



## Orthodontic-surgical treatment of the skeletal class III malocclusion: a case report

### Ortodontsko-hirurško lečenje malokluzije III skeletne klase

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#### Abstract

**Background.** Class III malocclusions are considered to be ones of the most difficult problems to treat. Their causes are multifactorial and include genetic and/or environmental factors. Class III malocclusions are generally classified into 2 categories: skeletal and dental. The diagnosis is important due to the different treatment approaches. Generally a dental class III can be treated with orthodontics alone, while a true skeletal class III requires a combination of orthodontics and surgery. **Case report.** We presented a female patient with skeletal Class III malocclusion. The treatment was complete with positive overbite and acceptable occlusion using a combination of fixed orthodontic appliance treatment as well as the surgical operation. The patient was happy with her new appearance and function. **Conclusion.** Class III discrepancy should be diagnosed and classified according to its etiology and treated with appropriate surgery, including, if necessary, not only mandibular, but also maxillary surgery, in order to achieve a normal facial appearance. In any case, as the field of orthodontics continues to develop technologically and philosophically, we can expect that advances in diagnosis and treatment planning are imminent and inevitable.

#### Key words:

malocclusion; orthodontics, corrective; oral surgical procedures; treatment outcome.

#### Apstrakt

**Uvod.** Malokluzije III klase smatraju se među najtežim za lečenje. Faktori koji dovode do njihovog formiranja su različiti, počev od naslednih do onih koji se javljaju tek posle rođenja. Ove malokluzije se inače dele na dve velike grupe: dentoalveolarne i skeletne. Zbog različitih pristupa samom lečenju kako dentoalveolarnih, tako i skeletnih oblika ove malokluzije, najvažnije je postaviti tačnu dijagnozu. Dentoalveolarni oblici III klase mogu se lečiti samo ortodontski, dok teži slučajevi skeletnih oblika moraju da kombinuju ortodontsko-hirurško lečenje. **Prikaz slučaja.** U ovom radu prikazana je bolesnica sa malokluzijom III skeletne klase. Lečenje je završeno sa pozitivnim zadovoljavajućim preklapom i okluzijom ortodontskim prehirurškim lečenjem, kao i hirurškim zahvatom. Bolesnica je bila zadovoljna novim promenama kako intraoralnim, tako i ekstraoralnim, uočljivim na samom licu kao i postignutom funkcijom. **Zaključak.** Mimoilaženje vilica III klase neophodno je dijagnostikovati i svrstati prema poreklu i uzroku i lečiti primenom odgovarajuće hirurgije uključujući, prema potrebi, ne samo hirurgiju mandibule, već i maksile. U svakom slučaju, možemo očekivati stalno usavršavanje u postavljanju dijagonoze i lečenju s obzirom na činjenicu da se ortodonticija razvija i tehnološki i filozofski.

#### Ključne reči:

malokluzija; ortodonticija, korektivna; hirurgija, oralna, procedure; lečenje, ishod.

#### Introduction

A developing skeletal class III malocclusion is one of the most challenging problems confronting the practicing orthodontists<sup>1-3</sup>. Compared to class II and class I, a true class III malocclusion is rare. This type of malocclusion is a growth-related problem that often becomes severe if left untreated, and should be corrected as soon as its initial signs are recognized,

such as edge to edge bite or cross bite<sup>4</sup>. Jaw growth is a slow and gradual process, and in some individuals, the upper and lower jaws may grow at different rates affecting chewing, speech, long-term oral health, and appearance<sup>5</sup>.

Skeletal class III malocclusion is characterized by mandibular prognathism, maxillary deficiency or both and has a significant genetic component<sup>1-5</sup>. Clinically, these patients have a concave facial profile, with a retrusive nasomaxillary

area and a prominent lower third of the face and often the lower lip is protruded relative to the upper lip. Usually the upper arch is narrower than the lower one, and the overjet and overbite can range from reduced to reverse<sup>6</sup>. Also, this profile is associated with functional and esthetic problems. Since the lower incisors are located in front of the upper incisors, they can erupt to unattractive lengths. This type of profile is also known as a "prognathic", or "strong chin" appearance<sup>7,8</sup>.

