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CORRELAÇÃO ENTRE A SINUSITE CRÔNICA E ALTERAÇÕES ENDOPERIODONTAIS: UM ESTUDO POR TOMOGRAFIA COMPUTADORIZADA DE FEIXE CÔNICO E AVALIAÇÃO CLÍNICA

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Dissertação apresentada ao Programa de Pós-graduação em Clínica Odontológica, da Faculdade de Odontologia da Universidade Federal de Juiz de Fora, como requisito parcial para obtenção do título de Mestre em Clínica Odontológica. Área de concentração em Clínica Odontológica.

Orientador: Prof. Dr. Celso Neiva Campos

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RESUMO

A proximidade das raízes dos dentes maxilares posteriores com o assoalho do seio maxilar pode estar associada ao desenvolvimento da sinusite maxilar crônica (SMC). O objetivo neste estudo foi avaliar a correlação entre alterações endoperiodontais (doença periodontal e necrose pulpar) e a proximidade dos dentes maxilares posteriores ao assoalho do seio maxilar com a presença de sinusite maxilar crônica. Foram selecionados 83 pacientes (159 seios maxilares), que foram submetidos ao exame clínico dentário para avaliar a mobilidade dentária e a condição pulpar do dente. Realizou-se, também, o exame de tomografia computadorizada de feixe cônico para verificar a presença de lesão periapical, perda óssea periodontal e mensurar a distância dos ápices radiculares à cortical do seio maxilar. Os seios maxilares foram divididos em dois grupos: GCSM- com sinusite maxilar crônica; GSSM- sem sinusite. A associação entre as alterações endoperiodontais e a proximidade dos dentes com o assoalho do seio maxilar em relação à presença ou ausência de SMC foi analisada pelo teste Qui-quadrado ($p < 0,05$). A regressão logística binária foi utilizada para avaliar os fatores associados à SMC ($p < 0,05$). Os resultados mostraram que a mobilidade dentária teve associação positiva com a sinusite maxilar, aumentando em 3,45 vezes, a chance de desenvolvimento da doença ($p < 0,05$). O GCSM está associado a dentes com alterações endoperiodontais próximos ao seio maxilar, enquanto no GSSM, os dentes com alterações endoperiodontais estavam mais distantes do seio maxilar ($p < 0,05$). À medida que o dente distancia-se do assoalho do seio maxilar, a chance de apresentar sinusite maxilar reduz 2,5 vezes ($p = 0,003$). Concluiu-se que a doença periodontal e a proximidade de dentes com o seio maxilar estão associadas à sinusite maxilar crônica, tornando-se necessária uma maior interação entre cirurgiões-dentistas e médicos otorrinolaringologistas na busca de uma maior eficácia no tratamento da doença.

Palavras-chave: seio maxilar, sinusite maxilar, necrose da polpa dentária, perda óssea periodontal, infecção focal dentária

ABSTRACT

The proximity of the roots of maxillary posterior teeth to the maxillary sinus floor can be associated with the development of chronic maxillary sinusitis (CMS). Therefore, the aim of this study was to evaluate the correlation between odontogenic endoperiodontal change conditions and the proximity of the maxillary posterior teeth to the floor of the maxillary sinus and the presence of chronic maxillary sinusitis. A total of 83 patients (159 maxillary sinuses) were selected and underwent clinical dental examination to assess tooth mobility and tooth pulp condition. In addition, cone beam computed tomography was performed to evaluate the presence of periapical lesions, periodontal bone loss and measure the distance from the root apices to the cortical of the maxillary sinus. . The maxillary sinuses were divided into two groups: GCMS- chronic maxillary sinusitis and GNMS- no maxillary sinusitis. The association between the endoperiodontal changes and the proximity with the maxillary sinus floor in relation to presence or absence of SMC was analyzed by Chi-square test ($p < 0.05$). Binary logistic regression was used to evaluate the factors associated with the SMC ($p < 0.05$). The results showed that tooth mobility was positively associated with chronic sinusitis, leading to a 3.45-fold increased association of developing the disorder ($p < 0.05$). GCMS is associated with teeth with endoperiodontal changes near the maxillary sinus, whereas teeth with endoperiodontal changes were more distant from the maxillary sinus in GNMS ($p < 0.05$). To the extent that the tooth is more distant from the maxillary sinus floor, the chance risk of presenting chronic sinusitis is reduced up to 2.5-fold ($p < 0.05$). In conclusion, tooth mobility and proximity to the maxillary sinus are associated with cases of chronic maxillary sinusitis, requiring better interactions between dental surgeons and an otolaryngologyspecialists in pursuit of greater effectiveness in the treatment of the disorder.

Keywords: *maxillary sinus, maxillary sinusitis, dental pulp necrosis, alveolar bone loss, focal infection dental*

LISTA DE ILUSTRAÇÕES

LISTA DE ABREVIATURAS

CBCT	*cone beam computed tomography*
CMS	*chronic maxillary sinusitis*
SMC	sinusite maxilar crônica
GCSM	grupo com sinusite maxilar crônica
GSSM	grupo sem sinusite maxilar
HU/UFJF	hospital universitário da Universidade Federal de Juiz de Fora
POP	perda óssea periodontal
PBL	*periodontal bone loss*
TC	tomografia computadorizada
TCFC	tomografia computadorizada de feixe cônico
2nd premolar	*second premolar*
1st molar	*first molar*
2nd molar	*second molar*

SUMÁRIO

1 INTRODUÇÃO

Os seios paranasais são cavidades pneumáticas localizadas no interior dos ossos da face, que se comunicam com a fossa nasal através de pequenas aberturas em suas paredes (BROOK, 2006). O seio maxilar é o maior seio paranasal e está localizado na região entre as cavidades orbital e nasal. Apresenta uma forma piramidal com a base voltada para a parede lateral da cavidade nasal e o ápice voltado para o processo zigomático da maxila (MEHRA e MURAD, 2004). É coberto por uma fina membrana mucosa respiratória, denominada membrana de Schneiderian, que se adere ao periósteo (PHOTHIKHUN et al., 2012).

A inflamação da membrana sinusal que cobre a cavidade paranasal é referida como sinusite maxilar, que pode ser provocada por micro-organismos patogênicos através do óstio nasal ou da boca (MEHRA e MURAD, 2004).

A sinusite odontogênica corresponde de 10 a 12% (MEHRA e MURAD, 2004) podendo chegar até a 40% dos casos de sinusite maxilar (PATEL e FERGUSON, 2012) e tem como principais sintomas a dor dentária isolada, obstrução ou congestão nasal, dor ou pressão na face, dores de cabeça, gotejamento pós-nasal e mau odor (ARIAS-IRIMIA et al., 2010; BROOK, 2006; LECHIEN et al., 2014).

