The influence of morphological and esthetical parameters and the expectations of patients with Class II dentofacial deformities on the acceptance of surgical treatment.

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Abstract

Introduction: The purpose of this study was to evaluate the influence of aesthetics self-perception, patients' expectations, facial profile, overbite and overjet and the facial type on the acceptance of the surgical treatment. **Methods:** 40 patients with mandibular deficiency were requested to complete questionnaires rating their perceptions of their own faces frontal, profile, in general and smile views. Patients indicated their desire whether undergoing orthognathic surgery or not and their expectations concerning the treatment. Measurements of the facial profile in standard photographs, besides the overbite and overjet in plaster models and the facial type in the profile radiography were obtained. Patients were divided in two groups according to their acceptance or not to undergo the surgery. T test, Mann-Whitney test and chi-square test were used for statistic analysis. **Results:** the facial profile measurements and the overbite of the two groups were statistically similar. The decision to accept surgery was related to overjet, aesthetics self-perception in general and of the smile, as well as to patient's expectations. **Conclusion:** the overjet magnitude, the aesthetics self-perception of the face in general and of the smile, besides patient's expectation towards the changes in his/her life was associated to the surgery procedure acceptance by patient.

Keywords: facial aesthetics, orthognathic surgery, mandibular deficiency.

Introduction

There are only two treatment options for adult patients with skeletal maxilo-mandibular discrepancies; dental compensation or orthognathic surgery. Dental compensation is associated to upper and lower incisors inclination on the opposite direction to the skeletal error. The surgical-orthodontic procedure involves the dental discompensation and the orthognathic surgery for the bones correction and the establishment of satisfactory occlusion. The decision on the ideal treatment depends on the capacity of reaching normal occlusion, proper facial proportions, agreeable aesthetics and stable results, besides the evaluation of the cost-benefit relation[10].

Orthodontists and orthognathic surgeons exercise great influence on the patient's decision whether undergoing the surgical procedures or not[8]. Patient's motivation is not, however, related to the objective need of treatment[15], but associated to self-perception of the procedure need[2] and prospective aesthetics improvement following the surgery. The choice between compensatory or surgical treatment performed by the patient relies greater on its self-image and self-esteem than the severity of the discrepancy and patients who choose for surgery seems to have more psychological problems[13, 14].

Patients with Class II dentofacial deformities are characterized by the positive sagittal degree between the maxilla and the mandible resulting in increased facial convexity. The mandibular deficiency can be associated to the excess of maxilla or not, and is characterized by the short chin-neck line, deficiency in the mandibular protrusion and lower lip eversion lip. The upper lip posture depends on the verticalization or protrusion of the upper incisors[3]. Patients with these characteristics seem more willing to the orthodontic treatment than to surgical procedure[16].

The comparison between Class II, division 1 patients treated with orthodontic or orthognathic surgery proved that compensation is the best treatment for light and borderline cases, since only the most severe cases are significantly benefited by the surgical procedure[5].

The professional must evaluate the objective parameters related to aesthetics and occlusion in order to define the best treatment plan, but also to

consider patient's perception of his/her need of a more or less invading intervention. The objective of this study is to investigate the association between acceptance or not of the surgery and the discrepancy severity, evaluated by the overbite and overjet and facial profile measurements, and with patient's aesthetics self-perception and expectation towards possible social, affective and professional changes resulting from treatment.

Material and Methods

The sample included 40 Brazilian leucodermas, grown up individuals, 26 female and 14 male. All the selected individuals presented a facial convexity angle above 12º, identifying maxilo-mandibular sagittal discrepancy, positive degree, called Pattern II. This angle is measured in the supplement of that formed by glabela, subnasal, soft tissue pogonio points and is statistically different in Patterns I, II and III[12]. Aiming at excluding patients whose increased facial convexity was associated to Long Face Pattern, only those whose gums exposition while smiling was equals or smaller than 3 mm. The individuals were selected among those who sought orthodontic treatment in the screening of the Department of Orthodontics at the Universidade Metododista of São Paulo Orthodontics Faculty.

Sample average age was 30 ± 8 years, minimum of 16 and maximum 53 years old. In order to include patients over whom there was a doubt on the presence of reminiscent facial growth, a hand and wrist radiographs were made. The patient was only included in the sample when the complete fusion of radio bone (J Stage) was verified in this exam[7].