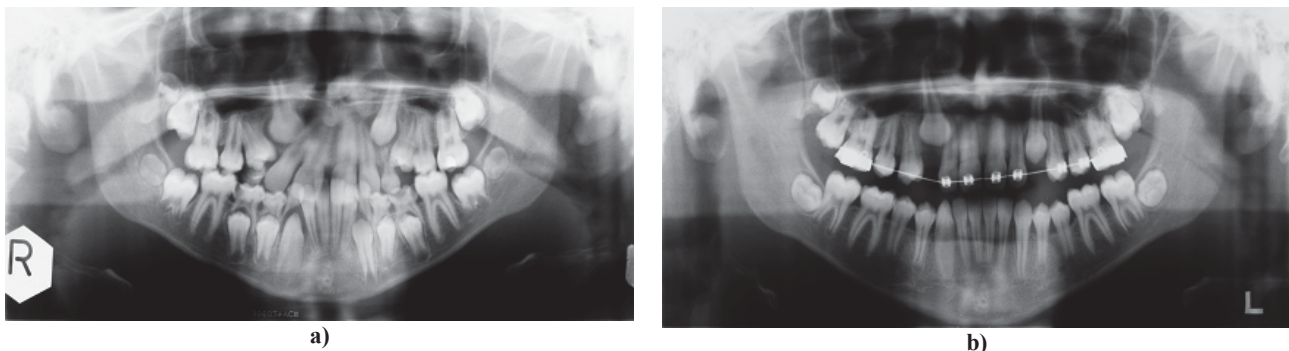
To obtain the best results in the treatment of patients with angle class III malocclusion, the etiology of malocclusion should first be clarified<sup>9-14</sup>. Cephalometric analysis is still the best way to approach the definition of phenotypes within the class III population. The goal of early orthodontic treatment is to correct the existing or developing skeletal, dentoalveolar and muscular imbalance and to improve the oral environment<sup>9</sup>.

There are three main treatment options for skeletal class III malocclusion: growth modification, dentoalveolar compensation (orthodontic camouflage), and orthognathic surgery<sup>10</sup>. Growth modification should be commenced before the pubertal growth spurt. After this spurt, only the latter two options are possible. However, how should clinicians determine whether or not patients are suitable for surgery? Decision to reposition the mandible posteriorly or the maxilla

nines, class III mandibular prognathism and a skeletal anterior and posterior crossbite on the right and left side and her chief complaint was "teeth do not come together, jaw protruding, and trouble chewing". A panoramic radiograph showed that all teeth were present with all the third molars. There were no supernumerary teeth. The crown-root ratios were normal with good alveolar bone levels, no bone pathology, and mandibular condyles, nasal floor and maxillary sinuses appeared normal. The patient's periodontal status was healthy, with no bleeding on probing and generalized gingival recession was found throughout the mouth, however, with thin periodontal tissues.

The treatment goals for the patient were: to eliminate the CR-CO discrepancy (centric occlusion – centric relation) and anterior crossbite; to establish class I canine relationships; to eliminate maxillary and mandibular arch length discrepancies; to align the arches; to align the midlines; to correct the right/left posterior crossbite and to finish with about 2 mm of overbite and 2 mm of overjet; to provide an aesthetic smile.

In view of the fact that this was a patient with class III malocclusion, the orthodontic treatment was planned in two presurgical and one postsurgical step: the first presurgical treatment was undertaken only in the maxilla (Figures 1a, b).