A proximidade das raízes dos dentes maxilares posteriores com o seio maxilar, associada à presença de iatrogenias de origem dentária, inflamação ou infecções endodônticas e/ou periodontais, pode ser considerada como o principal fator etiológico para a sinusite odontogênica (ARIJI et al., 2010; KRETZSCHMAR e KRETZSCHMAR, 2003; MAILLET et al., 2011; OBAYASHI et al., 2004)

Além disso, a presença de um abscesso periapical crônico pode provocar a drenagem do conteúdo necrótico da infecção endodôntica por meio de fistulas, que se abrem na superfície mais próxima do ápice radicular infectado. Dessa forma, suspeita-se que tais fístulas poderiam surgir também em outras superfícies como: cavidade nasal, canal nasopalatino e no seio maxilar (WATZEK, BERNHART e ULM, 1997). No entanto, este processo é difícil de ser detectado por exames utilizados rotineiramente na prática odontológica, como a radiografia periapical e panorâmica, já que estas não estimam a quantidade de perda óssea e não permitem a visualização completa do seio maxilar (OBERLI, BORNSTEIN e VON, 2007). E ainda, dependendo da proximidade do ápice radicular à cortical do seio maxilar,

essa perda óssea seria tão mínima que a tornaria impossível de ser notada, tanto em radiografias quanto em tomografias.

Embora a tomografia computadorizada (TC) seja considerada o padrão-ouro para avaliação dos seios maxilares, a tomografia computadorizada de feixe cônico (TCFC) tem sido utilizada por cirurgiões-dentistas para avaliar os seios paranasais (BREMKE et al., 2009; CAKLI et al., 2012). A TCFC oferece uma baixa dose de radiação quando comparada à tomografia médica, um menor tempo de aquisição e melhor resolução da imagem (SUOMALAINEN et al., 2009), permitindo ao clínico avaliar a relação de uma lesão periapical com defeitos no assoalho do seio e qualquer alteração presente nos seios maxilares, em múltiplos planos (MAILLET et al., 2011; MEHRA e MURAD, 2004).

Alguns estudos têm demonstrado, através de imagens de TCFC, que alterações dentárias, tais como a presença de alterações endoperiodontais, podem estar associadas a casos de espessamento da mucosa sinusal (GOLLER-BULUT et al., 2015; LU et al., 2012; NASCIMENTO et al., 2016; NUNES et al., 2016; SHANBHAG et al., 2013; SHEIKHI, POZVE e KHORRAMI, 2013). No entanto, não há estudos que correlacionem à presença de alterações em dentes maxilares posteriores com a presença de sinusite maxilar crônica através de exame clínico dos dentes e imagens de TCFC.

Destarte, torna-se interessante aprofundar os estudos que visam estabelecer uma correlação entre a sinusite maxilar crônica, diagnosticada por uma médica especialista em otorrinolaringologia, e as infecções dentais dos dentes maxilares posteriores, através de exames clínicos específicos e de TCFC, bem como a proximidade destas raízes dentais com os seios maxilares, onde flui-se para a proposta deste trabalho.

2 PROPOSIÇÃO

A proposta do presente estudo visou estabelecer uma correlação entre a sinusite maxilar crônica e as alterações endoperiodontais dos dentes maxilares posteriores através de exames clínico e tomográfico

Objetivos específicos

1. Avaliação clínica dos dentes maxilares posteriores quanto às alterações endoperiodontais;
2. Análise topográfica do posicionamento dos ápices radiculares em relação ao seio maxilar;
3. Correlação entre as alterações endoperiodontais e a proximidade dos ápices radiculares com o seio maxilar com a presença de sinusite maxilar crônica.

3 MATERIAL E MÉTODOS

3.1 SELEÇÃO DA AMOSTRA

O presente estudo foi aprovado pelo Comitê de Ética em Pesquisa (ANEXO A). Foram avaliados 83 pacientes provenientes do ambulatório de Otorrinolaringologia do Hospital Universitário da Universidade Federal de Juiz de Fora (HU/UFJF) e/ou da Clínica de Endodontia da Faculdade de Odontologia da UFJF.

Os pacientes provenientes do HU/UFJF foram aqueles diagnosticados com sinusite maxilar crônica, por uma médica, especialista em Otorrinolaringologia e com mais de 20 anos de experiência na área, por meio de exame clínico e de endoscopia. Os pacientes deveriam apresentar sintomas como obstrução, congestão ou descarga nasal e dor ou pressão na face. A manutenção destes sintomas deveria ser superior a 12 semanas para ser caracterizado como sinusite maxilar crônica (DAINES e ORLANDI, 2012).

Os pacientes selecionados da Clínica de Endodontia da UFJF foram aqueles que precisavam realizar TCFC para avaliações dentárias, como exodontia de terceiros molares, planejamento de implantes e alteração periodontal ou periapical. Além disso, estes pacientes foram diagnosticados pela médica especialista com a ausência de qualquer tipo de sinusite maxilar, sendo caracterizados como grupo controle no presente estudo.

Foram excluídos do presente estudo: indivíduos com idade inferior a 18 anos; com histórico de cirurgias na região de seio maxilar, lesões maxilo-mandibulares, cirurgia ortognática; e aqueles com edentulismo de todos os dentes maxilares posteriores. Nos casos em que os pacientes apresentaram ausência de dentes maxilares posteriores unilateralmente, foram avaliados apenas os seios maxilares associados aos dentes presentes.

3.2 DIVISÃO DOS GRUPOS

Os seios maxilares foram divididos em dois grupos: GCSM - com sinusite maxilar crônica; e GSSM – sem sinusite maxilar (controle).

3.3 EXAME CLÍNICO

Inicialmente, todos os pacientes foram submetidos ao exame clínico dentário. Este exame foi feito em uma ordem pré-estabelecida, iniciando-se nos segundos pré-molares, primeiros e segundos molares do lado direito e esquerdo, respectivamente. O terceiro molar não foi incluído no estudo, pelo fato de estar ausente, semi-incluso ou incluso, o que impediria o exame clínico (OK et al., 2014).

O examinador preencheu um quadro para cada paciente para identificar as alterações presentes em cada dente e as ausências dentárias (QUADRO 1). No exame clínico, verificou-se a mobilidade dentária e a resposta pulpar do dente, já que a presença de mobilidade dentária e necrose pulpar podem indicar proliferação de micro-organismos nos sítios afetados e possível propagação destes micro-organismos para o seio maxilar (MEHRA e MURAD, 2004, NASCIMENTO et al., 2016).

Quadro 1- Avaliação clínica dos pacientes

Exame Clínico	**Dentes**					
	15	16	17	25	26	27
Mobilidade						
Teste de sensibilidade positivo/normal						
Teste de sensibilidade positivo/exarcerbado						
Teste de sensibilidade negativo						

Fonte: Autor

Para verificar a mobilidade dentária, o examinador utilizou os dedos indicador e polegar, com movimento de vai e vem, com o auxílio do cabo do espelho bucal. A presença da mobilidade foi caracterizada quando houvesse uma movimentação dentária maior que 1 mm no sentido vestíbulo-lingual no exame clínico (CARRANZA, 2002).