All the individuals that agreed to participate in this study signed a consent form, which explained the objectives of the work and the exams to which they would be submitted to. The research project was approved by the Ethics Committee in Research of the Odonthology Faculty from *Universidade de São Paulo*, opinion number 131/06.

Following the initial explanation on the possibility of compensatory orthodontic treatment or associated to orthognathic surgery, patients were required to fill a questionnaire answering the following questions:

1- Rate your face appearance:

Unpleasant Acceptable Pleasant

1 2 3 4 5 6 7 8 9

2- Considering your face viewed face on, which rate would you give to your appearance?

Unpleasant Acceptable Pleasant

1 2 3 4 5 6 7 8 9

2- Considering your face viewed in profile, which rate would you give to your appearance?

Unpleasant Acceptable Pleasant

1 2 3 4 5 6 7 8 9

4- Which rate would you give to your smile?

Unpleasant Acceptable Pleasant

1 2 3 4 5 6 7 8 9

5- Would you be willing to make a surgical intervention, if necessary, to better your appearance?

( ) yes

( ) no

6- Do you believe that the changes to your face would result in better opportunities to which of the following areas of your live?

( ) social

( ) affective

( ) professional

( ) none of the above

Standardized face photographs, radiographies of facial profile and plaster models of all sample patients were obtained.

The photographs were submitted to Numeric Facial Analysis of the Profile, using Radiocef® Studio 2 program to obtain the following variables: 1- Nasolabial Angle; 2- Interlabial angle; 3- Angle of mentolabial fold; 4- Angle of facial convexity; 5- Angle of total facial convexity; 6- Angle of lower third of the face; 7- proportion between AFAM/AFAI; 8- proportion of the lower third of the face.

The same program was used to obtain the first five measurements of Ricketts Cephalometric Analisys, which determined the brachyfacial, mesofacial and dolichofacial types for each patient of the sample. A Mitutoyo® digital caliper was used for the overbite and overjet measurement on the plaster models.

The Kolmogorov-Smirnov test was used to evaluate the sample normality in all variables. Only the vertical trespass did not present normal behavior.

In order to evaluate the method error, all the photographs, radiographs and the plaster models were measured twice by the same operator. The Student t test for matched samples and the Dahlberg test were used to evaluate the systematic and the casual errors of the two measurements (Table I). For the evaluation of the two vertical trespass measurements, Wilcoxon and Dahlberg tests were used (Table II). For the statistic evaluations performed in this study, the significance level of 5% was adopted. Differences above 1,5º or 0,5 mm for the Dalhberg test were statistically significant.

t Test identified statistic differences between the first and the second measurement on nasolabial and interlabial angles and for the proportion of the lower third of the face. The differences observed in Dalhberg test were, however, insignificant, suggesting that the significances observed were resulting from a small dispersion of the sample for their variables, which makes evident small differences as statistically significant in t Test (Table I).

In order to evaluate the concordance in the determination of the facial type, Kappa Index was used. The concordance was of 100% between the first and the second measurements, i.e., all patients were classified likewise in the two opportunities, with Kappa Index equals 1 and perfect concordance.

Patients were, then, divided in two groups according to the acceptance or not to perform a surgical procedure. These groups were named Orthodontic Group and Surgical Group. The non-matched t test was used to compare the variables of the Numeric Facial Analysis of the Profile and the horizontal trespass of both groups studied. The Mann-Whitney test was used to analyze the possible difference in the vertical trespass between the two groups and the chi-square test was applied to evaluate the association between general, face on, profile and smile facial aesthetics self-perception, and the surgical procedure acceptance. This last test was also used to check the association

between the surgery acceptance and the patient's expectation concerning the changes in his/her life resulting from the treatment.

Results

From the 40 patients composing the sample, 29 marked they would accept the surgical procedure and 11 said they wouldn't. The average age and the pattern deviation of the surgery group was 29,2 ± 8,3 years and the orthodontic group 32,8 ± 9,75 years. This difference was not, however, statistically significant (p=0,29).

None of the profile numeric facial analysis variable presented statistic differences between the two groups studied (Table III).

The vertical trespass also presented similar values in both groups (table IV).

