

Patients with Class II Malocclusion: Cephalometric analysis in the Tegumentary Profile

Sandra Kalil Bussadori¹; Carlos Eduardo Bugano de Oliveira²; Carolina Cardoso Guedes³; Kristianne Porta Fernandes¹; Analúcia Ferreira Marangoni⁴; Maria Aldeide Costa Borges⁵; Elaine Marcílio Santos⁵

¹Professor, Master Degree Program in Rehabilitation Sciences, Nove de Julho University

²DDS, Ortopedia Funcional dos Maxilares, Camilo Castelo Branco University

³Professor, Pediatric Dentistry Department, Braz Cubas University

⁴Pos Graduate Student, Master Degree Program in Rehabilitation Sciences, Nove de Julho University

⁵Professor in Pos Graduate Program in Dentofacial Orthopedics, Camilo Castelo Branco University

Postal address:

Analúcia Ferreira Marangoni
Rua Antônio João de Medeiros, 412 casa 21, Itaim
08140-060 São Paulo – SP [Brasil]
analuciaferreira_cd@superig.com.br

Abstract

The aim of the study was to assess cephalometric abnormalities in the tegumentary profile of patients with Class II malocclusion. Twenty patients with average age of seven years and eight months were divided into: Group I - control, Class I, no malocclusions (n=10); Group II – Class II malocclusion (n=10). Standardized radiography was performed for the obtainment of the cephalometric points. Langlade's classification was employed and the features were used: GN.Sn.Pog, ANL,A'-Gv, Pog'- Gv, Ls-GV, Li-GV, Sls-Gv, Sli-Gv. The Student's t-test and Pearson's correlation were used, with the level of significance set at 5%. The results show that the patients with Class II had more convex tegumentary profile, less protruded mid face and upper lip, less depth of the upper lip groove and more retracted lower lip and tegumentary chin, with statistically significant differences between groups ($p<0.005$). The conclusion is that the patients with Class II malocclusion exhibited cephalometric abnormalities in the tegumentary profile.

Key words: Angle Class I; Angle Class II; Cephalometry; Malocclusion.

Introduction

Maintenance of the stomatognathic system is obtained through a balance between bones and teeth in relation to the base of the skull¹. A number of factors can cause the functional impairment of this system, such as abnormal dental eruptions, the growth vector of the bone bases and harmful habits, which can result in facial imbalance. Abnormalities in facial bone structures have been widely discussed^{2,3}.

A number of cephalometric analyses have been developed in an attempt to qualify and quantify craniofacial features. Most of these analyses focus on dental and skeletal measurements as determinants of patterns of facial normality. There are several studies on facial analysis to assess soft tissues, however, though many methods of implementation, few types of analysis are unique to soft tissues and few studies assess the degree of efficiency in improvements occurring in the profile following treatment with orthodontic and functional orthopedic methods. Such analyses do not correspond to tegumentary aspects, for they provide a detailed assessment of dental relationships, but make little mention of the balance in tegumentary tissues⁴.

The assessment of facial profile measurements was introduced in cephalometrics in the mid 1950s, and it is an important factor in the planning of orthopedic treatment, allowing better discernment regarding dental-skeletal problems. Many orthodontists go by the supposition that, if the dental and skeletal structures are in balance, the facial lines will automatically be in balance as well⁵⁻⁸. However, the thickness of the facial tegument is variable and does not necessarily depend on dental-skeletal structures. Thus, the assessment of alterations in the facial profile stemming from orthodontic or orthopedic treatment should not be entirely based on skeletal analyses^{4,5,9,10}. Furthermore, the esthetic satisfaction of the patient also needs to be considered¹¹⁻¹⁴.

The aim of the present study was to assess cephalometric abnormalities in patients with Angle's Class II malocclusion.

Materials and methods

This study received approval from the Ethics Committee of the Universidade Camilo Castelo Branco (process n° 778-1004/04). All parents/guardians received information regarding the project and signed terms of informed consent (in compliance with Resolution 196/96 of the Brazilian National Health Council), allowing the use of orthodontic documentation for teaching purposes and divulgation.