**Fig. 1 – a) The panoramic radiography reveals the opening of the spaces for both maxillary canines and their eruption; b) Initial intraoral photoimage of the occlusal aspect of the maxillary and mandibular dental arch**

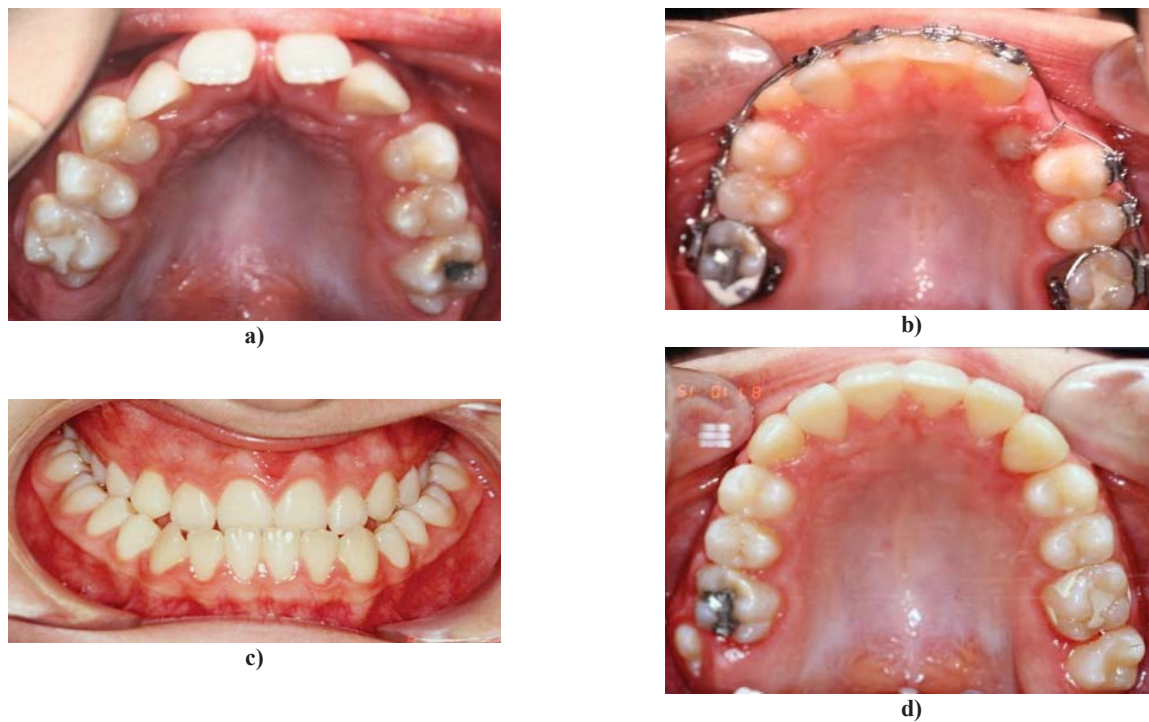
anteriorly in the treatment of class III malocclusions depends upon multiple clinical, cephalometric, and biomedical considerations. In each case the decision must be made on the basis of frontal and profile treatment objectives, occlusion, and the needs of the patient. In many instances, depending upon the magnitude of the disharmony, the treatment plan will be based upon the clinical judgment and experience of the surgeon and orthodontist. Surgery for class III patients is both predictable and stable, in proportion to how much maxilla or mandible has been moved<sup>15-20</sup>.

Treatment of the presented case was undertaken using a combination of a fixed orthodontic appliance treatment and a surgery.

### Case report

At the beginning of the treatment a 12-year-old female had a long problem list: impacted upper right and left ca-

The second one was performed two years after the first treatment had ended, but that time in both jaws. During the initial phase of fixed appliance treatment, the upper right and left canines needed to be extruded. Firstly, it was necessary to provide the spaces, which was achieved in three month's time using pendulum appliance. Extrusion of the canines into a correct relationship with the adjacent teeth required an additional six months (Figures 2a-d). The second fixed appliance treatment, undertaken in both jaws, required 9 months. When the second phase of fixed appliance treatment was finished, all erupted teeth were bonded with brackets for the final presurgical preparation (Figures 3a, b). Both presurgical treatments had moved the teeth into a new position, so that they fitted together properly when the lower jaw was surgically repositioned – orthognathic surgery involved a mandibular setback. Correction of skeletal and dental problems allowed the occlusal, functional and aesthetic goals to be achieved. Class I canine relationships were established with



