



Multidisciplinary treatment of complex skeletal class III malocclusion

Multidisciplinarno lečenje kompleksne skeletne malokluzije III klase

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Abstract

Introduction. Skeletal malocclusions, especially those with a prominent vertical component, always present a challenge for the interdisciplinary approach to their treatment planning. The aim of this report is to present a patient with a complex skeletal deformity in all three directions (vertical, sagittal and transverse). **Case report.** A twenty-four year old female patient with a skeletal Class III malocclusion, open bite and laterognathia, was firstly treated by orthodontic fixed appliances, whereas the dental decompensation of dentoalveolar structures was carried out and adjusted to their bone structures, thus enabling an adequate and sufficient reposition of the jaw. A surgical correction included bi-maxillary osteotomy due to pronounced vertical cephalometric parameters, necessitating a posterior maxillary intrusion and mandibular repositioning. In that manner, the relapse was prevented and a long-term stable result obtained. In the retention period, the patient wore removable bi-maxillary retention devices. **Conclusion.** The combined orthodontic-surgical treatment provided the Class I occlusion with aesthetic and functionally satisfactory results which were envisioned by the treatment plan.

Key words:

malocclusion, angle class III; open bite; orthognathic surgery; orthodontics, corrective; treatment outcome.

Apstrakt

Uvod. Skeletne ortodontske anomalije, pogotovu one sa naglašenom vertikalnom komponentom, uvek predstavljaju izazov za interdisciplinarni pristup u planiranju njihovog lečenja. Cilj ovog rada je da se prikaže pacijentkinja sa teškom skeletnom anomalijom u sva tri pravca (vertikalnom, sagitalnom i transverzalnom). **Prikaz slučaja.** Pacijentkinja stara 24 godine sa malokluzijom III klase, otvorenim zagrižajem i laterognatijom, lečena je najpre ortodontskim fiksnim aparatima, pri čemu je izvršena dekompenzacija dentoalveolarnih struktura, čime su one postale usaglašene sa svojim koštanim bazama. Tako je omogućena adekvatna i dovoljna repozicija vilica. Hirurška korekcija je podrazumevala bimaksilarnu osteotomiju, jer su kod ove pacijentkinje postojali naglašeni vertikalni kefalometrijski parametri, te je bila neophodna intruzija posteriorne maksile, kao i repozicija mandibule. Time je sprečen recidiv i dobijen dugogodišnji stabilni rezultat. U retencionom periodu pacijentkinja je nosila bimaksilarne mobilne retencione aparate. **Zaključak.** Kombinovanim ortodontsko-hirurškim lečenjem obezbeđena je okluzija I klase sa estetski i funkcionalno zadovoljavajućim rezultatima predviđenim planom lečenja.

Ključne reči:

malokluzija, klase III; zagrižaj, otvoreni; hirurgija, ortognatska, procedure; ortodoncija, korektivna; lečenje, ishod.

Introduction

Skeletal cranio-dental facial anomalies, especially those with a prominent vertical component, are most often of the heritable etiology and always represent a challenge for the interdisciplinary approach to their treatment planning. During the growth of these malformations and their development, the disharmony of the size of the jaws becomes more and more pro-

nounced and reflects to the soft facial tissues, creating facial asymmetry, which additionally complicate a clinical picture and the treatment of these patients. A combined surgical-orthodontic treatment is preferable, and this is the only way to obtain a stable functional occlusion, normal skeletal inter-maxillary relation and the aesthetically harmonious tissue profile.

These patients require an adequate differential diagnosis, a detailed clinical examination, careful analysis and a

treatment plan provided by professionals of different specialties as well as the defined indications and contraindications for the different treatment modalities in order to determine the preferable treatment^{1,2}.

The most frequent reason for coming for advice is that of aesthetic nature, but at the same time it is a difficult mastication function. Temporomandibular dysfunctions are also frequently represented in the clinical picture in these patients, especially in those with a facial asymmetry and psychological and social handicaps of different kinds³.

