UNIVERSIDADE DE SÃO PAULO
FACULDADE DE ODONTOLOGIA DE BAURU

MARCELO VINICIUS VALERIO

Long-term soft-tissue changes and profile attractiveness in class II subdivision malocclusion treatment with symmetric and asymmetric extractions

Alterações tegumentares e atratividade do perfil em longo prazo no tratamento da má oclusão de classe II subdivisão com extrações simétricas e assimétricas

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Orientadora: Prof.ª Dr.ª Daniela Gamba Garib Carreira

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ABSTRACT

Long-term soft-tissue changes and profile attractiveness in class II subdivision malocclusion treatment with symmetric and asymmetric extractions

Class II subdivision malocclusion treatment with 4-symmetric and 3-asymmetric premolar extractions produce different soft-tissue outcomes. This discrepancy may lead to different final facial appearance and long-term soft-tissue behavior. Thus, this retrospective study aimed to compare the long-term soft-tissue changes and profile attractiveness of Class II malocclusion subdivision patients treated with 4- and 3-premolar extractions. Forty treated patients were divided according to the extraction protocol used into 2 groups: Group 1 comprised patients treated with extractions of 3 premolars, with pre- (T1), posttreatment (T2), and long-term posttreatment (T3) ages of 14.10 (SD=2.51), 17.01 (SD=2.82) and 24.50 (SD=4.38) years, respectively, with mean T2-T3 observational time of 6.90 (SD=1.21) years. Group 2 comprised patients treated with 4-premolar extractions, with pre-, posttreatment, ang long-term posttreatment ages of 13.10 (SD=1.22), 16.80 (SD=2.63) and 23.11 (SD=4.39) years, respectively, with mean T2-T3 observational time of 6.83 (SD=1.08) years. The number of female and male patients was the same in both groups: 13 and 7, respectively. T1-, T2- and T3 headfilms were digitized. Soft-tissue cephalometric tracings were performed at the three stages in the Dolphin Software®, according to the Legan-Burstone soft-tissue analysis. Androgenous silhouettes were created in the Adobe Photoshop® CS6 to T2 and T3 headfilms, and profile attractiveness evaluation was performed by laypeople and orthodontists. Treatment- and long-term posttreatment changes were compared between the groups with T- and Mann-Whitney tests. The influence of treatment protocol and the type of rater, and their interaction, in attractiveness evaluation was assessed with Two-Way-ANOVA tests at the T2 and T3 stages. Intragroup profile attractiveness over time was compared with paired-t tests. Significantly greater lower lip retraction (P=0.038) and mentolabial sulcus depth reduction (P=0.010) were observed in the group 2, with treatment (T2-T1). Intergroup long-term soft-tissue changes were similar. There were similar inter- and intragroup profile attractiveness at both stages, and the type of rater did not influence in the evaluation. Class II subdivision malocclusion patients treated with 4-symmetric extractions present greater lower lip retrusion and mentolabial sulcus depth reduction than those treated with 3-asymmetric premolar extractions. The posttreatment long-

term soft-tissue changes and the profile attractiveness at debonding and in the long-term were similar between the groups.

Keywords: Angle Class II malocclusion. Tooth extraction. Corrective Orthodontics.

RESUMO

Alterações tegumentares e atratividade do perfil em longo prazo no tratamento da má oclusão de classe II subdivisão com extrações simétricas e assimétricas

O tratamento da má oclusão de Classe II subdivisão com extrações simétricas e assimétricas produz alterações diferentes no tecido mole. Isto pode resultar em diferenças na aparência facial ao final do tratamento e nas alterações faciais em longo prazo. Assim, o objetivo deste estudo retrospectivo foi comparar as alterações de tecido mole e a atratividade facial em longo prazo de pacientes com Classe II subdivisão inicial completa tratados com extrações simétricas e assimétricas de 4 e 3 pré-molares, respectivamente. Quarenta pacientes tratados foram divididos em 2 grupos de 20, de acordo com o protocolo de tratamento utilizado: Grupo 1 incluiu pacientes tratados com extrações de 3 pré-molares, com idades inicial (T1), final (T2) e em longo prazo (T3) de 14,10 (DP=2,51), 17,01 (DP=2,82) e 24,50 (DP=4,38) anos, respectivamente, com tempo observacional em longo prazo de 6,90 (DP = 1.21) anos. O Grupo 2 incluiu pacientes tratados com extrações de 4 pré-molares, com idades inicial, final e em longo prazo de 13,10 (DP=1,22), 16,80 (DP=2,63) e 23,11 (DP=4,39), respectivamente, com tempo de observação em longo prazo de 6,83 (DP=1,08) anos. Ambos os grupos contavam com 13 pacientes do sexo feminino e 7 do sexo masculino. Telerradiografias finais e de longo prazo foram digitalizadas. Traçados cefalométricos dos tecidos moles foram feitos no programa Dolphin Software®, seguindo-se a análise de tecidos moles de Legan-Burstone. As telerradiografias finais e de longo prazo foram exportadas para o programa Adobe Photoshop CS6, onde silhuetas dos perfis foram criadas para avaliação da atratividade do perfil por leigos e ortodontistas. As alterações dos tecidos moles ocorridas com o tratamento e no período pós-tratamento foram comparadas entre os grupos com testes T e Mann-Whitney. A influência do protocolo de extração e do tipo de avaliador, bem como a interação entre ambos, nas notas da atratividade do perfil foi avaliada com o teste de ANOVA-a-dois-critérios, ao final e em longo prazo. A atratividade do perfil ao final e em longo prazo também foi comparada intragrupo, em ambos os grupos, com o teste t pareado. O grupo tratado com extrações de 4 pré-molares apresentou retrusão do lábio inferior (P=0,038) e redução da profundidade do sulco mentolabial (P=0,010) significativamente maiores que o grupo tratado com 3 extrações. Em longo prazo, as

alterações dos tecidos moles foram semelhantes em ambos os grupos. A atratividade do perfil foi semelhante entre os grupos em ambos os estágios, e o tipo de avaliador não influenciou nas notas da atratividade. A atratividade foi semelhante nas análises intragrupos, entre os estágios. Pacientes com má oclusão de Classe II subdivisão inicial tratados com extrações de 4 pré-molares apresentam retrusão do lábio inferior e redução do sulco mentolabial significativamente maiores que aqueles tratados com extrações de 3 pré-molares. As alterações de tecidos moles em longo prazo, bem como a atratividade do perfil ao final e em longo prazo foram semelhantes entre os grupos.

Palavras-chave: Má oclusão de Classe II de Angle. Extração dentária. Ortodontia corretiva.

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LIST OF ABBREVIATIONS AND ACRONYMS

T1	Pre-treatment stage.
T2	Posttreatment stage.
T3	Long-term posttreatment stage.
T2-T1	Treatment period.
T2-T3	Long-term posttreatment period.
SD	Standard deviation.

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1 INTRODUCTION

1 INTRODUCTION

Class II subdivision malocclusion is primarily characterized by distal positioning of the mandibular first molar on the Class II side, what results in mandibular dental midline deviation to the same side.(JANSON; METAXAS; WOODSIDE; DE FREITAS *et al.*, 2001) Subdivision cases with this condition are classified as Type 1. (JANSON; DE LIMA; WOODSIDE; METAXAS *et al.*, 2007) Secondarily, other subdivision cases may present a maxillary first molar mesial positioning, what results in maxillary dental midline deviation to the Class I side. (JANSON; METAXAS; WOODSIDE; DE FREITAS *et al.*, 2001) These cases are classified as Type 2 Class II subdivision. (JANSON; DE LIMA; WOODSIDE; METAXAS *et al.*, 2007)

When great amounts of crowding and/or dental/labial protrusion are present, extractions are largely recommended.(RUELLAS; RUELLAS; ROMANO; PITHON *et al.*, 2010) Class II subdivision extraction treatment may be mainly performed by three protocols, in accordance with malocclusion etiological characteristics. Type 1 cases may be treated with four symmetric extractions, two-maxillary and two-mandibular premolars, or with three asymmetric extractions, two-maxillary and one-mandibular premolar extraction on the Class I side.(ALAVI; BEGOLE; SCHNEIDER, 1988; JANSON; DAINESI; HENRIQUES; DE FREITAS *et al.*, 2003) Type 2 extraction treatment has been satisfactorily performed with asymmetric extraction of one-maxillary-premolar on the Class II side.(DAHIYA; MASOUD; VIANA; OBREZ *et al.*, 2017; JANSON; WOODSIDE; METAXAS; HENRIQUES *et al.*, 2003; JANSON; METAXAS; WOODSIDE; DE FREITAS *et al.*, 2001; REBELLATO, 1998; TURPIN, 2005; WERTZ, 1975)

Type 1 symmetric and asymmetric protocols have been compared regarding its effects and efficiency. Asymmetric extractions have been performed better than the symmetric ones, showing greater treatment efficiency and providing better occlusal results at the end of treatment.(JANSON; BALDO; GARIB; BARROS *et al.*, 2016; JANSON; DAINESI; HENRIQUES; DE FREITAS *et al.*, 2003) Additionally, cephalometric comparisons between both protocols found that extractions of four premolars result in greater mandibular incisor and soft-tissue retractions with treatment.(JANSON; CARVALHO; CANCADO; DE FREITAS *et al.*, 2007) It means

that profile appearance and attractiveness at the end of treatment may be not equal between patients treated with symmetric and asymmetric extractions. Nonetheless the clinical impact of the greater amount of soft-tissue retraction on the face is still unknown. It could be argued that large amounts of retraction may negatively affect the face, resulting in a dished-in profile.(ERDINC; NANDA; DANDAJENA, 2007) On the other hand, one may argue that substantial soft-tissue retraction is desired for protrusion correction, what exactly led to the extraction choice. Furthermore, individuals with different soft-tissue condition may behavior differently over time. (ERDINC; NANDA; DANDAJENA, 2007; MENDES; JANSON; ZINGARETTI JUNQUEIRA-MENDES; GARIB, 2019) Thus, the different profiles that result from those two extraction protocols may lead the patients to divergent long-term soft-tissue conditions. Nevertheless, the long-term soft-tissue changes of Class II subdivision patients treated with the two protocols is still unknown.

Therefore, on the light of the lack of scientific evidence regarding this topic, the aims of this Ph.D. Thesis were to compare:

- The long-term soft-tissue changes after Type 1 Class II subdivision malocclusion treatment with symmetric and asymmetric extractions;
- The profile attractiveness in patients with Type 1 Class II subdivision malocclusion treated with symmetric and asymmetric premolar extractions, at posttreatment and long-term posttreatment stages.

2 ARTICLES

2 ARTICLES

The articles presented in the present Ph.D. Thesis were written and formatted in accordance with the submission guidelines of the American Journal of Orthodontics and Dentofacial Orthopedics.

- **Article 1:** Long-term soft-tissue changes in Class II subdivision malocclusion treated with symmetric and asymmetric extractions;
- **Article 2:** Long-term profile attractiveness in Class II subdivision malocclusion treated with 3 and 4 premolar extractions.

Authors:

Marcelo Vinicius Valerio.
Department of Pediatric Dentistry, Orthodontics and Collective Health, Bauru School of Dentistry, University of São Paulo.

