UNIVERSIDADE DE SÃO PAULO
FACULDADE DE ODONTOLOGIA DE BAURU

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Influence of posterior discrepancy in anterior open bite severity

Influência da discrepância posterior na severidade da mordida aberta anterior

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Orientador: Prof. Dr. Guilherme Janson

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ABSTRACT

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INFLUENCE OF POSTERIOR DISCREPANCY IN ANTERIOR OPEN BITE SEVERITY

Introduction: This study aimed to determine the effect of posterior discrepancy and third molar angulation on the overbite. **Methods:** Pretreatment lateral cephalograms of 131 subjects were analyzed. The sample included 83 open bite and 48 deep bite subjects. A multiple regression analysis was used to evaluate the influence of maxillary and mandibular posterior discrepancy and third molar angulation (predictor variables) on the overbite. Correlations between posterior discrepancy and third molar angulation, and correlations between predictor variables and dental angulation and height of posterior teeth and incisors were evaluated with Pearson´s correlation coefficient. Extreme subgroups with accentuated negative and positive overbites (27 open bite and 37 deep bite) were compared using T tests. **Results:** The multiple linear regression analysis showed a positive correlation of the mandibular third molar mesial angulation with the overbite. Posterior discrepancy was negatively associated with posterior teeth mesial angulation and dentoalveolar height. The deep bite subgroup showed significantly greater mesial angulation of the mandibular third molars than the open bite subgroup. **Conclusion:** There was no effect of the posterior discrepancy on the overbite. There was a positive correlation of the mandibular third molar mesial angulation with the overbite.

Keywords: Malocclusion. Open Bite. Cephalometry.

RESUMO

RESUMO

INFLUÊNCIA DA DISCREPÂNCIA POSTERIOR NA SEVERIDADE DA MORDIDA ABERTA ANTERIOR

Introdução: O objetivo deste estudo foi determinar o efeito da discrepância posterior e da angulação do terceiro molar no trespasse vertical anterior. **Materiais e métodos:** Foram analisadas 131 telerradiografias laterais. A amostra foi constituída por 83 indivíduos com mordida aberta anterior e 48 indivíduos com sobremordida profunda. Foi utilizada uma análise de regressão linear múltipla para avaliar a influência da discrepância posterior maxilar e mandibular, assim como da angulação do terceiro molar (variáveis preditoras) no trespasse vertical anterior. As correlações entre a discrepância posterior e a angulação do terceiro molar, e as correlações entre as variáveis preditoras e as angulações e alturas dos dentes posteriores e incisivos foram avaliadas com o coeficiente de correlação de Pearson. Comparações entre subgrupos que incluíam indivíduos com trespasse vertical acentuadamente negativo e positivo (27 mordida aberta e 37 sobremordida profunda) foram realizadas com o teste T. **Resultados:** A análise de regressão linear múltipla mostrou uma correlação positiva da angulação mesial do terceiro molar inferior com o trespasse vertical anterior. A discrepância posterior esteve negativamente associada às angulações mesiais dos dentes posteriores e às alturas dentoalveolares. O subgrupo com sobremordida apresentou uma maior angulação mesial do terceiro molar inferior quando comparado com o subgrupo de mordida aberta anterior. **Conclusão:** Não houve efeito da discrepância posterior no trespasse vertical anterior. Houve uma correlação positiva entre a angulação mesial do terceiro molar inferior e o trespasse vertical anterior.

Palavras-chave: Má Oclusão. Mordida Aberta. Cefalometria.

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LIST OF ABBREVIATIONS AND ACRONYMS

PTV	Pterygo-palatine fossa.
FAPESP	São Paulo Research Foundation.
BOP	Bisected occlusal plane.
FOP	Functional occlusal plane.
SD	Standard deviation.
SNA	Angle formed by SN and NA planes.
SNB	Angle formed by SN and NB planes.
ANB	Angle formed by NA and NB planes.
APDI	Anteroposterior dysplasia indicator.
ODI	Overbite depth indicator.
SN.GoGn	Angle formed by SN and GoGn planes.
SN.PP	Angle formed by SN and PNS-ANS (PP) planes.
PP.MP	Angle formed by PP and MP.
PFH	Posterior face height.
AFH	Anterior face height.
FHR	Face height ratio.
LAFH	Lower anterior face height.
Mx8.PP	Maxillary third molar angulation.
Mx6-Ptv	Maxillary third molar space availability.
Md8.MP	Mandibular third molar angulation.
Md7-ABR	Mandibular third molar space availability.
Mx1.PP	Maxillary incisor inclination related to palatal plane.
Mx4.PP	Maxillary first premolar angulation related to palatal plane.
Mx5.PP	Maxillary second premolar angulation related to palatal plane.
Mx6.PP	Maxillary first molar angulation related to palatal plane.
Mx7.PP	Maxillary second molar angulation related to palatal plane.
Mx1.BOP	Maxillary incisor inclination related to bisected occlusal plane.
Mx4.BOP	Maxillary first premolar angulation related to bisected occlusal plane.
Mx5.BOP	Maxillary second premolar angulation related to bisected occlusal plane.
Mx6.BOP	Maxillary first molar angulation related to bisected occlusal plane.
Mx7.BOP	Maxillary second molar angulation related to bisected occlusal plane.

Mx1H-PP	Maxillary incisor height.
Mx4H-PP	Maxillary first premolar height.
Mx5H-PP	Maxillary second premolar height.
Mx6H-PP	Maxillary first molar height.
Mx7H-PP	Maxillary second molar height.
Md1.MP	Mandibular incisor inclination related to mandibular plane.
Md4.MP	Mandibular first premolar angulation related to mandibular plane.
Md5.MP	Mandibular second premolar angulation related to mandibular plane.
Md6.MP	Mandibular first molar angulation related to mandibular plane.
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Md1H-PP	Mandibular incisor height.
Md4H-PP	Mandibular first premolar height.
Md5H-PP	Mandibular second premolar height.
Md6H-PP	Mandibular first molar height.
Md7H-PP	Mandibular second molar height.
MxPD	Maxillary posterior discrepancy.
MdPD	Mandibular posterior discrepancy
mm	Millimeter
°	Degree

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1 INTRODUCTION

1 INTRODUCTION

Anterior open bite malocclusion is considered one of the most challenging malocclusion to treat.(SUBTELNY; SAKUDA, 1964; NGAN; FIELDS, 1997) It has a multifactorial etiology that results from interactions of environmental and genetic factors.(NGAN; FIELDS, 1997; MOSSEY, 1999) The severity of the open bite depends on the skeletal and dentoalveolar features involved.(NAHOUM; HOROWITZ; BENEDICTO, 1972) The greater the influence of environmental factors, the better the orthodontic treatment prognosis, as long as the causative factor is eliminated.(JANSON; VALARELLI, 2014; FERES et al., 2016) On the other hand, the greater the skeletal involvement, the more elaborated is the orthodontic mechanics and sometimes surgery correction can be necessary to treat some cases.(GREENLEE et al., 2011; SOLANO-HERNANDEZ et al., 2013; JANSON; VALARELLI, 2014) When open bite subjects present marked vertical skeletal growth pattern, the posterior teeth tend to naturally compensate their apical bases divergence, modifying their angulations and heights.(KIM, 1987; CHANG; MOON, 1999; KUCERA et al., 2011; SU et al., 2014; CHOI et al., 2016; JANSON et al., 2016) It seems important to study the dentoalveolar characteristics of open bite subjects, in order to apply strategies aimed to simplify treatment mechanics and decrease the chances of relapse.

Evaluation of the presence of posterior discrepancy has been considered for some authors.(KIM, 1987; SATO, 1987; SATO et al., 1990 ; SATO, 1991 ; CHANG; MOON, 1999; CHEN et al., 2010; NAGAYAMA et al., 2015) The mentioned discrepancy, known as posterior crowding as well, is related to the dentoalveolar discrepancy in the molar area (distal to second premolars) and could be evaluated measuring the space availability for third molar eruption.(SATO, 1987; KIM et al., 2003; ARTUN; BEHBEHANI; THALIB, 2005; BEHBEHANI; ARTUN; THALIB, 2006)

Third molars effect in the oral cavity has been controversially associated with anterior crowding and post orthodontic relapse.(KIM, 1987; SATO, 1987; SATO et al., 1990 ; HARRADINE; PEARSON; TOTH, 1998; LITTLE, 1999; BUSCHANG; SHULMAN, 2003; SIDLAUSKAS; TRAKINIENE, 2006) However, definitive conclusions have not been established because of the lack of good quality evidence

supporting this assumption.(COSTA et al., 2013; STANAITYTÉ; TRAKINIENE; GERVICKAS, 2014; ZAWAWI; MELIS, 2014; GHAEMINIA et al., 2016)

It has been speculated that in open bite subjects, posterior discrepancy (in other words, absence of enough space in the posterior area), could cause mesial angulation of the posterior teeth (including the unerupted third molars) and this could produce overeruption of these teeth, increasing their dentoalveolar heights and generating occlusal interferences that consequently could aggravate the open bite malocclusion.(KIM, 1987; SATO, 1987; SATO et al., 1990 ; SATO, 1991 ; CHANG; MOON, 1999) In order to avoid these posterior discrepancy effects, the defenders of this theory recommend third molar extractions, with the intention to facilitate orthodontic mechanics and ensure stability. However, their clinical speculations have not been scientifically demonstrated.