A presença da doença periodontal foi definida quando no exame clínico o dente apresentasse movimentação maior do que 1 mm no sentido vestibulo-lingual (CARRANZA, 2002), associada com a detecção da perda óssea periodontal (POP) no corte sagital, na TCFC. A POP foi considerada na presença de uma distância maior que 2 mm entre a junção cemento-esmalte e a crista do osso alveolar nos lados mesiais e/ou distais dos dentes na TCFC (PHOTHIKHUN et al., 2012) (FIGURA 1). Quando estas condições não estavam presentes em conjunto, o d foi classificado como sem doença periodontal.

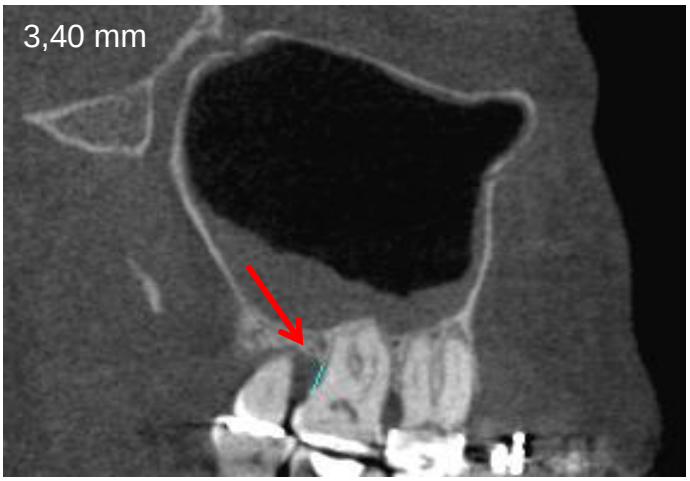

Figura 1 – Corte sagital de TCFC mostrando a presença de perda óssea periodontal na distal do 2º molar superior direito (seta vermelha)
Fonte: Banco de dados Radiologia FO/UFJF.

A resposta ao teste de sensibilidade pulpar ao frio foi utilizada a fim de determinar a presença ou ausência de alterações pulpares. Neste teste, borrifou-se o gás refrigerante (tetrafluoretano -50ºC) em uma bolinha de algodão presa à pinça clínica e, em seguida, o conjunto foi levado à superfície vestibular dos dentes e a resposta foi anotada. A resposta negativa no teste de sensibilidade pulpar indicou necrose pulpar ou tratamento endodôntico prévio, enquanto a resposta positiva normal ou exacerbada indicou a presença de polpa viva, normal ou inflamada ou necrose parcial.

O dente foi considerado com necrose pulpar quando respondeunegativamente ao teste de sensibilidade pulpar e/ou apresentou uma radiolucência apical associada com o ápice dentário com uma espessura de pelo menos 0,5 mm na TCFC (GOMES et al., 2015) (FIGURA 2). Quando o dente

respondeu negativamente ao teste de sensibilidade pulpar e não havia lesão periapical, o dente foi considerado com necrose pulpar, porque a lesão periapical poderia ainda não ter sido desenvolvida ou não estar visível, na TCFC, devido a proximidade ou projeção do ápice radicular para o interior do seio maxilar. No entanto, quando o teste de sensibilidade pulpar foi positivo e os dentes apresentaram uma lesão periapical na TCFC, o dente foi considerado com ausência de necrose pulpar.

Neste estudo, a doença periodontal ou necrose pulpar foram consideradas presentes quando pelo menos um dente apresentava tal condição. Considerou-se para a avaliação, o dente com doença periodontal ou necrose pulpar que estavam mais próximos à cortical do seio maxilar, em ambos os grupos (LU et al., 2012), pelo fato de dentes mais próximos serem mais susceptíveis de propagar micro-organismos para o seio maxilar. Dentes que apresentaram doença periodontal ou necrose pulpar foram considerados duas vezes.

Nos casos em que nenhum dente associado ao seio maxilar apresentou alteração endoperiodontal foi considerado o dente hígido mais próximo ao seio maxilar.

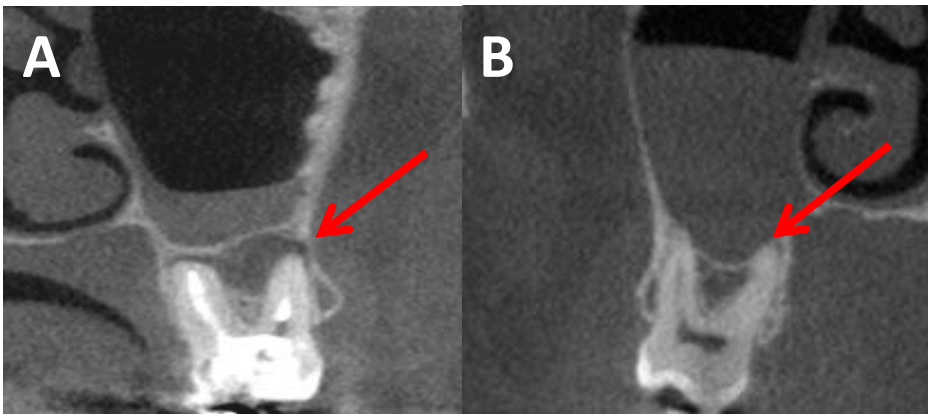

Figura 2 – Corte coronal de TCFC mostrando: (A) - presença de lesão periapical no 2º molar superior esquerdo (seta vermelha); (B) – 1º molar superior direito justaposto ao seio maxilar sem lesão periapical, que respondeu de forma negativa ao teste de sensibilade pulpar, durante o exame clínico.

Fonte: Banco de dados Radiologia FO/UFJF.

3.4 AQUISIÇÃO E ANÁLISE DAS IMAGENS DE TCFC

Após o exame clínico, os pacientes foram submetidos ao exame de TCFC. Os exames foram realizados na Clínica de Radiologia da Faculdade de Odontologia da UFJF. Todas as imagens foram adquiridas pelo mesmo tomógrafo (I-Cat®, Imaging Sciences International, Hatfield, Pensilvânia, EUA), com o seguinte protocolo de aquisição: 120 kV, 8mA, 26,9 segundos de tempo de rotação, espessura de corte de 0,25mm e FOV de 7 x 23 cm.

As imagens de TCFC foram avaliadas a fim de verificar a presença de lesão periapical e perda óssea periodontal nos dentes maxilares posteriores (segundo pré-molar, primeiro molar e segundo molar) e para mensurar a menor distância encontrada entre o ápice radicular destes dentes e a cortical externa do seio maxilar. Os exames foram avaliados, por um examinador, endodontista, com experiência em imagens de TCFC. O examinador foi calibrado por meio da visualização de 20 imagens de TCFC, não pertencentes ao estudo, antes das sessões de avaliação e foi treinado para registrar a presença ou ausência das alterações endoperiodontais avaliadas neste estudo. Para mensurar a reprodutibilidade do método, 10% dos exames foram avaliados em dois momentos distintos, com intervalo de duas semanas entre eles.

