

## CLASS II/1 REHABILITATION WITH FUNCTIONAL APPLIANCES IN GROWING PATIENTS-INFLUENCE ON FACIAL PROPORTIONS

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### ABSTRACT

**Aim of the study.** Orthodontic treatment intends to create a harmony between dental, muscular and osseous components. The purpose of this study was to evaluate, using proportional indexes, the effect of functional therapy on facial aesthetics rehabilitation, in class II/1 patients. **Material and methods.** We selected 60 patients with class II/1 malocclusion, aged between 6 and 12 years, treated with functional appliances. Specific indexes on standard photography at the beginning and the end of the treatment were assessed: F2- Lower face-face height, F3-Mandibulo-face height, F4-Mandibulo-upper face height, F5-Mandibulo-lower face height. **Results.** Statistically significant differences were noticed for F4 and F5 ( $p < 0.005$ ) for both age groups (6-9 years, 9-12 years) and both genders. **Conclusions.** Functional treatment demand intrinsic motivation and for this reason, two stage rehabilitation in class II/1 malocclusion can be commenced in the second phase of the mixed dentition.

**Key words:** facial proportion, functional therapy

### INTRODUCTION

What makes a face attractive and beautiful? The answer to this question has been addressed in numerous studies [1, 2]. Papers conclude that self-perceived pleasant appearance influences personal opinion of the others attractiveness, but the conclusion remains subjective; both males and females prefer faces that resemble their own [3, 4]. Dental maxillary anomalies have an important effect not only on teeth position but also on surrounding soft tissues and facial attraction. Class II/1 malocclusion present in its aetiology dysfunctional factors and in children, these features can affect normal growth and alliterate the proportion between

various segments of the dental maxillary complex. Soft tissues are sustained on skeletal components—in respect to this, lateral cephalometric radiographs analysis can be completed with anthropometric measurement for a better characterisation of the problem [5]. Orthodontic treatment aims to improve aesthetics, but long-term stability and relapse prevention enforces a perfect harmony between dental, muscular and osseous components [6]. For class II/1 malocclusion in growing patients, functional therapy represents a rational approach that could respond to all of these requirements. The ideal time for malocclusion treatment onset remains controversial. A 2-phased treatment

is advocated by some clinicians as advantageous, while others consider this approach ineffective. The 2-phased treatment should be recommended on a case-by-case basis, not as a general treatment option and only when it provides patients additional benefits [4, 6].

The purpose of this study was to evaluate, using photos and facial indexes, the effect of functional therapy on facial proportions in class II/1 patients, in order to achieve adequate rehabilitation.

### MATERIAL AND METHODS

The study group consisted of 60 patients distributed according to gender and dentition development as follows: 6-9 years (14 girls, 14 boys) and 9-12 years (16 girls, 16 boys). Patients show evidence of class II/1 malocclusion and they were undergoing orthodontic treatment with Andresen functional appliance. For facial analysis standard orthodontic photographs were used. Frontal photographs were taken with a photographic camera (Nikon D80; Nikon Corp., Japan) and telescopic lens (105 mm; Nikon Corp., Japan). The patient was positioned with the back contra a wall, the head was oriented with inter pupillary plane parallel to the floor, the teeth were in centric occlusion with relaxed facial muscles. The patient was asked to stay with the eyes open and to look straight ahead. Soft tissue areas with diagnostic value were adequately registered in these photos. We draw on photos specific points required for proportion measurement (Quickceph software-Quick Ceph Systems Inc., USA):

Nasion-the midpoint of the sutures of the frontal and nasal bone;

Subnasale- the midpoint where the upper lip joins the columella;

Stomion-the midpoint of the labial fissure when the lips are closed naturally;

Gnathion-the midpoint on the lower border of the mandible in the mid sagittal plane.