Daniela Gamba Garib Carreira.
Department of Pediatric Dentistry, Orthodontics and Collective Health, Bauru School of Dentistry, University of São Paulo.

Guilherme Janson.
Department of Pediatric Dentistry, Orthodontics and Collective Health, Bauru School of Dentistry, University of São Paulo.

2.1 ARTICLE 1

LONG-TERM SOFT-TISSUE CHANGES IN CLASS II SUBDIVISION MALOCCLUSION TREATED WITH SYMMETRIC AND ASYMMETRIC EXTRACTIONS

ABSTRACT

Introduction: This retrospective study aimed to compare the long-term soft-tissue changes in complete Class II subdivision malocclusion treatment with 4-symmetric and 3-asymmetric premolar extractions. **Methods:** Forty treated patients were divided into 2 groups according to the extraction protocol used. Group 1 comprised 20 patients (7 male, 13 female) treated with asymmetric extractions of 3 premolars with Pre- (T1), posttreatment (T2) and long-term posttreatment (T3) ages of 14.10 (SD=2.51), 17.01 (SD=2.82) and 24.50 (SD=4.38) years, respectively. Group 2 comprised 20 patients (7 male, 13 female) treated with symmetric 4-premolar extractions with pre-, posttreatment, and long-term posttreatment ages of 13.10 (SD=1.22), 16.80 (SD=2.63) and 23.11 (SD=4.39) years, respectively. The mean T2-T3 time interval was 6.90 (SD=1.21) and 6.83 (SD=1.08) years for groups 1 and 2, respectively. T1-, T2- and T3 headfilms were digitized and cephalometric tracings of the Legan-Burstone soft-tissue analysis were performed. Treatment- and long-term posttreatment changes were compared between groups with T- and Mann-Whitney tests ($p<0.05$). **Results:** During treatment, significantly greater lower lip retrusion ($P = 0.038$) and greater mentolabial sulcus depth reduction ($P=0.010$) was observed in Group 2 compared to Group 1. At posttreatment follow-up, both groups presented similar soft-tissue changes, with increases in the values of prognathism, angle of the lower face-throat, vertical-height and lower-vertical-height-depth ratios, nasolabial angle, and vertical lip-chin ratio. Reductions were observed in the values of the facial convexity angle, upper and lower lip protrusion, mentolabial sulcus depth, maxillary incisor exposure and interlabial gap. **Conclusion:** 4-premolar extractions caused a greater lower lip retrusion and a greater decrease of the mentolabial sulcus depth than 3-premolar extractions with the orthodontic treatment. After treatment, the soft-tissue changes were similar in patients treated with symmetric and asymmetric extractions.

INTRODUCTION

Class II subdivision malocclusion treatment may be performed with different extraction protocols, in accordance with the occlusal classification. Type 1 cases are the most prevalent and characterized by a distal positioning of the mandibular first molar on the Class II side, leading to mandibular dental midline deviation to Class II side.[1,2] These cases may be treated with symmetric-4-premolar or asymmetric-3-premolar extractions. With the symmetric protocol, two-maxillary and two-mandibular premolars are extracted and great patient compliance is needed to accomplish the correction of molar relationship with Class II elastics on the Class II side.[3] Differently, asymmetric extractions provide mandibular dental midline correction by a single extraction in the mandibular arch, on the Class I side, correcting the midline deviation without the need of much patient compliance. On the other hand, Type 2 cases are characterized by mesial positioning of the maxillary first molar on the Class II side, leading to maxillary dental midline deviation to the opposite side.[1,2] In this type of Class II subdivision, a single protocol of one-maxillary-premolar extraction on the Class II side is adequate to treat the malocclusion.[2,4-8]

Symmetric and asymmetric extraction protocols for Type 1 cases were previously compared. Three-premolar protocol showed better final occlusal outcomes and greater treatment efficiency than symmetric four-premolar extractions.[3,9] These results were attributed to the requirement of patient compliance with the use of Class II elastics when 4 premolars are extracted.[10,11] When cephalometrically compared, the changes caused by both protocols were also different in some points. Greater mandibular incisor and labial retrusion occurred when symmetric extractions were performed.[12]

Despite the speculation that greater amount of labial retrusion might result a dished-in profile,[13] it could be argued that significant retraction is a desired outcome when an extraction treatment is performed to correct cases with lip protrusion.[14] Additionally, soft-tissue changes may behavior differently over time leading to different long-term facial profile appearance.[13,15] Nevertheless, there is no previous study in the orthodontic literature comparing the long-term soft-tissue changes provided by both protocols.

Therefore, the aim of this study was to compare the long-term soft-tissue changes after Type 1 Class II subdivision malocclusion treatment with symmetric and

asymmetric extractions. The tested null hypothesis was that long-term soft-tissue changes observed in patients treated by the two protocols are similar.

MATERIAL AND METHODS

This study was approved by the Ethics in Research Committee of _____ (number_____).

Differences of 2.0 mm or greater in upper or lower lip anteroposterior positions may significantly influence the facial attractiveness.[16] The changes of upper and lower lip protrusions were selected as the primary outcomes to determine the sample size calculation. In order to detect a minimum difference of 2.0 mm between groups, with a standard deviation of 1.8,[17] a test power of 80% and a significance level of 5%, 14 patients were necessary in each group.

A retrospective sample was consecutively selected from the orthodontic charts of the Department of Orthodontics of _____. The inclusion criteria were: patients with Type 1 Class II subdivision malocclusion treated with extractions, all permanent teeth up to first molars at the pre-treatment stage, absence of dental or craniofacial anomalies and presence of long-term follow-up records (at least 5.0 years posttreatment). All the cases should present complete Class II molar relationship on the Class II side.[18,19]

Group 1 was composed by 20 patients (13 female, 7 male) with a mean initial age of 14.10 years (SD=2.51), treated with asymmetric extractions of 2-maxillary-premolar and 1-mandibular-premolar on the Class I side. Pre-treatment (T1), posttreatment (T2, mean age 17.01 (SD=2.82) years) and long-term posttreatment (T3, mean age 24.50 (SD=4.38) years) cephalometric headfilms were evaluated.

Group 2 was composed by 20 patients (13 female, 7 male), with a mean initial age of 13.10 years (SD=1.22), treated with symmetric extractions of 2-maxillary and 2-mandibular premolars. Pre-treatment (T1), posttreatment (T2, mean age 16.80 (SD=2.63) years) and long-term posttreatment (T3, 23.11 (SD=0.39) years) cephalometric headfilms were evaluated.

The mean T2-T3 time interval was 6.90 (SD=1.21) and 6.83 (SD=1.08) years for groups 1 and 2, respectively.

Comprehensive orthodontic treatment was performed by graduate students supervised by the team of instructors, using standard edgewise 0.022 x 0.028-inch brackets. Extraoral headgear and lip bumpers were used in the cases when anchorage

was necessary. Intermaxillary Class II elastics were used by the patients who undergone extractions of 4 premolars, to achieve the molar relationship correction on the Class II side. The wire sequence included 0.015-in twist-flex or 0.016-in nickel-titanium alloy wire, 0.016, 0.018, 0.020 and 0.018 x 0.025 or 0.021 x 0.025-in stainless steel wire (3M Unitek, Monrovia, CA). In the presence of a significant incisor crowding, a small amount of canine retraction was performed to allow incisor alignment without incisor protrusion. En-masse retraction was performed with stainless steel rectangular archwires. Cases without crowding undergone only en-masse retraction. Accentuated and reversed Spee curves were used in the maxillary and mandibular archwires, respectively, during alignment and retraction. The usual retention protocol was a Hawley plate in the maxillary arch and a canine-to-canine fixed retainer in the mandibular arch for a minimum of 1 and 3 years, respectively.

Considering that the amount of pre-treatment incisor crowding could influence the amount of incisor retraction and lip retrusion, pre-treatment dental crowding was assessed in both groups. Dental crowding was measured in the pre-treatment dental models by a trained operator (M.V.V.). Using a brass wire segment and a dry point compass,[20] dental crowding was calculated as the difference between the arch length (from one first molar to its homologous), and the crowns' width sum, in millimeters.[21]

The lateral headfilms taken at pre-treatment, at debonding and at the follow-up period were digitized and exported to the Dolphin Imaging Premium v. 10.5 software (Dolphin Imaging & Management Solutions, Chatsworth, CA, USA). Magnification was corrected in all images. The Legan-Burstone analyses was used at T1, T2 and T3 timepoints (Figure 1A-B).[22] This analysis comprises facial-form and lip form variables. All measurements were performed in a standardized head position in which the cranial base presented a 7° inclination in relation to a constructed Horizontal Reference Plane (HP), perpendicular to a true vertical line drawn from the soft-tissue Glabella (G') point. The soft-tissue variables analyzed were: (1) Facial Convexity Angle (G'.Sn.Pog'), (2 and 3) Maxillary and Mandibular Prognathism (G'-Sn and G'-Pog', respectively), (4) Lower Face-Throat Angle (SnGn'.C), (5) Vertical Height Ratio (G'-Sn:Sn-Me') and (6) Lower Vertical Height-Depth Ratio (Sn-Gn':C-Gn'). The lip form variables are: (1) Nasolabial Angle (Cm.Sn.Ls), (2) Upper Lip Protrusion (Ls to Sn-Pog'), (3) Lower-lip protrusion (Li to Sn-Pog'), (4) Mentolabial sulcus depth (Si to Li-Pog'), (5) Maxillary Incisor Exposure (Stms-Ui), (6) Interlabial Gap (Stms-Stmi) and (7) Vertical Lip-Chin Ratio (Sn-Stms:Stmi-Me'). Cephalometric tracings were performed by a trained

operator (M.V.V.). To blind the operator regarding the treatment protocol each patient had been undergone the images were randomly numbered from 1 to 40, with the use of The Random Allocation Software (Microsoft Visual Basic 6), without patient identification, when digitized and registered in the Dolphin software. This numeric sequence was randomly determined by the software regardless the treatment protocol group or patient name initials.

Error study

Error study was performed for the crowding measurement and for the cephalometric tracings. One third of the cases was randomly selected and pre-treatment crowding was re-measured fifteen days after the first measurement. The headfilms of these patients were re-traced at the three time points. Random errors were calculated with the Dahlberg's formula,[23] ($Se^2 = \Sigma\ d2 / 2n$) where S^2 is the error variance and *d* is the difference between 2 determinations of the same variable. Dependent t-test was used for systematic error evaluation.[24]

Statistical Analyses

Intergroup sex distribution was compared using Chi-Square tests.

Data normality of all quantitative variables was assessed with Shapiro-Wilk test.

T tests were used for intergroup comparability checking regarding pre-, posttreatment and long-term-posttreatment ages, treatment time, time of long-term evaluation and amount of pre-treatment crowding.

Intergroup comparisons of starting forms and interphase changes were performed using T- and Mann-Whitney tests. Statistical significance was considered at $P<0.05$.

All statistical comparisons were performed using Statistica software (Statistica for Windows, version 7.0, StatSoft Inc., Tulsa, Okla, USA).