It could be thought that if posterior discrepancy aggravates open bite malocclusion scenario, it should have a direct relation with the severity of the open bite. Based on this speculation, patients that present smaller or absence of posterior discrepancy should be prone to present greater amount of overbite.

Therefore, the purpose of this study was to evaluate the effect of maxillary and mandibular posterior discrepancies and third molar angulation on the overbite and on the dental angulation and height of the posterior teeth and incisors.

2 ARTICLE

2 ARTICLE

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INFLUENCE OF POSTERIOR DISCREPANCY IN ANTERIOR OPEN BITE SEVERITY

ABSTRACT

Introduction: This study aimed to determine the effect of posterior discrepancy and third molar angulation on the overbite. **Methods:** Pretreatment lateral cephalograms of 131 subjects were analyzed. The sample included 83 open bite and 48 deep bite subjects. A multiple regression analysis was used to evaluate the influence of maxillary and mandibular posterior discrepancy and third molar angulation (predictor variables) on the overbite. Correlations between posterior discrepancy and third molar angulation, and correlations between predictor variables and dental angulation and height of posterior teeth and incisors were evaluated with Pearson´s correlation coefficient. Extreme subgroups with accentuated negative and positive overbites (27 open bite and 37 deep bite) were compared using T tests. **Results:** The multiple linear regression analysis showed a positive correlation of the mandibular third molar mesial angulation with the overbite. Posterior discrepancy was negatively associated with posterior teeth mesial angulation and dentoalveolar height. The deep bite subgroup showed significantly greater mesial angulation of the mandibular third molars than the open bite subgroup. **Conclusion:** There was no effect of the posterior discrepancy on the overbite. There was a positive correlation of the mandibular third molar mesial angulation with the overbite.

Keywords: Malocclusion. Open Bite. Cephalometry.

INTRODUCTION

Open bite malocclusion has a multifactorial etiology including interactions of environmental, genetic, skeletal and dentoalveolar features.[1,2] The greater the apical base divergence, the greater the natural posterior dentoalveolar compensation, either in angulation and height.[3-8]

Posterior discrepancy refers to the deficient available space for third molar eruption, in the maxilla and mandible.[3,9-16]

The effect of third molars on anterior crowding and post orthodontic relapse is still controversial and definitive conclusions have not been established.[3,10,11,17-25] It has been speculated that in open bite patients, posterior discrepancy could promote mesial

angulation of the posterior teeth (including the unerupted third molars) and this produces overeruption of these teeth, generating occlusal interferences that may aggravate the open bite malocclusion. In these cases, third molar extractions should be recommended in non-premolar extraction treatments.[3,11,17]. Contrarily, other studies reported that the presence of posterior discrepancy in the maxilla does not cause the mentioned effects. Nevertheless; in these last studies, subjective criteria were used to diagnose the presence of posterior discrepancy.[26,27] Additionally, no evaluation was performed in the mandible.

Since the posterior discrepancy theory has a lack of scientific support, it seems important to prove it or reject it. Therefore, the purpose of this study was to objectively evaluate the effect of maxillary and mandibular posterior discrepancies and third molar angulation on the overbite and on the dental angulation and height of the posterior teeth and incisors.

MATERIAL AND METHODS

This study was approved by the ethics in research committee of Bauru Dental School, University of São Paulo, Brazil (protocol number 43933015.8.0000.5417)

Sample characteristics

The sample included 131 pre-treatment lateral cephalograms from 83 open bite and 48 deep bite subjects (82 female; 51 male) with a mean age of 14.53 $\pm$ 2.53 years, retrospectively selected from the files of the Orthodontic Department at Bauru Dental School, University of São Paulo, Brazil. The open bite ranged from 0.1 to 7.0 mm and the deep bite ranged from 3.1 to 8.5 mm). All subjects had unerupted third molars. Subjects with previous orthodontic treatment, associated syndromes, tumors or infection and without maxillary and mandibular third molars were excluded.

The sample size was calculated considering the use of a multiple regression analysis, where an absolute minimum of 10 participants per predictor variable is recommended.[28] Although 40 subjects were necessary, 131 subjects were included in the sample. The sample consisted of two groups according to their vertical malocclusion. Group 1 comprised 83 open bite subjects (52 female; 31 male, mean age of 15.09 $\pm$ 2.84 years) and group 2 comprised 48 deep bite subjects (28 female; 20 male, mean age of 13.58 $\pm$ 1.50 years). Deep bite group was included in order to have a large variability of the overbite. Therefore, any correlation between the overbite

and the posterior discrepancies and third molar angulations could be detected in the regression analysis.

The cephalometric tracings and landmark identifications were performed on acetate paper by a single investigator (A.A.D.C.) and then digitized with the DT-11 digitizer (Houston Instruments, Austin, TX). These data were then stored in a computer and analyzed with Dentofacial Planner software (version 7.0; Dentofacial Software, Toronto, Ontario, Canada), which corrected the image magnification factors. The definitions of linear and angular variables are shown in Table I.

Posterior Discrepancy

Evaluation of the available space in the maxillary posterior area was performed by measuring the distance from the pterygoid vertical to the distal surface of the maxillary first permanent molar crown along the functional occlusal plane[12,13,29] (Fig.1). Estimation of available space in the mandibular posterior region was performed by measuring the distance from the anterior border of the ramus to the distal surface of the mandibular second permanent molar crown along the functional occlusal plane, as well[9,12,14,30] (Fig. 2).

Dental angulations

Assessment of third molar angulation was performed by measuring the angle between the occlusal surface of the maxillary and mandibular third molars crowns and the palatal or mandibular planes, respectively.[13,14] For the maxillary third molar, a positive reading denoted distal angulation (Fig. 1). For the mandibular third molar, a positive reading denoted mesial angulation (Fig. 2).

The maxillary and mandibular dental angulations of the posterior teeth and the incisor inclinations were measured by the angle formed between the tooth long axis and the palatal and mandibular planes, respectively (Fig. 3). They were also measured by the angle formed between the tooth long axis and the bisected occlusal plane (Fig. 4). In both cases, greater values denoted mesial angulation or labial inclination.

Dentoalveolar heights

The dentoalveolar heights were measured as the perpendicular distance from the palatal and mandibular plane to the maxillary and mandibular incisor edges, first

and second premolar cusp tips, and first and second molar mesial cusp tips, respectively (Fig. 5).

Error study

Twenty-eight lateral cephalograms were randomly selected and retraced by the same examiner (A.A.D.C.), after a 30-day interval. Random errors were calculated according to Dahlberg´s formula[31] and systematic errors, with dependent t tests,[32] at $P<0.05$.

Statistical analyses

A multiple regression analysis was performed in the total sample to evaluate the influence of the maxillary and mandibular posterior discrepancy and third molar angulation variables (4 predictor variables) in the overbite as the dependent variable. Correlations between posterior discrepancy and third molar angulation in the maxilla and in the mandible, and correlations between the predictor variables and the dental angulations and dentoalveolar heights of the maxillary and mandibular molars, premolars and incisors were evaluated with Pearson´s correlation coefficient.

To further investigate the influence of the maxillary and mandibular posterior discrepancy and third molar angulations in the overbite, extreme subgroups with accentuated negative and positive overbites were compared. Therefore, the open bite subgroup consisted of 27 subjects with open bite equal or greater than 3 mm (15 female; 12 male, mean age of 15.24 $\pm$ 3.30 years) and the deep bite subgroup consisted of 37 subjects with deep bite greater than 3mm (22 female; 15 male, mean age of 14.03 $\pm$ 1.42 years).

Normal distribution assessment was performed with Kolmogorov-Smirnov tests. All variables showed normal distribution (Appendix 1). Therefore, inter subgroup comparability for age and sex was evaluated with t and Chi-square tests. All statistical analyses were performed with Statistica software (Statistica for Windows, version 7.0, StatSoft Inc., Tulsa, Okla, USA). Results were considered significant at $P<0.05$.

RESULTS

The random errors ranged from 0.80° (ANB°) to 2.03° (Md7.BOP°) and from 0.48 mm (Mx5H-PP) to 1.21 mm (PFH). No significant systematic errors were found (Appendix 2).

Descriptive statistics of the total sample are presented in Table II. The multiple linear regression analysis model showed that there was a positive correlation of the mandibular third molar mesial angulation with the overbite (Table III). No other predictor variable showed significant influence on the dependent variable. It was found that 12.8% (R^2=0.128) of the variation in the overbite can be explained by this model. Normal distribution of the residuals was found in the multiple linear regression analysis model (Appendix 3).

Significant, but weak[33] negative correlations between third molar available space and maxillary third molar distal angulation and mandibular third molar mesial angulation were found, respectively (Table IV).

The amount of maxillary third molar available space was significantly and positively associated with greater incisor labial inclination, second premolar, first and second molars mesial angulation, and first and second molar dentoalveolar heights. Third molar angulation was negatively associated with first and second molar mesial angulation and height and second premolar height (Table V).

The amount of mandibular third molar available space was significantly and positively associated with greater incisor and posterior teeth dentoalveolar heights. Third molar angulation was positively associated with second premolar and first and second molar mesial angulation and negatively associated with incisor and posterior teeth height, with exception of the second molar (Table VI).