The purpose of this report is to present the results of a multidisciplinary treatment of a patients with cranio-dental facial deformities in all three direction-sagittal (Class III), vertical (open bite) and transverse (cross bite and facial asymmetry).

Case report

A twenty-four-years-old female patient with a facial asymmetry and the increased lower third of the face had a facial asymmetry of functional type with a slightly concave profile and the anterior lower third of the face. Clinical findings confirmed dental Class III with a narrow maxilla, open bite, crowding in both sets of teeth, increased vertical dimensions of the face and lateral cross-bite on the right side. The cephalometric analysis of angular variables (ANB, SNA, SNB) revealed skeletal Class III (ANB = -1), maxillary retrognathism (SNA = 79) (SNB = 80), increased vertical facial parameters, suggesting divergent Class III (B = 42, 45 = SNMP, Bjork = 407). In addition, the presence of dentoalveolar compensatory mechanism was found in terms of the upper protrusion and retrusion of lower incisors (Figure 1a and 1b).



Fig. 1a – Pre-treatment intraoral photographs



Fig. 1b – Pre-treatment dental models.

The global objective of orthodontic pre-surgical treatment was to correct inter-maxillary relationships in all three directions (sagittal, vertical and transversal), and later, to close surgically the bite and reduce the lower third of the face, remove the facial asymmetry and regulate the sagittal inter-maxillary relationships into the position of Class I. Prior to this, it was necessary to expand the upper jaw and thereby remove the interference that created the cross-bite and the facial asymmetry, solve the problem of dental anxiety and thus provide conditions for surgical correction.

In pre-surgical orthodontic phase of the treatment, decompensation of dentoalveolar arches was carried out, which means that the upper jaw was expanded, the upper incisors were retruded, whereas the lower incisors were protruded (rating of perceived exertion – RPE + Roth .0.022"). By expansion of the upper jaw and protrusion of the lower incisors, the space in both sets of teeth was obtained in order to resolve a dental anxiety. In this manner, we provided conditions for the adequate and sufficient surgical repositioning of the jaws.

During the orthodontic treatment phase, the control models were occasionally made in order to check the possibilities of a surgical repositioning and when that possibility was established, the surgical arches 0.019 × 0.025 stainless steel (SS) were placed with the surgical hooks, which were used for a tighter in-

ter-maxillary fixation. Based on cephalometric assessments, two splints were made to position the jaws during surgery.

A surgical correction included the ante-positioning of the maxilla, intrusion of the maxillary posterior segments, the counterclockwise rotation and posterior placement of the mandible, which required a bi-maxillary surgical procedure (Le Fort I, bilateral sagittal split osteotomy – BSSO).

The postsurgical orthodontic treatment enabled us to delicately fix the problem by inter-maxillary rubber bands, causing a state of the maximum intercuspation as one of the most important factors of the reliability of the results. In this way, the relapse was prevented and the long-term reliable results were obtained. In the retention period, the patient wore the bi-maxillary mobile retention appliances.

Functionally and aesthetically satisfactory occlusion and normal horizontal and vertical overbite were achieved, the middle point of dental arches was corrected and the skeletal Class I ratio was obtained (Figure 2). By removing the facial asymmetry as well as vertical and sagittal skeletal disharmony, the facial aesthetics was significantly improved whereas the normal function was enabled. The most cephalometric parameters measured before and after the treatment showed differences and were closer to the reference values (Figure 3a, 3b and 3c, and Table 1).



Fig. 2 – Post-treatment intraoral potographs.

Table 1

Comparison of pre- and post-treatment cephalometric values

Measurement	Mean	Pre-treatment	Post-treatment
SNA	82	79	77
SNB	80	80	76
ANB	2	-1	1
B	25–30	42	35
Bjork	396	407	405
MP-NS	32	45	44
Upper incisor to PP	75	115	113
Lower incisor to MP	90	81	81
U6- posterior maxillary hypoplasia		26	23
IOTN-Index Orthodontic treatment need			
Dental Health Component		5	1
Aesthetic Component		9	1



Fig. 3a – Pre-treatment and post-treatment *en face* photographs show good facial and esthetic balance.



