

# CHANGES IN THE BUCCAL CORRIDOR SPACE IN PATIENTS WITH CLASS II DIVISION 1 MALOCCLUSION BEFORE AND AFTER ORTHODONTIC THERAPY

## ПРОМЕНИ НА БУКАЛНИОТ ПРОСТОР КАЈ ПАЦИЕНТИ СО МАЛОКЛУЗИЈА II КЛАСА 1 ОДДЕЛЕНИ ПРЕД И ПОСЛЕ ОРТОДОНТСКАТА ТЕРАПИЈА

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### Abstract

Malocclusions except changes in dental and skeletal structures, cause changes in the soft tissues, too. In Class II Division 1 Malocclusion, maxillary incisions are proclinated, lips are often incompetent, and the buccal corridor is enlarged. It affects the aesthetics of the smile and the appearance of patients. **The purpose** of this study is to determine the changes that occur before and after orthodontic therapy at patients with Class II/1 Malocclusion with respect to: the exposure of the maxillary incisions at rest position of the lips and when smiling, to determine the height of the upper lip at rest position of the lips and while smiling and to determine the size of the buccal space on the left and right side. For this purpose, a total of 60 patients with Class II/1 Malocclusion were examined before and after orthodontic therapy. From the obtained **results** it can be concluded that after orthodontic therapy, the length of the upper lip increases and the size of the buccal space decreases both, on the left and on the right side. **Keywords:** Malocclusion Class II Division 1, smile, buccal corridor space.

### Апстракт

Малоклузиите освен промените на денталните и скелетните структури, даваат промени и на меките ткива. Кај малоклузија од II класа 1 одделени максиларните инцизиви се протурдирани, усните најчесто се инкомпетентни, а букалниот простор е зголемен. Тоа влијае на естетиката на насмевката и изгледот на пациентите. **Целта** на оваа студија е кај пациенти со II/1 класа да се одредат промени кои настануваат пред и после ортодонтската терапија во однос на: експозицијата на максиларните инцизиви при мирување на усните и за време на насмевка, да се одреди висината на горната усна при мирување на усните и за време на насмевка и да се одреди големината на букалниот простор од левата и десната страна. За таа цел испитани се вкупно 60 пациенти со малоклузија II класа 1 одделение, пред и после ортодонтска терапија. Од добиените **резултати** може да се заклучи дека после ортодонтската терапија се зголемува должината на горната усна и се намалува големината на букалниот простор и од левата и од десната страна. **Клучни зборови:** Малоклузија II класа 1 одделение, насмевка, букален простор.

### Introduction

The face and eyes are mirror of the soul, while the smile is a reflection of the character of people<sup>1</sup>. Often, people who are open and communicative have a wide smile, showing most of the teeth in the lateral region, while those who are closed, introverted, rarely show their teeth during smiling.

Bones of the skull and of the face are a foundation, covered by soft tissues. These two components should be in a harmonious relationship if we want to have satisfactory facial aesthetics.

Lips are made of soft tissues, muscles and glands. The outer part of the lips is covered with skin, and the inner part with mucosa.

The border of the upper lip is actually the base of the nose, and in relation to the cheeks, the border is the nasolabial furrow<sup>1</sup>.

The lower lip borders the beard with sulcus mentolabialis. The depth of the sulcus depends on the thickness of the lips, the depth of the bite and the age of the patient<sup>1</sup>.

The connection between the upper and lower lips is in the corners of the lips. Canines are located between the frontal teeth of the lateral region, and play a major role in the aesthetics of the lips. They hold the corner of the lips so as not to collapse.

Any irregularity of the occlusion causes a deviation from normal intercuspitation and has its own repercussions on dento-facial correlation and structures.

Class II malocclusion is manifested by changes in the anteroposterior direction, with a distal position of the mandible in relation to the maxilla. In this malocclusion, there is a proclination of the maxillary incisions, incompetent lips, and convex profile of the face.

Angle (1907), considered to be the father of orthodontics, thought that the position of the lips is an important criterion for the facial aesthetics.

Arnett, Bergman, Proffit<sup>2</sup> emphasized the importance for perceiving aesthetics from a frontal point of view. Patients should not only be seen from a static position, but also pay attention to the dynamics of lips during conversation and smiling. In their examination, 92 adult patients were treated with fixed orthodontic appliances. They came to the conclusion that the buccal space is a multifactorial phenomenon. In order to control it and to get a better aesthetic smile, it is necessary to perceive the vertical facial features and the degree of exposure of the maxillary incisions. Whether the extraction will be carried out or not during orthodontic therapy will not affect the size of the buccal space<sup>2,3</sup>.