The extreme subgroups with accentuated negative and positive overbites were comparable regarding age and sex (Table VII). The subgroups were significantly different regarding most skeletal vertical variables and overbite. Subjects in the deep bite subgroup showed significantly greater mandibular third molar mesial angulation when compared with open bite subjects (Table VIII).

DISCUSSION

It is known that open bite malocclusion has various etiological factors.[1,2] Treatment focuses in the elimination of them, when possible, to achieve efficiency and to ensure stability of the orthodontic therapy.[34,35]

It has been speculated that in the presence of posterior discrepancy, the third molars do not have enough space to erupt and consequently apply pressure on the adjacent teeth, increasing their mesial angulation and producing overeruption, which generate occlusal interferences and aggravate the open bite. In these cases, third

molar extractions are suggested to improve the orthodontic mechanics.[3,4,10,11,17] However, this hypothesis lacks scientific support.

To correct an open bite, the orthodontic mechanics usually aims to upright and to vertically control or intrude the posterior teeth.[3,4,34-36] Consequently, It seems important to know if the third molars do have some effect in the overbite or in the posterior teeth that could interfere with the orthodontic mechanics. For this reason, the purpose of this investigation was to evaluate the influence of maxillary and mandibular posterior discrepancies and third molar angulation on the overbite and on the dental angulation and height of molars, premolars and incisors.

Sample characteristics

It could be argued that the ages of the included patients are not ideal to conduct a study evaluating third molars, because third molar impaction could be overdiagnosed[12-14] (Table II). However, it was not aimed to evaluate third molar impaction. The focus of the study was to evaluate the effect of third molar space availability and angulation on the overbite. Considering the speculations on posterior discrepancy as an etiologic or aggravating factor for open bite malocclusion, its effects should be detected in every third molar with an eruption potential.[3,10,11,17] For this reason, inclusion of adolescent subjects should not interfere with the results.

Because many patients would not present complete root formation, only crown angulation was measured, as previously performed[12-14] (Table I).

Methodology

It could be argued that the methods used to evaluate the posterior discrepancies do not correspond to the method preconized by the posterior discrepancy theory defenders.[10,17] However, they only preconized a method to evaluate the maxillary and did not develop any method to evaluate the mandibular discrepancy.[10,17] Additionally, the mentioned method based on the evaluation of the anteroposterior position of the first molar in the maxillary basal bone[10,17] has been studied before and had the disadvantage of creating false positive or negative in some cases.[26,27] To avoid these problems, other recognized methods to evaluate space discrepancies in the posterior region were used.[9,12-14,29,30] Additionally, any method that evaluates posterior discrepancy should show the relationship between the lack of space for third molar eruption and the speculations mentioned above, if they actually exist.

Regression analysis

A multiple linear regression analysis including the posterior discrepancy and third molar angulation variables as predictors and the overbite as dependent variable was planned for evaluation of the primary objective of this study.[37,38] The inclusion of deep bite patients in the total sample was considered important to have a large variability of the overbite to detect whether there were correlations between it and the posterior discrepancies and third molar angulations.[37,38] It seems logical that if any correlation exists between the predictor variables and the overbite, this could be expected in both, in open bite and deep bite subjects.

The regression analysis showed a significant positive correlation of the mandibular third molar mesial angulation with the overbite (Table III). Therefore, the greater the mesial angulation of the mandibular third molar, the greater is the overbite. An opposite effect of mandibular third molar mesial angulation on the overbite was found, contrary to the posterior discrepancy theory.[3,10,11,17]. Then, it could be concluded that third molar mesial angulations and deficient available spaces for their eruption are not aggravating factors for an open bite. Similar results were found in previous studies,[26,27] where only the maxillary posterior discrepancy was evaluated and calculated according to the method proposed by the posterior discrepancy idealizers.[10,17] The third molar angulations were only subjectively evaluated on the radiographs. The results of the present study, carried out more objectively, confirmed those previous findings.

Third molar extraction decision, when necessary, should be based in other diagnostic criteria[39,40] and not in order to prevent open bite increase, as speculated before.[3,10,11,17]

Posterior discrepancy and third molar angulations

The behavior of third molar in the maxilla was to decrease its distal angulation in the presence of greater available space (Table IV). Based on the posterior discrepancy speculations, an opposite result would be expected.[3,10,11,17] This finding also rejects the theory of the posterior discrepancy effect on the maxillary third molars mesial angulation.

Correlation between the posterior discrepancy and third molar angulation in the mandible showed that mesial angulation of the third molar decreases in the presence

of greater available space (Table IV). This result could be expected, and follows the posterior discrepancy speculation in the mandible.[41,42] Because the correlations were significant, but weak, they only show a slight behavior tendency.[33]

Maxillary and mandibular correlations

The significant weak correlations between the maxillary posterior discrepancy and third molar angulation with the posterior teeth angulation and dentoalveolar heights allow the following general conclusions (Table V). As space decreases for the third molars, the greater will be their distal angulations as well as the other posterior teeth dental angulations and the smaller are the dentoalveolar heights (Tables IV and V). These results are contrary to the posterior discrepancy theory,[3,10,11,17] but are more logical.[41] Because of the maxillary tooth buds disposition, if there is lack of space for their eruption, they will tend to distally angulate.[41] The other posterior teeth seem to follow the same pattern. The lack of space for the third molars may be consequent to small basal bone. If the basal bone is anteroposteriorly small, it may be also vertically small. Therefore, the dentoalveolar heights are small as well.

Similarly, the significant weak correlations between the mandibular posterior discrepancy and third molar angulation with the posterior teeth angulation and dentoalveolar heights allow the following general conclusions (Table VI). As space decreases for the third molars, the greater will be their mesial angulations[41] as well as the other posterior teeth dental angulations and the smaller are the dentoalveolar heights (Tables IV and VI). The results concerning the teeth mesial angulations support the posterior discrepancy theory, while those concerning the smaller dentoalveolar heights are contrary to it.[3,10,11,17] The explanation for the posterior teeth mesial angulation and dentoalveolar heights is similar to that for the maxillary dentition.

Usually, open bite patients present a greater dentoalveolar height[5,36] with the maxillary and mandibular premolars with a greater mesial angulation in relation to the bisected occlusal plane, than normal occlusion patients.[3,4,7] Associating the results from this study,[7] it can then be concluded that open bite patients with great posterior discrepancy will present smaller dentoalveolar heights, less mesially angulated first and second maxillary premolars, and more mesially angulated first and second mandibular premolars, than open bite patients with small posterior discrepancy. However, future studies should investigate this speculation.

Subgroup comparisons

The subgroups were significantly different regarding most of the vertical skeletal variables and the overbite, as expected, because they included representative subjects with totally different vertical malocclusions.[1,2,43] (Table VIII). The third molars in the deep bite group presented a significantly greater mesial angulation than in the open bite group, confirming the results of the regression analysis. Again, this contradicts the posterior discrepancy theory. Additionally, the maxillary and mandibular discrepancies and the maxillary third molar angulation presented no intergroup differences, which also do not provide support for the posterior discrepancy theory.

Our results showed that third molars do not represent an aggravating factor for open bite malocclusion. Therefore, generally, third molar extractions do not contribute in decreasing open bite severity.

CONCLUSIONS

The maxillary and mandibular posterior discrepancy theory on the overbite, posterior teeth angulation and dentoalveolar height was not supported because:

- There was a positive correlation of the mandibular third molar mesial angulation with the overbite;
- Posterior discrepancy was negatively associated with posterior teeth mesial angulation and dentoalveolar height;
- Extreme deep bite subjects showed greater mandibular third molar mesial angulation when compared with extreme open bite individuals.

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Figure Legends.

Fig. 1. Maxillary posterior discrepancy and third molar angulation variables.

Fig. 2. Mandibular posterior discrepancy and third molar angulation variables.

Fig. 3. Dental angulations related to palatal and mandibular planes.

Fig. 4. Dental angulations related to the Bisected occlusal plane BOP.

Fig. 5. Dentoalveolar heights.

