Study of the cephalometric features of Brazilian long face adolescents

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Abstract

Objective: To determine skeletal and dental cephalometric values for Brazilian long-faced adolescents. **Methods:** The sample comprised lateral cephalograms of 30 long-faced patients, 17 females and 13 males, and 30 Pattern I adolescent patients, 15 males and 15 females, with permanent dentition, during adolescence. The features that characterized the long face pattern were defined clinically by subjective facial analysis. The following cephalometric landmarks were assessed: 1) Sagittal behavior of the apical bases (SNA, SNB, ANB, NAPog, Co-A, Co-Gn), 2) Vertical behavior of the apical bases (SN.PP, SN.MP, gonial angle, TAFH, LAFH, MAFH, PFH, TAFHperp, LAFHperp), 3) Dentoalveolar behavior (1-PP, 6-PP, 1-MP, 6-MP, 1.PP, IMPA), and 4) Facial height ratios (LAFHPerp/TAFHPerp, LAFH/TAFH, MAFH/LAFH). **Results and Conclusions:** The vertical error of the long face pattern was concentrated in the lower third. The maxilla exhibited greater dentoalveolar height and the mandible, given its more vertical morphology, displayed greater clockwise rotation. These morphological and spatial features entail sagittal and vertical skeletal changes as well as vertical dentoalveolar changes. The facial convexity angles were increased in the sagittal direction. Vertically, the total and lower anterior facial heights were increased. The dentoalveolar component was found to be longer.

Keywords: Face. Adolescent. Cranial circumference.

INTRODUCTION

From Michelangelo's "Belvedere Torso" to the "Venus at the mirror," by Velazquez, the sensitivity of the human eye has captured the beauty behind the sublime conception of human anatomy. The pursuit of the beauty concealed in the face takes orthodontic diagnosis to a whole new level and highlights the daily exercise of orthodontists, who analyze the face to establish such diagnosis. The approach is technical, although it does encompass some subjectivity, since it is a qualitative, not quantitative analysis.

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Nevertheless, orthodontists are concerned with the morphological—not transcendental—diagnosis involving the shape and proportions of the face. Hence the connotation of "morphological diagnosis". In this light, there is nothing metaphysical about discovering beauty in the morphology of the face. This task consists in an analysis of the face, a morphological evaluation, both qualitative and subjective.

The first concern of orthodontists lies in recognizing normality. In frontal view the normal face combines three essential characteristics (Fig 1). The first is symmetry. The chin of a symmetrical face is centered on the face, i.e., collinear with the midsagittal plane. The second feature concerns proportionality between the facial thirds. The facial thirds should be similar, with a slight predominance of the lower third. And finally, as a consequence of the previous feature, competent lip seal. The latter's behavior indicates compatibility between soft tissue and skeletal lengths. These skeletal features are determined by morphogenesis. It is plausible to assume that, in general, environmental factors will not interfere, or will interfere only marginally, with facial morphology in the frontal view.

This morphogenetic connotation of facial morphology entails two fundamental implications. When the face is normal, it retains its morphology throughout its growth. When it deviates from normality, it is not possible to perform any orthodontic or orthopedic treatment capable of exerting any significant clinical impact, particularly in the frontal view. Thus, the first concern of orthodontists when performing a facial analysis in the frontal view is to determine whether there are any errors in facial morphology. Among the errors diagnosed in the frontal view of the face is the so-called long face, an error in the vertical direction.

A "long face" is characterized by an excessively vertical face, also referred to as Long Face Pattern,[4,5] "long face syndrome",[11] hypodivergent facial type[13] or, erroneously, "mouth breathing syndrome". Disparity between facial thirds (Fig 2) can be identified clinically. The lower third is increased, resulting in incompetent lip seal, overexposed maxillary incisors at rest, gingival exposure on smiling and double chin in an attempt at lip seal competence.[2,10,29]

As is the case with other frontal view errors, long faces cannot be corrected by orthodontics

FIGURE 1 - Characteristics of the Pattern I face as defined by facial analysis. **A**) A pleasant frontal morphology of the face results from symmetry and proportionality between facial thirds. **B**) Lip competence results from compatibility between skeletal and soft tissue lengths. **C**) Lateral analysis shows a balanced sagittal behavior between the apical bases.