RESULTS

The random error of dental crowding measurement ranged from 0.11mm (mandibular crowding) and 0.13mm (maxillary crowding). The random errors of cephalometric variables ranged from 1.2° (Facial Convexity Angle) to 1.8º (Lower Face-Throat Angle) and from 0.10mm (upper lip protrusion) and 0.13mm (lower lip protrusion) for linear variables. These ranges were within acceptable limits.[25-27]

Both groups were comparable regarding sex distribution, pre-, posttreatment and long-term posttreatment ages, treatment time, time of long-term posttreatment evaluation, pre-treatment crowding (Table I). Similar pre-treatment values for the variables of the Legan-Burstone analysis for both groups were found (Table II).

After treatment, a significantly greater lower lip retrusion and a greater decrease of the mentolabial sulcus depth were observed in group 2 compared to group 1 (Table III).

In the post-treatment period, both groups presented similar soft-tissue changes (Table IV).

DISCUSSION

No previous study has specifically investigated the long-term soft-tissue changes of Class II subdivision malocclusion treatment with premolar extractions. Despite several studies evaluating the origin of Class II subdivision malocclusion,[1,2,10,28-30] and treatment mechanic and changes,[3,9,31-33] there is a lack of evidence regarding facial profile modifications over time. Furthermore, because there are two possible extraction protocols to be indicated for correction of Type 1 cases,[3] and different treatment outcomes are expected,[12] posttreatment changes might also be distinct.

In the present study, a rigid inclusion criterium was used regarding pre-treatment molar anteroposterior discrepancy severity. Considering milder anteroposterior severities may not present the same treatment challange,[34] only cases with full-cusp Class II molar relationship on the Class II side were included.[18,19] Additionally, the ages at all the three stages and the time of long-term evaluation were comparable between the groups. In addition, intergroup comparability regarding pre-treatment dental crowding was important. Differences in pre-treatment dental crowding would require different amounts of anterior retraction during treatment. This would influence in intergroup comparison of soft-tissue treatment changes, as well as could have led the groups to different posttreatment soft-tissue outcomes, regardless the extraction protocol used. Groups were comparable regarding pre-treatment crowding on both arches (Table I). Similarly, both groups were comparable regarding all the pretreatment cephalometric variables assessed in this investigation (Table II). Because Legan-Burstone analyses is composed by facial- and lip form variables,[22] this comparability ensures intergroup similarity regarding pre-treatment facial features.

Therefore, pre-treatment similarities ensured that treatment- and posttreatment changes were attributed to the extraction protocol used, either symmetric or asymmetric.

Only two treatment changes were significantly different between groups. A greater amount of lower lip retrusion and a greater decrease of mentolabial sulcus depth were observed in patients treated with 4 premolar extractions (Table III). The interaction of these variables revealed that the subdivision cases that undergone extractions of 4 premolars presented greater retraction of the landmark 'Li' than those treated with 3 extractions. Because mentolabial sulcus depth is calculated as the distance between the B' point (Si) to the Li-Pog' line, significant depth reduction is expected as a result of the lower lip retrusion. A previous study found significantly greater mandibular incisor retraction and numerically greater maxillary incisor lingual tipping in patients treated with 4 extractions in comparison with those treated with the 3 extractions.[12] These results are in accordance to the findings of the present study as lower lip retrusion is proportional to the amount of mandibular incisor retraction and maxillary incisor lingual tipping produced during treatment.[35,36] Lingual tipping of the maxillary incisor influences on lower lip retraction due to the touch of maxillary incisor tip on the lower lip.[36] Differently from the same previous study,[12] no significant difference was found between groups regarding the amount of upper lip retraction. Once maxillary bilateral space closure mechanics was similarly performed in both protocols, regardless the mandibular extraction choice,[4,6,9,31] the amount of maxillary anterior teeth retraction performed is also similar.[9] Consequently, the expected upper lip retraction amount also tends to be similar. This reasoning is supported by the findings of a previous study showing that the upper lip retraction is proportional to the amount of maxillary incisor retraction, but not to its lingual tipping.[36] Nonetheless, lip behavior does not depend only on the amount of incisor retraction and does not always follow it proportionally.[37,38] Lip positional changes also depends on the lip anatomy, strain and tonus, and different responses have been found in patients with thinner and thicker lips.[39,40] Speculatively, the divergence between our outcomes and the findings by Janson et al, 2007,[12] might be associated with possible differences in lip anatomy of sample patients. However, because lip thickness was not evaluated in the present study nor in the previous one, the difference between the results of upper lip retraction between both studies can be better explained by the mechanical tendencies describe above.

Both groups presented similar long-term posttreatment changes (T3-T2, Table IV). Similar tendencies of profile flattening and lip retrusion over time were numerically observed in the groups. These results are in accordance with previous studies regarding facial profile posttreatment changes,[15,40-42] and facial maturational changes in untreated samples.[43-46] The long-term similar changes might be explained by the similarity among both groups at the pre-treatment stage (Tables I and II). Both protocols presented significant differences only in the amount of lower lip retrusion and, consecutively, in the mentolabial sulcus depth reduction produced with treatment (T2-T1, Table III) with no difference among other facial- and lip form variables that were evaluated. Therefore, it is reasonable to assume that these differences in posttreatment lip position did not influence soft-tissue changes long-term posttreatment. Furthermore, similar occlusal stability was found between both protocols in a previous study.[47] As soft-tissue changes tend to occur in response to occlusal changes, the similar occlusal stability found in previous studies reinforces the tendency of similar soft-tissue changes over time.

The present results suggest that Type 1 Class II subdivision patients with similar pre-treatment characteristics tend to present similar long-term posttreatment soft-tissue changes when treated with 3- or 4-premolar extractions. Because significant greater lower lip retraction and mentolabial sulcus depth reduction are produced by 4-premolar extraction protocol with treatment (Table III), the similar long-term stability means that this difference continue to exist in the long-term. Nonetheless, future studies should be performed to compare the profile attractiveness of patients treated with the two protocols in a patient-centered measure.

CONCLUSION

The tested null hypothesis was accepted.

- A greater amount of lower lip retrusion and a greater decrease of the mentolabial sulcus depth occurred after 4-premolar extraction compared with 3-premolar extraction treatment.
- Posttreatment soft-tissue changes were similar in both extraction protocols.

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FIGURE LEGENDS

Figure 1. A: Soft tissue variables of the Legan-Burstone analysis. **B:** Lip form variables of the Legan-Burstone analysis. Letters represent the cephalometric points. Numbers represent the soft-tissue variables: (1-A) Facial Convexity Angle (G'.Sn.Pog'), (2-A) Maxillary Prognathism (G'-Sn), (3-A) Mandibular Prognathism (G'-Pog'), (4-A) Lower Face-Throat Angle (SnGn'.C), (5-A) Vertical Height Ratio (G'-Sn:Sn-Me'), (6-A) Lower Vertical Height-Depth Ratio (Sn-Gn':C-Gn'), (1-B) Nasolabial Angle (Cm.Sn.Ls), (2-B) Upper Lip Protrusion (Ls to Sn-Pog'), (3-B) Lower Lip Protrusion (Li to Sn-Pog'), (4-B) Mentolabial Sulcus Depth (Si to Li-Pog'), (5-B) Maxillary Incisor Exposure (Stms-Ui), (6-B) Interlabial Gap (Stms-Stmi), (7-B) Vertical Lip-Chin Ratio (Sn-Stms:Stmi-Me').

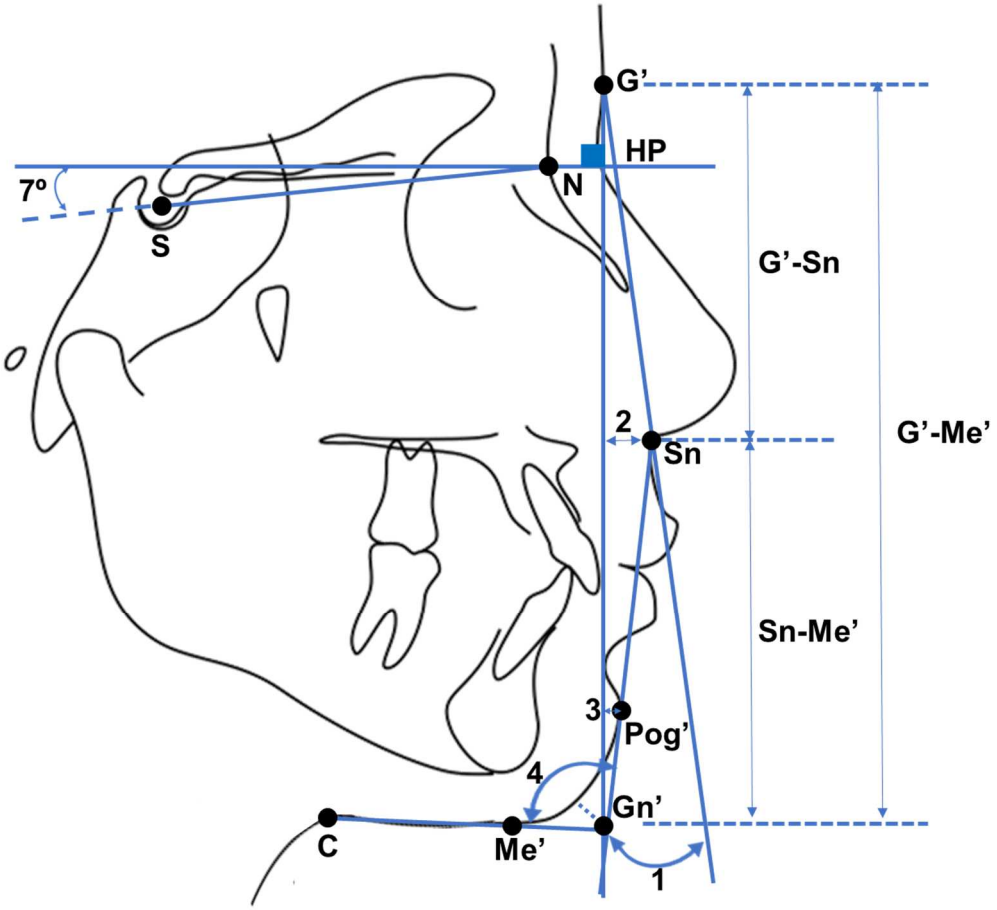

Figure 1A.