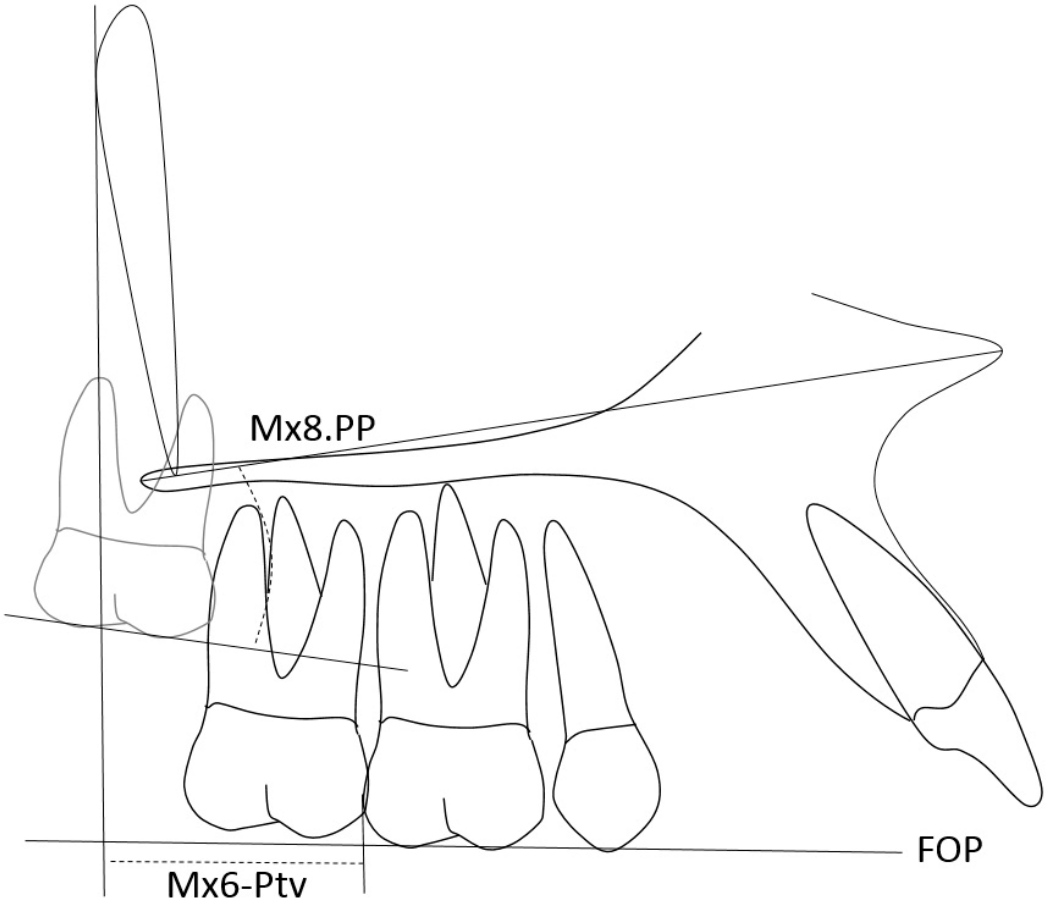


Fig. 1

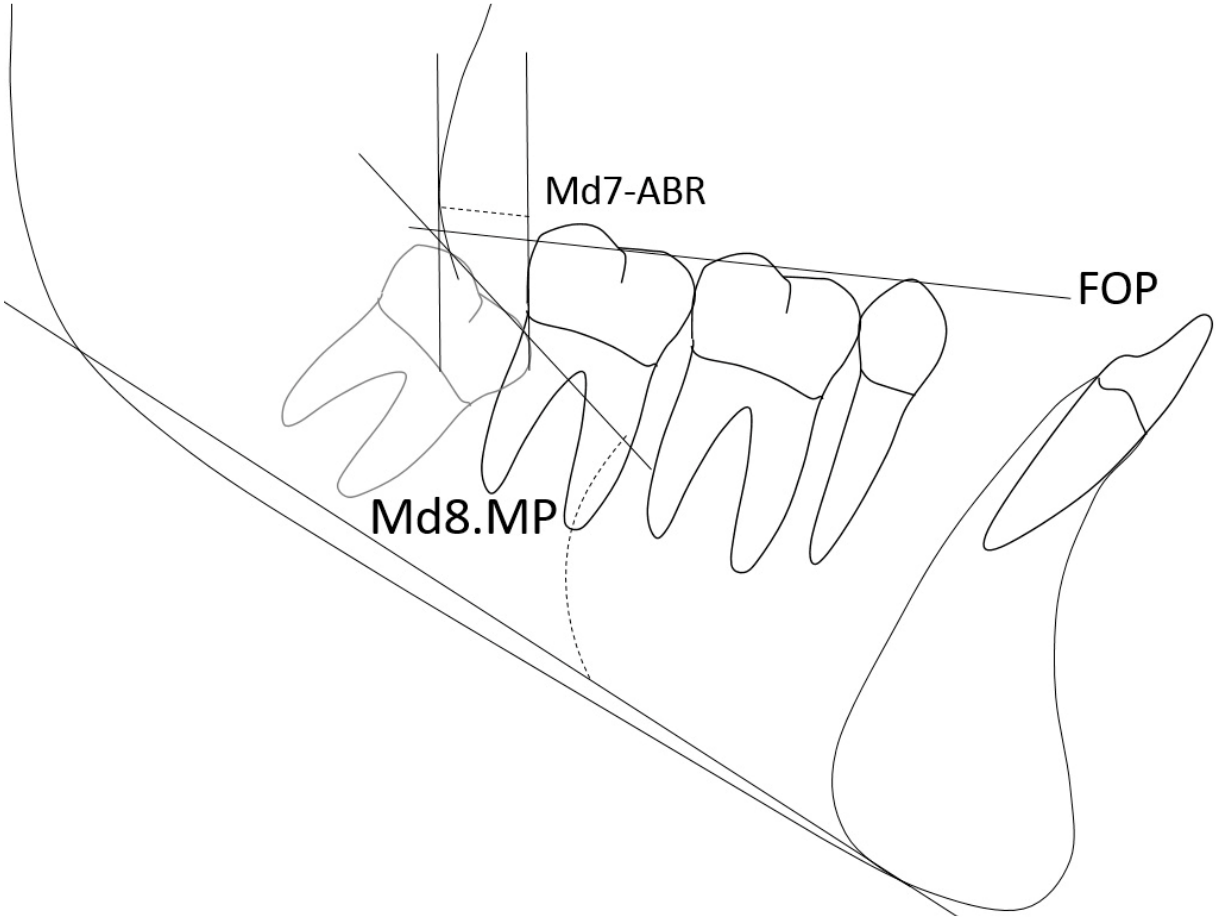
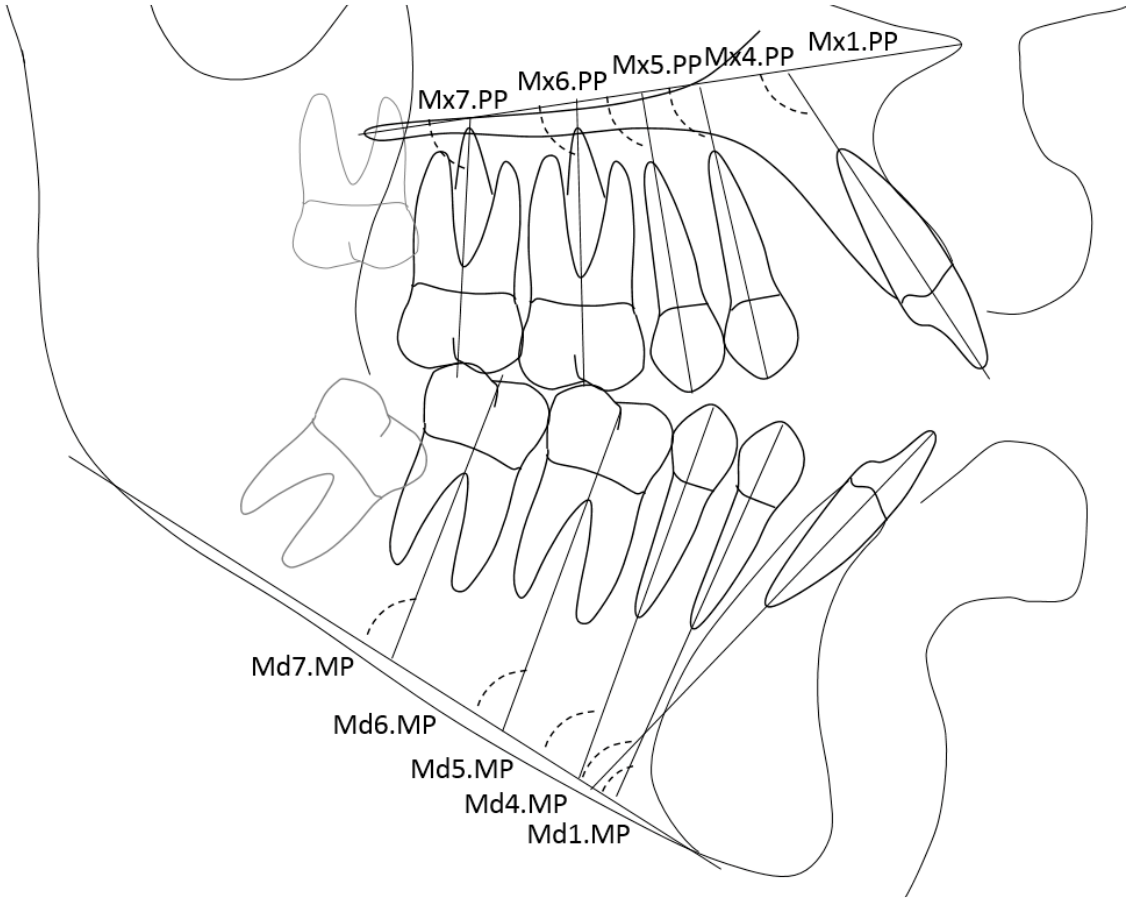