Fig. 3b – Pre-treatment and post-treatment profile photographs show good facial and esthetic balance.

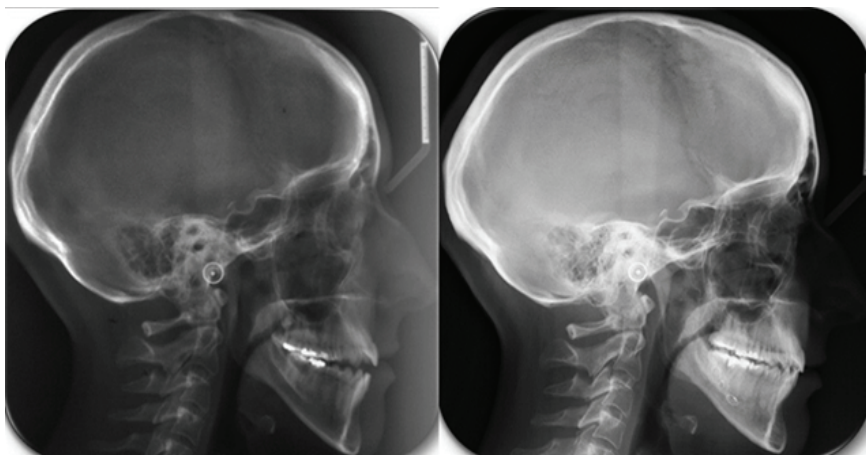


Fig. 3c – Pre-treatment and post-treatment lateral cephalometric radiographs.

Skeletal Class III malocclusion with the open bite and the divergent growth pattern is one of the most difficult skeletal anomalies to treat. The best results are achieved by the usage of bi-maxillary surgical procedure and repositioning of both jaws, which results in reduction of both, sagittal and vertical discrepancies^{4,5}. The persistence of the results is achieved by reduction of the posterior maxillary hyperplasia which is always present in patients with a divergent facial type. Therefore, the intrusion of the maxillary posterior segments enables the mandible to be rotated around its axis when the bite is surgically closed and thus the lower third of the face is reduced^{5,6}, as it was the case in the patient presented in this report.

It is necessary to establish the exact localization of the problem in patients with skeletal Class III and a facial asymmetry. The etiology of facial asymmetry is often unclear and may be multifactorial. Therefore, it is very important to make an accurate assessment at the beginning of the treatment. It can be congenital, skeletal or developed later due to some local etiological factors or simply dental⁷.

Class III malocclusions which are not part of the syndrome and the cleft facial asymmetry are most often the result of narrowness, usually a hypoplastic maxilla or the simple mandible deviation due to its higher growth potential⁸. As dental compensation is present in Class III patients in the form of protrusion of

the upper and retrusion of the lower incisors in the sagittal direction, there is also the dental compensation in the form of molar inclination, the shape of dental arches and the lateral overjet in the transverse direction in patients with the facial asymmetry and deviation of the mandible^{7,9-11}.

In the patient presented in this report, the facial asymmetry was caused by the narrowness of the upper jaw, whereas the abovementioned transversal dental compensation was also present and had to be corrected before surgical repositioning in order to obtain a correct and stable occlusion. The results shown in Figure 2 were made two years after the completion of the entire orthodontic-surgical treatment, which supports the reliability of the results.

Conclusion

The orthodontic surgical therapy is required in patients with the complex cranio-dental facial deformities in all three directions. The surgical phase of the treatment should be planned after the completion of growth. Thus, the postsurgical subsequent growth would not compromise the obtained results because these deformities are of developmental nature. The success and particularly the reliability of the results depend on the correct diagnosis, clinical experience and the treatment planning.

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