An observational, cross-sectional study was carried out to assess the tegumentary profile of patients with Class II malocclusion. For this purpose, an analysis was performed on 248 radiographs of patients from the polyclinic of the department of Functional Orthopedics of the Maxillae at the Universidade Camilo Castelo Branco (Brazil). Taking the inclusion criteria into consideration, 20 radiographs were selected for the assessment of the tegumentary profile and the sample was divided into two groups, as follows:

- Group I: control group, made up of 10 patients (9 female and 1 male), with an average age of seven years and two months, with no type of malocclusion.
- Group II: patients with Angle's Class II malocclusion (7 female and 3 male), with an average age of seven years and eight months.

The radiographs used were obtained in *norma lateralis* and the accepted standardization criteria for the taking and developing of radiographic images were followed. Table 1 displays the points and cephalometric features used, following the Langlade classification⁵. For analysis of the results, it was used softwear SPSS, version 2.0 statistical package. The Student's t-test and Pearson's correlation coefficient were used for

the comparison of differences between groups regarding the cephalometric features, with the level of significance set at 5% ($p < 0.05$).

Table 1: Description of cephalometric features used

Cephalometric Feature	Description
1. Gn. Sn. Pog'	Angle that measures facial convexity
2. ANL	Angle representing protrusion
3. A'Gv	Horizontal distance of protrusion of the mid face
4. Pog'- Gv	Horizontal distance of the soft pogonium
5. Ls - Gv	Measurement of upper lip protrusion
6. Li -Gv	Measurement of lower lip protrusion
7. Lsl - Gv	Horizontal distance of the depth of the upper lip groove
8. Sli - Gv	Horizontal distance of the depth of the lower lip groove

Results

Table 1 shows the points assessed to obtain the tissue profile changes in patients with malocclusion Class II, the analysis of Langlade.

Table 2 and 3 displays the values of the features assessed in Group I (control) and Group II (Class II malocclusion), respectively. Table 4 displays the mean and standard deviation values of the features assessed both groups. Table 5 shows that, although there were differences in the linear and angle measurements, Pog'-Gv was the only feature to exhibit a statistically significant abnormality.

The Gn.Sn.Pog' angle was more convex in the patients with Class II malocclusion. There was no statistically significant difference in the position of the upper lip in relation to the nose. Protrusion of the mid face and upper lip were lesser; the depth of the upper lip groove was

lesser; and the lower lip and tegumentary chin were more retracted in the patients with Class II malocclusion (Table 3).

Discussion

The results of the study show that the patients with Class II had more convex tegumentary profile, less protruded mid face and upper lip, less depth of the upper lip groove and more retracted lower lip and tegumentary chin.

Angle's Class II malocclusion is a frequent condition and involves different functional, skeletal, dental and bone remodeling aspects. Innumerable treatment methods are proposed for this type of malocclusion, seeking both a good occlusal alignment as well as the reestablishment of functions correlated to breathing and swallowing^{15,16}. Most studies, however, are directed toward dental-skeletal aspects and little is mentioned regarding the tegumentary profile.

Dental-skeletal analysis should not be the only diagnostic factor considered, as alterations produced by orthodontics and functional orthopedics are not necessarily accompanied in the same proportion for an improvement in profile¹⁷. Furthermore, malocclusions trigger myofascial abnormalities that need to be treated. The mechanical approach for the correction of Class II malocclusion can be difficult, prolonged and unstable when not taking the behavior of facial muscles into account.

It is believed that facial esthetics is benefited by harmonious dental and skeletal relationships, but it is not completely dependent on such relationships. Thus, the analysis of tegumentary tissues is a fundamental diagnostic resource in the assessment of patients through a functional, dental-skeletal and esthetic approach¹⁸. However, few studies have been conducted in recent decades in order to verify the change in cutaneous cases of malocclusion, especially in children^{3, 4, 5, 8, 10}.

