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## Orthodontic and surgical treatment of a patient with mandibular prognathism – a case report

### Ortodontyczno-chirurgiczne leczenie pacjenta z progenią – opis przypadku

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#### Abstract

This study describes the course of interdisciplinary treatment for mandibular prognathism in an adult patient with a severe Class III malocclusion and a reverse overjet of 9 mm that involved an orthodontic and surgical orthognathic treatment. The orthodontic treatment involved attaching a fixed appliance to the upper and lower dental arches to prepare the patient for the mandibular surgery. Following the orthodontic treatment, there was performed a bilateral sagittal split ramus osteotomy (BSSRO) in order to reduce the length of the mandible and to reposition the mandibular anterior segment posteriorly. The treatment turned out to be successful. The mandible was shortened and the profile was corrected. The orthognathic surgery was followed by the second step of the orthodontic treatment of the mandible and maxilla. Now, following three years of treatment and observation, the patient shows a good face profile and occlusion as well as the acceptance of the facial aesthetics.

**Keywords:** orthodontics, osteotomy, malocclusion.

#### Streszczenie

Artykuł przedstawia opis interdyscyplinarnego, ortodontyczno-chirurgicznego leczenia dorosłego pacjenta z progenią. Opisano przypadek poważnej wady III klasy Angle'a z odwrotnym nagryzem poziomym wynoszącym 9 mm, który wymagał leczenia ortodontycznego z zastosowaniem chirurgii ortognatycznej. Pierwszym etapem leczenia było ortodontyczne przygotowanie pacjenta do zabiegu chirurgicznego i w tym celu założono górny i dolny stały aparat cienkołukowy. Następnie przeprowadzono obustronną strzałkową osteotomię gałęzi żuchwy (BSSRO) w celu redukcji jej długości i repozycji przedniego segmentu żuchwy dystalnie. Operacja ortognatyczna została przeprowadzona jako drugi etap leczenia i okazała się skuteczna. Osiągnięto zamierzone rezultaty, czyli skrócenie długości żuchwy oraz prawidłową okluzję. Wewnątrzustnie uzyskano nachodzenie zębów siecznych górnych na dolne, a profil uległ zdecydowanej poprawie. Pacjent był w pełni usatysfakcjonowany efektami przeprowadzonego leczenia. Obecnie po trzech latach leczenia i obserwacji profil pacjenta jest prawidłowy, pacjent jest usatysfakcjonowany poprawą okluzji i rysów twarzy. W przypadku nieznacznego zaburzenia w szczęce, nawet przy dużym zaburzeniu nagryzu poziomego, może być zastosowane leczenie chirurgiczne jednoszczękowe, przy równoczesnym leczeniu ortodontycznym i uzyskanie dobrego efektu estetycznego i zgryzowego.

**Słowa kluczowe:** chirurgia ortognatyczna, osteotomia, III klasa.

#### Introduction

The treatment of mandibular prognathism poses a considerable challenge to orthodontists. With the incidence between 0.5 per cent and 9 per cent of all malocclusions, mandibular prognathism is a Class III skeletal problem. Patients suffering from mandibular prognathism show an excessive growth of the mandible, which is genetically inherited. Doctors who are to treat such patients need to take into consideration the characteristics of the face profiles of the patients' parents in order to make the right treatment choice. Class III skeletal problems must be differentiated from functional problems, since the latter might be treated non-surgically, using exclusively fixed or removable

appliances [1]. Class III skeletal malocclusion, on the other hand, needs to be treated surgically. A surgical procedure is performed to correct any bone deformities, bring harmony to the face and improve the patient's occlusion to ensure proper breathing, swallowing as well as speech and temporal-mandibular joint functions [2].

#### Aim

The aim of this paper is to present an interdisciplinary treatment of a patient with mandibular prognathism that involved an orthodontic and surgical orthognathic treatment. The report discusses the diagnosis, the orthodontic treatment, the method of surgery and the retention of treatment results.

## Case report

### Diagnosis and etiology

A 23-year-old patient visited the orthodontic office to seek treatment for malocclusion. He complained of his facial appearance as well as problems with biting and chewing food. He had not undergone any previous orthodontic treatment. A series of tests was performed to examine the mouth cavity, face profile, the depth of the nasolabial sulcus, the depth of the labiomental sulcus and the size of the maxillary segment, which constitutes 69 per cent of the morphological face. After the oral examination, the following were found: Class III angle malocclusion on both sides, a missing first upper right molar, a reverse overjet as well as a retrusion of lower incisors that did not touch the upper teeth. The patient had the impressions taken to make a diagnostic dental cast and was referred for pantomographic and cephalometric x-rays (**Figure 1**).

The OPG results (**Figure 2**) showed the presence of all third molars. The results of cephalometric x-rays (**Table 1**) indicated mandibular ramus and corpus elongation.