### The purpose of this study is:

To determine the size of exposure to maxillary incisions in patients with Class II Division 1 Malocclusion, at a resting lips position and during a smile, before and after orthodontic treatment;

To determine the height of the upper lip at a resting position and during the smile, before and after treatment in patients with Class II Division 1 Malocclusion;

To determine the size of the buccal space on the left and right side before and after orthodontic treatment in patients with Class II Division 1 Malocclusion.

### Material and methods

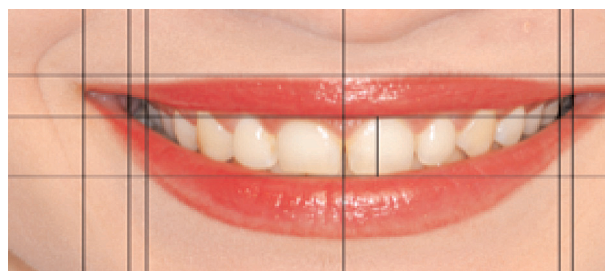
A total of 60 male and female patients with Class II Division 1 Malocclusion were examined, before and after

orthodontic treatment. They were treated with fixed orthodontic appliances.

All patients were between 12 and 18 years of age.

Every patient was photographed an-face, in a resting lips position and during a smile. The following parameters were examined (Picture 1):

- Length of upper left permanent maxillary incision - from the incisal edge of the maxillary incision to the highest point of the marginal gingiva;
- Height of the upper lip at rest - when the mandible is in physiological motion, the distance from Sn to the lower edge of the upper lip is measured (mm);
- The height of the upper lip during a smile;
- Buccal space on the left side - a space that appears between the buccal side of the maxillary posterior teeth and the mucosa of the lips on the left side;
- Buccal space on the right side - a space that appears between the buccal side of the maxillary posterior teeth and mucosa of the lips on the right side.



Picture 1. Measuring the smile

### Results

Table 1 presents the obtained mean values found in the total number of examinees (male and female) with Class II Division 1 Malocclusion before the orthodontic

Table 1. Presentation of values of patients with Class II Division 1 Malocclusion before orthodontic treatment

|  | x     | SD   | SE   | Min.  | Max.  |
|--|-------|------|------|-------|-------|
| Length of 21                           | 9.63  | 0.95 | 0.18 | 7.00  | 12.00 |
| Upper lip length in a resting position | 17.17 | 2.16 | 0.41 | 13.00 | 22.00 |
| Upper lip length during a smile        | 13.67 | 2.45 | 0.46 | 9.00  | 19.00 |
| Buccal space right                     | 5.97  | 0.95 | 0.18 | 4.00  | 8.00  |
| Buccal space left                      | 5.83  | 0.93 | 0.18 | 5.00  | 8.00  |

**Table 2.** Presentation of values of patients with Class II Division 1 Malocclusion after orthodontic treatment

|  | x     | SD   | SE   | Min.  | Max.  |
|--|-------|------|------|-------|-------|
| Length of 21                           | 9.70  | 0.90 | 0.17 | 7.00  | 11.00 |
| Upper lip length in a resting position | 20.30 | 1.99 | 0.38 | 17.00 | 24.00 |
| Upper lip length during a smile        | 16.50 | 1.84 | 0.35 | 12.00 | 20.00 |
| Buccal space right                     | 2.70  | 0.64 | 0.12 | 1.00  | 4.00  |
| Buccal space left                      | 2.73  | 0.51 | 0.10 | 2.00  | 4.00  |

**Table 3.** "t" test in patients with Class II Division 1 Malocclusion before and after orthodontic treatment

|  | II/1 before th |      | II/1 after th |      | T-test  | P             |
|--|----------------|------|---------------|------|---------|---------------|
|  | x              | SD   | x             | SD   |         |               |
| Length of 21                           | 9.63           | 0.95 | 9.70          | 0.90 | 0.78458 | P > 0.05 -    |
| Upper lip length in a resting position | 17.17          | 2.16 | 20.30         | 1.99 | 0.00000 | P < 0.001 *** |
| Upper lip length during a smile        | 13.67          | 2.45 | 16.50         | 1.84 | 0.00001 | P < 0.001 *** |
| Buccal space right                     | 5.97           | 0.95 | 2.70          | 0.64 | 0.00000 | P < 0.001 *** |
| Buccal space left                      | 5.83           | 0.93 | 2.73          | 0.51 | 0.00000 | P < 0.001 *** |

treatment: Length of 21 is with an average value of 9.63 mm  $\pm$  0.95. The height of the upper lip in resting position is 17.17mm  $\pm$  2.16. The height of the upper lip during a smile is 13.67 mm  $\pm$  2.45. Buccal space to the right is 5.97mm  $\pm$  0.95. Buccal space to the left is 5.83 mm  $\pm$  0.93.