It is known that 60% of patients with Class II malocclusion exhibit mandibular retraction

Table 2: Cephalometric features of Group I (control)

Patient	Gn.Sn.Pog'	ANL	A'-Gv	Pog'-Gv	Ls-Gv	Li-Gv	Sis-Gv	Sli-Gv
1	13°	110°	0 mm	-8 mm	6 mm	-5 mm	0 mm	-11 mm
2	12°	122°	0 mm	-5 mm	4 mm	-4 mm	0 mm	-8 mm
3	14°	135°	3 mm	-9 mm	6 mm	-8 mm	4 mm	-15 mm
4	15°	120°	4 mm	-7 mm	8 mm	-3 mm	5 mm	-5 mm
5	13°	135°	0 mm	-5 mm	2 mm	-2 mm	-2 mm	-11 mm
6	12°	110°	-2 mm	-7 mm	3 mm	-4 mm	-2 mm	-9 mm
7	14°	131°	4 mm	-8 mm	7 mm	-2 mm	3 mm	-6 mm
8	13°	140°	-1 mm	-4 mm	4 mm	-1 mm	-1 mm	-6 mm
9	15°	139°	5 mm	-8 mm	9 mm	-1 mm	4 mm	-6 mm
10	13°	131°	-3mm	-9 mm	3 mm	-6 mm	-2 mm	-11 mm

Table 3: Cephalometric features of Group II (Class II malocclusion)

Patient	Gn.Sn.Pog'	ANL	A'-Gv	Pog'-Gv	Ls-Gv	Li-Gv	Sis-Gv	Sli-Gv
1	10°	97°	0 mm	-8 mm	8 mm	5 mm	0 mm	-7 mm
2	16°	147°	5 mm	-6 mm	8 mm	4 mm	4 mm	-8 mm
3	12°	116°	-3 mm	-17 mm	2 mm	-4 mm	-1 mm	-13 mm
4	18°	130°	-1 mm	-18 mm	3 mm	-6 mm	-1 mm	-15 mm
5	24°	135°	0 mm	-24 mm	2 mm	-6 mm	-1 mm	-15 mm
6	16°	110°	3 mm	-10 mm	2 mm	3 mm	6 mm	-9 mm
7	20°	140°	3 mm	-24 mm	2 mm	-5 mm	-2 mm	-20 mm
8	14°	140°	0 mm	-12 mm	2 mm	-1 mm	-1 mm	-10 mm
9	16°	140°	-2 mm	-17 mm	-1 mm	-3 mm	-3 mm	-11 mm
10	12°	120°	-4mm	-2 mm	-2 mm	-4 mm	-3 mm	-8 mm

Table 4: Mean and standard deviation for each cephalometric feature according to group

Cephalometric Feature	Group I (control)		Group II (Class II)	
	Mean	Standard Deviation	Mean	Standard Deviation
Gn.Sn.Pog'	13.4°	1.07°	15.8°	4.15°
ANL	127.3°	11.17°	127.5°	16.11°
A'-Gv	1 mm	2.78 mm	0.1 mm	2.84 mm
Pog'-GV	-7 mm	1.76 mm	-14.7 mm	6.30 mm
Ls-Gv	5.2 mm	2.34 mm	3 mm	3.26 mm
Li-Gv	-3.6 mm	2.27 mm	-4.1 mm	1.52 mm
SI-Gv	0.9 mm	2.80 mm	0.2 mm	2.93 mm
Sli-Gv	-8.8 mm	3.10 mm	-11.6 m	4.11 mm

Table 5: Statistical analysis using Student's t-test and Pearson's correlation

Cephalometric Feature	t-value	Degrees of freedom	
Gn.Sn.Pog'	1.77	18	NS
ANL	0.03	18	NS
A'-Gv	0.71	18	NS
Pog'-GV	3.72	18	S
Ls-Gv	1.73	18	NS
Li-Gv	1.25	18	NS
SI-Gv	0.54	18	NS
Sli-Gv	1.70	18	NS

NS – non-significant; S – significant

and, in most cases, maxilla position is either normal or retracted. The present study found that tegumentary characteristics in patients with Class II malocclusion revealed greater convexity in comparison to the control group, while there was no difference between groups regarding the position of the upper lip in relation to the nose. This corroborates findings described by Freitas, who also found a higher degree of convexity in ten-year-old patients with Class II malocclusion¹⁹.

Thus, protrusion of the mid face and upper lip and the depth of the upper lip groove were lesser in the patients with Class II malocclusion in comparison to the control group. Moreover, the lower lip and tegumentary chin were more retracted in patients with Class II malocclusion.

Conclusion

The patients with Class II malocclusion exhibited cephalometric abnormalities in the tegumentary profile when compared to the control group, with more convex tegumentary profile, less protruded mid face and upper lip, less depth of the upper lip groove and more retracted lower lip and tegumentary chin, with statistically significant differences between groups.

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