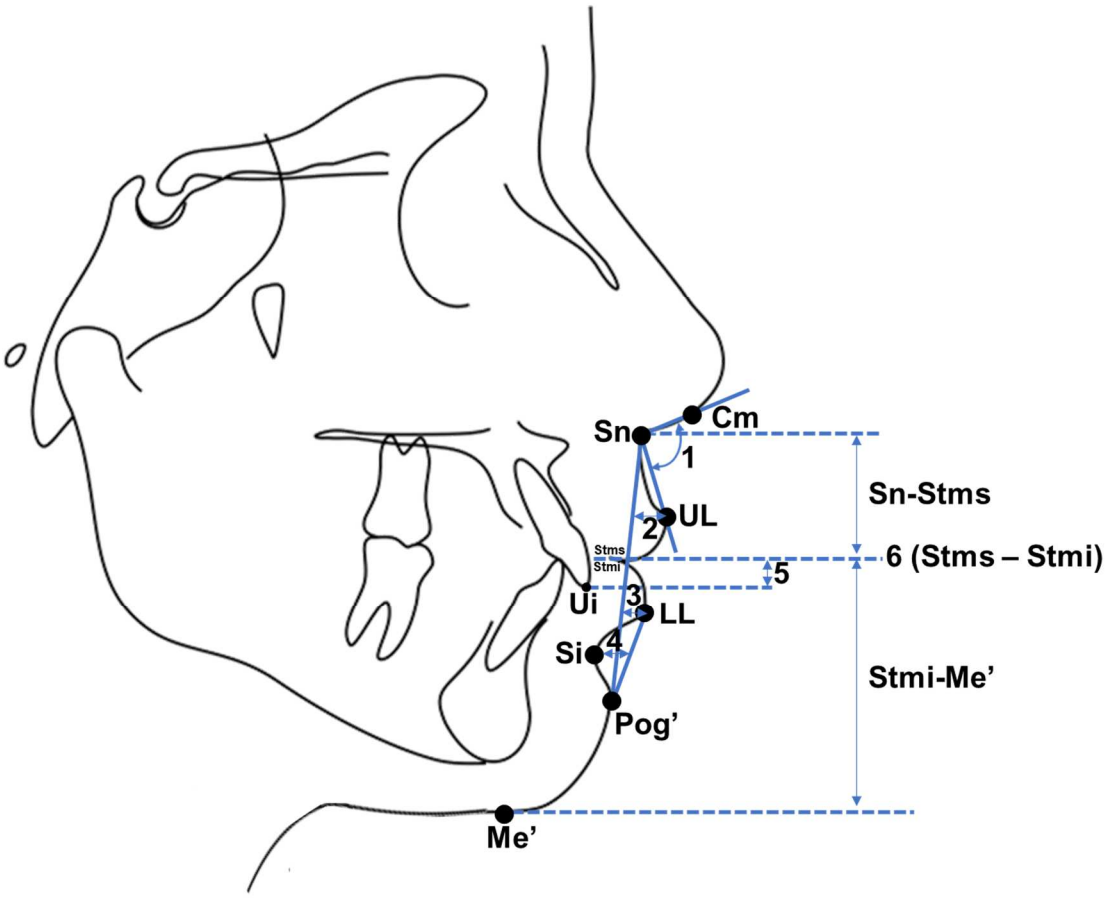
Sn
Cm
1
UL
2
Stms
Stmi
5
6 (Stms – Stmi)
Sn-Stms
Ui
3
LL
Si
4
Stmi-Me'
Pog'
Me'

Figure 1B.

Table I. Intergroup comparability regarding sex distribution, pre- posttreatment- and long-term posttreatment ages, treatment time, time of long-term posttreatment evaluation and pretreatment crowding (T- and Chi-Square tests).

Variable	Group 1 (N = 20) Mean (SD)	Group 2 (N = 20) Mean (SD)	*P*
Sex Male Female	 7 13	 7 13	1.000‡
Pre-treatment age (T1, years)	14.10 (2.51)	13.10 (1.22)	0.145†
Posttreatment age (T2, years)	17.01 (2.82)	16.80 (2.63)	0.482†
Long-term posttreatment age (T3, years)	24.50 (4.38)	23.11 (4.39)	0.621†
Treatment time (T2 – T1, years)	3.22 (1.46)	3.17 (1.08)	0.903†
Time of long-term posttreatment evaluation (T3 – T2, years)	6.90 (1.21)	6.83 (1.08)	0.848†
Pre-treatment maxillary crowding (T1, mm)	-0.05 (4.17)	1.03 (5.01)	0.463†
Pre-treatment mandibular crowding (T1, mm)	1.85 (2.01)	-0.11 (4.60)	0.089†

†T test; ‡Chi-square test.

Table II. Intergroup comparison of pre-treatment cephalometric variables (T1, T- and Mann-Whitney tests).

Variable	Group 1 (N = 20)		Group 2 (N = 20)		*P*
Facial form	**Mean***	**SD**	**Mean**	**SD**	
Facial convexity angle (º) (G.Sn.Pog')	16.7	5.73	15	5.36	0.357†
Maxillary prognathism (mm) (G'-Sn perpendicular)	4.44	4.48	5.47	4.23	0.457†
Mandibular prognathism (mm) (G'-Pg' perpendicular)	-6.81	5.81	-2.90	6.78	0.058†
Lower face – throat angle (°) (SnGn'.C)	114	3.5	112	3	0.072‡
Vertical height ratio (%) (G-SN:SN-Me)	99.1	10.3	97.9	11.6	0.738†
Lower vertical height – depth ratio (%) (Sn-Gn': C-Gn')	1.45	0.25	1.37	0.242	0.336†
Lip position					
Nasolabial angle (°) (Col.Sn.UL)	107	12.7	105	12.8	0.600†
Upper lip protrusion (mm) (Ls to Sn-Pog')	5.29	0.74	5.93	0.78	0.119‡
Lower lip protrusion (mm) (Li to Sn-Pog')	4.43	1.96	5.36	1.78	0.125†
Mentolabial sulcus (mm) (Si to LL-Pg')	6.83	1.48	7.21	2.52	0.564†
Mx1 Incisor exposure (mm) (UL1-Stms)	6.87	2.67	9.16	1.31	0.277†
Interlabial gap (mm) (Stms - Stmi)	2.05	1.73	2.91	0.84	0.735‡
Vertical lip‑chin ratio (%) (SnStms/StmiMe')	27.1	2.35	26.4	0.80	0.675‡

†T test; ‡Mann-Whitney test; *Median and Interquartile Deviation are shown for variables without normal distribution.

Table III. Intergroup comparison of treatment changes (T2 – T1, T- and Mann-Whitney tests).

Variable	Group 1 (N = 20)		Group 2 (N = 20)		*P*
Facial form	**Mean***	**SD**	**Mean**	**SD**	
Facial convexity angle (º) (G.Sn.Pog')	-1.79	4.03	-3.85	3.04	0.075†
Maxillary prognathism (mm) (G'-Sn perpendicular)	-1.04	2.92	-1.27	2.70	0.797†
Mandibular prognathism (mm) (G'-Pg' perpendicular)	1.11	4.17	1.43	4.15	0.809†
Lower face – throat angle (°) (SnGn'.C)	-4.4	7.74	-3.3	2.98	0.999‡
Vertical height ratio (%) (G-SN:SN-Me)	1.05	9.57	2.97	7.45	0.483†
Lower vertical height – depth ratio (%) (Sn-Gn' / C-Gn')	0.06	0.36	0.06	0.20	0.983†
Lip position					
Nasolabial angle (°) (Col.Sn.UL)	-1.85	8.83	0.20	7.23	0.715‡
Upper lip protrusion (mm) (Ls to Sn-Pog')	-1.36	1.85	-1.44	1.88	0.895†
Lower lip protrusion (mm) (Li to Sn-Pog')	-0.98	2.05	-2.37	2.03	0.038†**
Mentolabial sulcus (mm) (Si to LL-Pg')	-0.51	3.68	-3.69	3.72	0.010†**
Mx1 Incisor exposure (mm) (UL1-Stms)	-0.10	2.61	0.43	1.02	0.579‡
Interlabial gap (mm) (Stms - Stmi)	0.10	3.23	-0.13	2.78	0.925‡
Vertical lip‑chin ratio (%) (SnStms/StmiMe')	0.26	2.76	-0.40	2.25	0.419†

†T test; ‡Mann-Whitney test; *Median and Interquartile Deviation are shown for variables without normal distribution; **Statistically significant at P < 0.05.

Table IV. Intergroup comparison of long-term posttreatment changes (T3 – T2, T- and Mann-Whitney tests).

Variable	Group 1 (N = 20)		Group 2 (N = 20)		*P*
Facial form	**Mean***	**SD**	**Mean**	**SD**	
Facial convexity angle (º) (G.Sn.Pog')	-0.74	3.48	-0.49	3.53	0.826†
Maxillary prognathism (mm) (G'-Sn perpendicular)	0.35	1.69	1.10	2.61	0.818‡
Mandibular prognathism (mm) (G'-Pg' perpendicular)	3.44	6.93	1.51	5.55	0.336†
Lower face – throat angle (°) (SnGn'.C)	3.79	13.00	6.01	9.63	0.544†
Vertical height ratio (%) (G-SN:SN-Me)	0.40	8.61	1.02	6.48	0.797†
Lower vertical height – depth ratio (%) (Sn-Gn' / C-Gn')	0.03	0.54	0.04	0.21	0.941†
Lip position					
Nasolabial angle (°) (Col.Sn.UL)	1.90	3.83	0.55	3.73	0.695‡
Upper lip protrusion (mm) (Ls to Sn-Pog')	-0.40	0.90	-0.90	1.03	0.499‡
Lower lip protrusion (mm) (Li to Sn-Pog')	-0.70	1.46	-0.91	2.09	0.716†
Mentolabial sulcus (mm) (Si to LL-Pog')	-1.48	2.45	-1.52	3.52	0.969†
Mx1 Incisor exposure (mm) (UL1-Stms)	-0.85	1.41	-0.74	1.44	0.807†
Interlabial gap (mm) (Stms - Stmi)	-1.05	1.08	-0.20	0.60	0.172‡
Vertical lip‑chin ratio (%) (SnStms/StmiMe')	0.60	2.28	0.95	1.75	0.685‡

†T test; ‡Mann-Whitney test; *Median and Interquartile Deviation are shown for variables without normal distribution.

2.2 ARTICLE 2

LONG-TERM PROFILE ATTRACTIVENESS IN CLASS SUBDIVISION MALOCCLUSION TREATED WITH 3 AND 4 PREMOLAR EXTRACTIONS

ABSTRACT

Introduction: This study aimed to compare the profile attractiveness of Class II malocclusion subdivision patients treated with 3- and 4-premolar extractions, at the posttreatment and 6-year posttreatment stages. **Methods:** Group 1 comprised 20 patients (7 male, 13 female) treated with asymmetric extractions of 3 premolars, with pre- (T1), posttreatment (T2) and long-term posttreatment (T3) ages of 14.10 (SD=2.51), 17.01 (SD=2.82) and 24.50 (SD=4.38) years. Group 2 comprised 20 patients (7 male, 13 female) treated with symmetric 4-premolar extractions, with pre-, posttreatment and long-term posttreatment ages of 13.10 (SD=1.22), 16.80 (SD=2.63) and 23.11 (SD=4.39) years. T1-, T2- and T3 headfilms were digitized. Androgenous silhouettes were created to T2 and T3 headfilms. Profile attractiveness of the silhouettes was evaluated by 73 Laypeople and 73 orthodontists. The influence of the extraction protocol and rater, as well the interaction of both, in profile attractiveness evaluation was assessed with the Two-Way-ANOVA tests at T2 and T3. Intragroup profile attractiveness over time was compared using paired-t tests ($p<0.05$). **Results:** Group 1 had attractiveness scores at posttreatment- and long-term posttreatment of 4.72 and 4.58, respectively. Group 2 had attractiveness scores at posttreatment- and long-term posttreatment of 4.26 and 4.30, respectively. No inter- and intragroup differences was found for facial attractiveness. Different group of raters assigned similar scores for facial attractiveness. **Conclusion:** Posttreatment and long-term posttreatment profile attractiveness of Class II subdivision malocclusion patients treated with 4-symmetric- and 3-asymmetric premolar extractions were similar.