FIGURE 2 - Features of the Long Face Pattern. **A**) In lateral view, the downward and backward rotation of the mandible may favor the diagnosis of mandibular deficiency. **B**) In frontal view the diagnosis is unmistakable: a disproportion between the facial thirds, with a disproportionate increase of the lower third, compromises lip competence and exposes the upper incisors at rest.

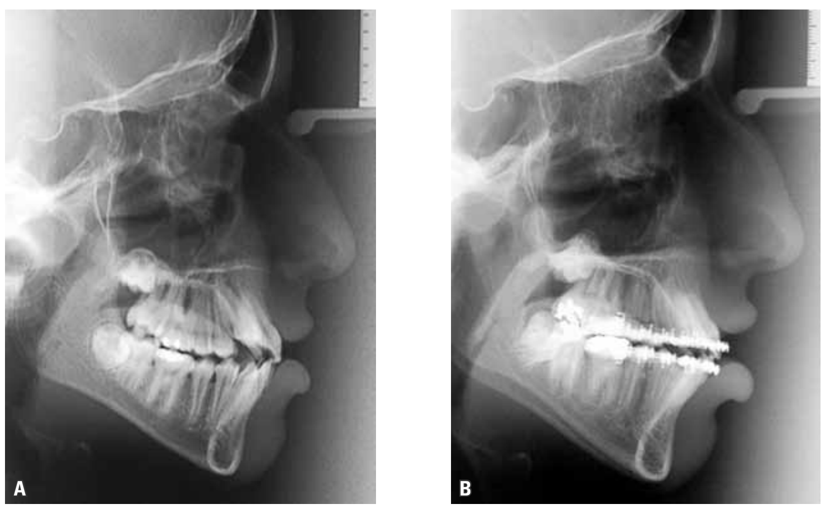

FIGURE 3 - Lateral cephalograms before (**A**) and after orthodontic treatment (**B**) of long-faced patient, demonstrating that orthodontics exerts no impact on dentofacial morphology. Comparison of cephalograms **A** (initial) and **B** (final) shows that the upper lip/lower lip and upper lip/incisors relationships do not change as a result of orthodontic treatment.

and/or orthopedics alone. Patients and clinicians share an identical perception of this issue (Fig 3). Orthodontists are therefore aware of the vital role played by orthognathic surgery in reducing the vertical excess that characterizes this facial pattern. Two morphological criteria lead to the indication of orthognathic surgery for long face reduction, i.e., compromised facial esthetics and inability to treat the existing malocclusion. The former issue is subjective and depends mainly on what the patient expects from the treatment and from the facial change. The latter refers to the severity and direction of the interarch error found in the malocclusion. For example, an anterior open bite in a long face pattern is a strong indication for surgery.

In the history of orthodontics, the diagnosis of excessively vertical facial growth was initially based on cephalometric measurements. However, the criterion used for defining the long face that prevailed in the literature until the late 1970s[8] was mistaken as it was based on the occlusal condition. From a cephalometric standpoint, a long face is characterized by increased total anterior facial height due to increased lower anterior facial height.[12,15,22] The mandible is considered the main culprit in the long face condition,[11] exhibiting a short ramus, obtuse gonial angle,[11,24] increased mandibular plane angle, both relative to the cranial base[2,11-14,20,29] and the palatal plane.[16] The literature suggests no difference in the sagittal and vertical dimensions of the maxilla in patients with excessive vertical growth. The distance from the palate to the cranial base, the length of the maxilla and the palatal plane angle relative to the cranial base do not differ from normal.[24] Changes in the midface are concentrated in the dentoalveolar process, with an increase in distance from the molars, and from the incisors to the palatal plane.