Para esta avaliação foi utilizado o software XoranCat, versão 3.1.62 (Xoran Technologies, Ann Arbor, Michigan, EUA), onde o brilho e o contraste das imagens poderiam ser ajustados pelas ferramentas do *software* para melhorar a visualização. Para a realização das medições, a tela do tomógrafo foi ajustada em modo de reconstrução multiplanar (MPR), com corte em 0,25 mm, sem filtro.

Para a realização das medições, foram utilizados os cortes axiais e coronais. Os cortes axiais foram definidos para cada raiz estudada, a partir do início da visualização do ápice radicular. A partir daí, foi determinado o corte coronal correspondente ao corte axial pré-definido (FIGURA 3).

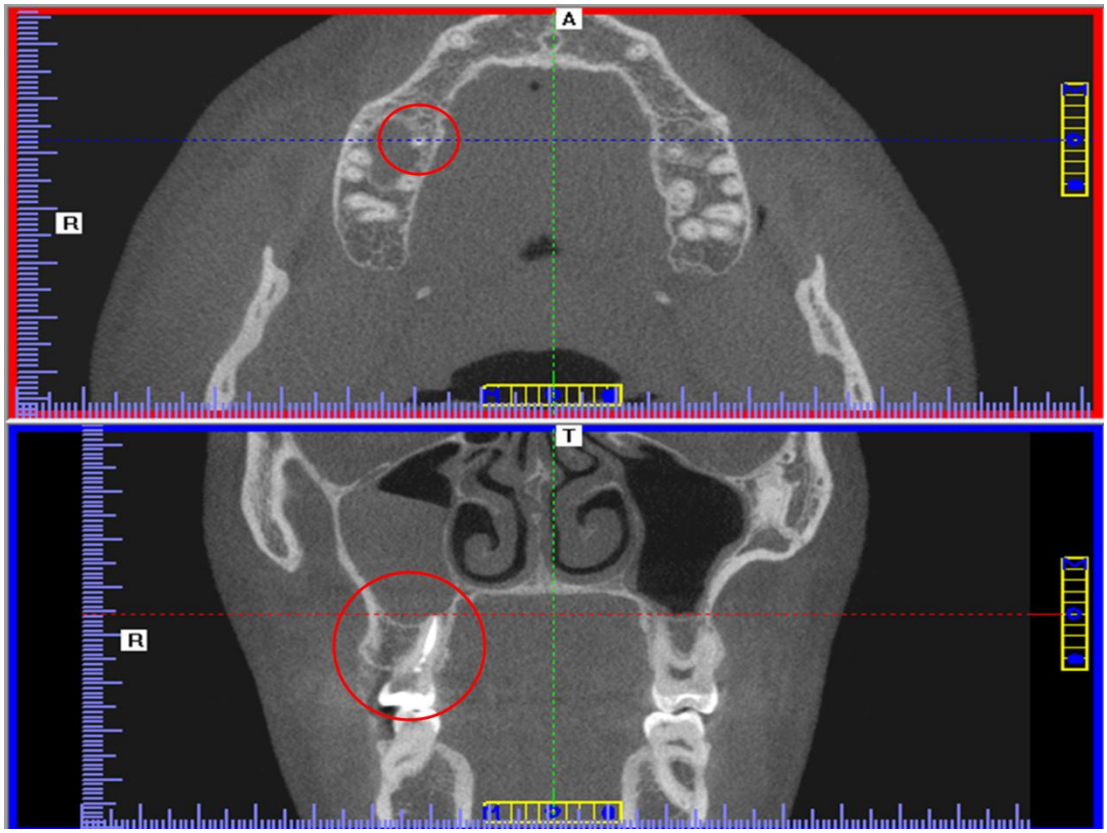

Figura 3 – Imagem de TCFC mostrando o corte axial definido (janela vermelha) e corte coronal correspondente ao ponto determinado no axial (janela azul)
Fonte: Banco de dados Radiologia FO/UFJF.

No corte coronal foi determinada a menor distância do ápice radicular de cada raiz dentária em relação a cortical externa do seio maxilar (FIGURA 4).

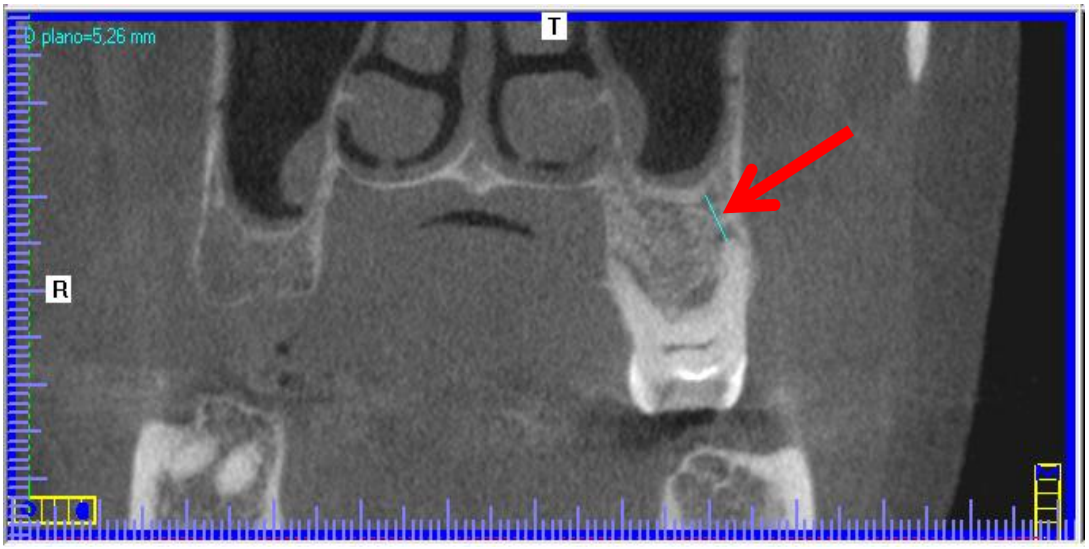

Figura 4 – Corte coronal de TCFC mostrando a mensuração da distância entre o ápice radicular e o ponto mais próximo da cortical do seio maxilar (seta)
Fonte: Banco de dados Radiologia FO/UFJF.

Em seguida, os dentes foram agrupados em quatro tipos: I- com pelo menos um ápice radicular dentro do seio maxilar; II – com pelo menos um ápice radicular em contato com a cortical externa do seio maxilar (0 mm); III - com pelo menos um ápice radicular distante entre 0,1 mm até 1 mm da cortical do seio maxilar; IV – com pelo menos um ápice radicular distante mais de 1 mm da cortical do seio maxilar (OK et al., 2014)(FIGURA 5). Foi considerada a medida do ápice mais próximo ao seio maxilar para classificação de cada dente.