INTRODUCTION

The long-term clinical impact of asymmetric mechanics on the face of Class II subdivision malocclusion patients is still unknow.

Class II subdivision malocclusion is classified in Type 1 or Type 2, in accordance with the occlusal characteristics and etiology.[1,2] Type 1, the most prevalent, is characterized by a distal positioning of the mandibular first molar on the Class II side,

what results in mandibular dental midline deviation to the same side. In Type 2, the main etiologic factor is a mesial positioning of the maxillary first molar on the Class II side with maxillary dental midline deviation to the Class I side. Some degree of skeletal asymmetry has also been found in recent studies of subdivision cases.[3,4] However, compensatory orthodontic treatment is satisfactorily applied in cases without facial compliant.

Type 1 Class II subdivision malocclusion treatment can be carried out with or without tooth extractions. When Type 1 patients present significant amounts of initial crowding or incisor protrusion, extractions are recommended.[5] Extraction treatment may be performed with symmetric extractions of two-maxillary and two-mandibular premolars, or with asymmetric extractions of two maxillary premolars and only one mandibular premolar, on the Class I side.[6,7] On the other hand, extraction treatment of Type 2 patients has a single protocol of one-maxillary-premolar extraction on the Class II side.[2,7-11] Treatment of Type 1 cases with asymmetric extractions produced greater occlusal success rates and treatment efficiency with a decreased mandibular incisor retraction and lip retrusion in comparison with symmetric four-premolar extraction protocol.[7,12,13]

Inter-labial relationship and lip projection are important variables to be considered in treatment planning due to the influence on the facial esthetics.[14,15] Because differences were found in the amount of soft-tissue retraction provided by both extraction protocols,[13] it is reasonable to speculate that posttreatment profile appearance and attractiveness may also differ between these protocols. Additionally, because long-term soft-tissue changes may be influenced by posttreatment facial features, profile attractiveness should be evaluated over time.[16,17]

Therefore, the aim of this study was to compare the facial profile attractiveness in patients with Type 1 Class II subdivision malocclusion treated with asymmetric and symmetric premolar extractions. The null hypothesis was that profile attractiveness is similar between both protocols at posttreatment and long-term posttreatment stages.

MATERIAL AND METHODS

This study was approved by the Ethics in Research Committee of _____ (number _____).

Sample size calculation showed that to detect a minimum intergroup difference of 1.0 for facial attractiveness score, with a standard deviation of 1.02, a power of 80% and a significance level of 5%, 18 cases would be necessary in each group.[17]

The sample was retrospectively selected from the files of the Orthodontic Department of _____. The cases were consecutively selected based on presenting full-cusp[18,19] Type 1 Class II subdivision malocclusion, all permanent teeth up to first molars at the pre-treatment stage, absence of dental or craniofacial anomalies, and follow-up records taken at least 5 years after debonding. Group division was performed according to the treatment protocol performed: asymmetric and symmetric extractions. Group 1 comprised 20 patients (13 female, 7 male) treated with 3 asymmetric extractions of two-maxillary and one-mandibular premolars, with pre- (T1), posttreatment (T2) and long-term posttreatment (T3) ages of 14.10 (SD=2.51), 17.01 (SD=2.82) and 24.50 (SD=4.38) years, respectively. The mandibular premolar extraction was performed on the Class I side, leading to the correction of the mandibular dental midline deviation.[20] Group 2 comprised 20 patients (13 female, 7 male) treated with 4 symmetric extractions of two-maxillary and two-mandibular premolars, with pre-, posttreatment, and long-term posttreatment ages of 13.10 (SD=1.22), 16.80 (SD=2.63) and 23.11 (SD=0.39) years, respectively. The time interval between T2 and T3 was 6.90 (SD=1.21) and 6.83 (SD=1.08) years in groups 1 and 2, respectively.

Orthodontic treatment was performed by graduate students under the supervision of the same team of instructors using standard edgewise 0.022 x 0.028-inch bracket appliances. Anchorage reinforcement was provided by extraoral headgear and lip bumper when necessary. Class II elastics were used in 4-premolar extraction treatment in order to achieve molar anteroposterior discrepancy correction on the Class II side. The usual wire sequence was 0.015-in twist-flex or 0.016-in nickel-titanium alloy wire, 0.016, 0.018, 0.020 and 0.018 x 0.025 or 0.021 x 0.025-in stainless steel wire (3M Unitek, Monrovia, CA). In the case of mild or absent incisor crowding, en-masse retraction was performed bilaterally in the maxillary and mandibular arches in group 2, and in the extraction quadrants in group 1. In those cases with moderate to severe incisor crowding, the canines were retracted after the extractions to provide enough space for tooth alignment. Once the anterior teeth were aligned, en-masse retraction was performed. Retraction was performed with stainless steel rectangular archwires, using accentuated and reverse curves of Spee in the maxillary and

mandibular arches, respectively, and elastic chains. Hawley plates, by 1 year, and fixed canine-to-canine retainers, by at least 3 years, were used in the maxillary and mandibular arches, respectively, as a retention protocol.

Groups was expected to be comparable regarding the amount of initial crowding to ensure that possible differences in the amounts of anterior teeth retraction would be only due to the extraction protocol used. Therefore, maxillary- and mandibular pre-treatment crowding was manually measured by a trained operator (M.V.V.) using pre-treatment dental models. Crowding calculation was performed as the difference between the arch length (circumference, from left to right first molars) and the sum of mesiodistal crown widths from the mesial aspect of first molar to its contralateral.[21] Arch length and crown widths were measured in millimeters using a brass wire segment and a dry point compass, respectively.[22]

T2 and T3 headfilms were digitized and exported to the Dolphin Imaging Premium v. 10.5 software (Dolphin Imaging & Management Solutions, Chatsworth, CA, USA) for magnification correction. The magnification factors of the x-ray machines used ranged from 6% to 9.8% and were corrected accordingly. The corrected images were exported to the Adobe Photoshop CS6 and oriented to a natural head position. From the oriented images, androgenous silhouettes were created to eliminate the influence of patient individual characteristics and evaluator personal preferences in attractiveness evaluation (Figure 1).

The sample size calculation for numbers of raters showed that to detect a mean intergroup difference of 0.6 for facial attractiveness scores, with a standard deviation of 1.28, a test power of 80% and a significance level of 5%, 73 evaluators was needed for each type of raters.[17] The profile attractiveness evaluation was performed using a Google Forms questionnaire (LLC Google, Mountain View, CA, USA). The links were sent by a messenger app to two groups of 73 raters each: laypeople and orthodontists. Image sequence was randomly determined using The Random Allocation Software (Microsoft Visual Basic 6). The laypeople group comprised participants without education in dentistry. The orthodontists were participants that had already concluded the orthodontic residence, Master or Ph.D. programs.

There was no time restriction to perform the evaluation and the participants could return to previous images to change their notes, whenever was necessary. The facial attractiveness scores ranged from 1 (less attractive) to 10 (most attractive).

Error study

For crowding measurement error study, one third of the cases was randomly selected and re-measured fifteen days after the first measurement. Random errors were calculated with the Dahlberg's formula,[23] Dependent t-test was used to evaluate the systematic errors.[24] For attractiveness evaluation error study, one third of the evaluators of both groups was randomly selected to re-evaluate one third of the images, which was randomly selected. The Random Allocation Software (Microsoft Visual Basic 6) was used to select the cases to be remeasured and re-evaluated and evaluators to re-evaluate the images. Intraclass Correlation Coefficient (ICC) was used to assess the agreement between the first and second facial esthetic evaluation.

Statistical analyses

The Chi-Square test was performed to compare sex distribution between groups of treatment protocols and between raters.

Shapiro-wilk normality test was applied to all the quantitative variables. Evaluator age was the only data without normal distribution. Therefore, Mann-Whitney tests were used to inter-evaluator age comparison, meanwhile all the other comparisons were performed with parametric tests.

T-tests were used to evaluate intergroup compatibility regarding pre-, posttreatment- and long-term-posttreatment ages, treatment time, time of long-term posttreatment evaluation, pre-treatment maxillary- and mandibular crowding.

The Two-Way-ANOVA was performed to evaluate the influence of the treatment protocol and type of evaluator, as well as their interaction, on the facial profile attractiveness at T2 and T3.

Paired-t tests were performed for intragroup inter-phase comparison of posttreatment and long-term posttreatment attractiveness.

The differences were considered significant at $P<0.05$.

All statistical comparisons were performed using Statistica software (Statistica for Windows, version 7.0, StatSoft Inc., Tulsa, Okla, USA), at $P<0.05$.

RESULTS

The random errors of dental crowding ranged from 0.11mm (mandibular crowding) to 0.13mm (maxillary crowding), and were within acceptable limits.[25] No

systematic error was found. The agreement for facial profile attractiveness evaluation was 0.986, indicating excellent agreement.[26]

Both groups were comparable regarding sex distribution, pre-, posttreatment- and long-term posttreatment ages, treatment time, time of long-term posttreatment evaluation, and pre-treatment dental crowding (Table I).

Groups of evaluators were comparable regarding sex distribution. Laypeople was significantly older than orthodontists (Table II).

Profile attractiveness was similar between groups at both T2 and T3 stages. The interaction analyses showed that the treatment protocol and the type of evaluator had no influence in the profile attractiveness evaluation (Tables III and IV).

Inter-phase comparison showed that profile attractiveness was similar at debonding and long-term posttreatment, in both groups (Table V).

DISCUSSION

Asymmetric Class II malocclusion is a topic of continuous interest in clinical orthodontics. The motivation of the present study was based on a significant difference found in a previous study regarding the amount of soft-tissue retrusion provided by symmetric and asymmetric extractions, with shorter upper lip retrusion found in the asymmetric group.[13] The authors reported that the 3-premolar extraction protocol would be more adequate indicated than the 4-premolar extraction protocol in cases requiring less soft-tissue retrusion. Nonetheless, despite the possibility of tooth extraction to treat crowded cases, the amount of dental retraction and labial retrusion is a concern mainly when dental/labial protrusion correction is necessary. From a point of view favorable to asymmetric extractions, it could be stated that the greater amount of soft-tissue retrusion provided by the 4-premolar protocol could result in a dished-in profile, affecting negatively the facial attractiveness.[17] However, from a point of view favorable to the symmetric extractions, it could be argued that a substantial amount of soft-tissue retraction is exactly what is desired when extractions are used to correct protruded cases. In front of these controversies, it could be speculated that the greater integumentary retraction provided by the 4-premolar extractions would be more effective in correcting cases with great lip protrusion, and, thus, facial appearance would be improved. Therefore, facial attractiveness should be evaluated to determine whether the differences found in soft-tissue retrusion between both protocols actually have an influence on the final and posttreatment facial profile.

