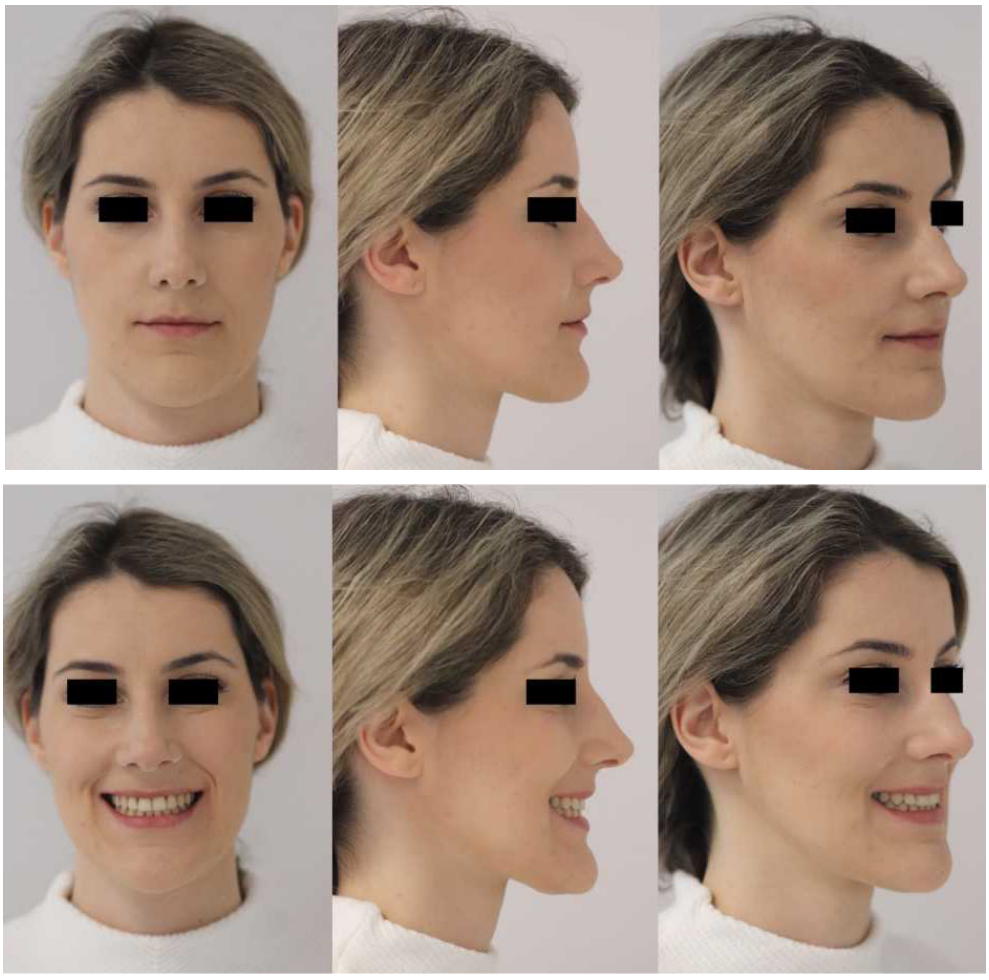

Figure 8. *Extraoral photography of a patient after orthognathic treatment.*

Figure 9. *Intraoral photography's after combined orthodontic and surgical treatment.*

arches coincides. Masticatory dysfunction is corrected. The patient more clearly pronounces the letters S, Z and C.

The patient is currently in a retention phase, showing no signs of relapse. Genioplasty will be performed in the future to further enhance the patient's facial attractiveness.

A correct occlusion, proper orofacial functions, and good facial aesthetics could be provided by combined surgical and orthodontic treatment of Class III malocclusion.

4. REFERENCES

[1] S. Eslami, J. Faber, A. Fateh, F. Sheikholaemmeh, V. Grassia and A. Jamilian, *Treatment decision in adult patients with class III malocclusion: surgery versus orthodontics*, Progress in Orthodontics Vol 19 (2018) 28.

[2] M.S. Alhammadi, A.A. Almashraqi, A.H. Khadhi, K.A. Arishi, A.A. Alamir, E.M. Beleges, E.Halboub, *Orthodontic camouflage versus orthodontic-orthognathic surgical treatment in borderline class III malocclusion: a systematic review*, Clinical Oral Investigations, Vol 26 (2022) 6443–6455.

[3] P. Ngan, W. Moon, *Evolution of Class III treatment in orthodontics*, American Journal of Orthodontics and Dentofacial Orthopedics, Vol 148 (2015) 22–36.

[4] R. Rongo, V. D'Antd, R. Bucci, I. Polito, R. Martina, A. Michelotti, *Skeletal and dental effects of Class III orthopaedic treatment: a systematic review and meta-analysis*, Journal of Oral Rehabilitation Vol 44 (2017) 545–562.

[5] Z. Stamenković, *Upotreba Frenklovog regulatora funkcije u tretmanu skeletne klase III*, Zadužbina Andrejević, Beograd, 2014.

[6] J.H.Park, J. Yu, R. Bullen, *Camouflage treatment of skeletal Class III malocclusion with conventional orthodontic therapy*, American Journal of Orthodontics and Dentofacial Orthopedics, Vol 151 (2017) 804–811.

[7] R. Raposo, B. Peleteiro, M. Pago, T. Pinho, *Orthodontic camouflage versus orthodontic- orthognathic surgical treatment in class II malocclusion: a systematic review and meta-analysis*, International Jouranal of Oral and Macillofacial Surgery, Vol 47 (2018) 445–455.

ОРТОДОНТСКО-ХИРУРШКИ ТРЕТМАН ПРАВОГ МАНДИБУЛАРНОГ ПРОГНАТИЗМА

Сажетак: Приказан је комбиновани ортодонтско-хируршки третман код одрасле пацијенткиње старости 30 година. На почетном клиничком прегледу уочена је оклузија пуне III класе, конкаван профил, обрнут преклоп од 4,5 мм и дубина преклопа 2 мм. План терапије подразумевао је ортодонтску припрему горњим и доњим фиксним апаратом, хируршку корекцију скелетне неусаглашености и постхируршки ортодонтски третман. Профилни телерендгенски снимци урађени су пре отпочињања ортодонтске терапије, непосредно пре хируршке интервенције и на крају третмана, након уклањања фиксних апарата. На почетном телерендгенском снимку угао SNB је био 88°, ANB -5°, SpP/MP 28°, збир углова Бјорковог полигона 405°, I/SpP 71°, i/MP 111° и дужина корпуса мандибуле +11 мм. На завршном профилном телерендгенском снимку након хируршке интервенције и уклањања фиксних апарата угао SNB је био 81°, ANB 3°, SpP/MP 25°, збир углова Бјорковог полигона 398°, I/SpP 64°, i/MP 96° и дужина корпуса мандибуле +3 мм. Прехируршка ортодонтска терапија трајала је 12 месеци, након чега је урађена бимаксиларна хирургија. Постхируршки ортодонтски третман трајао је 12 месеци. Након уклањања фиксних апарата ретенциони период подразумева ношење фолија током ноћи. Постигнута је стабилна оклузија у I класи, задовољавајући изглед профила, дубина преклопа од 2,5 мм и инцизални размак од 2 мм.

Кључне речи: III скелетна класа, мандибуларни прогнатизам, прехируршка ортодонтска терапија, бимаксиларна хирургија.

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