

SKELETAL ANCHORAGE IN ORTHODONTIC TREATMENT OF A CLASS II MALOCCLUSION

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ABSTRACT

Aim of the study The aim of this paper is to present a clinical case of an Angle class II malocclusion which was treated with premolar extractions and skeletal anchorage in order to establish the facial and dental balance.

Material and methods After the clinical and paraclinical evaluations, it was assigned a diagnostic of a class II, division 2 malocclusion according to Angle classification. The main objective of the orthodontic treatment was maintaining the anchorage after premolar extractions which was obtained with the aid of mini-implants. **Results** The orthodontic treatment managed to restore the functionality of the occlusion and to enhance facial aesthetics.

Conclusions The skeletal anchorage with orthodontic mini-implants provided the high needs of anchorage necessary for managing the space obtained after extractions.

Keywords: class II malocclusion, anchorage, mini-implant

INTRODUCTION

Orthodontists have always looked for the absolute anchorage and their interest in gaining it is not new. Their first attempts to obtain skeletal anchorage were marked by the use of osseointegrated implants. But dental implants seemed to have a great disadvantage for the orthodontic treatment: the delay in loading which was necessary to obtain osseointegration. Clinicians have then looked for a way to overcome this problem [10].

The first orthodontic nonintegrated screws were reported by Kanomi in 1997 who has used mini-implants as anchorage devices for intruding the mandibular incisors [7,10].

Unlike dental implants, orthodontic mini-screws are loaded immediately and most authors recommend the use of light forces in the first weeks after their insertion [4.] Today, it is produced a large variety of orthodontic mini-implants and they are used in many cases which require skeletal anchorage.

MATERIAL AND METHODS

For treatment of a class II malocclusion division 2, treatment objectives [12] are as follows:

- to readjust the anterior guidance that can guarantee protection of the posterior teeth and stability of the orthodontic treatment

outcome;

- to reestablish the height of the lower face;
- to reposition the mandible, possibly obtaining a mandibular response;
- to distalize the maxillary arch;
- to correct dental and alveolar crowding;
- to reestablish cuspid to fossa occlusal contacts;
- to reduce the incisive deep bite.

Treatment methods that are carried out to correct irregularities of a class II/2 malocclusion are aimed to produced changes to the skeletal, dental, alveolar and occlusal levels that are either compensatory or in hypercorrection, in order to maintain the results of the orthodontic treatment.

This case report describes a treatment approach of a class II malocclusion division 2 that involved extraction of four premolars in order to obtain dental and facial correction. The high anchorage need required skeletal support which was provided by orthodontic mini-screws.

CLINICAL CASE

A 21-year-old female patient referred to the Department of Orthodontics and Dento-Facial Orthopaedics, Faculty of Dentistry, "Carol Davila" University of Medicine and Pharmacy, Bucharest, complaining about facial aesthetics being affected by the smile which revealed the malpositioned teeth. From the patient information questionnaire, no personal or family history pathology was noted.

Clinical evaluation of the patient included facial and intraoral examination. The face has an oval shape with the symmetry conserved in the transverse and vertical planes. The lips have normal aspect, with no interlabial gap at rest. The smile is uptight and affected by the malpositioned teeth with a display of two thirds of their clinical crowns. The smile arc is not consonant with the curvature of the incisal edges of the maxillary incisors and

canines. Upper interincisive line corresponds with the median line of the face (fig. 1).



Figure 1. Facial photographs before orthodontic treatment

From the lateral view, it can be observed a convex profile with the upper lip going beyond the lower lip with more than 1 mm. The deep labiomental sulcus, the increase in chin projection and in the nasolabial angle contribute to deterioration of the profile aspect. Also, the mandibular angle is decreased. The functional and temporomandibular joint evaluations did not reveal any pathological aspects.

Intraorally, permanent dentition is revealed with all teeth being present on the arch without the third molars 1.8, 3.8 and 4.8. There are dental lesions partially treated with aesthetic fillings. The most important change in dental position is represented by the ectopic maxillary canines. Also, in the mandible, the same modification can be observed. Oral hygiene is satisfactory considering the severe malocclusion,

although there are inflammatory changes of the gums, especially in the areas with crowded teeth (fig. 2).



Figure 2. Intraoral photographs in the beginning of the orthodontic treatment

Examination of dental casts shows asymmetrical, constricted and shortened arches. The palatal vault is deep. Dental arches follow the alveolar arch form, with various malpositions and rotations whereof the position of the incisors and the canines are the most suggestive for the lack of space.