Attuned to the esthetic demands of the facial analysis era and to the main complaint voiced by patients,[11] orthodontists confirm vertical maxillary errors by reference to upper incisor exposure at rest and exposure of the gingival tissue upon smiling. The clinical reference for diagnosing the maxilla in long face cases is so important that the vertical reduction surgery includes impaction of the maxilla, whose key advantage is high stability.[21]

The incidence of individuals with excessively vertical face growth patterns is controversial, even when diagnosis is based on facial analysis. This is due to difficulties in standardizing the magnitude of the excess to determine a long face. For example, the impact of increased LAFH in young Caucasian Americans is 18%[5,6] while in young Brazilians it is 35,00%.[8] When the diagnosis refers to the long face itself, probably with an indication for surgical correction, incidence drops to around 1.5% of the population.[6] The cephalometric characteristics are well defined for adult patients who are no longer in the growth phase, including Brazilians.[4] The literature also confirms that facial morphology is established at an early stage,[17,18,22] and the long face is no exception. Characteristics such as total anterior facial height, mandibular plane angle, gonial angle, angle formed by the palatal and mandibular planes are increased from pre-adolescence,[11] while the proportion of the facial thirds remains[16] or even worsens during adolescent growth.[11] The number of studies on the long face in adolescents is proportionate to the importance of the subject. Within this scenario, our investigation aimed to put into perspective the cephalometric characteristics of the long face pattern in adolescents.

MATERIAL AND METHODS

Material

For this retrospective study, pretreatment lateral cephalograms of White patients of both genders, with permanent dentition and excessively vertical faces, enrolled in the orthodontics specialization program at Profis-Bauru were selected. Vertical excess was diagnosed by the presence of incompetent lip seal and exposure of upper incisors with the upper lip at rest, as seen in facial photographs. Among the selected patients, 9 were female and 21 were male. The selected patients had a mean age of 13 years, ranging between 10 years and 8 months and 15 years and 8 months. These patients comprised the Long Face Pattern group.

Pretreatment lateral cephalograms were also selected of Pattern I White patients of both genders, with permanent dentition enrolled in the orthodontics specialization program at Profis-Bauru. Among the selected patients, 18 were female and 12 were male. The selected patients had a mean age of 13 years, ranging from 11 years and 2 months to 15 years and 7 months. These patients comprised the control group.

The technical requirement for cephalogram selection was adequate bone and tooth image quality.

Methods

The radiographs were scanned and the images were analyzed using the program Radiocef 2.0, according to the manufacturer's instructions.[26] The landmarks were defined (Fig 4) on the scanned images of the lateral radiographs by a single examiner following the same method adopted by Cardoso et al.[4] The results were stored and then submitted to statistical evaluation. The angular and linear measurements were grouped in the following order: 1) Sagittal behavior of the apical bases (Fig 5) (SNA, SNB, ANB, NAPog, Co-A, Co-Gn), 2) Vertical behavior of the apical bases (Fig 6) (SN.PP, SN.MP, gonial angle, TAFH, LAFH, MAFH, PFH, TAFHperp, LAFHperp), and 3) Dentoalveolar behavior (Fig 7) (1-PP, 6-PP, 1-MP, 6-MP, 1.PP, IMPA).