Fig. 2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Mx4.PP
Mx5.PP
Mx6.PP
Mx7.PP
Md7.MP
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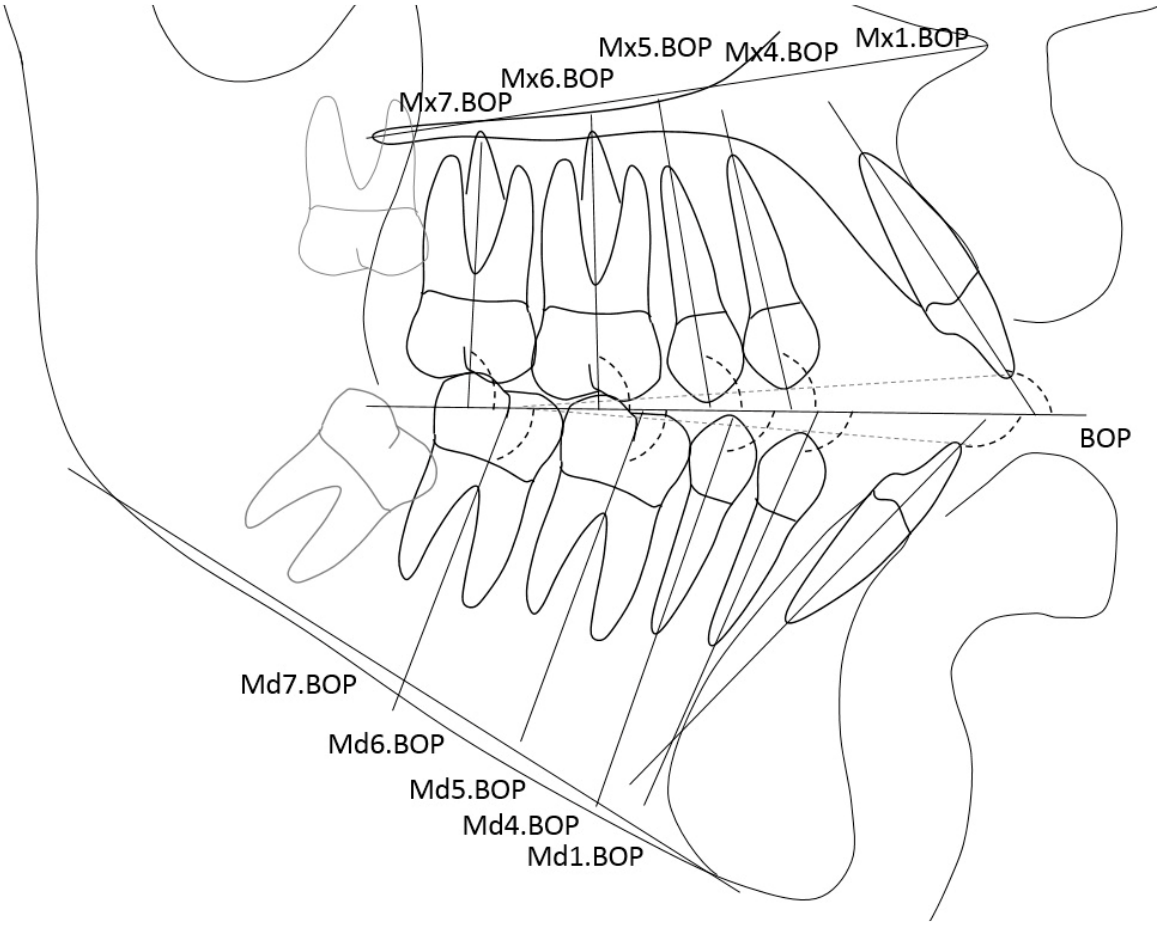
Md5.MP
Md4.MP
Md1.MP

Fig. 3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Mx4.BOP
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BOP
Md7.BOP
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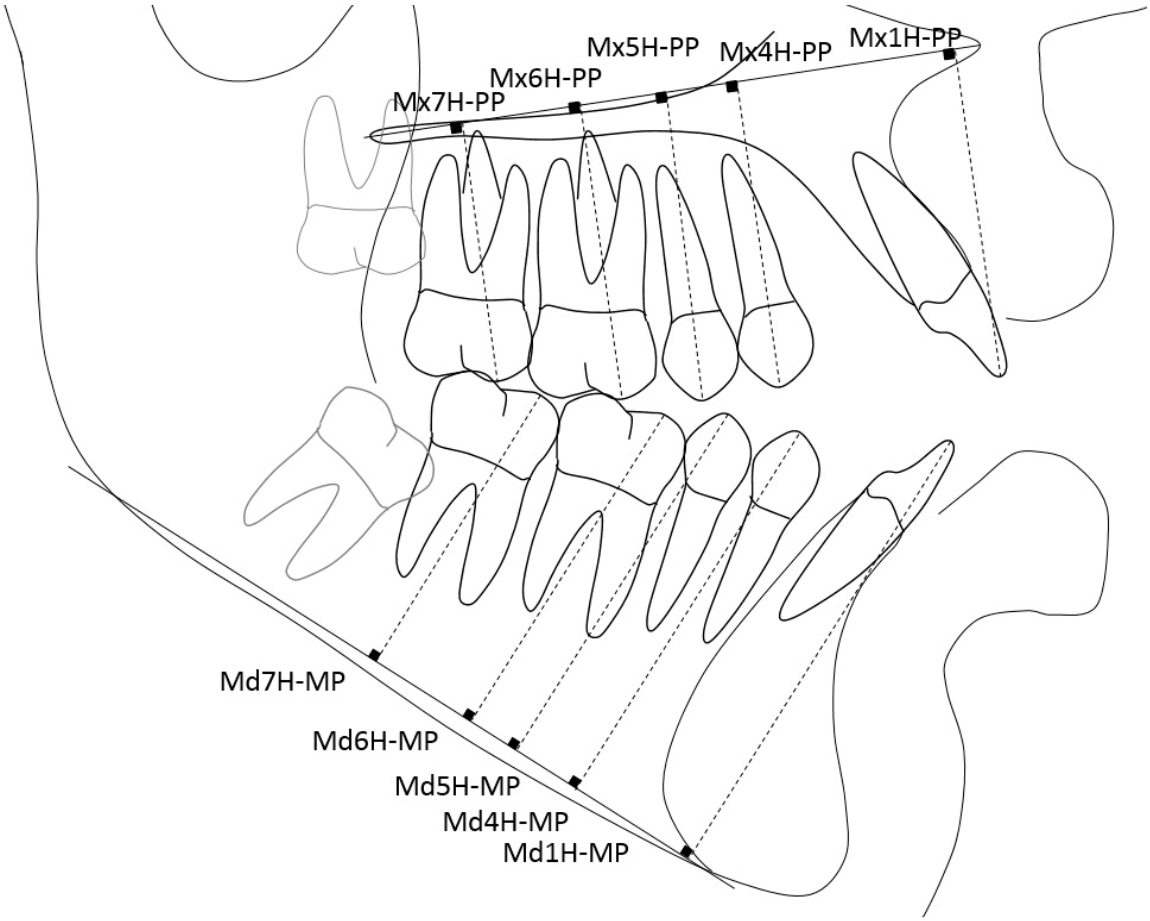
Md5.BOP
Md4.BOP
Md1.BOP

Fig.4


Mx5H-PP
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Mx1H-PP
Mx6H-PP
Mx7H-PP
Md7H-MP
Md6H-MP
Md5H-MP
Md4H-MP
Md1H-MP

Fig. 5

Table I. Definitions of cephalometric variables used

Variables	Definition
Maxillary Component	
SNA (°)	Angle formed by SN and NA planes.
Mandibular Component	
SNB (°)	Angle formed by SN and NB planes.
Maxillomandibular Sagittal Relationship	
ANB (°)	Angle formed by NA and NB planes.
APDI (°)	Sum of facial plane, AB plane angle, and FH-PP angle.
Maxillomandibular Vertical Relationship	
ODI (°)	Sum of AB-MP plane and FH-PP angle.
Gonial (°)	Angle formed by ArGo plane and GoMe plane (MP).
SN.GoGn (°)	Angle formed by SN and GoGn planes.
SN.PP (°)	Angle formed by SN and PNS-ANS (PP) planes.
FMA (°)	Angle formed by FH plane and MP.
PP.MP (°)	Angle formed by PP and MP.
PFH (mm)	Distance between S point and Go point.
AFH (mm)	Distance between N point and Me point
FHR (ratio)	Ratio between AFH/PFH
LAFH (mm)	Distance between ANS point and Me point.
Dentoalveolar Relationship	
Overbite (mm)	Distance between incisal edge of maxillary and mandibular central incisor, perpendicular to occlusal plane.
Maxillary Posterior Discrepancy	
Mx6-Ptv (mm)	Distance from distal surface of maxillary first molar to Ptv line along the FOP.
Maxillary third molar angulation	
Mx8.PP (°)	Angle between the occlusal surface of maxillary third molar and PP.
Mandibular Posterior Discrepancy	
Md7-ABR (mm)	Distance from distal surface of mandibular second molar to the anterior border of ramus, along the FOP.
Mandibular third molar angulation	
Md8.MP (°)	Angle between the occlusal surface of mandibular third molar and MP.
Maxillary Dental Angulations	
Mx1.PP	Angle between maxillary incisor long axis and PP.
Mx4.PP	Angle between maxillary first premolar long axis and PP.
Mx5.PP	Angle between maxillary second premolar long axis and PP.
Mx6.PP	Angle between maxillary first molar long axis (intercuspid groove-bifurcation) and PP.
Mx7.PP	Angle between maxillary second molar long axis (intercuspid groove-bifurcation) and PP.
BOP	Bisected occlusal plane. Bisectrix between maxillary and mandibular occlusal plane.
Mx1.BOP	Angle between maxillary incisor long axis and BOP
Mx4.BOP	Angle between maxillary first premolar long axis and BOP.
Mx5.BOP	Angle between maxillary second premolar long axis and BOP.
Mx6.BOP	Angle between maxillary first molar long axis (intercuspid groove-bifurcation) and BOP.
Mx7.BOP	Angle between maxillary second molar long axis (intercuspid groove-bifurcation) and BOP.
Maxillary Dentoalveolar Heights	
Mx1H-PP	Perpendicular distance from PP to maxillary incisor edge
Mx4H-PP	Perpendicular distance from PP to maxillary first premolar cusp tip
Mx5H-PP	Perpendicular distance from PP to maxillary second premolar cusp tip
Mx6H-PP	Perpendicular distance from PP to maxillary first molar mesial cusp tip
Mx7H-PP	Perpendicular distance from PP to maxillary second molar mesial cusp tip
Mandibular Dental Angulations	
Md1.MP	Angle between mandibular incisor long axis and PP.
Md4.MP	Angle between mandibular first premolar long axis and PP.