The occlusal examination reveals distalized molar contacts and misleading neutral (right side) and mesialized canine contacts (left side) in the sagittal plane. The incisive relation is neutral. In the transverse plane, the molar relationship is neutral both on the right and left side. The canine contact is lingualized on the right side and inverse on the left side. The lower interincisive line is directed with 3 mm to the right in relation to the upper midline. In the vertical plane, there are neutral contacts in the incisive and molar areas and infraocclusion of the canines due to their ectopic position.

On the panoramic radiograph, it is observed the permanent dentition with the lack of space for the evolution of the third molars. Also, it can be observed an incorrect root canal filling on tooth 3.6 which should be reevaluated before orthodontic treatment (fig. 3).

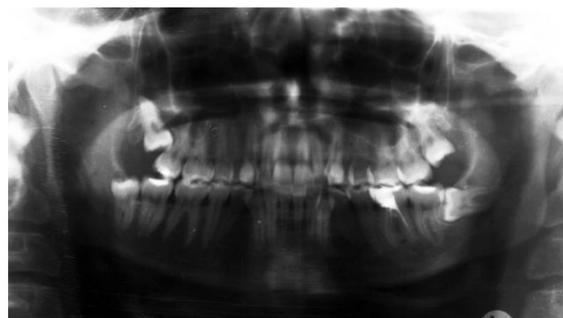


Figure 3. Panoramic radiograph in the beginning of the orthodontic treatment

Evaluation of the lateral cephalometric radiograph confirms the hypodivergent skeletal pattern and the class II skeletal relationship between the maxilla and the mandible. Lower incisor inclination demonstrates dental compensation of the skeletal malocclusion (fig. 4).



Figure 4. Lateral cephalometric radiograph in the beginning of orthodontic treatment

The diagnosis assigned after the clinical and radiographic evaluation is of a class II dental and skeletal malocclusion with a hypodivergent skeletal pattern.

Treatment was aimed to correct dental crowding, the occlusal relationships and to improve the aesthetics of the smile and face.

Treatment was performed with fixed appliances. Due to the increased necessity of space and in order to improve the profile, it

was decided to extract the first upper and lower premolars. Maxillary canines were distalized through the use of orthodontic mini-implants (fig.5).



Figure 5. Orthodontic mini-implants inserted in order to distalize the upper canines

RESULTS AND DISCUSSIONS

At the end of the treatment, the facial aspect is highly improved and the dental and occlusal parameters are well restored (fig. 6 and 7). The active treatment lasted 3 years. Third molars were extracted in order to maintain the result of the orthodontic treatment.

The retention phase of treatment was completed with a Hawley removable appliance in the upper arch and a bonded retainer in the lower arch.

The evaluation of the lateral cephalometric radiograph at the end of treatment shows a reduction of the dental compensation and an improved position of the soft tissues.

It should be noted the importance of preserving the space obtained after extraction of teeth. This was a case where the space should have been completely maintained to correct dental crowding and, therefore, the maximum anchorage necessary in the maxilla

was obtained through the use of orthodontic mini-implants.



Figure 6. Facial photographs in the end of orthodontic treatment



Figure 7. Intraoral photographs at the end of orthodontic treatment

Although extractions are not recommended in medium arch area for patients with a hypodivergent skeletal pattern, the clinical situation can impose this option and treatment management becomes more complex.

Table 1. Lateral cephalometric radiograph in the beginning of the orthodontic treatment

Cephalometrics	Objectives	Beginning	Final
FMIA	67° ± 3	60	63
FMA	25° ± 3	20	21
IMPA	88° ± 3	100	93
SNA	82°	82	82
SNB	80°	79	79
ANB	2° ± 2	3	3
Ao-Bo	2 mm ± 2	1	2
Occlusal plane	10°	8	9
Z Angle	75° ± 5	78	75
Upper lip	/	16	16
Chin	/	12	14

PFH	45 mm	48	46
AFH	65 mm	63	64
FI	0.69	0.76	0.71
Interincisive angle	120° ± 2	140	130

CONCLUSIONS

1. Anchorage with orthodontic mini-implants provides the best solution in cases with extraction when the displacement of the molars is not an option.
2. Using the orthodontic mini-implants is not compliant with the patient cooperation, thus the results are highly predictable.
3. The possibility of immediate loading of this kind of implants shortens considerably the treatment duration.

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