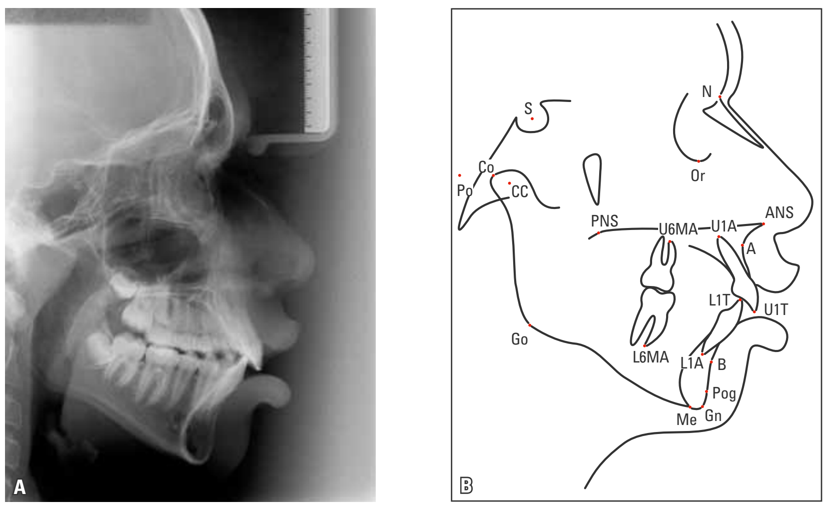

FIGURE 4 - **A**) Lateral cephalogram, and **B**) cephalometric tracing illustrating the points used as cephalometric landmarks in a long-faced patient.

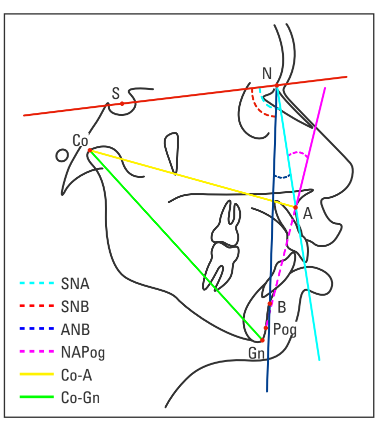

FIGURE 5 - Cephalometric landmarks representative of the sagittal behavior of apical bases: SNA, SNB, ANB, NAPog, Co-A, Co-Gn.

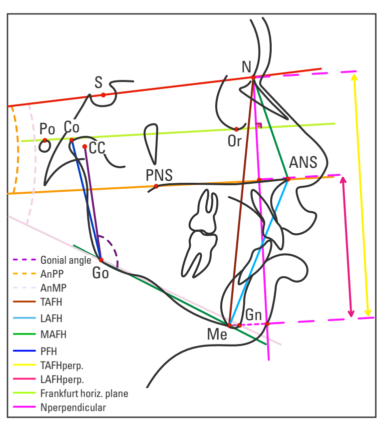

FIGURE 6 - Cephalometric landmarks representative of the vertical behavior of the apical bases: SN.PP, SN.MP, gonial angle, TAFH, LAFH, MAFH, PFH, TAFHperp, LAFHperp.

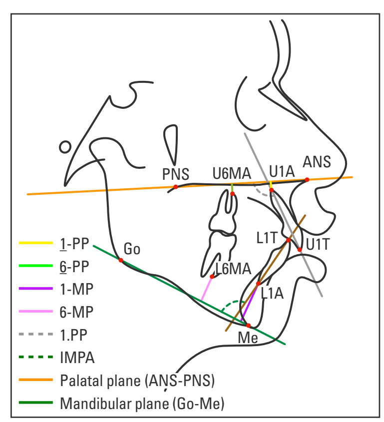

FIGURE 7 - Cephalometric landmarks representative of the dentoalveolar behavior: 1-PP, 6-PP, 1-MP, 6-MP, 1.PP, IMPA.

STATISTICAL ANALYSIS

The means and standard deviations of all variables were calculated. In order to detect differences between the groups, the t-test for independent data was used. We compared the Long Face Pattern and Pattern I groups in terms of gender. Comparisons were made using a 5% ($p < 0.05$) level of significance.

To check the method error, 10 cephalograms from each group were randomly selected, whose cephalometric landmarks were again marked and measurements redone with the Radiocef 2.0 software program (Table 1). The values obtained in the first and second measurements were tested using the t-test to study the systematic error and Dahlberg's formula, to study the random error.[13]

TABLE 1 - Application of the t-test in two measurements made with the intent to establish the method error.