The patient was diagnosed with mandibular prognathism.

### Treatment objectives

The main treatment plan included preparing the patient for the mandibular surgery in order to reduce the length of the mandible and to reposition the mandibular anterior segment posteriorly.

### Treatment progress

After the oral surgeon was consulted, the orthodontic treatment to prepare the patient for the surgery started. The treatment involved the compensation of upper and lower incisor inclination. The patient had upper and lower Roth system appliances, featuring a 0.22 slot, put on. The orthodontic treatment took 20 months and resulted in the straightening of the upper and lower teeth.

After the orthodontic straightening of the teeth extractions were performed of third molars in the mandible, then he was referred to the Department of Maxillo-Facial Surgery at the Medical University in Poznań, where the patient underwent a bilateral sagittal split ramus osteotomy (BSSRO) performed as a treatment for mandibular prognathism. Six weeks after the orthognathic surgery, the patient returned for a general orthodontic treatment.

### Treatment results

The surgical procedure resulted in a considerable improvement of the patient's facial features. The



**Figure 1.** Patient before treatment a) Face (extraoral pictures), b) Cephalometric x –ray, c) Mouth interior  
**Rycina 1.** Pacjent przed leczeniem a) rysy twarzy, b) zdjęcie cefalometryczne, c) zdjęcia wewnętrzne

**Figure 2.** Pre-treatment OPG*Rycina 2. Zdjęcie pantomograficzne przed leczeniem***Table 1.** Pre and post-treatment cephalometric x-rays*Tabela 1. Analiza cefalometryczna przed i po leczeniu*

Angle	Measure	Norm	Comment	After treatment	Measure
SNA	72.3	82.0 ± 3.0	maxillary retrusion		-
SNB	82.2	80.0 ± 3.0	mandibular protrusion		75.1
ANB	-9.9	2.0 ± 2.0	mandibular protrusion		-2.3
1-: ML	67.4	94.0 ± 7.0	retrusion of lower incisors		81.6
WITS	-9.3	0.0 ± 2.0	skeletal class III		-0.8

post-treatment cephalometric x-rays results are shown in **Table 1**.

The patient's measurements were close to the standard ones. Intraorally, the upper incisors overlapped the lower ones. The lower median line had shifted slightly to the left. However, that did not affect the patient's external appearance and the patient was content with the results of the treatment. **Figure 3** presents the patient post-treatment.

We put on a fixed retainer on the lower arch from canine to canine and removable retainer on the upper arch. We observed the patient for almost three years and noticed no relapse until this time.

## Discussion

Treating mandibular prognathism is problematic, especially with only orthodontic means at our disposal. Skeletal Class III problems must be differentiated from functional Class III problems. It is possible to treat the latter type non-surgically, using exclusively fixed or removable appliances [3].

Our choice of treatment was determined by the patient's age. In young patients Class III malocclusion can affect not only the mandible, but it can also result in the anteroposterior deficiency of the maxilla. There are also cases where both the mandible and maxilla are affected. In growing children, however, we can take advantage of the growth po-

tential and it might be possible to treat malocclusion with a rapid maxillary expansion and maxillary protraction [4–6]. In adult patients, on the other hand, we face a much more complicated situation. In many cases, it is necessary to perform a surgical procedure and the patient must undergo an osteotomy of the maxilla and mandible [7]. We can also choose a non-surgical course of treatment. When an osteotomy is not necessary or the patient does not wish to undergo surgery, an orthodontic camouflage such as dentoalveolar compensations (maxillary incisor proclination and mandibular incisor retroclination) may be used. That treatment, however, may have an unfavourable effect on the facial aesthetics and can also jeopardize the stability of the results [8].

Consequently, orthodontists must distinguish between surgical and non-surgical Class III malocclusion. The most important factors to be taken into consideration are the size of the anteroposterior discrepancy, the inclination of the mandibular incisors and the appearance of the soft tissue profile [9–11].

The patient in question was determined to have his profile and chin corrected and the only available treatment option was surgery. The patient was informed about the possibility of a skeletal relapse, which most often occurs in the first six months



**Figure 3.** Patient post-treatment a) Face (extraoral pictures), b) Cephalometric x -ray, c) Mouth interior

**Rycina 3.** Pacjent po leczeniu a) rysy twarzy, b) zdjęcie cefalometryczne, c) zdjęcia wewnętrzne

after the osteotomy [12]. Despite the risk factors, the patient made the decision to undergo surgery. After the surgery, he was satisfied with the result of the treatment and with his appearance.

### Paper conclusion

The successful treatment of mandibular prognathism is the result of the cooperation between an orthodontist and an orthognathic surgeon. Such interdisciplinary cooperation allows clinicians to obtain good results of treatment that would otherwise be impossible to achieve.

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