The subsequent indexes (Farkas and Munro) were evaluated [5, 6]:

F2- Lower face-face height: Subnasale-gnathion/ Nasion-gnathion;

F3-Mandibulo-face height: Stomion-gnathion/ Nasion-gnathion;

F4-Mandibulo-upper face height: Stomion-gnathion/ Nasion-stomion;

F5-Mandibulo-lower face height: Stomion-gnathion/ Subnasale-gnathion.

We selected these items since orthodontic treatment with functional appliances act mainly on lower and in a smaller amount on the middle third of the face. Measurements were done by the same operator at the beginning and the end of the treatment, in order to minimize errors.

Data were recorded and analysed using SPSS 25 (SPSS Inc, Chicago, USA) at  $\alpha=0.05$ . Descriptive statistics (mean, minimum, maximum and standard deviation) for each measurement were computed. The Student's t-test was used to compare and the results were considered significant for  $p<0.05$ .

### RESULTS AND DISCUSSIONS

Values compared initial and final for F2, F3 and F4 did not reveal statistically significant differences between groups in our study group. (Table 1, 2, 3)

Table 1. Correlation initial and final-F2

Factor	Age	Min.	Max.	p
F2 initial	6-9y	0.46	0.62	0.43
	9-12y	0.42	0.65	
F2 final	6-9y	0.51	0.63	0.14
	9-12y	0.51	0.63	

Table 2. Correlation initial and final-F3

Factor	Age	Min.	Max.	p
F3 initial	6-9y	0.35	0.54	0.87
	9-12y	0.35	0.54	
F3 final	6-9y	0.35	0.50	0.57
	9-12y	0.35	0.54	

Table 3. Correlation initial and final-F4

Factor	Age	Min.	Max.	p
F4 initial	6-9y	0.54	1.03	0.11
	9-12y	0.54	1.03	
F4 final	6-9y	0.61	0.85	0.76
	9-12y	0.36	0.82	

In our study group, we noticed statistically significant differences between selected age periods for F5 at the beginning of the treatment. (Table 4).

Table 4. Correlation initial and final-F5

Factor	Age	Min.	Max.	p
F5 initial	6-9y	0.60	0.72	<b>0.04</b>
	9-12y	0.61	0.78	
F5 final	6-9y	0.62	0.94	0.34
	9-12y	0.60	0.87	

The main goal of our research was to assess improvement in facial proportions, in order to decide when to initiate functional therapy. We would like also to emphasise on the importance of photographic analysis for orthodontist, patient and parents.

Beauty is not an exact science but there is a specific proportion that includes facial height and symmetry [6, 7]. In spite of this, the definition of an attractive and beautiful face is subjective and related to many factors: social, cultural, ethnic [7, 8].

Orthodontists have placed accent on the evaluation of the soft tissue profile, with less consideration being given to frontal facial analysis. When patients evaluate facial aesthetics, they often look in a mirror from a frontal view and are not as much concerned with the profile. For this particular reason, we considered that more importance should be given to the correction of total facial aesthetics, during orthodontic treatment [9, 10, 11].

Facial analysis by means of photographs is

a routine diagnosis method in orthodontics with the purpose to complete the clinical examination. The advantages of these 2D imaging techniques are rapid acquisition and low cost. Limitations include measurement impreciseness, due to operator variability, and head orientation errors, when the photographs were taken. Opposite, in children, anthropometric measurement could be time consuming and demand a lot of patience, element in dissonance with patient's emotional development and for this reason the use of photography and indexes is a natural approach [6, 7, 8, 9].

For the age group 6-9 y functional therapy exerted a significant effect for F4 and F5. (Table 5).

Table 5. Values compared initial/ final-age group 6-9 years

Factor initial(i)-final(f)	Mean	Std. Error	p
F2-F2	0.004	0.007	0.83
F3-F3	-0.002	0.012	0.79
F4-F4	0.126	0.031	<b>0.001</b>
F5-F5	-0.056	0.014	<b>&lt;0.001</b>

At the beginning of the treatment, we did not observe differences with statistical importance for F2, F3, F4 between patients in the first and second period of mixed dentition. For a single index, F5, the differences were statistically significant-the class II/1 malocclusion alliterate the balance in the lower third of the face.