Landmark	1st Measurement		2nd Measurement		t	p	Error
	mean	SD	mean	SD			
Co-A	90.43	3.63	90.66	3.53	1.544	0.139	0.47
Co-Gn	114.53	5.22	114.68	5.29	1.632	0.119	0.30
CoGo	114.53	5.22	114.68	5.29	1.693	0.107	0.30
Dif. Mx Md	24.10	3.98	24.02	4.01	0.641	0.529	0.37
LAFH	67.50	5.04	67.65	5.20	2.107	0.049	0.25
TAFH	118.14	6.63	117.97	6.82	1.221	0.237	0.44
MAFH	52.87	3.49	52.58	3.58	2.202	0.040	0.46
PFH	55.46	5.99	55.45	5.99	0.126	0.901	0.24
TAFH perp	117.66	6.44	117.50	6.66	1.094	0.287	0.45
LAFH perp	65.35	4.13	65.50	4.32	1.856	0.079	0.28
1-PP	4.34	2.24	4.52	2.13	1.634	0.119	0.35
6-PP	21.59	2.08	21.66	2.21	1.103	0.284	0.19
1-MP	15.81	2.47	16.05	2.73	2.721	0.014	0.33
6-MP	29.77	2.94	29.79	2.95	0.461	0.650	0.14
SNA	82.49	2.96	82.86	2.67	2.376	0.028	0.55
SNB	77.98	3.36	78.37	3.17	2.671	0.015	0.53
ANB	4.51	2.44	4.50	2.43	0.189	0.852	0.23
Gonial Angle	124.09	5.86	124.25	5.91	3.070	0.006	0.20
SN.MP	92.88	3.20	93.00	3.19	2.260	0.036	0.19
SN.PP	8.32	4.16	8.09	4.16	1.832	0.083	0.41
1.PP	64.43	5.42	64.18	5.30	0.913	0.373	0.86
IMPA	95.33	7.89	95.08	7.72	1.138	0.269	0.72
Lower third angle	101.77	3.68	101.97	3.81	2.009	0.059	0.34
NAPog	8.72	5.16	8.61	5.47	0.668	0.512	0.48
LAFHperp./TAFHperp	0.56	0.02	0.56	0.02	0.567	0.577	0.00
LAFH/TAFH	0.57	0.02	0.57	0.02	0.809	0.428	0.00
MAFH/LAFH	0.79	0.06	0.78	0.06	2.668	0.015	0.01
PFH/TAFH	0.47	0.05	0.47	0.05	0.567	0.577	0.00

RESULTS

For didactic purposes, the statistical treatment of the cephalometric measurements was organized in tables (Tables 2, 3, 4 and 5) containing the mean, standard deviation and the result of Student's t-test considering facial morphology and gender.

Table 2 assesses the sagittal behavior of the apical bases. The maxilla behaved similarly in both the Long Face and Pattern I groups, regardless of gender. In boys the maxilla was larger both in linear Co-A and angular SNA measurements. The position of the mandible relative to the cranial base (SNB) was influenced by two variables, facial morphology and gender, exhibiting greater retrusion in the Long Face and in girls. Mandibular length (Co-Gn) was influenced only by the gender variable, and less so in girls. Facial convexity of long-faced subjects was less pronounced. Therefore, in the sagittal direction, mandibular behavior was changed in the Long Face Pattern.

Table 3 evaluates the vertical behavior of the apical bases. Angular measurements (gonial angle, mandibular plane angle and palatal plane angle) were influenced only by the gender variable. The angular behavior of the mandible was affected by facial morphology. Mandibular angles (gonial angle and mandibular plane angle) were increased in long-faced subjects while the palatal plane was identical in both facial patterns. Therefore, in terms of angular measurements, the mandible behaved differently in the Long Face Pattern. As for the linear measurements, the midface (MAFH) is not influenced by either gender or morphology. Total facial heights and lower facial heights tended to be higher in long-faced subjects and lower in Pattern I girls.

Table 4 evaluates dentoalveolar behavior, i.e., the heights of the upper and lower dental arches, and inclination of the incisors in their respective apical bases (1.PP and IMPA). The only quantities influenced by gender were the first molar heights (6-PP and 6-MP), which were higher in males. Dental arch heights were increased among female long-faced subjects. Maxillary incisors also behaved identically in Long Face and Pattern I subjects, whereas mandibular incisors were more proclined in long face subjects.