Md5.MP	Angle between mandibular second premolar long axis and PP.
Md6.MP	Angle between mandibular first molar long axis (intercuspid groove-bifurcation) and PP.
Md7.MP	Angle between mandibular second molar long axis (intercuspid groove-bifurcation) and PP.
Md1.BOP	Angle between mandibular incisor long axis and BOP
Md4.BOP	Angle between mandibular first premolar long axis and BOP.
Md5.BOP	Angle between mandibular second premolar long axis and BOP.
Md6.BOP	Angle between mandibular first molar long axis (intercuspid groove-bifurcation) and BOP.
Md7.BOP	Angle between mandibular second molar long axis (intercuspid groove-bifurcation) and BOP.
Mandibular Dentoalveolar Heights	
Md1H-MP	Perpendicular distance from MP to mandibular incisor edge
Md4H-MP	Perpendicular distance from MP to mandibular first premolar cusp tip
Md5H-MP	Perpendicular distance from MP to mandibular second premolar cusp tip
Md6H-MP	Perpendicular distance from MP to mandibular first molar mesial cusp tip
Md7H-MP	Perpendicular distance from MP to mandibular second molar mesial cusp tip

Table II. Total sample descriptive statistics

	Total		Open bite Subjects > 0 mm (Range 0.1, 7.0)		Deep bite Subjects >3mm (Range 3.1, 8.5)	
	n=131		n= 83		n=48	
Variables	Mean	SD	Mean	SD	Mean	SD
Overbite			-2.55	1.59	5.51	1.36
Age	14.53	2.53	15.09	2.84	13.58	1.50
Sex						
Female	80		52		28	
Male	51		31		20	

Table III. Results of the multiple linear regression analysis with the overbite as the dependent variable.

N=131	**Unstandardized coefficient B**	SE	Standardized beta coefficient	P
Intercept	-2.733	2.233		0.223
Mx6-Ptv(mm)	0.031	0.123	0.025	0.800
Mx8.PP(°)	0.010	0.025	0.034	0.694
Md7-ABR(mm)	-0.134	0.200	-0.068	0.503
Md8.MP(°)	**0.153**	**0.034**	**0.376**	**<0.001***
R= .394; R^2= .155; **Adjusted R^2= .128**; F=5.812; P<0.001				

*Statistically significant at P<0.05.

Table IV. Correlations between posterior discrepancy and third molar angulation in the maxilla and in the mandible

	Maxillary third molar angulation Mx8.PP(°)	
Maxillary posterior discrepancy (third molar available space) Mx6-Ptv(mm)	r **-0.25**	P **0.003***
	Mandibular third molar angulation Md8.MP(°)	
Mandibular posterior discrepancy (third molar available space) Md7.ABR(mm)	r **-0.19**	P **0.026***

*Statistically significant at P<0.05.

Table V. Correlations between maxillary posterior discrepancy (MxPD), third molar angulation and dental variables

n=131	MxPD. Third molar available space Mx6-Ptv(mm)		Third molar angulation Mx8.PP(°)	
	r	P	r	P
Dental Angulations				
Mx1.PP	**0.23**	**0.007***	-0.12	0.176
Mx4.PP	0.16	0.072	-0.10	0.249
Mx5.PP	**0.24**	**0.005***	-0.14	0.107
Mx6.PP	**0.31**	**<0.001***	**-0.23**	**0.009***
Mx7.PP	**0.33**	**<0.001***	**-0.25**	**0.004***
Mx1.BOP	0.11	0.205	-0.04	0.622
Mx4.BOP	0.00	0.980	-0.00	0.984
Mx5.BOP	0.05	0.554	-0.03	0.776
Mx6.BOP	0.16	0.062	-0.14	0.121
Mx7.BOP	**0.21**	**0.018***	**-0.17**	**0.047***
Dentoalveolar Heights				
Mx1H-PP	-0.05	0.607	-0.06	0.526
Mx4H-PP	0.07	0.439	-0.13	0.150
Mx5H-PP	0.11	0.229	**-0.18**	**0.037***
Mx6H-PP	**0.17**	**0.049***	**-0.20**	**0.019***
Mx7H-PP	**0.24**	**0.007***	**-0.27**	**0.002***

*Statistically significant at P<0.05.

Table VI. Correlations between mandibular posterior discrepancy (MdPD), third molar angulation and dental variables

n=131	MdPD. Third molar available space Md7-ABR(mm)		Third molar angulation Md8.MP(°)	
	r	P	r	P
Dental Angulations				
Md1.MP	0.14	0.109	0.07	0.455
Md4.MP	0.13	0.130	0.07	0.400
Md5.MP	0.06	0.475	**0.24**	**0.007***
Md6.MP	0.00	0.989	**0.50**	**<0.001***
Md7.MP	-0.01	0.928	**0.52**	**<0.001***
Md1.BOP	0.16	0.071	-0.10	0.277
Md4.BOP	0.11	0.202	-0.12	0.185
Md5.BOP	0.06	0.508	-0.01	0.902
Md6.BOP	0.01	0.948	**0.30**	**0.001***
Md7.BOP	-0.01	0.918	**0.35**	**<0.001***
Dentoalveolar Heights				
Md1H-MP	**0.26**	**0.003***	**-0.27**	**0.002***
Md4H-MP	**0.32**	**<0.001***	**-0.39**	**<0.001***
Md5H-MP	**0.34**	**<0.001***	**-0.35**	**<0.001***
Md6H-MP	**0.35**	**<0.001***	**-0.31**	**<0.001***
Md7H-MP	**0.32**	**<0.001***	-0.13	0.126

*Statistically significant at P<0.05.

Table VII. Inter subgroups comparability

	Subgroup 1 Open bite ≥ 3mm (Range 3.0, 7.0) n= 27		Subgroup 2 Deep bite > 3mm (Range 3.1, 8.5) n=37			
Variables	Mean	SD	Mean	SD	P	
Age	15.24	3.30	14.03	1.42	0.051	†
Sex						
Female	15		22			
Male	12		15		0.754	‡

† T test
‡ Chi-square test

Table VIII. Inter subgroup comparisons

	Subgroup 1 Open bite ≥ 3 mm n= 27		Subgroup 2 Deep bite > 3mm n=37		T test
Variables	Mean	SD	Mean	SD	P
Maxillary component					
SNA (°)	82.39	5.79	81.89	4.67	0.702
Mandibular component					
SNB (°)	78.05	5.38	77.67	4.55	0.762
Sagittal relationship					
ANB (°)	4.32	3.45	4.21	2.10	0.870
APDI (°)	79.19	8.18	78.41	4.13	0.617
Vertical relationship					
ODI (°)	**64.27**	**6.13**	**76.92**	**7.24**	**<0.001***
Gonial (°)	**131.96**	**5.47**	**122.05**	**4.79**	**<0.001***
SN.GoGn (°)	**39.53**	**6.59**	**30.25**	**5.33**	**<0.001***
SN.PP (°)	6.66	3.52	7.19	4.71	0.626
FMA (°)	**32.26**	**5.87**	**24.12**	**3.95**	**<0.001***
PP.MP (°)	**34.40**	**6.11**	**24.41**	**4.42**	**<0.001***
PFH (mm)	72.35	5.36	72.29	6.65	0.967
AFH (mm)	**119.65**	**8.33**	**109.58**	**5.94**	**<0.001***
FHR (ratio)	**60.60**	**4.46**	**66.01**	**5.33**	**<0.001***
LAFH (mm)	**71.48**	**5.44**	**61.24**	**4.28**	**<0.001***
Dentoalveolar relationship					
Overbite (mm)	**-4.37**	**1.18**	**5.38**	**1.35**	**<0.001***
Maxillary posterior discrepancy					
Mx6-Ptv (mm)	16.35	3.84	16.16	3.50	0.840
Maxillary third molar angulation					
Mx8.PP (°)	35.87	15.14	38.27	15.69	0.541
Mandibular posterior discrepancy					
Md7-ABR (mm)	2.66	1.89	2.43	1.99	0.639
Mandibular third molar angulation					
Md8.MP (°)	**15.53**	**9.56**	**22.55**	**8.50**	**0.002***

*Statistically significant at P<0.05.