The horizontal trespass was significatively bigger in the surgery group (6,72 ± 2,95 mm) than in the orthodontic group (4,19 ± 2,66 mm) (p=0,018) (Table III).

The distribution of the brachyfacial, mesofacial e dolichofacial types, defined by Ricketts analysis, was similar in both groups (Table V).

An association between the rate given by the patients to their own general facial aesthetics (p=0,025) and smile aesthetics (p<0,000) and the orthognathic surgery (Table V) acceptance was noticed. The face aesthetics self-perception in the profile view did not present association with the surgery acceptance (p=0,79). The association between the aesthetics self-perception in the face on view and the surgery acceptance was not statistically significative, but the difference notice greater association tendency (p=0,073) than the profile view (Table V).

The association between patient's expectation of improvements in affective, professional or social opportunities, resulting from the facial changes after surgery, and the acceptance of this procedure was also noticed (p=0,024) (Table V). Among patients that did not accept surgical procedures, 82% reported not having improvement expectations of social, affective or professional opportunities with the treatment. From the patients that accepted surgery, 62,05 % reported expectation of opportunities improvement, after the

facial change, for at least one of the items suggested in the questionnaire. Twenty-four percent expect improvements in one aspect (social, affective or professional). Seventeen percent expect social and professional changes and 20,7% reported expectation of better social, affective and professional opportunities (Table VI).

Discussion

Orthodontic treatment, associated to the orthognathic surgery is the choice treatment for the patients with severe maxilo-mandibular discrepancies. Patient's decision of accepting or not the surgical procedure depends on the self-perception of the problem and does not seem to be related to the objective factors, but to his/her self-image and self-esteem[13, 14, 15].

Skeletal Class III patients seemed more motivated to surgery[16], maybe because this discrepancy affects more the face on view aesthetics, which facilitates the indication of this procedure. Mandibular deficiency is, however, more prevalent on the population and many times it is not perceived by the patient himself, who just wishes the teeth correction[16]. Specially when the discrepancy does not compromise the face on view aesthetics, the surgery indication is not well accepted, limiting treatment to what is possible to do with the compensatory orthodontic.

Besides, the studies that compared orthodontically and compensatorily treated groups, with Class II malocclusions of similar magnitudes, did not observe differences in the aesthetics and functional quality of the occlusion and in the face, 4,7 years after surgery and 7,1 year after compensatory treatment[5]. Some operated patients presented extensive relapse, probably as a result of condylar resorption[5, 9]. Most authors conclude that the compensatory treatment options would be indicated to borderline Class II patients, while surgery would be reserved to more severe cases[5, 9, 10].

In this sample of patients with increased facial convexity, the percentage of surgery acceptance was of 72,5%, similar to male and female and to different ages. This percentage is high if we consider that the sample is composed by patients with moderate and severe discrepancy. Patients received initial information on the surgical procedure, but did not face the costs issues, which

very much limit the procedure performance. Previous studies already showed that the percentage of those that pay medical insurance is significatively bigger among those that effective operate[1]. Problems related to surgery costs will probably reduce this percentage among those that will really operate, and the discompensatory orthodontic treatment must only begin after the financial part is feasible.

Another important aspect is the influence of relatives and friends on the decision to operate. The way patient is evaluated by his/her peers is one of the main motivation factors for the surgery performance[15], influencing the self-image and self-esteem. Relatives' opinions may change patient's opinion. Again, the orthodontic treatment must only begin after a family consensus on the surgical intervention or patient's certainty as to his/her wish, despite adverse opinions. Otherwise, parents or spouses rejection may desmotivate the patient during the treatment or influence his/her satisfaction with the facial aesthetics result after the surgery.

Some authors studied the association between cephalometric measurements and the surgical procedure acceptance in skeletal Class II patients. Only the ANB cephalometric measurement could foresee the motivation level for the surgery[2, 16]. No work has been found which studied the association between the profile measurement, performed directly on the photography, and the surgery acceptance. Among the 8 facial profile measurements evaluated in this study, none of them was statistically different between the groups that accepted or not surgery (Table III). There was a tendency of greater labial biprotrusion, increase in total facial convexity and mandibular retrusion in the group of patients that accepted surgery, with no statistic difference.