Table 5 evaluates facial heights and the ratios between them. The facial proportions were influenced only by facial morphology, and tended to show a greater involvement of the lower face in Long Face subjects. The heights of the apical bases were lower in Pattern I girls.

DISCUSSION

The cephalometric characteristics of the Long Face pattern in adolescents is a largely unexplored subject in the orthodontic literature, particularly through a cephalometric study based on the clinical morphology of the face. Even in adults, very few investigations have hitherto performed facial analyses to quantify the vertical error[3,11,19] or assessed patients with an indication for vertical excess reduction surgery.[2,10,28]

This study investigated the morphological features of long-faced patients, as defined by facial analyses. It was inspired by previous research, which defined the cephalometric means of long-faced adult patients.[4,6] These data lay the groundwork for the discussion of these findings in adolescents.

For didactic reasons the results were distributed in Tables 2-5, following the order of cephalometric landmarks displayed under Material and Methods: 1) Table 2: Sagittal behavior of the apical bases, 2) Table 3: Vertical behavior of the apical bases, 3) Table 4: Dentoalveolar behavior, and 4) Table 5: Ratios between facial heights.

The sagittal evaluation of the apical bases included angular (SNA, SNB, ANB, NAPog) and linear (Co-A and Co-Gn) measurements, shown in Table 2.

TABLE 2 - Mean values, standard deviations and application of the t-test for sagittal values.

MEASURE	LONG FACE				PATTERN I			
	Male		Female		Male		Female	
	mean	SD	mean	SD	mean	SD	mean	SD
SNA	83.56[a]	3.22	81.65[b]	2.17	83.48[a]	3.13	81.18[b]	2.95
SNB	77.71[a]	3.15	76.26[b]	3.42	80.36[c]	2.93	78.15[d]	3.20
ANB	5.86[a]	2.42	5.39[a]	2.60	3.13[b]	1.74	3.03[b]	1.69
NAPog	12.16[a]	5.26	10.27[a]	7.08	5.03[b]	4.53	6.01[b]	2.42
Co-A	92.28[a]	3.71	90.87[b]	2.13	91.97[a]	3.71	88.37[b]	2.66
Co-Gn	116.04[ab]	6.02	114.46[ab]	3.89	119.86[a]	5.64	112.16[b]	4.05

Groups with the same letters presents no statistically significant difference between them.

TABLE 3 - Mean values, standard deviations and application of the t-test for vertical values.

MEASURE	LONG FACE				PATTERN I			
	Male		Female		Male		Female	
	mean	SD	mean	SD	mean	SD	mean	SD
Mand. Plane Angle	93.91[a]	2.81	94.23[a]	3.67	92.32[b]	4.21	91.79[b]	3.25
Pal. Plane Angle	7.85[a]	3.11	9.24[a]	2.30	7.94[a]	4.88	8.80[a]	4.23
TAFH	122.29[b]	6.07	120.80[b]	4.62	120.57[b]	4.92	112.85[a]	3.63
LAFH	71.74[b]	4.97	71.11[b]	4.93	68.13[b]	4.03	62.91[a]	2.22
MAFH	54.24[a]	3.20	53.12[b]	3.38	54.20[a]	3.39	51.44[b]	2.97
PFH	56.57[ab]	3.95	55.64[ab]	4.84	60.64[b]	5.59	53.63[a]	4.34
TAFH perp.	121.67[b]	6.02	119.63[b]	4.32	120.35[b]	5.01	112.50[a]	3.60
LAFH perp.	68.77[a]	4.98	67.09[b]	2.90	66.78[c]	4.08	61.43[d]	2.30

Groups with the same letters presents no statistically significant difference between them.

TABLE 4 - Mean values, standard deviations and application of the t-test for dentoalveolar values.