For the age group 9-12y functional therapy exerted a significant effect for F5. (Table 6).

Table 6. Values compared initial/ final-age group 9-12 years

Factor initial(i)-final(f)	Mean	Std. Error	p
F2-F2	0.004	0.011	0.57

F3-F3	-0.008	0.009	0.75
F4-F4	0.075	0.028	0.006
F5-F5	-0.042	0.014	<b>0.005</b>

There is no consensus regarding the initiation of orthodontic treatment in order to improve facial balance in class II/1 malocclusion. Author's opinions are divergent, reporting insignificant changes in facial aesthetics after functional treatment [12]. Instead, children and preadolescents with malocclusion can be exposed intentionally and repetitively to acts of physical or psychological violence. This might cause anxiety and low self-esteem, which significantly affects their psychosocial development [13].

For young people and their parents, physical attractiveness is an important factor affecting social relationships. In line with this assertion, aesthetic alterations of the face, related to class II/1 malocclusion, disparity on lower face vertical proportion, can be perceived even at a very young age and can affect quality of life [12, 14, 15].

Values compared initial and final for female gender reveal statistical significance for F4 and F5. (Table 7)

Table 7. Correlation initial/ final-girls

Factor initial(i)-final(f)	Mean	Std. Error	p
F2-F2	0.002	0.008	0.38
F3-F3	-0.017	0.010	0.37
F4-F4	0.149	0.035	<b>0.001</b>
F5-F5	-0.058	0.014	<b>0.000</b>

Values compared initial and final for male gender turn up to be statistically significant for F4 and F5. (Table 7).

Table 8. Correlation initial/ final-boys

Factor	Mean	Std.	p
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initial(i)-final(f)		Error	
F2-F2	-0.001	0.011	0.90
F3-F3	0.007	0.011	0.44
F4-F4	0.049	0.020	<b>0.002</b>
F5-F5	-0.039	0.013	<b>0.002</b>

In our experimental group, the orthodontic treatment demand started at early ages. Results of many studies make known that confidence stands in feature related to physical appearance especially during childhood and adolescence, when there is intense social and affective interaction [12, 16, 17].

Regarding the values at the beginning and the end of the treatment, for evaluated patients, indexes F4 and F5 appeared to be significantly statistically influenced by functional treatment for both genders. Studies have shown that the amount of facial change from functional orthodontic treatment is typically minimal and confined to the lower third of the face [18, 19, 20]. According to literature, the lower 1/3 of the face considerably influences facial appearance. The same indexes F4 and F5 express differences in both age groups, for this reason we can assume that aesthetic rehabilitation using functional treatment can be started in late mixed dentition, when patient acceptance and compliance are more adequate.

Studying the effects of functional treatment in growing patients can help determine its limits, possibilities and strategies for achieving ideal facial aesthetics. Clinicians show confidence in the ideal ratios and angles which can be used to draw guidelines [21]. Today's society is overwhelmed with the importance of being attractive through a variety of media. That fact brings facial standards together with the perception of beauty associated with social acceptance and success. Early orthodontic treatment worth to be applied especially in

patients with skeletal class II/1 malocclusion [22]. To successfully meet expectations on facial aesthetics, it is important to understand normal craniofacial growth and the impact of orthodontic treatment. Our results are in line

with this statement; functional therapy improved lower face appearance in facial balance for both genders, in mixed dentition [23, 24, 25].

## CONCLUSIONS

Within the limitation to a specific group the subsequent conclusion can be formulated:

1. Childhood is a period where defects are noticed mainly by family and for this reason, treatment demands start from early mixed dentition. At this age, growth can ensure and regain the development of skeletal structure improving the balance of soft tissues.
2. The results in our study group demonstrate the effect of Andersen appliance with statistically significant differences in lower and medium face equilibrium rehabilitation.

3. Patient compliance and cooperation must balance the decision when to initiate orthodontic treatment. For better results, the second period of mixed dentition represents an adequate option.

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