APPENDIX 1. Variables distribution (Kolmogorov-Smirnov test)

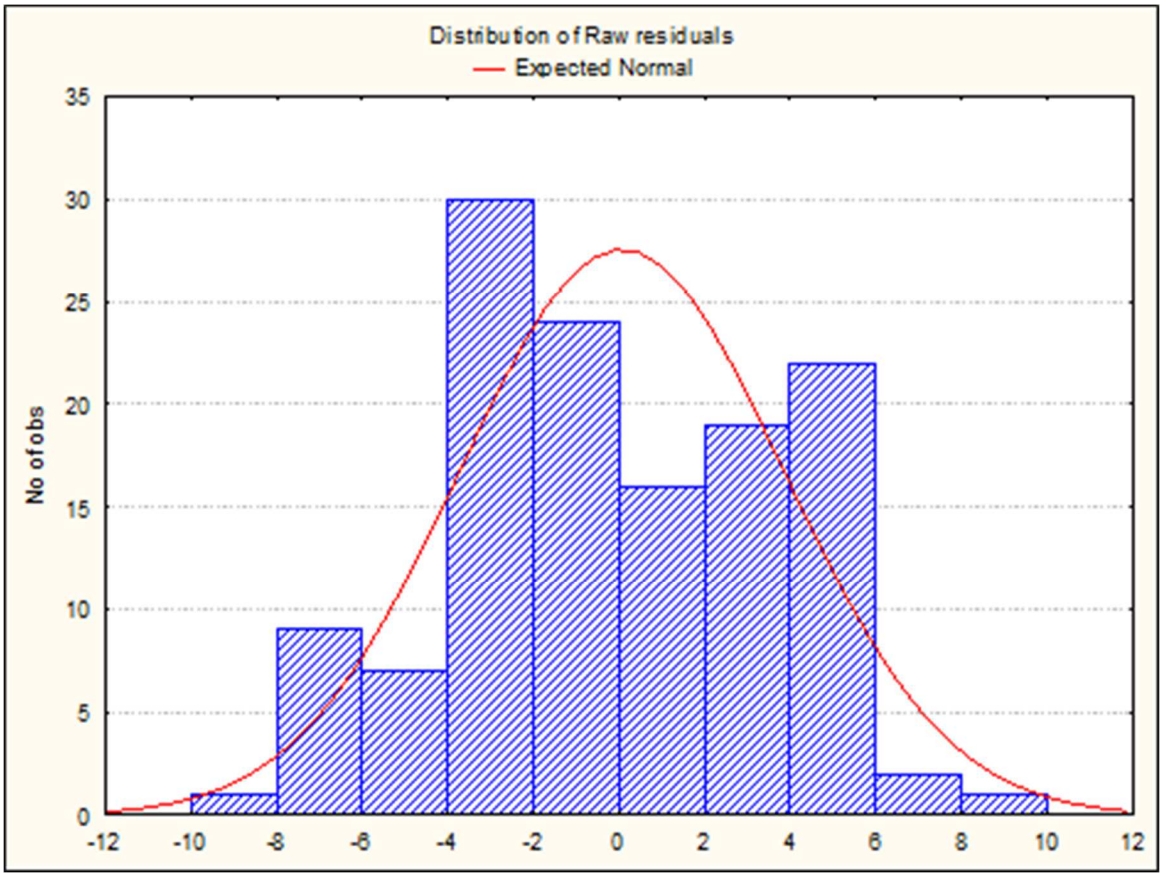
	Subgroup 1 Open bite	Subgroup 2 Deep Bite
	n= 27	n=37
Variables	K-S p	K-S p
Maxillary component		
SNA (°)	p>.20	p>.20
Mandibular component		
SNB (°)	p>.20	p<.10
Sagittal relationship		
ANB (°)	p>.20	p>.20
APDI (°)	p>.20	p>.20
Vertical relationship		
ODI (°)	p>.20	p>.20
Gonial (°)	p>.20	p>.20
SN.GoGn (°)	p>.20	p>.20
SN.PP (°)	p>.20	p>.20
FMA (°)	p>.20	p>.20
PP.MP (°)	p>.20	p>.20
PFH (mm)	p>.20	p>.20
AFH (mm)	p>.20	p>.20
FHR (ratio)	p>.20	p<.10
LAFH (mm)	p>.20	p>.20
Dentoalveolar relationship		
Overbite (mm)	p<.15	p>.20
Maxillary posterior discrepancy		
Mx6-Ptv (mm)	p>.20	p>.20
Maxillary third molar angulation		
Mx8.PP (°)	p>.20	p>.20
Mandibular posterior discrepancy		
Md7-ABR (mm)	p>.20	p>.20
Mandibular third molar angulation		
Md8.MP (°)	p>.20	p>.20

APPENDIX 2. Random and systematic errors of the measurements performed on the lateral head films. (Dahlberg's formula and dependent t tests)

	1st measure		2nd measure			
	Mean	SD	Mean	SD	Dahlberg	P
Maxillary component						
SNA (°)	80.93	4.12	80.58	3.73	1.07	0.226
Mandibular component						
SNB (°)	77.52	4.22	77.52	4.35	0.84	1.000
Sagittal relationship						
ANB (°)	3.40	3.01	3.05	2.92	0.80	0.094
APDI (°)	80.74	7.31	80.85	7.03	1.29	0.763
Vertical relationship						
ODI (°)	62.94	5.81	63.10	6.50	1.56	0.701
Gonial (°)	130.54	6.50	130.96	6.36	1.32	0.237
SN.GoGn (°)	41.27	4.94	41.14	4.77	1.13	0.670
SN.PP (°)	8.32	3.47	8.33	3.39	1.10	0.972
FMA (°)	32.73	4.66	32.78	4.86	0.81	0.810
PP.MP (°)	34.51	4.98	34.39	5.07	1.12	0.701
PFH (mm)	71.57	6.10	72.11	5.87	1.21	0.094
AFH (mm)	118.65	7.63	118.81	7.93	0.75	0.420
FHR (ratio)	60.36	3.93	60.77	3.82	1.08	0.161
LAFH (mm)	70.20	6.11	70.38	5.94	0.68	0.334
Dentoalveolar relationship						
Overbite (mm)	-2.11	1.58	-2.26	1.54	0.60	0.358
Maxillary posterior discrepancy						
Mx6-Ptv (mm)	14.76	2.64	15.01	2.78	0.94	0.320
Maxillary third molar angulation						
Mx8.PP (°)	34.65	15.18	34.95	14.61	1.89	0.566
Mandibular posterior discrepancy						
Md7.ABR (mm)	2.57	2.27	2.84	2.20	0.68	0.138
Mandibular third molar angulation						
Md8.MP (°)	12.78	9.34	12.43	9.27	1.88	0.490
Maxillary Dental Angulations						
Mx1.PP	117.76	5.34	116.94	6.09	1.67	0.065
Mx4.PP	96.95	4.88	96.23	5.37	1.64	0.105
Mx5.PP	87.67	3.96	88.11	4.76	1.76	0.355
Mx6.PP	79.05	6.26	78.53	6.50	1.80	0.284
Mx7.PP	66.83	6.65	66.28	6.96	1.92	0.293
Mx1.BOP	127.60	4.64	127.81	5.80	1.78	0.665
Mx4.BOP	106.76	4.61	107.10	5.30	1.70	0.465
Mx5.BOP	97.81	4.65	98.48	5.90	1.58	0.116
Mx6.BOP	88.87	4.41	89.34	5.08	1.82	0.346
Mx7.BOP	76.66	6.92	76.56	6.96	1.98	0.865
Maxillary Dentoalveolar Heights						
Mx1H-PP	28.67	3.04	28.65	3.01	0.58	0.929

Mx4H-PP	26.99	2.51	26.89	2.62	0.49	0.439
Mx5H-PP	25.79	2.50	25.75	2.67	0.48	0.765
Mx6H-PP	24.47	2.31	24.21	2.46	0.55	0.080
Mx7H-PP	20.94	2.34	20.88	2.47	0.63	0.740
Mandibular Dental Angulations						
Md1.MP	90.28	6.90	90.94	6.60	1.64	0.136
Md4.MP	78.53	6.08	77.99	6.27	1.97	0.312
Md5.MP	76.40	5.76	75.87	5.63	1.65	0.233
Md6.MP	73.34	5.39	72.41	5.80	1.96	0.075
Md7.MP	75.94	6.08	76.15	6.08	1.64	0.645
Md1.BOP	113.40	5.83	112.89	6.05	1.97	0.339
Md4.BOP	102.75	4.87	101.96	5.04	2.00	0.142
Md5.BOP	100.87	6.06	100.28	5.75	1.94	0.258
Md6.BOP	97.39	4.91	97.12	5.43	1.81	0.589
Md7.BOP	100.63	5.30	100.02	5.30	2.03	0.267
Mandibular Dentoalveolar Heights						
Md1H-MP	39.78	3.50	40.02	3.75	0.67	0.193
Md4H-MP	35.62	3.51	35.84	3.46	0.78	0.295
Md5H-MP	33.03	3.55	33.35	3.33	0.74	0.102
Md6H-MP	30.95	3.50	31.30	3.58	0.84	0.116
Md7H-MP	27.59	3.56	27.82	3.79	0.75	0.263

APPENDIX 3. Multiple linear regression analysis model. Histogram of residuals.



3 DISCUSSION

3 DISCUSSION

A great amount of speculations regarding diagnosis, treatment, and stability exists in the orthodontic area. Orthodontists have to be aware that not all of these speculations have scientific support.