MEASURE	LONG FACE				PATTERN I			
	Male		Female		Male		Female	
	mean	SD	mean	SD	mean	SD	mean	SD
6-PP	22.81[b]	2.50	23.00[ab]	1.38	23.07[b]	1.53	20.78[a]	1.64
1-MP	16.81[bc]	2.02	18.25[c]	3.18	15.85[ab]	0.99	14.74[a]	1.87
6-MP	31.09[b]	1.93	31.00[b]	3.12	30.23[b]	1.57	27.63[a]	1.99
1.PP	7.85[a]	3.11	9.24[a]	2.30	7.94[a]	4.88	8.80[a]	4.23
IMPA	96.87[a]	4.43	95.26[a]	7.75	89.85[b]	6.30	92.09[b]	5.66

Groups with the same letters presents no statistically significant difference between them.

TABLE 5 - Mean values, standard deviations and application of the t-test for facial height values.

MEASURE	LONG FACE				PATTERN I			
	Male		Female		Male		Female	
	mean	SD	mean	SD	mean	SD	mean	SD
LAFH/TAFH	0.59[a]	0.02	0.59[a]	0.03	0.57[b]	0.02	0.56[b]	0.02
MAFH/LAFH	0.75[a]	0.06	0.75[a]	0.07	0.80[b]	0.07	0.82[b]	0.06
Co-A	92.28[a]	3.71	90.87[b]	2.13	91.97[a]	3.71	88.37[b]	2.66
Co-Gn	116.04[ab]	6.02	114.46[ab]	3.89	119.86[a]	5.64	112.16[b]	4.05
LAFH	71.74[a]	4.97	71.11[b]	4.93	68.13[b]	4.03	62.91[a]	2.22

Groups with the same letters presents no statistically significant difference between them.

The anteroposterior position of the maxilla in long-faced subjects can play an important role, especially when planning includes orthognathic surgery. A correctly positioned maxilla, for example, can eliminate the sagittal maxillary procedure during surgery. The present cephalometric data point to the fact that vertical facial excess does not interfere with this maxillary relationship. The maxilla remains well positioned in relation to the cranial base (SNA) and its length (Co-A) is similar to that of Pattern I. The sagittal behavior of the maxilla in adolescents is consistent with the literature,[12,13] but disagrees with the findings of Cardoso et al,[4] who reported maxillary retrusion.

The quantification of the maxilla using cephalometric point "A" as a reference (SNA and Co-A) does not disclose the zygomatic deficiency that tends to be present in these patients when their faces are evaluated clinically. It is likely that the position of the maxilla in the Long Face Pattern tends towards a sagittal deficiency, with considerable individual variation, which may not be amenable to identification by cephalometry.

If it is true that the long face pattern does not exhibit any cephalometric sagittal changes in the maxilla, such is not the case in the mandible. Vertical excess interferes with the sagittal relationship of the mandible by keeping it retruded (SNB), although without interfering with its length (Co-Gn). The literature associates the appearance of retrognathia in the mandible with a retrusion, or posterior displacement, of the chin[12-15,24,29] caused by a clockwise rotation of the mandibular plane, as shown in Table 2.

This mandibular retrusion affects the facial convexity angles (NAPog and ANB), making the face more convex. Facial convexity angular values are increased in the Long Face Pattern due to the positioning of point "B".

The pattern of facial growth in the vertical direction was examined through the spatial behavior of the maxilla (SN.Palatal Plane) and mandible (SN.Mandibular Plane), mandibular morphology (gonial angle) and facial heights (TAFH, LAFH, MAFH, PFH, TAFHperp., LAFHperp.).

The palatal plane angle relative to the cranial base showed no difference, suggesting that the maxilla retains its angulation relative to the cranial base in long-faced patients. We can therefore conclude that the maxilla does not undergo any inclination changes in this facial type. This behavior is similar to that of adult patients with the same facial pattern.[4]

Mandibular morphology was typical of vertical growth, exhibiting a more open gonial angle, consistent with the literature.[4,11,22,24] This morphology suggests clockwise rotation during facial growth, confirmed by a greater inclination of the mandibular plane, which is unanimously supported in the literature.[2,4,11-15,19,29] This angulation of the mandibular base justifies the use of "hyperdivergent" when referring to patients with a Long Face Pattern.[17,18]

Anterior, midface, lower and total facial heights were measured. Facial height was measured directly at the landmarks and was also measured perpendicularly to the Frankfurt horizontal plane in order to identify any possible flaw in the numerical evaluation of this dimension due to the clockwise rotation of the mandible. Clearly, the perpendicular distances were smaller, confirming the influence of mandibular rotation on facial height readings.