The evaluation of the profile on the photography is much closer than the cephalometric study of the evaluation performed by the patient and his/her peers. It must be noticed, however, that the persons do not see their own profile. Patients evaluate their faces from the face on view[6], which justifies the results found.

Vertical trespass did not present differences between the orthodontic and the surgery group either (Table IV). The horizontal trespass, on the other hand, was significatively bigger in the surgery group (Table III), confirming Bailey et

al.[1] (2001) results, which observed that 42% of the patients that accepted to undergo operation, presented a horizontal trespass bigger than 6 mm, against 30,9% of the ones that did not accept to undergo operation.

Patients distribution in the brachyfacial, mesofacial e dolichofacial types was not different in the two groups studied (Table V). It must be emphasized the exclusion of the long face Pattern patients, many times selected among patients with increased facial convexity or Class II malocclusions, which seizes 70% of this Pattern[4]. The indication to these patients, and their acceptance to the surgery are much more related to the vertical discrepancy than to the sagittal problem, sometimes consequence of the first. The vertical error compromises the function and the aesthetics, perceptive in the face on view, which may influence the surgery acceptance.

Previous studies noticed that, despite the surgery is indicated by experts based on the discrepancy seriousness, the face self-perception is the most important factor in patient's decision as to submitting to surgery[1, 2, 15, 16]. This statement was confirmed in this study, where the association between the surgery acceptance and the face aesthetics self-perception in general and of the smile was noticed (Table V). The smile self-evaluation was the item studied that was most strongly associated to the surgery acceptance, and, as well as the horizontal trespass, is related to the perception of the malocclusion severity by the patient and his/her peers (Table V).

The face self-evaluation in the frontal view showed a tendency of being higher in the orthodontic group than in the surgical group, but the difference was not statistically significant (Table V).

The face self-evaluation in the profile view was not associated to the surgery acceptance, which coincides with the absence of association between the acceptance and the facial profile measurements, which confirms Flores-Mir et al.[6] (2004) statements, that the patient does not see himself/herself from the profile. This finding contradicts most of the evaluations performed by orthodontists and surgeons who evaluate the skeletal discrepancy seriousness and plan their correction by means of measurements performed in the facial profile.

The results allow to state that the valorization of the frontal and smile aesthetics evaluations greatly brings near the result to be obtained to patient's expectation and satisfaction.

The last evaluation performed was the association between the surgery acceptance and patient's expectation of social, affective and professional improvements with the facial change due to the surgery. This association was confirmed. While 82% of the patients from the orthodontic group reported not having any expectation with the treatment, this percentage was of 37,95% in the surgical group (Table VI). This result calls attention to the need of orienting the patient as to the treatment's real possibilities, including the aid of a specialized psychologist. Literature reports that the patients who choose surgery seem to have more psychological and self-esteem problems[13, 14], which may indicate the need of pre and post-surgical support aiming at avoiding dissatisfactions resulting from unreal expectations.

Conclusion

The present study allowed concluding that the surgical procedure acceptance by patients with mandibular deficiency is not related to the seriousness of the discrepancy reflected in the facial profile. It was not observed the association between surgery acceptance and any of the facial profile measurements or even with the aesthetics self-evaluation of the profile.

Surgery acceptance was strongly associated to the horizontal trespass and to the smile aesthetics self-perception, which determine to the patients the seriousness of their malocclusion, and, therefore, the complexity of the treatment to which they are willing to be submitted.

It was also noticed an association between surgery acceptance and patients' expectation of social, affective and professional improvements due to the facial change, which may indicate the need of psychologists intervention to the pre and post-surgery phases in order to orient the real possibilities of the treatment, avoiding dissatisfactions resulting from unreal expectations.

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Table I – Evaluation of intraobserver error in the Numeric Facial Analysis of the Profile and horizontal Trespass

Variables	Measurement 1		Measurement 2		P	Dahlberg
	Average	Dp	Average	Dp		
Nasolabial angle	106,26°	10,35°	106,01°	10,61°	0,048*	0,58°
Mentolabial Fold Angle	129,66°	12,12°	129,63°	12,13°	0,917	1,11°
Interlabial Angle	129,09°	10,99°	128,12°	10,47°	0,001*	1,34°
Facial Convexity Angle	17,37°	4,64°	17,58°	4,90°	0,053	0,47°
Total Facial Convexity Angle	135,29°	4,29°	135,32°	4,52°	0,877	0,83°
Lower Third Angle of the Face	118,98°	9,32°	118,66°	9,01°	0,124	0,93°
AFAM/AFAI Proportion	0,88	0,06	0,88	0,07	0,578	0,007
Lower Third Proportion of Face	0,50	0,05	0,50	0,05	0,046*	0,007
Horizontal Trespass	6,03	3,05	6,02	3,05	0,826	0,075mm