**Fig. 2 – a) A progress occlusal view shows an adequate space created in the maxillary canine regions and their eruption; b) Initial intraoral photoimage of the maxillary dental arch occlusal aspect; c, d) A maxillary occlusal perspective at the end of the first step of the orthodontic treatment shows a generally good dental arch form**



a)



b)

**Fig. 3 – a) A post-treatment profile shows the patient’s good facial balance and esthetics following the whole treatment (The prognathic mandible and concave profile type improved significantly); b) The maxillary and mandibular dental intercuspation occurred efficient with a good control of the overall dental arch form**

good alignment of the teeth. A positive overjet was established and the overbite was somewhat reduced. Good torque control was maintained while the mandibular incisors were retracted resulting in better incisal inclination after orthodontic and surgical treatment. The maxillary incisors were proclined significantly resulting in better upper lip prominence and an improved facial profile (Figures 3c, d). Correction of

malocclusion was accomplished with dental movement as well as with surgical operation. On completion of active treatment, further occlusal adjustment was performed: maxillary and mandibular fixed retainers were inserted (Figures 4a–f). Final cephalometric analysis demonstrated a change in values of the ANB angle (anterior posterior angle of the maxilla with the mandible) from  $-4^\circ$  to ideal  $2^\circ$  (Table 1).