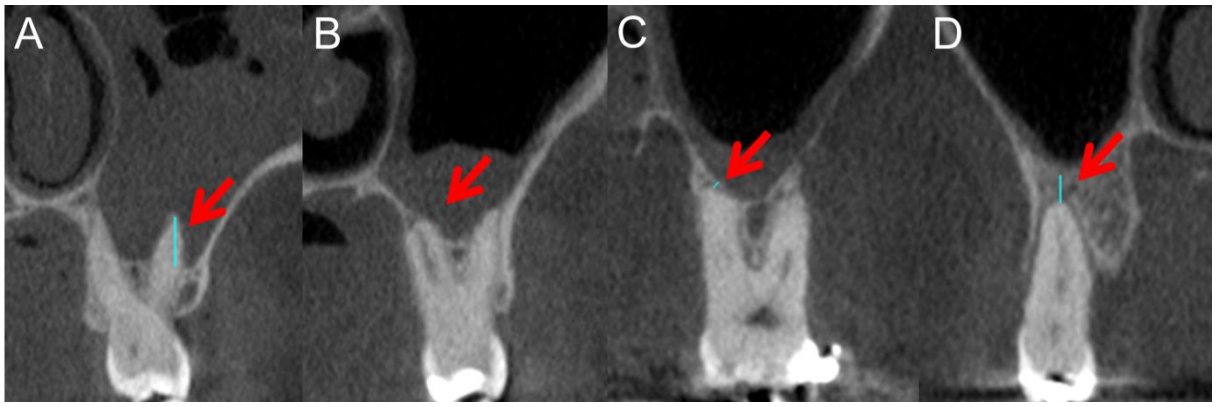

Figura 5 – Classificação dos dentes em relação à proximidade do ápice radicular com a cortical externa do seio maxilar (seta vermelha). (A) I: dente com pelo menos um ápice radicular dentro do seio maxilar; (B) II: com pelo menos um ápice radicular em contato com a cortical externa do seio maxilar (0 mm); (C) III: dente com pelo menos um ápice radicular entre 0 e 1 mm da cortical do seio maxilar; (D) IV:dente com pelo menos um ápice radicular distante mais de 1 mm da cortical. Fonte: Banco de dados Radiologia FO/UFJF.

3.5 ANÁLISE ESTATÍSTICA

A análise descritiva dos dados e análise estatística foi realizada no software IBM SPSS Statistics (versão 15,0; IBM Corp, Armonk, NY). Os dados foram analisados de forma descritiva (frequências, médias e desvios-padrão) e a associação entre as alterações endoperiodontais (doença periodontal e necrose pulpar); a proximidade dos dentes com o assoalho do seio maxilar com a presença de sinusite maxilar crônica foi avaliada através do teste Qui-quadrado ($p < 0,05$). A calibração intra-examinador foi avaliada pelo coeficiente Kappa.

Utilizou-se análise de regressão logística binária para determinar os fatores associados à presença de sinusite maxilar crônica. O intervalo de confiança utilizado foi de 95% ($p < 0,05$).

4 ARTIGO CIENTÍFICO

O artigo abaixo está apresentado nas normas do periódico Journal of Endodontics, classificado no Qualis da CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), na Área de Avaliação de Odontologia, como A1.

Correlation between chronic sinusitis and endoperiodontal changes: A study using clinical evaluation and cone beam computed tomography

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Abstract

Introduction: The proximity of the roots of maxillary posterior teeth to the maxillary sinus floor can be associated with the development of chronic maxillary sinusitis (CMS). Therefore, this study evaluated the correlation between the presence of periodontal disease and pulpar necrosis in maxillary posterior teeth and the presence of CMS. **Methods:** A total of 83 patients (159 maxillary sinuses) were selected and underwent clinical dental examination to assess tooth mobility and pulp condition. In addition, cone beam computed tomography was performed to evaluate the presence of periapical lesion, periodontal bone loss and measure the distance from the root apex to the cortical of the maxillary sinus. The maxillary sinuses were divided into two groups: GCMS- chronic maxillary sinusitis and GNMS- no maxillary sinusitis. Data were analysed using chi-square test and binary logistic regression analysis ($p<0.05$). **Results:** Periodontal disease was positively associated with CMS, leading to a 3.45-fold higher association between these disorders ($p<0.05$). CMS was significantly more common in patients with periodontal disease or pulpar necrosis in close proximity with the maxillary sinus. Patients with periodontal disease or pulpar necrosis that were more distant from the maxillary sinus were more common in GNMS ($p<0.05$).To the extent that the tooth is more distant from the maxillary sinus floor, the chance of presenting CMS is reduced up to 2.5-fold ($p<0.05$). **Conclusion:** Periodontal disease and proximity to the maxillary sinus are more common in cases of CMS, requiring a dental assessment and CBCT evaluation in patients with CMS with ineffective treatment.

Keywords: maxillary sinus; maxillary sinusitis; dental pulp necrosis; alveolar bone loss; teeth.

Introduction

Chronic maxillary sinusitis is defined as inflammation of the sinus membrane that covers the paranasal cavity, with signs and symptoms persisting for at least 12 weeks. This pathology may be caused by pathogenic microorganisms via the nasal ostium or the mouth (1).

Odontogenic sinusitis accounts for 10% to 40% of the cases of maxillary sinusitis (1,2) and is generally associated with cases of chronic maxillary sinusitis with ineffective treatments, according otorhinolaryngologists. If the association between maxillary sinusitis and odontogenic change was not diagnosed the treatment will be ineffective because the use of antibiotics would not be able to eliminate the cause of the disease. Various studies (3-6) have demonstrated that iatrogenesis during surgical procedures, the presence of apical periodontitis, and periodontal bone loss can be associated with cases of mucosal thickening.

However, the relationship between maxillary posterior teeth and the maxillary sinus cannot be adequately assessed through routinely used dental exams, such as periapical and panoramic X-rays, given that these modalities present overlapping images, do not allow complete visualization of the maxillary sinus, and do not assess the amount of bone loss (7).

Cone beam computed tomography (CBCT) is significantly more sensitive in detecting the relationship of a periapical lesion with defects in the sinus floor and any alteration present in the maxillary sinuses compared with periapical radiography (1,8,9). Therefore, the combination of clinical dental examination and tomographic assessment could help in diagnosing odontogenic sinusitis (10), given that it differs in its pathophysiology, microbiology, and treatment compared with sinusitis attributed to other causes. Thus, the definition of the dental aetiology is essential for the proper treatment of chronic maxillary sinusitis (11).