*p<0,05

Table II – Evaluation of intraobserver error of the vertical Trespass variable

Variable	Measurement 1	Measurement 2			
	Mean	Mean	Mean Diff.	p	Dalhberg
Vertical Trespass	3,105mm	3,125mm	-0,01	0,9942	0,103

*p<0,05

Table III – Comparison of the facial profile measurements and of the horizontal trespass obtained for Orthodontic and Surgery Groups

Variables	Orthodontic Group		Surgery Group		p
	Average	Dp	Average	Dp	
Nasolabial Angle	106,5°	12,1°	106,16°	9,83°	0,917
Mentolabial Fold Angle	130,5°	12,8°	129,3°	12,1°	0,776
Interlabial Angle	131,9°	15,4°	128,03°	8,9°	0,325
Facial Convexity Angle	17,71°	4,40°	17,53°	5,16°	0,92
Total Facial Convexity Angle	133,72°	4,05°	135,93°	4,6°	0,17
Lower Third Angle of the Face	116,76°	9,22°	119,83°	9,39°	0,689
AFAM/AFAI Proportion	0,9	0,07	0,87	0,06	0,191
Lower Third Proportion of Face	0,5	0,07	0,49	0,05	0,689
Horizontal Trespass	4,19mm	2,66mm	6,72mm	2,95mm	0,018*

*p<0,05

Table IV – Comparison of the vertical trespass measurements obtained for the Orthodontic and Surgery Groups

Variable	Orthodontic Group	Surgery Group	p
	Average	Average	
Vertical Trespass	3,04mm	3,17mm	0,72

*p<0,05

Table V –Chi-square tests results in relation to the facial type, the face aesthetics self-perception and patient's expectation

	Orthodontic Group Freq.obs (freq.exp)	Surgery Group Freq.obs (freq.exp)	x^2	p
Facial Type				
Brachyfacial	3 (1,93)	4 (5,08)		
Mesofacial	3 (4,95)	15 (13,05)	2,144	0,342
Dolichofacial	5 (4,13)	10 (10,88)		
General Aesthetics				
Pleasant	7 (3,58)	6 (9,43)		
Acceptable	4 (6,05)	18 (15,95)	7,381	0,025*
Unpleasant	0 (1,38)	5 (3,63)		
Face on Aesthetics				
Pleasant	7 (4,13)	8 (10,88)		
Acceptable	4 (5,50)	16 (14,50)	5,225	0,073
Unpleasant	0 (1,38)	5 (3,63)		
Profile Aesthetics				
Pleasant	2 (1,65)	4 (4,35)		
Acceptable	8 (7,70)	20 (20,30)	0,472	0,79
Unpleasant	1 (1,65)	5 (4,35)		
Smile Aesthetics				
Pleasant	8 (3,03)	3 (7,98)		
Acceptable	2 (3,58)	11 (9,43)	15,866	0,000*
Unpleasant	1 (4,40)	15 (11,60)		
Changes Expectations				
Social	2 (3,53)	14 (12,47)		
Affective	1 (1,76)	7 (6,24)	9,472	0,024*
Professional	1 (3,31)	14 (11,69)		
None of the above	9 (4,41)	11 (15,59)		

*p<0,05

Table VI – Patients' expectations related to the opportunities resulting from facial changes in Orthodontic and Surgical Group

Expectations	**Orthodontic Group**		**Surgery Group**	
	N	**%**	**N**	**%**
Social	0	0	3	10,35
Social and affective	1	9,0	0	0
Social and professional	1	9,0	5	17,25
Social, affective and professional	0	0	6	20,7
Affective	0	0	1	3,4
Professional	0	0	3	10,35
Affective and professional	0	0	0	0
None of the above	9	82,0	11	37,95
Total	**11**	**100,0**	**29**	**100,0**