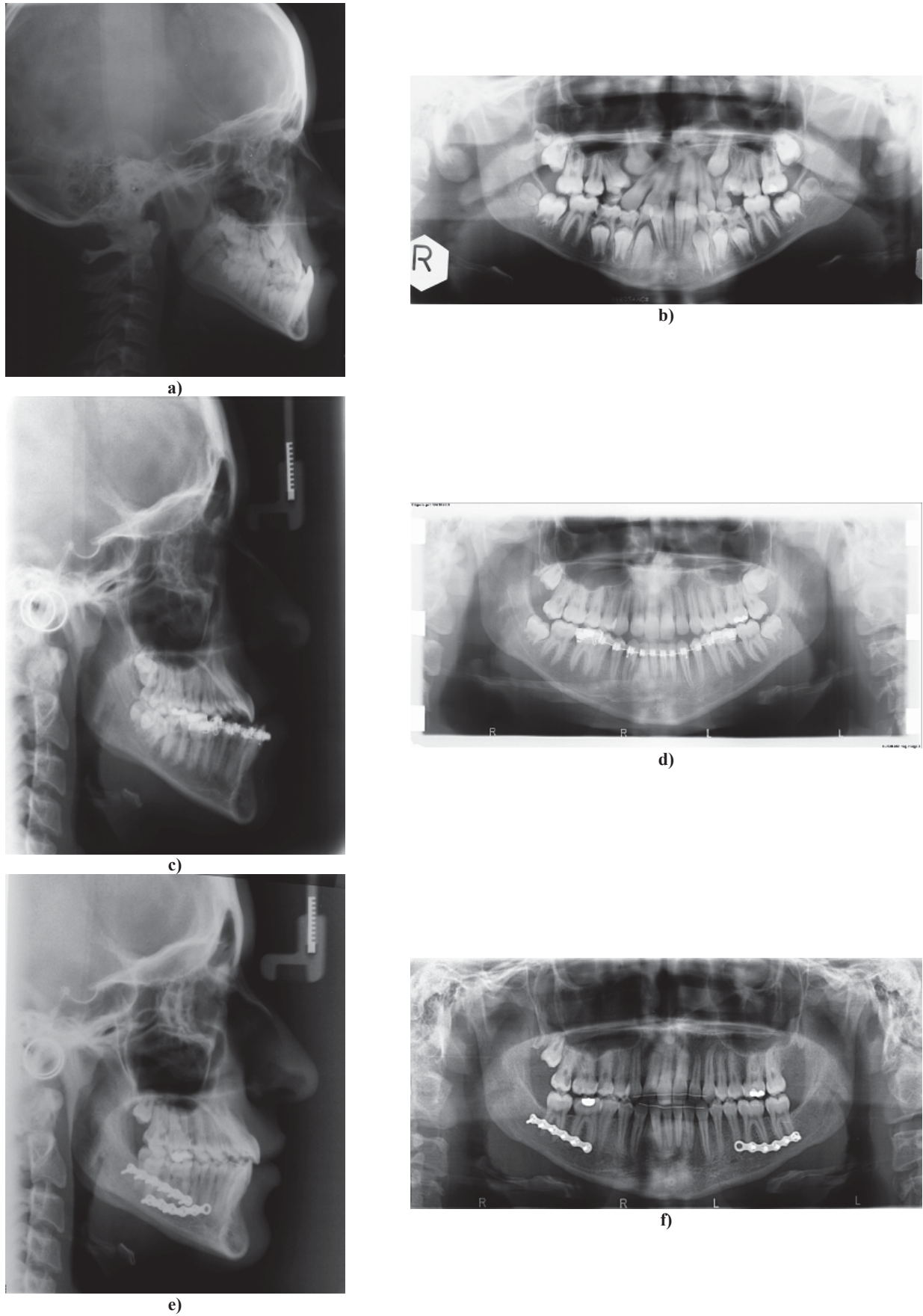


Fig. 4 – The panoramic radiography: a, b) at the beginning of the whole treatment; c, d) at the beginning of the second orthodontic presurgical treatment; e, f) after the whole treatment

**Table 1**  
**The values of the SNA, SNB and ANB angles before and after the whole treatment**

Angles	The values before and after the treatment	The referent values
SNA	80° → 80°	82°
SNB	84° → 78°	80°
ANB	-4° → 2°	2°

SNA – position of the maxilla (normal, prognathic, retrognathic); SNB – position of the mandible (normal, prognathic, retrognathic); ANB – skeletal relationship between the maxilla and the mandible

## Discussion

Every orthodontic treatment aims to achieve an adequate occlusion thus ensuring satisfactory and healthy functioning of the stomatognathic system's physiological routine, an optimal facial, oral and dental aesthetics, resulting in a long-term stability<sup>21</sup>.

Skeletal class III malocclusion is a classic example of "easy to be recognized but difficult to treat", the situation where sometimes orthodontic possibilities are limited and need support from other specialties, particularly surgery<sup>22-24</sup>. However, the key to a successful treatment lies in understanding and integrating these two specialties in seeking the best alternatives and procedures, as it was in our case where the treatment was carried out through orthodontic preparation and orthognathic surgery. The surgical correction of class III malocclusion can be undertaken in a variety of ways, by a bilateral sagittal split osteotomy to retract the mandible or by the Le Fort I procedure to advance the maxilla, or a combination of these. Before and after surgical correction of the skeletal discrepancy, the occlusion starts and finishes orthodontically to class I relationship<sup>25-27</sup>.

The presented case, with a skeletal class III malocclusion actually had two presurgical orthodontic treatments, firstly only in the upper jaw and second by in both jaws. Why was it in two phases? The answer is very simple. Since the patient was only 12 years old, we had plenty of time for the treatment, and on the other hand there were many more problems in upper jaw, and that is why we began the first phase of treatment only in maxilla. The result of both treatments was the correction of malocclusion but only with dentoalveolar changes, while the mandible was still prognathic. After surgical correction of mandibular setback, the occlusion was finished orthodontically to class I relationship, with a positive overbite and overjet.

## Conclusion

Class III discrepancy should be diagnosed and classified according to its etiology and treated with appropriate surgery, including, if necessary, not only mandibular, but also maxillary surgery, in order to achieve a normal facial appearance. In any case, as the field of orthodontics continues to develop technologically and philosophically, we can expect that advances in diagnosis and treatment planning are imminent and inevitable.

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