However, there are no studies that correlate the clinical pathologies of maxillary posterior teeth with the presence of chronic maxillary sinusitis diagnosed by an otolaryngology specialist. Therefore, the objective of this study was to establish an association between chronic maxillary sinusitis and periodontal disease or pulpar necrosis, of the upper posterior teeth, through specific clinical and CBCT exams. In

addition, it is sought to determine the proximity of these dental roots apices to the maxillary sinuses.

Material and methods

Sample selection

The present study was approved by the Research Ethics Committee (No. 1.461.931). In total, 83 patients from the Otorhinolaryngology Clinic of the University Hospital and the Clinic of the School of Dentistry [redacted] were evaluated.

Patients from the University Hospital included in this study were diagnosed with chronic maxillary sinusitis through clinical examination and endoscopy by an otolaryngology specialist with more than 20 years of experience in the area. Patients had to exhibit symptoms, such as obstruction, nasal congestion or discharge, and pain or pressure in the face. The duration of these symptoms had to be longer than 12 weeks to be characterized as chronic maxillary sinusitis (12).

The patients selected from the Clinic of the School of Dentistry were those who had underwent CBCT at the Radiology Clinic of the institution for other dental reasons, such as third molar extraction, implant planning and periodontal or periapical alteration. These patients were diagnosed with no maxillary sinusitis of any sort by an otolaryngology specialist. They were used as the control group in the present study.

The following exclusion criteria were employed in the present study: an age of less than 18 years; maxillo-mandibular lesions, or orthognathic surgery; and edentulism of all posterior teeth in the upper arch. In cases where the patients presented absence of posterior teeth unilaterally, only the maxillary sinuses associated with present teeth were evaluated.

Division into groups

The maxillary sinuses were divided into two groups: GCMS- chronic maxillary sinusitis and GNMS- no maxillary sinusitis (control).

Clinical Examination

Initially, all patients underwent clinical dental examination. This exam was performed in a pre-established order, starting at the second premolars, first and second molars on the right and left side, separately.

To verify tooth mobility, the examiner used her index finger and a metal instrument and thumb with a back-and-forth movement. The presence of mobility was identified in the clinical exam when there was tooth movement greater than 1 mm in the vestibular-lingual direction (13).

The presence of periodontal disease was defined when in the clinical exam tooth movement greater than 1 mm in the vestibular-lingual direction (13) associated with the detection of periodontal bone loss (PBL) in the sagittal view, on CBCT. The PBL was considered present when a distance greater than 2 mm between the cemento-enamel junction and the crest of the alveolar bone at the mesial and distal sides of teeth in the CBCT (14). So, if these conditions were not detection together, the tooth would be classified as no periodontal disease.

The response to the pulp sensitivity to cold test was used to determine the presence or absence of pulpal changes. In this test, refrigerant gas (tetrafluoroethane -50ºC) was sprayed onto a cotton ball attached to a clinical clamp. The preparation was then placed on the buccal surface of the teeth, and the response was noted. A negative response in the dental sensitivity test indicated pulpal necrosis or previous endodontic treatment, whereas a positive reaction indicated a healthy tooth or partial necrosis.

The tooth was considered with pulpar necrosis when it responded negatively to the dental sensitivity test and/or presented an apical radiolucency associated with the tooth apex with a thickness of at least 0.5 mm in the CBCT (15). In cases where

the tooth responded negatively to the dental sensitivity test and there was not periapical lesion, the tooth was considered with pulpal necrosis, because the periapical lesion could not yet have been developed or is not visible, on CBCT, when the root apex protruded or was in contact with the maxillary sinus floor. However, if the dental sensitivity test was positive and the teeth had a periapical inflammation, this is not considered.

In this study, dental alteration (periodontal disease or pulpar necrosis) was judged present when one or more teeth beneath the sinus presented such a condition. It was considered for evaluation, the tooth that has presented periodontal disease or pulpar necrosis and was closer to the maxillary sinus, in both groups (3), due to the fact that teeth closer are more likely to propagate microorganisms to the maxillary sinus. Teeth showed pulp necrosis and periodontal disease were considered twice

Acquisition and analysis of the CBCT images

After the clinical exam, patients with a diagnosis of sinusitis underwent the CBCT exam. The exams were performed at the Radiology Clinic of the School of Dentistry. All images were acquired by the same scanner (I-Cat®, Imaging Sciences International, Hatfield, Pennsylvania, USA) using the following acquisition protocol: 120 kV, 8 mA, rotation time of 26.9 seconds, slice thickness of 0.25 mm, and FOV of 7 x 23 cm.

CBCT images were then evaluated to verify the presence of bone loss and periapical lesion in the maxillary posterior teeth (2nd premolar, 1st molar, and 2nd molar) and to measure the shortest distance between the root apex of these teeth and the external cortical of the maxillary sinus. The evaluation was performed by an endodontist experienced in CBCT images. XoranCat software, version 3.1.62 (Xoran Technologies, Ann Arbor, Michigan, USA) was used for this evaluation, where the brightness and contrast of the images could be adjusted via the software tools to improve visualization. To obtain the measurements, the CT scanner screen was set in multiplanar mode (MPR) with a 0.25-mm slice without a filter. To measure the

reproducibility of the method, 10% of the exams were evaluated at two different times with a two-week interval between them.

For the measurements, the axial and coronal sections were used. The axial section was defined for each root studied based on root apex visualization. From that point, the coronal section corresponding to the pre-defined axial section was determined and then used to measure the shortest distance from the root apex of each dental root in relation to the external cortical of the maxillary sinus (Figure 1).

The teeth were then grouped into four types according to their relationship with the floor of the maxillary sinus: I - the root apex protruded into the maxillary sinus; II - the root apex was in contact with the maxillary sinus floor (MSF) (a root in which the distance is 0); III - the root apex was between 0.1 and 1 mm below the MSF; and IV - the root apex was greater than 1 mm below the MSF (16) (Figure 2). For the apices with roots inside the maxillary sinus, negative values were provided. The measurement of the apex closest to the maxillary sinus was considered in classifying each tooth (3).

At the end of the clinical and tomographic exams, the patients with periodontal disease or pulpar necrosis received guidance and were referred for treatment.

Statistical analysis

Descriptive data analysis and statistical analysis were run in IBM SPSS Statistics software (version 15.0; IBM Corp, Armonk, NY). Data were analysed descriptively (frequencies, means, and standard deviations), and the associations between periodontal disease, pulpar necrosis and proximity of the teeth to the floor of the maxillary sinus with chronic maxillary sinusitis were assessed using the chi-square test. Intra-examiner calibration, in relation to the shortest distance between the root apex of these teeth and the external cortical of the maxillary sinus, was assessed using the Kappa index.

A binary logistic regression analysis was used to determine the factors associated with the presence of chronic maxillary sinusitis. The confidence interval was 95% ($p < 0.05$).