Sample selection included only patients with full-cusp Class II subdivision malocclusion considering that malocclusion characteristics are more strongly expressed in the most severe cases.[27] Additionally, groups were comparable regarding pre-, posttreatment- and long-term posttreatment ages. Patients with different ages could present different soft-tissue maturational changes during treatment and at the posttreatment period.[17,28-34] Both groups should – and were – comparable regarding pre-treatment dental crowding in maxillary and mandibular arches (Table I), ensuring that the amount of retraction performed in both groups was similar. Therefore, as both groups were comparable regarding these initial characteristics, the final profile appearance differences may be mainly attributed to the extraction protocol used, 3- or 4-premolar extractions.

The use of silhouettes has been widely adopted in previous studies as they eliminate the influence of rater personal preferences regarding facial phenotypic characteristics, as skin texture and color, haircut style and sex.[17,35-37] Because laypeople and orthodontists may differ regarding facial profile evaluation, both types of evaluators composed two different groups. Groups of raters were similar regarding sex distribution and the orthodontists were significantly younger than laypeople (Table II). However, the age difference was small and might not have an influence in the facial attractiveness evaluation as both groups included only adults.

The extraction groups presented similar profile attractiveness at the end of treatment. No significant influence was found for the extraction protocol and type of evaluator on posttreatment facial attractiveness scores (Table III). These results suggest that the statistically greater amount of soft-tissue retraction that occurs when 4 premolars are extracted[13] is not enough to affect profile perception, and, so, it is not clinically relevant. It was previously found that extractions of 4 premolars in subdivision cases produce significantly greater mandibular incisor retraction in relation to the effects produced by 3 extractions.[13] However, when 3- or 4-premolar extractions were performed, the amount of maxillary incisor retraction was similar because maxillary bilateral space closure mechanics are similar in complete Type 1 Class II subdivision cases, regardless the mandibular management.[7,8,10,38] Therefore, there is a need of greater maxillary incisor lingual tipping in cases treated with 4 extractions to reach an adequate overjet.[13] Lingual tipping of maxillary incisors have little influence on the upper lip sagittal position. Thus, when the facial profile was evaluated, the slightly different soft-tissue changes provided by both protocols was not relevant.

The similar long-term posttreatment profile attractiveness found in both groups was also clinically important (Table IV). This result suggests that, even if slight soft-tissue differences may have occurred over time between groups after debonding, they were not enough to reverberate on facial profile perception. It could be argued that patients included in the present study were young adults at the long-term posttreatment stage (24.50 and 23.11 years of age in the groups 1 and 2, respectively). However, lip support is provided by the anterior teeth and the main changes on teeth positioning after treatment are expected in the first few years after debonding.[39-41] Because no intergroup attractiveness difference was found at debonding and at 6 years posttreatment (Tables IV and V), it is unlikely that clinically relevant changes associated to the extraction protocol used would be found on the profiles with a longer follow-up time. Furthermore, the similar posttreatment behavior of both groups is in part explained by the results of a previous study which found similar occlusal stability between patients treated with symmetric and asymmetric extractions.[42] Additionally, there is a tendency for maturational changes be similar in treated patients regardless the treatment protocol used.[30,43] Therefore, similar long-term attractiveness was expected since no difference was found in the profile evaluation at the end of treatment.

In conclusion, the extraction protocol used has not influenced the facial profile attractiveness after debonding and in the long-term posttreatment.

The present study did not compare the soft-tissue changes presented by both groups in the evaluation period, and it is a limitation. Cephalometric comparisons of the soft-tissues would clarify if there actually was no significant difference in soft-tissue posttreatment changes between the two groups, or if they were so mild that did not influence in the profile evaluation. Thus, future studies should cephalometrically compare the posttreatment soft-tissue changes produced by both protocols.

CONCLUSION

The tested null hypothesis was accepted. Profile attractiveness was similar in Type 1 Class II subdivision malocclusion patients treated with 3 and 4-premolar extractions at posttreatment- and long-term posttreatment stages.

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FIGURE LEGENDS

Figure 1. Example of cephalometric tracing-derived silhouette profile similar to those used in the present investigation.

Figure 1.

Table I. Intergroup comparability (T and Chi-Square tests).

Variable	Group 1 (N=20) Mean (SD)	Group 2 (N=20) Mean (SD)	*P*
Sex Male Female	 7 13	 7 13	1.000‡
Pre-treatment age (T1, years)	14.10 (2.51)	13.10 (1.22)	0.145†
Posttreatment age (T2, years)	17.01 (2.82)	16.8 (2.63)	0.482†
Long-term posttreatment age (T3, years)	24.50 (4.38)	23.11 (4.39)	0.621†
Treatment time (T2 – T1, years)	3.22 (1.46)	3.17 (1.08)	0.903†
Time of long-term posttreatment evaluation (T3 – T2, years)	6.90 (1.21)	6.83 (1.08)	0.848†
Pre-treatment maxillary crowding (T1, mm)	-0.05 (4.17)	1.03 (5.01)	0.463†
Pre-treatment mandibular crowding (T1, mm)	1.85 (2.01)	-0.11 (4.60)	0.089†

†T test; ‡Chi-Square test. *Statistically significant at P < 0.05.

Table II. Raters' comparability regarding sex distribution and age (Chi-Square and Mann-Whitney tests).

Variable	Laypeople (N=73)	Orthodontists (N=73)	*P*
Sex Male Female	 34 39	 33 40	0.868†
Age (Years) Median and Interquartile Deviation	25.4 (12.7)	24 (18.9)	<0.001‡

†Chi-Square test; ‡Mann-Whitney test.

Table III. Influence of treatment protocols and of group of raters on the facial profile attractiveness evaluation at the posttreatment stage (Two-Way-ANOVA).

Variable	Mean	SD	*P*
Protocol			
Asymmetric extractions	4.72	1.22	0.068
Symmetric extractions	4.26	0.96	
Evaluator			
Laypeople	4.53	1.10	0.672
Orthodontist	4.43	1.16	
Interaction			
Protocol*Evaluator			0.391
Asymmetric extractions			
Laypeople	4.66	1.23	
Orthodontist	4.77	1.24	
Symmetric extractions			
Laypeople	4.17	0.96	
Orthodontist	4.10	0.22	

Table IV. Influence of treatment protocols and of group of raters on the facial profile attractiveness evaluation at the long-term posttreatment stage (Two-Way-ANOVA).

Variable	Mean	SD	*P*
Protocol			
Asymmetric extractions	4.58	1.01	0.195
Symmetric extractions	4.30	0.94	
Evaluator			
Laypeople	4.49	0.95	0.662
Orthodontist	4.39	1.02	
Interaction			
Protocol*Evaluator			0.433
Asymmetric extractions			
Laypeople	4.55	1.05	
Orthodontist	4.62	1.00	
Symmetric extractions			
Laypeople	4.43	0.88	
Orthodontist	4.16	1.01	

Table V. Interphase comparison of facial profile attractiveness (Paired-T tests).

Variable	Group 1 (N=20)		Group 2 (N=20)	
	Mean	**SD**	**Mean**	**SD**
Posttreatment attractiveness (T2)	4.72	1.22	4.26	0.96
Long-term posttreatment (T3)	4.58	1.01	4.30	0.94
P	0.612		0.870	

3 DISCUSSION

3 DISCUSSION

Despite several investigations had been performed focused on Class II subdivision malocclusion treatment efficiency, occlusal success rate and stability, cephalometric treatment changes and posttreatment smile characteristics,(JANSON; ARAKI; ESTELITA; CAMARDELLA, 2014; JANSON; BALDO; GARIB; BARROS *et al.*, 2016; JANSON; BRANCO; MORAIS; FREITAS, 2014; JANSON; CARVALHO; CANCADO; DE FREITAS *et al.*, 2007; JANSON; DAINESI; HENRIQUES; DE FREITAS *et al.*, 2003) no attention had been given to the impact of the different soft-tissue changes provided by the asymmetric and symmetric extraction protocols on posttreatment facial profile yet.

Because different soft-tissue conditions may present divergent changes over time, (ERDINC; NANDA; DANDAJENA, 2007; MENDES; JANSON; ZINGARETTI JUNQUEIRA-MENDES; GARIB, 2019) it is important to know the long-term effect of the soft-tissue difference found between patients treated by the two protocols. Nonetheless, it is not simple to control the influence of patient pre-treatment characteristics as much as possible to ensure that possible differences found in intergroup comparisons would be only, or mainly, due to the extraction protocol used. That is why in the present study both groups were matched regarding several variables, as age at all stages, time of long-term posttreatment observational time, and especially regarding the amounts of crowding and regarding the facial linear- and angular variables at the pre-treatment stage. Additionally, the inclusion criteria of including only patients with complete Class II malocclusion aids to ensure that the malocclusion characteristics and the mechanical differences provided by the treatment protocols would be greatly expressed in both groups.(POPOWICH; FLORES-MIR; NEBBE; HEO *et al.*, 2006)

The long-term soft-tissue evaluation of Class II subdivision treated patients would be already unprecedented and interesting in itself. However, because the statistically significant differences may result in very slight clinical discrepancies, it could be argued that the soft-tissue cephalometric comparison would not be enough to clarify the facial issue between both protocols. Therefore, facial profile attractiveness evaluation was also performed at the posttreatment- and long-term posttreatment

stages. Facial attractiveness improvement is one of the main goals of the orthodontic treatment.(DEWEL, 1973; MERRIFIELD, 1966) Thus, the results of the profile evaluation should be taken into greater consideration even if significant differences had been found between the groups by the long-term cephalometric comparison performed.

The previous study which mainly motivated the present one has found a significant difference in soft-tissue changes provided by the two extraction protocols compared.(JANSON; CARVALHO; CANCADO; DE FREITAS *et al.*, 2007) However, they were different from those of the present study. In their sample, the authors found significantly greater upper lip retraction and non-significant numerically greater lower lip retraction when four premolars were extracted. Differently, the present study found significantly greater lower lip retraction and non-significant numerically greater upper lip retraction when the same extractions were done. As discussed in the first article of this thesis, the amount of lower lip retraction had been found as proportional to the amounts of mandibular incisor retraction and maxillary incisor lingual tipping,(CAPLAN; SHIVAPUJA, 1997; HAYASHIDA; IOI; NAKATA; TAKAHASHI *et al.*, 2011) which have already been found as greater when symmetric extractions are performed.(JANSON; CARVALHO; CANCADO; DE FREITAS *et al.*, 2007) Additionally, lip response to incisor retraction is influenced by its muscular tonus, strain, and thickness.(OLIVER, 1982; ZIERHUT; JOONDEPH; ARTUN; LITTLE, 2000) Thus, it could be speculated that lip anatomic differences between the patients of this study and those from the previous one may have led to this different result. Nevertheless, both studies converge regarding the idea that greater soft-tissue retraction may be expected when four premolars are extracted. This reinforces the motivation of the second article to investigate if this difference would be enough to significantly affect the perception of patient profile. Furthermore, as similar long-term soft-tissue changes were found between both protocols, it can be assumed that, if there was profile attractiveness difference at debonding, it would probably remain in the long-term. This highlights the importance of comparing the groups regarding the profile attractiveness also in the long-term.