The total anterior facial height was increased in long-faced patients in the two readings (TAFH and TAFHperp). This increase in facial height is corroborated by the literature.[3,12,14,15,24]

The increase in total anterior facial height was ascribed to an increase in the lower face (LAFH) since midface height (MAFH) did not differ from that of the Pattern I group. Increased LAFH constitutes the essence of the problem and, as such, it is often found in the literature.[2,10,12-15,19,22,24,29]

The maxilla showed no vertical increase in long-faced individuals, at least when measured from the anterior nasal spine.[2,17] In other words, the nasal floor, or palatal plane, was not more distant from the cranial base in long face adolescents. Maxillary height might have been increased if alveolar ridge height had been taken into account. This is suggested in the clinical evaluation by incisor exposure at rest and by the excessive gingival exposure on smiling. This behavior justifies the assertion that vertical excess is located below the palatal plane.

Posterior facial height was lower only in boys, coinciding with the behavior of long-faced adult men.[4] The literature is conflicting with respect to the behavior of the mandibular ramus height. Studies have demonstrated a reduction in the posterior face,[4,14,15,22] but have also shown similarity[11,17,24] and even increase.[12,13]

In the sagittal direction, the lower incisors of long-faced patients are proclined, a finding consistent with the literature.[1] This position of the lower incisors can be considered a dental compensation to mandibular retrusion, i.e., to the clockwise rotation of the mandible. The occlusal analysis showed that 71% of long-faced adult patients exhibit a Class II, Division 1 relationship.[6] This sagittal compensation was present only in mandibular incisors, whereas the upper incisors showed no difference in sagittal behavior between Long Face Pattern and Pattern I subjects.

Vertically, the maxillary incisors showed greater height in the alveolar ridge and this is probably responsible for the excessive exposure of the upper incisors at rest and the gummy smile. This greater height has also been confirmed in lower incisors. The greatest distance found between lower incisors and the symphysis base can be easily identified both clinically and radiologically by the greater length of the symphysis, which leads to the need for genioplasty in most long face reduction surgeries. Vertical dentoalveolar excess in the incisor region reflects dental compensation, i.e., an attempt to camouflage the vertical skeletal discrepancy. This finding has been confirmed in the literature.[2,13,14,15,24,29]

In the posterior region, the upper molars tended to show a height that was greater than the palatal plane, while the incisors and molars exhibited a greater vertical distance from the mandibular plane.

In long-faced individuals, the vertical excess tends to be located in the lower third (LAFH). In this sample of long-faced adolescents, vertical excess was present in females. Because patients are growing, it is likely that vertical excess will persist after adolescent growth. But just as important as the absolute values of facial heights are the ratios between facial heights. The ratio between the lower anterior and total heights (LAFH/TAFH) appears increased in long-faced individuals, corroborating the findings of Cardoso et al[4] for adults.

The ratio between the midface and lower face was smaller for long-faced patients, probably due to lower third excess. These data agree with the data on adult patients.[4,6]

CONCLUSIONS

The cephalometric assessment of patients with permanent dentition during adolescence leads to the conclusion that the vertical error found in long-faced individuals is concentrated in the lower third of the face. The maxilla exhibits greater dentoalveolar height and the mandible, given its more vertical morphology, displays greater clockwise rotation. These morphological and spatial features entail sagittal and vertical skeletal changes as well as vertical dentoalveolar changes. In the sagittal direction, facial convexity angles are increased due to a posterior displacement of point “B”. Vertically, the total and lower anterior facial heights are increased. The dentoalveolar component displays a greater length.

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