Results

In this study, 159 maxillary sinuses and 413 teeth (2nd premolar, 1st and 2nd molars) were evaluated from 83 individuals (57 women and 26 men). Patient age ranged from 18 to 69 years with a mean of 41.67 (±15.12) years. The presence of maxillary sinusitis was observed in 83 (52.2%) maxillary sinuses.

A single examiner performed the evaluations, and the intra-examiner Kappa was 0.94, which demonstrated excellent agreement.

From the clinical examination, it was observed that among the odontogenic changes studied, the most common was pulpar necrosis (49.1%) (Table 1). 50.6% of maxillary sinuses with chronic maxillary sinusitis (GCMS) presented pulpar necrosis and 28.5% of GCMS presented periodontal disease. Only periodontal disease exhibited a significant association with the presence of chronic maxillary sinusitis ($p < 0.05$) (Figure 3).

Table 1. Correlation between pulpar necrosis and periodontal disease with maxillary sinuses with chronic maxillary sinusitis

		chronic maxillary sinusitis (GCMS) n (%)	no maxillary sinusitis (GNMS) n (%)	Total of maxillary sinuses n (%)	p-values
Pulpar necrosis	Presence	42 (50.6)	36 (47.4)	78 (49.1)	p>0.05
	Absence	41 (49.4)	40 (52.6)	81 (50.9)	
	Total	83	76	159	
Periodontal disease	Presence	24 (28.9)	8 (10.5)	32 (20.1)	p<0.05*
	Absence	59 (71.1)	68 (89.5)	127 (79.9)	
	Total	83	76	159	

* Significant association by Chi-square test ($p \leq 0.05$)

Four hundred and thirteen (413) teeth were analysed, of which 137 (33.2%) were 2nd premolars, 138 (33.4%) were 1st molars, and 138 (33.4%) were 2nd molars. Regarding the proximity of the teeth to the floor of the maxillary sinus, the first molar had the closest contact with the maxillary sinus (48.8% - type I) followed by the second molar (37.2%) and second premolar (6%) (Table 2).

Table 2: Frequency of the proximity of the teeth to the maxillary sinus

Teeth proximity with the maxillary sinus	2º PM n (%)	1º molar n (%)	2º molar n (%)
Type I	6 (14)	21 (48.8)	16(37.2)
Type II	33 (19.5)	64 (37.9)	72 (42.6)
Type III	24 (34.8)	20 (29)	25 (36.2)
Type V	74 (56.1)	33 (25)	25 (18.9)

Note: Type I - the root apex protruded into the maxillary sinus; Type II - the root apex was in contact with the MSF (a root in which the distance is 0); Type III - the root apex was between 0.1 and 1 mm below the MSF; and Type IV - the root apex was greater than 1 mm below the MSF.

Table 3 indicates that maxillary sinuses with chronic maxillary sinusitis (GCMS) was significantly more common in patients with periodontal disease (25% and 45.8% for types I and II, respectively) or pulpar necrosis (12.2% and 39% for types I and II, respectively) in close proximity with the maxillary sinus. In GNMS, the teeth with pulpar necrosis (52.8%) and periodontal disease (66.7%) were more distant from the maxillary sinus (type IV) ($p < 0.05$).

A significant association was noted for the proximity of the tooth that presents pulpar necrosis and periodontal disease with the presence of chronic maxillary sinusitis (Table 3).

Table 3: Correlation between the proximity of the teeth to the maxillary sinus and periodontal disease or pulpar necrosis in the study groups, by maxillary sinus

Groups	Endoperiodontal changes	Teeth proximity with the maxillary sinus				p-values
		Type I n (%)	Type II n (%)	Type III n (%)	Type IV n (%)	
Chronic maxillary sinusitis (GCMS)	With pulpar necrosis	5 (12.2)	16 (39)	6 (14.7)	14 (34.1)	
	Without pulpar necrosis	15 (35.7)	21 (50)	3 (7.15)	3 (7.15)	
No maxillary sinusitis (GNMS)	With pulpar necrosis	0 (0)	8 (22.2)	9 (25)	19 (52.8)	p<0.05*
	Without pulpar necrosis	6 (15)	23 (57.5)	6 (15)	5 (12.5)	
Chronic maxillary sinusitis (GCMS)	With periodontal disease	6 (25)	11 (45.8)	3 (12.5)	4 (16.7)	
	Without periodontal disease	19 (32.8)	25 (43.1)	8 (13.8)	6 (10.3)	p<0.05*
No maxillary sinusitis (GNMS)	With periodontal disease	0 (0)	3 (33.3)	0 (0)	6 (66.7)	
	Without periodontal disease	8 (11.8)	33 (48.5)	19 (27.9)	8 (11.8)	

* Statistically significant for Pearson's Chi-square test ($p \leq 0.05$)

The binary logistic regression analysis indicated that periodontal disease was positively associated with chronic maxillary sinusitis, leading to a 3.45-fold higher association between these disorders ($p<0.05$). In addition, when the tooth lies closer

the maxillary sinus floor, the chance of presenting chronic maxillary sinusitis increases up to 2.5-fold ($p < 0.05$).

Discussion

Odontogenic maxillary sinusitis corresponds to 10-40% of cases of maxillary sinusitis indicating the importance of knowledge about the aetiology, diagnosis, and treatment of this pathology (1,2,17,18).

Various studies have demonstrated that dental changes, such as the presence of periapical lesion and periodontal bone loss, can be associated with cases of mucosal thickening (3-6,19,20). However, this is the first study that correlates the presence of periodontal disease and pulpar necrosis in the maxillary posterior teeth with the presence of chronic maxillary sinusitis via clinical examination of the teeth and CBCT images.

Given its high sensitivity, CBCT was used for the detection the presence of periodontal bone loss and periapical lesion and their relationship with the presence of chronic maxillary sinusitis (1,9). Furthermore, the responses to the dental sensitivity test were combined with CBCT findings (2). A negative response in the dental sensitivity test indicated pulpal necrosis or previous endodontic treatment, whereas a positive reaction indicated a healthy tooth or partial necrosis. These results are useful for assessing the pulp condition, in cases where the presence of a lesion was not observed (21). Electronic pulp testing (EPT) is not used because the thermal testing provides better accuracy of diagnoses when compared with EPT (90% and 75%, respectively), has lower cost and it is available in private clinics and public institutions (22).

The definition of changes in the maxillary sinus differed between studies according to the degree of mucosal thickening (3-6,19,20,23). Some authors note that changes in the maxillary sinus should only be considered when mucosal thickening is greater than 1 mm (3,5,6,19), whereas others demonstrated that mucosal thickening greater than 2 or 3 mm characterizes maxillary sinusitis (4,20,23). Although small, this variation can generate bias in the diagnosis of sinusitis, thus over- or underestimating the actual prevalence of maxillary sinusitis. Therefore, in the

present study, mucosal thickening was not considered in isolation. The diagnosis of chronic maxillary sinusitis was performed by an otorhinolaryngologist through clinical examination using complementary imaging and endoscopic tests. In addition, only patients diagnosed with chronic maxillary sinusitis were included in the study because they are generally more associated with prolonged and ineffective treatments (12).