Profile attractiveness were similar between both protocols at both stages, and it was also similar in the intragroup comparison over time. These results mean that the cephalometric differences found in the present sample, regarding the amounts of lower

lip retraction and mentolabial sulcus depth does not have relevant clinical impact. A previous study that evaluated long-term profile attractiveness in bilateral Class II malocclusion treatment attributed the long-term differences found in profile attractiveness provided by different extraction protocols, even without cephalometric significant differences among the groups, to the set of patient facial features.(MENDES; JANSON; ZINGARETTI JUNQUEIRA-MENDES; GARIB, 2019) Non-significant mild changes in several variables as a set would have more impact than significant changes in few variables, as lip position, singly. In fact, chin and nose prominences have presented interaction between themselves and with lip' anteroposterior position as influencers of profile attractiveness.(TORSELLO; GRACI; GRANDE; DELI, 2010) Nonetheless, because the great pre-treatment facial comparability of both groups and the similar choice for extraction therapies in the present sample, it can be speculated that pre-treatment overall soft-tissue characteristics were similar in both groups. This possibility supports the similar profile attractiveness found even with significant different changes in lower lip position with treatment.

From the present results, it can be assumed that asymmetric extractions of three premolars can satisfactorily correct the pre-treatment dental/labial protrusion, with similar clinical impact on the face in relation to the symmetric extraction protocol. Additionally, the protocol used seems to play no role in patient posttreatment long-term soft-tissue changes and profile attractiveness.

4 FINAL CONSIDERATIONS

4 FINAL CONSIDERATIONS

From the findings of both studies that compose the present work, it can be concluded that:

- With treatment, extractions of 4 premolars produced significantly greater lower lip retrusion and mentolabial sulcus depth reduction, in comparison with the 3-premolar extraction protocol;
- The long-term soft-tissue changes of patients treated with asymmetric and symmetric extractions were similar;
- Profile attractiveness was similar between patients treated with extractions of 3 and 4 premolars, at debonding and long-term posttreatment stage.

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REFERENCES

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APPENDIXES

APPENDIX A. Declaration of exclusive use of article 1 in thesis.

DECLARATION OF THE USE OF THE ARTICLE IN THESIS

We hereby declare that we are aware that the article "Long-term soft-tissue changes in Class II subdivision malocclusion treated with symmetric and asymmetric extractions" will be included in the thesis of the student Marcelo Vinicius Valerio and may not be used in other works of Graduate Programs at Bauru Dental School, University of São Paulo.

Bauru, February 23, 2022

Marcelo Vinicius Valerio

Signature

Daniela Garib

Signature

APPENDIX B. Declaration of exclusive use of article 2 in thesis.

DECLARATION OF THE USE OF THE ARTICLE IN THESIS

We hereby declare that we are aware that the article "Long-term profile attractiveness in Class II subdivision malocclusion treatment with 3 and 4 premolar extractions" will be included in the thesis of the student Marcelo Vinicius Valerio and may not be used in other works of Graduate Programs at Bauru Dental School, University of São Paulo.

Bauru, February 23, 2022

Marcelo Vinicius Valerio _____
Signature

Daniela Garib _____
Signature

ANNEXES

ANNEX A. Ethics Committee approval, protocol number 51109321.0.0000.5417 (front).

USP - FACULDADE DE ODONTOLOGIA DE BAURU DA USP

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DA EMENDA

Título da Pesquisa: Atratividade do perfil após tratamento da má oclusão de Classe II subdivisão com extrações simétricas e assimétricas

Pesquisador: Marcelo Valerio

Área Temática:

Versão: 2

CAAE: 51109321.0.0000.5417

Instituição Proponente: Universidade de Sao Paulo

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 5.142.160

Apresentação do Projeto:

Trata-se de um projeto já avaliado e aprovado por esse CEP aonde os autores solicitam a inclusão das avaliações cefalométricas antes e após o tratamento, utilizando imagens radiográficas já obtidas durante o tratamento.

Objetivo da Pesquisa:

Os objetivos desta investigação serão:

• Primeiramente, comparar a atratividade do perfil e as alterações cefalométricas de pacientes com Classe II subdivisão Tipo 1 completa inicial tratados com os protocolos de extrações simétricas e assimétricas, ao final do tratamento e, no mínimo, 5 anos após a remoção do aparelho.

• Secundariamente, serão comparadas as notas de atratividade atribuídas por avaliadores leigos e ortodontistas.

A amostra será composta por documentações ortodônticas de pacientes tratados, com finalização anterior a 2015, com extrações com finalidade ortodôntica, com má oclusão de Classe II subdivisão completa inicial, divididos em dois grupos, conforme o protocolo de tratamento empregado: Grupo XP4, tratado 4 extrações simétricas, ou seja, de 2 pré-molares superiores e 2 inferiores, bilateralmente em ambos os arcos, e Grupo XP3, tratado com 3 extrações assimétricas, sendo duas de pré-molares no arco superior, bilateralmente, e 1 de pré-molar no arco inferior do lado da Classe I. Estas documentações encontram-se armazenadas no arquivo da Disciplina de

Endereço: DOUTOR OCTAVIO PINHEIRO BRISOLLA 75 QUADRA 9
Bairro: VILA NOVA CIDADE UNIVERSITARIA **CEP:** 17.012-901
UF: SP **Município:** BAURU
Telefone: (14)3235-8356 **Fax:** (14)3235-8356 **E-mail:** cep@fob.usp.br

ANNEX A. Ethics Committee approval, protocol number 51109321.0.0000.5417 (verso).

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Continuação do Parecer: 5.142.160

Ortodontia da FOB-USP.

O termo de Consentimento Livre e Esclarecido aos sujeitos da amostra desta pesquisa e/ou seus responsáveis foi apresentado anteriormente, no momento da execução do tratamento, já que a amostra pertence ao arquivo da Disciplina de Ortodontia da Faculdade de Odontologia de Bauru. O mesmo contemplava a utilização das documentações para fins didáticos, científicos, de pesquisa e afins.

Digitalização das telerradiografias ou das fotos de perfil e criação das silhuetas

As telerradiografias inicial, final e de acompanhamento pós-tratamento serão digitalizadas para o formato JPEG, utilizando-se um scanner ScanMaker i800 (Microtek, Hsinchu, Taiwan), com resolução de 300dpi, para permitir a aquisição das imagens pelo programa Dolphin Imaging 11.5 (Dolphin Imaging and Management Solutions, Chatsworth, Califórnia, EUA)

Avaliação dos Riscos e Benefícios:

Esta pesquisa pode trazer o risco de constrangimento aos participantes no momento de avaliarem as imagens, caso tenham dificuldade de atribuírem notas a elas. Entretanto, caso isso ocorra, o participante poderá fechar a janela do formulário e seus dados não serão computados, nem armazenados de forma alguma.

Como benefício direto ao participante, seja leigo ou ortodontista, este questionário permitirá uma autoavaliação da sua percepção da estética do perfil facial humano. Além disso, toda a comunidade ortodôntica de pacientes e profissionais será beneficiada, pois a comparação que será realizada entre as atratividades de pacientes tratados pelos protocolos ortodônticos descritos neste projeto é inédita. A evidência que será gerada nesta pesquisa servirá como parâmetro clínico a ser utilizado no momento da escolha conjunta do ortodontista e do paciente quanto ao protocolo de tratamento que melhor se adeque às expectativas e possibilidades de ambos.

Comentários e Considerações sobre a Pesquisa:

Esse projeto ja foi aprovado por esse CEP e os pesquisadores adicionam uma emenda onde farão uma análise digital cefalométrica nas telerradiografias já coletadas, inclusive incluindo a documentação necessária.

Considerações sobre os Termos de apresentação obrigatória:

Documentação correta.

Recomendações:

Não se aplica

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UF: SP **Município:** BAURU
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ANNEX A. Ethics Committee approval, protocol number 51109321.0.0000.5417 (front).

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Continuação do Parecer: 5.142.160

Conclusões ou Pendências e Lista de Inadequações:

Sou parecer favorável a aprovação do projeto por esse CEP.

Considerações Finais a critério do CEP:

A emenda apresentada pelo(a) pesquisador(a) foi considerada APROVADA na reunião ordinária do CEP de 01/12/2021, via Google Meet, devido à pandemia da COVID-19 e por orientações da CONEP, com base nas normas éticas da Resolução CNS 466/12. Ao término da pesquisa o CEP-FOB/USP exige a apresentação de relatório final. Os relatórios parciais deverão estar de acordo com o cronograma e/ou parecer emitido pelo CEP. Alterações na metodologia, título, inclusão ou exclusão de autores, cronograma e quaisquer outras mudanças que sejam significativas deverão ser previamente comunicadas a este CEP sob risco de não aprovação do relatório final. Quando da apresentação deste, deverão ser incluídos todos os TCLEs e/ou termos de doação assinados e rubricados, se pertinentes.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_1858316_E1.pdf	11/11/2021 18:47:03		Aceito
Outros	Projeto_MarceloViniciusValerio_Revisado.docx	11/11/2021 18:44:39	Marcelo Valerio	Aceito
Outros	Oficio_Emenda.doc	11/11/2021 18:44:10	Marcelo Valerio	Aceito
Outros	Check_listCEP_2019.docx	24/08/2021 14:34:24	Marcelo Valerio	Aceito
Folha de Rosto	FolhaDeRosto.pdf	18/08/2021 22:11:58	Marcelo Valerio	Aceito
Projeto Detalhado / Brochura Investigador	Projeto_MarceloViniciusValerio.docx	18/08/2021 22:09:20	Marcelo Valerio	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	Dispensa_TCLE_e_Termo_de_Assentimento.doc	18/08/2021 22:09:00	Marcelo Valerio	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_avaliadores.doc	18/08/2021 22:08:47	Marcelo Valerio	Aceito
Outros	Termo_de_aquiescencia.doc	18/08/2021 22:08:27	Marcelo Valerio	Aceito
Declaração de	DeclaracaoCompromissoPesquisador	18/08/2021	Marcelo Valerio	Aceito

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ANNEX A. Ethics Committee approval, protocol number 51109321.0.0000.5417 (verso).