Table 2 presents the obtained mean values found in the total number of patients with Class II Division 1 Malocclusion after orthodontic treatment: Length of 21 is with an average value of 9.70 mm  $\pm$  0.90. The height of the upper lip in resting position is 20.30mm  $\pm$  1.99. The height of the upper lip during a smile is 16.50mm  $\pm$  1.84. Buccal space to the right is 2.70mm  $\pm$  0.64. Buccal space to the left is 2.72mm  $\pm$  0.51.

From the values obtained for the "t" test, we can see that there is a marked significant difference in relation to the height of the upper lip in resting position and during a smile. The values for the size of the buccal space on the left and right side also have significant differences before and after treatment.

P > 0.05 (-) has no significance

0.05 > P > 0.01 (\*) has significance

0.01 > P > 0.001 (\*\*) high significance

P < 0.001 (\*\*\*) expressed significance

## Discussion

Orthodontic treatment has an impact on dento-facial structures, because soft tissues most often follow the movements of the bones and teeth<sup>4</sup>. This allows the orthodontists to have an influence on the formation of facial aesthetics, during the correction of occlusion.

Lips and teeth are parts of the face that attract attention during conversation. That's why people are striving more to correct the position of the teeth, their ratio and get better function and aesthetics.

In our examination we found that there is a significant difference in relation to the length of the upper lip in resting position and during a maximum smile before and after the orthodontic treatment. It was 17.17 mm before treatment and 20.30 mm after treatment, in a resting mouth position. During a maximum smile this value was 13.67 mm before and 16.50 mm after orthodontic treatment. Our values match the values of Shay Desai<sup>5</sup>. Shorter upper lip before therapy results in greater exposure of the incisions, not only during a smile but also in the resting position. After orthodontic treatment, there were changes in the length of the upper lip in resting lips position and during a smile, which is the result of the

retraction of the incisors. This shows that soft tissues follow the movements of the teeth. This results in a significant improvement of the aesthetic component.

The buccal space is determined by the buccal surface of the teeth and the oral surface of the cheeks. There are a number of examinations related to the influence of this space in relation to the formation of aesthetics of the smile<sup>6,7</sup>. Some authors consider that the size of the buccal space does not affect the aesthetics of the smile (Daltro Eneas Ritter<sup>7,8</sup>), while others (Sanja Manhar Parkha and all<sup>9,10</sup>) consider it is important in order to minimize the black spaces in the corners of the lips. Some studies<sup>11,12,13</sup> suggest that the smiles showing a larger number of teeth in the posterior segment are more pleasant and more attractive than those showing less posterior teeth.

Hideki Ioi and all<sup>14</sup> came to the conclusion that a wide smile is more attractive and desired, where the arc of the smile is parallel to the lower lip and the buccal space is minimal.

In our examination, the size of the buccal space in patients with Class II Division 1 Malocclusion was 5.97 mm on the right side and 5.83 mm on the left. These values coincided with the values obtained by Catherine McLeod and all<sup>15</sup>. After the orthodontic treatment, the values for this area were 2.70 mm on the right side and 2.73 mm on the left. This decrease of the values for the buccal corridor on the left and right side after the orthodontic treatment has shown that with orthodontic treatment there was correction of the maxillary dental arch from the "V" shape in the normal shape for maxillary arch - parabola. This also corrects the smile in terms of reducing the size of the buccal space and patients have a wide smile full of teeth. Our findings are in accordance with the findings of Daltro Eneas Ritter and all<sup>7,8</sup>.

## Conclusion

Orthodontists should follow beauty and wellness standards so they can respond to their patients' demands.

From the analyzed 60 patients with Class II Division 1 Malocclusion before and after orthodontic treatment, we made the following conclusions:

- The height of the upper lip in a resting position shows a lower value before orthodontic treatment in patients with Class II Division 1 Malocclusion;
- The height of the upper lip during a maximum smile significantly increases after orthodontic

treatment in patients with Class II Division 1 Malocclusion;

- The size of the buccal space significantly decreases in both the left and the right side in patients with Class II Division 1 Malocclusion after orthodontic therapy.

The use of orthodontic appliances in correcting the present Class II Division 1 Malocclusion has a significant influence in the correction of the facial aesthetics and the aesthetics of the smile.

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