Controversial results, about the effect of third molars on anterior crowding and post orthodontic relapse can be found in literature.(HARRADINE; PEARSON; TOTH, 1998; LITTLE, 1999; BUSCHANG; SHULMAN, 2003; SIDLAUSKAS; TRAKINIENE, 2006) Systematic reviews show a lack of good quality and high risk of bias in the studies evaluating this topic.(COSTA et al., 2013; STANAITYTÉ; TRAKINIENE; GERVICKAS, 2014; ZAWAWI; MELIS, 2014; GHAEMINIA et al., 2016) Based on this, conclusions with scientific strength could not been drawn.

Regarding to the theory evaluated in this study,(KIM, 1987; SATO, 1987; SATO et al., 1990 ; SATO, 1991 ; CHANG; MOON, 1999) posterior discrepancy would have an effect on the increase of the mesial angulation and height of posterior teeth and consequently, would aggravate the open bite malocclusion. Therefore, they recommend third molar extractions in order to prevent these effects and to ensure treatment stability. However, the mentioned hypothesis and suggestion are based only on clinical speculations.

Two recently published studies made an effort to evaluate the effects of the posterior discrepancy on molar angulations and heights in open bite subjects.(ARRIOLA-GUILLEN; ALIAGA-DEL CASTILLO; FLORES-MIR, 2016; ARRIOLA-GUILLEN et al., 2016) These studies evaluated only the effects in the maxilla and showed that maxillary posterior discrepancy does not produce an increase in first and second molar mesial angulation or height, contrary to the mentioned clinical speculations. However, these studies presented deficiencies in the methodology used to diagnose maxillary posterior discrepancy. They used a clinically-based approach using visual observation of cephalometric radiographs for determining the presence of posterior discrepancy in the maxilla. It could be argued that the diagnosis was made in a subjective manner and that it could have some influence in the results. Another limitation observed in those studies was the lack of evaluation in the

mandible.(ARRIOLA-GUILLEN; ALIAGA-DEL CASTILLO; FLORES-MIR, 2016; ARRIOLA-GUILLEN et al., 2016)

For this reason, the present study was planned to be performed with more soundness in the evaluation of posterior discrepancy and third molar angulation. These evaluations were performed in the maxilla and mandible, since the mentioned speculations could be found in both apical bases. Additionally, a group of deep bite subjects was included with the intention of having great variability in the overbite. Therefore, a better understanding of the multiple linear regression analysis could be achieved.(KIRKWOOD; STERNE, 2003. p. 87-106.; PANDIS, 2016)

The results of the current study showed a positive correlation between the mandibular third molar mesial angulation and the overbite. No effect of the maxillary and mandibular posterior discrepancies on the overbite was found. Additionally, posterior discrepancy was negatively associated with posterior teeth mesial angulation and dentoalveolar height.

These findings contradict the posterior discrepancy effect speculations,(KIM, 1987; SATO, 1987; SATO et al., 1990 ; SATO, 1991) but are more logical(VAN DER LINDEN, 2013. p. 124-143.) and support the conclusions obtained in previous investigations,(ARRIOLA-GUILLEN; ALIAGA-DEL CASTILLO; FLORES-MIR, 2016; ARRIOLA-GUILLEN et al., 2016) using more objective methods.

Based on the results, there is no evidence to support third molar extraction with the intention of preventing open bite increase or to ensure open bite treatment stability. Third molar extractions decision should be based in other factors such as associated pathologies or symptoms, and not as a scientifically unsupported prophylactic procedure.(KANDASAMY, 2011; WHITE; PROFFIT, 2011; GHAEMINIA et al., 2016)

4 CONCLUSION

4 CONCLUSION

The maxillary and mandibular posterior discrepancy theory on the overbite, posterior teeth angulation and dentoalveolar height was not supported because:

- There was a positive correlation of the mandibular third molar mesial angulation with the overbite;
- Posterior discrepancy was negatively associated with posterior teeth mesial angulation and dentoalveolar height;
- Extreme deep bite subjects showed greater mandibular third molar mesial angulation when compared with extreme open bite individuals.

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REFERENCES

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APPENDIX

APPENDIX A - DECLARATION OF EXCLUSIVE USE OF THE ARTICLE IN DISSERTATION/THESIS

We hereby declare that we are aware of the article “INFLUENCE OF POSTERIOR DISCREPANCY IN ANTERIOR OPEN BITE SEVERITY” will be included in Dissertation of the student Arón Aliaga Del Castillo and may not be used in other works of Graduate Programs at the Bauru School of Dentistry, University of São Paulo.

Bauru, November 30th, 2016.

Aron Aliaga-Del Castillo _____
Author Signature

Guilherme Janson _____
Author Signature

_____ _____
Author Signature

_____ _____
Author Signature

ANNEXES

ANNEX A. Ethics Committee approval, protocol number 43933015.8.0000.5417 (front).

FACULDADE DE ODONTOLOGIA DE BAURU-USP

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Influência da discrepância posterior na severidade da mordida aberta anterior
Pesquisador: Arón Aliaga Del Castillo
Área Temática:
Versão: 1
CAAE: 43933015.8.0000.5417
Instituição Proponente: Universidade de Sao Paulo
Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 1.051.507
Data da Relatoria: 29/04/2015

Apresentação do Projeto:
O projeto de pesquisa "Influência da discrepância posterior na severidade da mordida aberta anterior" apresenta como pesquisador responsável o pós-graduando Arón Aliaga Del Castillo e como integrante Prof. Dr. Guilherme dos Reis Pereira Janson (orientador). Seu desenho consiste em avaliar a influência da discrepância posterior na severidade da mordida aberta anterior em indivíduos com mordida aberta anterior não tratados. Para isso a amostra consistirá de 80 telerradiografias de pacientes com mordida aberta anterior da Disciplina de Ortodontia da FOB/USP. Para avaliar o erro sistemático será utilizado o teste t dependente e para o erro casual a fórmula de Dahlberg. A distribuição normal das amostras será avaliada pelo teste Kolmogorov-Smirnov. Verificada a normalidade, será utilizada a análise de regressão linear múltipla para avaliar a influência da discrepância posterior no overbite, nas angulações e nas alturas dos primeiros e segundos molares.

Objetivo da Pesquisa:
Objetivo Primário:
- Avaliar a influência da discrepância posterior na severidade da mordida aberta anterior em indivíduos com mordida aberta anterior não tratados.

Objetivo Secundário:
- Avaliar a influência da discrepância posterior sobre as angulações e alturas dos primeiros e

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ANNEX A. Ethics Committee approval, protocol number 43933015.8.0000.5417 (verso).

FACULDADE DE ODONTOLOGIA DE BAURU-USP

Continuação do Parecer: 1.051.507

segundos molares nos mesmos indivíduos devido às especulações sobre o efeito da discrepância posterior sobre essas variáveis.

Avaliação dos Riscos e Benefícios:

O pesquisador informa que:

Riscos:

A pesquisa não gera nenhum risco, já que serão utilizadas só telerradiografias do arquivo da disciplina de Ortodontia.

Benefícios:

Se em pacientes com Mordida Aberta Anterior e presença de Discrepância Posterior, os terceiros molares tiverem um efeito significante sobre a posição vertical e a angulação dos segundos e primeiros molares, alterando ainda mais a mordida aberta anterior, então sua presença deveria ser levada em consideração como um dos fatores etiológicos envolvidos na expressão deste tipo de má oclusão. E sua eliminação poderia ter benefícios
no tratamento quanto na estabilidade.

Comentários e Considerações sobre a Pesquisa:

A pesquisa não apresenta comprometimento ético. A metodologia e os objetivos são descritos e condizentes com a pesquisa. Propõe dispensa de TCLE pelo fato da amostra ser retrospectiva. 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 científicas. 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 ORTODÔNTICO”. 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,

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ANNEX A. Ethics Committee approval, protocol number 43933015.8.0000.5417 (front).

FACULDADE DE ODONTOLOGIA DE BAURU-USP

Continuação do Parecer: 1.051.507

de 12.12.12.

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados os termos: Projeto detalhado, autorização do uso do acervo, dispensa de TCLE, folha de rosto e ciência do Departamento.

Recomendações:

Não há recomendações.

Conclusões ou Pendências e Lista de Inadequações:

Sugiro aprovação.

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

Considerações Finais a critério do CEP:

Esse projeto foi considerado APROVADO na reunião ordinária do CEP de 29.4.2015, 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.

BAURU, 06 de Maio de 2015

Assinado por:
Izabel Regina Fischer Rubira Bullen
(Coordenador)

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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 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 **"Influência da discrepância posterior na severidade da mordida aberta anterior",** de autoria de *Arón Aliaga Del Castillo* sob a orientação do *Prof. Dr. Guilherme Janson*.

Tal solicitação justifica-se pelo fato da amostra ser retrospectiva. 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, 24 de março de 2015.

Arón Aliaga Del Castillo
Orientado

Prof. Dr. Guilherme Janson
Orientador

Al. Dr. Octávio Pinheiro Brisolla, 9-75 – Bauru-SP – CEP 17012-901 – C.P. 73
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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 cientificas do país e do exterior.

Bauru, ____ de _____ de 19 ___.

_____

Assinatura do paciente ou responsável

R.G. Nº: _____

Nome: _____

Endereço: _____

CEP: _____ Telefone:_____