USP - FACULDADE DE ODONTOLOGIA DE BAURU DA USP

Continuação do Parecer: 5.142.160

Pesquisadores	ResultadosPesquisa.doc	22:06:19	Marcelo Valerio	Aceito
Outros	Autoriz_para_diag_e_exec_de_tratamento_ortod.jpg	29/07/2021 00:23:49	Marcelo Valerio	Aceito
Cronograma	Cronograma.pdf	28/07/2021 23:59:12	Marcelo Valerio	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

BAURU, 02 de Dezembro de 2021

Assinado por:
Juliana Fraga Soares Bombonatti
(Coordenador(a))

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Bairro: VILA NOVA CIDADE UNIVERSITARIA **CEP:** 17.012-901
UF: SP **Município:** BAURU
Telefone: (14)3235-8356 **Fax:** (14)3235-8356 **E-mail:** cep@fob.usp.br

ANNEX B. Patient´s informed consent exoneration (front)

Universidade de São Paulo
Faculdade de Odontologia de Bauru

Departamento Odontopediatria, Ortodontia e Saúde Coletiva
Disciplina de Ortodontia

DISPENSA DE TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO E DO TERMO DE ASSENTIMENTO

Solicitamos ao Comitê de Ética em Pesquisa, FOB-USP, a dispensa do Termo de Consentimento Livre e Esclarecido e Termo de Assentimento, do projeto de pesquisa **"Atratividade do perfil de pacientes tratados de má oclusão de Classe II subdivisão com extrações simétricas e assimétricas",** de autoria de *Marcelo Vinicius Valerio* sob a orientação da *Profª. Drª. Daniela Garib.*

Tal solicitação justifica-se pelo fato da amostra ser retrospectiva e de que os prontuários estão sob os cuidados da disciplina de Ortodontia do Departamento de Odontopediatria, Ortodontia e Saúde Coletiva. Estes prontuários são do acervo desde 1973, constituindo uma dificuldade o contato com os pacientes devido ao tempo decorrido desde o tratamento feito até a data presente. Vale ressaltar que os pacientes, quando atendidos da clínica de Ortodontia, assinam a "AUTORIZAÇÃO PARA DIAGNÓSTICO E/OU EXECUÇÃO DE TRATAMENTO ORTDÔNTICO" (modelo anexo) a qual aprova tanto a execução do tratamento quanto seu uso para "quaisquer fins de ensino e de divulgação em jornais e/ou revistas científicas do país e do exterior", desta forma aprova-se também o uso dos dados do seu prontuário para o ensino em pesquisas cientificas.

A dispensa do termo de Assentimento se deve ao fato de os pacientes da amostra, no momento da execução do exame, serem tanto menor de 18 anos quanto adultos, não sendo diferenciado para a pesquisa, como critério de inclusão ou exclusão. Tais pacientes também foram autorizados pelo responsável no documento "AUTORIZAÇÃO PARA DIAGNÓSTICO E/OU EXECUÇÃO DE TRATAMENTO ORTDÔNTICO". Os nomes e dados pessoais dos pacientes não serão divulgados em nenhum momento, mantendo desta forma o sigilo profissional (Artigo 9º do Código de Ética Odontológico) e a privacidade dos participantes da pesquisa durante todas as fases e assumimos o compromisso de cumprir as exigências contidas na Resolução CNS Nº 466, de 12.12.12.

Bauru, 18 de julho de 2021.

Marcelo Vinicius Valerio
Pesquisador Responsável

Daniela Garib
Orientadora

Al. Dr. Octávio Pinheiro Brisolla, 9-75 – Bauru-SP – CEP 17012-901 – C.P. 73
e-mail: **veragato@fob.usp.br** – Fone (0xx14) 3235-8217 – Fax (0xx14) 3223-4679
http://www.fob.usp.br

ANNEX B. Patient´s informed consent exoneration (verso)

UNIVERSIDADE DE SÃO PAULO
FACULDADE DE ODONTOLOGIA DE BAURU
CLÍNICA DE ORTODONTIA

AUTORIZAÇÃO PARA DIAGNÓSTICO E/OU EXECUÇÃO DE TRATAMENTO ORTODÔNTICO

Por este instrumento de autorização por mim assinado, dou pleno consentimento à FACULDADE DE ODONTOLOGIA DE BAURU-USP para, por intermédio de seus professores, assistentes e alunos devidamente autorizados, fazer diagnóstico, planejamento e tratamento em minha pessoa ou meu filho menor de idade _____, de acordo com os conhecimentos enquadrados no campo dessa especialidade.

Concordo também, que todas radiografias, fotografias, modelos, desenhos, históricos de antecedentes familiares, resultados de exames clínico e de laboratório e quaisquer outras informações concernentes ao planejamento de diagnóstico e/ou tratamento, constituem propriedade exclusiva desta FACULDADE, à qual dou plenos direitos de retenção, uso para quaisquer fins de ensino e de divulgação em jornais e/ou revistas científicas do país e do exterior.

Bauru, ____ de _____ de 19 ___.

_____

Assinatura do paciente ou responsável

R.G. Nº: _____

Nome: _____

Endereço: _____

CEP: _____ Telefone:_____

ANNEX C. Evaluator´s digital informed consent (front)

Universidade de São Paulo
Faculdade de Odontologia de Bauru

Departamento de Odontopediatria, Ortodontia e
Saúde Coletiva

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Convidamos a(o) Sra(Sr) a participar voluntariamente da pesquisa intitulada "Atratividade do perfil após tratamento da má oclusão de Classe II subdivisão com extrações simétricas e assimétricas ", sob responsabilidade do pesquisador Marcelo Vinicius Valerio, telefone (14) 981003539, email marcelo.valerio@usp.br, e orientação do Profª Drª Daniela Garib, telefone (14) 32358217, email dgarib@fob.usp.br. Absolutamente todas as dúvidas poderão ser esclarecidas com o pesquisador responsável. Apenas quando todas as suas dúvidas estiverem sanadas e a(o) Sra(Sr) estiver completamente satisfeita(o) é que pedimos que clique na resposta "Sim, aceito participar da pesquisa", no botão abaixo. E, então, a página do questionário será aberta e este poderá ser respondido no ambiente em que a(o) Sra(Sr) estiver e julgar apropriado, não havendo absolutamente nenhuma necessidade de deslocar-se para isso. Caso deseje, é permitido que a(o) Sra(Sr) faça uma foto da tela do seu dispositivo com este termo aberto. Se não concordar em participar da pesquisa, não haverá absolutamente nenhum ônus ou problema. É sua escolha e será completamente respeitada, sem questionamentos. Nesta situação, basta clicar na resposta "Não, não aceito participar da pesquisa", abaixo. Além disso, enquanto a pesquisa estiver em andamento, é possível que retire seu consentimento a qualquer momento, também sem qualquer custo ou questionamento, simplesmente fechando a janela do questionário.

INFORMAÇÕES SOBRE A PESQUISA: O tratamento ortodôntico da má oclusão de Classe II subdivisão Tipo 1 pode ser realizado com ou sem extrações. Na abordagem extracionista, podem ser usados dois protocolos distintos: extrações simétricas, ou seja, de 4 pré-molares, 2 superiores e 2 inferiores, bilateralmente em ambos os arcos, ou extrações assimétricas, ou seja, 2 pré-molares superiores bilateralmente, e 1 pré-molar inferior, do lado da Classe I. Quando comparados, ambos os protocolos extracionistas, simétrico e

Al. Dr. Octávio Pinheiro Brisolla, 9-75 – Bauru-SP – CEP 17012-901 – C.P. 73
e-mail: veragato@fob.usp.br – Fone/FAX (0xx14) 3235-8369
http://www.fob.usp.br

ANNEX C. Evaluator´s digital informed consent (verso)

Universidade de São Paulo
Faculdade de Odontologia de Bauru

Departamento de Odontopediatria, Ortodontia e
Saúde Coletiva

assimétrico, têm se mostrado com diferenças significativas, com o protocolo assimétrico se mostrando com maior eficiência de tratamento, melhor taxa de sucesso oclusal, bem como menores quantidades de retrações do incisivo inferior e do lábio superior. Sendo o lábio superior uma estrutura de tecido mole com influência na estética da face, é razoável especular que a diferença significativa existente entre as quantidades de sua retração entre os dois protocolos pode resultar em perfis com aparência final também diferente. Uma vez que um dos objetivos do tratamento ortodôntico é a melhora do aspecto facial, convém comparar-se a atratividade final do perfil de pacientes tratados com protocolos extracionistas simétricos e assimétricos. Assim, o objetivo desta pesquisa será comparar a atratividade do perfil facial de pacientes tratados com ambos os protocolos mencionados.

RISCOS: Esta pesquisa pode trazer o risco de constrangimento aos participantes no momento de avaliarem as imagens, caso tenham dificuldade de atribuírem notas a elas. Entretanto, caso isso ocorra, o participante poderá fechar a janela do formulário e seus dados não serão computados, nem armazenados de forma alguma. Esta opção de desistência, sem qualquer retaliação ou identificação, será claramente informada na página inicial do formulário, conforme descrito anteriormente neste projeto. O pesquisador responsável e o seu orientador se comprometem a não compartilhar com terceiros os dados de identificação dos avaliadores (nome, data de nascimento e grupo (leigo/ortodontista)), e as tabelas finais do Excel geradas automaticamente pelo formulário Google, contendo as notas atribuídas à atratividade de cada imagem. Entretanto, sempre existe a possibilidade de que os dados sejam indevidamente tomados por outrem, através de meios ilícitos e sem a concordância dos pesquisadores, como ações de espiões virtuais, hackers e similares. Por isso, os formulários respondidos serão armazenados em HD externo utilizado unicamente para este fim, sob cuidados do

Al. Dr. Octávio Pinheiro Brisolla, 9-75 – Bauru-SP – CEP 17012-901 – C.P. 73
e-mail: veragato@fob.usp.br – Fone/FAX (0xx14) 3235-8369
http://www.fob.usp.br

ANNEX C. Evaluator´s digital informed consent (front)

Universidade de São Paulo
Faculdade de Odontologia de Bauru

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pesquisador responsável, sendo sua guarda mantida em local não divulgado. Além disso, quando os dados das tabelas estiverem sob avaliação estatística do pesquisador no software apropriado, o computador em uso estará desconectado de toda e qualquer rede possível, interna (intranet) ou externa (internet). Estas providências minimizam um possível risco de vazamento de dados, ao qual todos os usuários de computadores estão sujeitos.

BENEFÍCIOS: Como benefício direto ao participante, seja leigo ou ortodontista, este questionário permitirá uma autoavaliação da sua percepção da estética do perfil facial humano. Além disso, toda a comunidade ortodôntica de pacientes e profissionais será beneficiada, pois a comparação que será realizada entre as atratividades de pacientes tratados pelos protocolos ortodônticos descritos neste projeto é inédita. A evidência que será gerada nesta pesquisa servirá como parâmetro clínico a ser utilizado no momento da escolha conjunta do ortodontista e do paciente quanto ao protocolo de tratamento que melhor se adeque às expectativas e possibilidades de ambos.

CONSIDERAÇÕES GERAIS: nada será pago ou cobrado do participante. Sua participação é voluntária. Além disso, garante-se que suas respostas serão utilizadas apenas para fins científicos, visando-se o enriquecimento das informações científicas existências sobre o tema. Caso o participante tenha dúvidas quanto ao caráter ético da pesquisa e não as queira dirigir ao pesquisador responsável, é possível entrar em contato com o Comitê de Ética em Pesquisa da Faculdade de Odontologia de Bauru, Universidade de São Paulo, Alameda Octávio Pinheiro Brisolla 9-75, Jardim Brasil, telefone (14) 32358000, email mferrari@fob.usp.br. Cordialmente, Marcelo Vinicius Valerio.

Marcelo Vinicius Valerio (Pesquisador Responsável)

Daniela Garib (Orientadora)

Al. Dr. Octávio Pinheiro Brisolla, 9-75 – Bauru-SP – CEP 17012-901 – C.P. 73
e-mail: veragato@fob.usp.br – Fone/FAX (0xx14) 3235-8369
http://www.fob.usp.br