Regarding the presence of pulpar necrosis and chronic maxillary sinusitis, there was no significant correlation in the present study (Table 1). This fact is consistent with some studies (14,24). However, other studies (3-6,19,20) demonstrated the presence of a significant association between pulpoperiapical condition and mucosal thickening of the maxillary sinus. This difference can be explained by the different classifications of the pulpoperiapical condition and mucosal thickening. In the present study, the presence of a pulpar necrosis was considered according to Gomes et al. (15) associated with the response to the dental sensitivity test during the clinical exam. The clinical diagnosis of maxillary sinusitis by an otorhinolaryngologist was also considered. In other studies (3-6,19,20), the classification only considered periapical changes observed in the CBCT without considering the clinical exam. In addition, in this study, it was observed that no maxillary sinusitis (GNMS) were associated with teeth with pulpar necrosiss more distant from the maxillary sinus (Table 3), which could suggest that this greater distance would hinder microorganism propagation to the maxillary sinus and consequently the development of maxillary sinusitis.

Patients with dental mobility and periodontal bone loss in the maxillary posterior teeth exhibited a 3.45-fold increased risk of developing maxillary sinusitis ($p < 0.05$). Previous studies have reported OR values between 2.5 and 31.8 for mucosal thickening in relation to various degrees of periodontal disease (4,10,19,25). This finding can be explained by the fact that the levels of pathogenic bacteria and inflammatory cytokines are significantly increased in sites with periodontitis. Thus, these products can reach the sinus mucosa through direct diffusion through the porous maxillary bone, causing maxillary sinusitis (26). This knowledge is extremely important during the clinical dental exam, especially in cases where the patient reports chronic maxillary sinusitis, given that this condition may have been caused by the presence of dental mobility of the upper posterior teeth.

In this study, the root apices of the first and second molars exhibited closer proximity to the maxillary sinus compared with the second premolar (Table 2). Although there are various classifications for determining the proximity between the maxillary posterior teeth and the sinus floor, several studies (16,27-30) demonstrated that the molars are more associated with the maxillary sinus floor compared with premolars.

Regarding the correlation of teeth proximity with odontogenic changes and the groups in this study, the chronic maxillary sinusitis (GCMS) is associated with teeth closer to the maxillary sinus (types I and II) independent of the presence of periodontal disease or pulpar necrosis. This finding indicates that some cases of chronic maxillary sinusitis in this study potentially do not associated with an odontogenic source (Table 3).

Chronic maxillary sinusitis (GCMS) is associated with teeth with odontogenic changes close to the maxillary sinus (type I and II), whereas teeth with periodontal disease or pulpar necrosis were more distant from the maxillary sinus (types III and IV) in no maxillary sinusitis group (GNMS) ($p < 0.05$). This result suggests that teeth with periodontal disease or pulpar necrosis closer to the maxillary sinus could provoke the development of maxillary sinusitis. This finding is confirmed by binary logistic regression, which verified that the chance of presenting chronic maxillary sinusitis increases up to 2.5-fold when the tooth lies closer to the sinus. This fact corresponds with the study by Nascimento et al. (19) that demonstrated that the risk of a sinus disorder occurring when there is contact between the tooth and the maxillary sinus is 2.77-fold increased compared with cases without contact.

The significant association between the proximity of the teeth to the maxillary sinus and the development of sinusitis can be explained by the fact that teeth near the maxillary sinus during exodontia and parendodontic surgeries and in cases of periodontal disease can cause damage to the maxillary sinus floor, such as oroantral communication, the presence of a foreign body, or even the propagation of microorganisms of dental origin into the maxillary sinus (6,30).

This study has limitations as a small study population, however, this evaluation was made in two groups, patients with chronic maxillary sinusitis and patients without maxillary sinusitis (control group). Hence, it was possible to do a comparison between the sinus disease and the presence of odontogenic changes. It was considered for evaluation, the tooth that has presented periodontal disease and/or

pulpar necrosis closer to the maxillary sinus due to the fact that teeth closer are more likely to propagate microorganisms to the maxillary sinus.

In addition, it is a cross-sectional observational model. Therefore, a longitudinal experimental study is suggested to determine whether treatment of dental changes would lead to resolution of chronic maxillary sinusitis and to know the relation cause/effect between periodontal disease and pulpar necrosis with chronic maxillary sinusitis. Moreover, studies of the correlation between dental and sinus microbiota are warranted.

In conclusion, the presence of periodontal disease and the teeth apices located closer from the maxillary sinus floor is seen significantly more often in cases of chronic maxillary sinusitis. Therefore, interaction between dental surgeons and an otolaryngology specialist is needed for the diagnosis and treatment of chronic maxillary sinusitis of dental origin.

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References

1. Mehra P, Murad H. Maxillary sinus disease of odontogenic origin. Otolaryngol Clin North Am 2004;37:347-364.
2. Patel NA, Ferguson BJ. Odontogenic sinusitis: an ancient but under-appreciated cause of maxillary sinusitis. Curr Opin Otolaryngol Head Neck Surg 2012;20:24-28.
3. Lu Y, Liu Z, Zhang L, et al. Associations between Maxillary Sinus Mucosal Thickening and Apical Periodontitis Using Cone-Beam Computed Tomography Scanning: A Retrospective Study. J Endod 2012;38:1069–1074.

4. Shanbhag S, Karnik P, Shirke P, et al. Association between pulpar necrosis and maxillary sinus mucosal thickening: a retrospective cone-beam computed tomographic study. J Endod 2013;39:853–857.
5. Sheikhi M, Pozve NJ, Khorrami L. Using cone beam computed tomography to detect the relationship between the periodontal bone loss and mucosal thickening of the maxillary sinus. Dent Res J (Isfahan) 2014;11:495–501.
6. Goller-Bulut D, Sekerci AE, Kose E, et al. Cone beam computed tomographic analysis of maxillary premolars and molars to detect the relationship between periapical and marginal bone loss and mucosal thickness of maxillary sinus. Med Oral Patol Oral Cir Bucal 2015;20:e572-e579.
7. Oberli K, Bornstein MM, von Arx T. Periapical surgery and the maxillary sinus: radiographic parameters for clinical outcome. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;103:848-853.
8. Cymerman, JJ, Cymerman DM, O'Dwyer RS. Evaluation of odontogenic maxillary sinusitis using cone-beam computed tomography: three case reports. J Endod 2011;37:1465–1469.
9. Maillet M, Bowles WR, McClanahan SL, et al. Cone-beam computed tomogaphy evaluation of maxillary sinusitis. J Endod 2011;37:753–757.
10. Brullmann DD, Schmidtmann I, Hornstein S, et al. Correlation of cone beam computed tomography (CBCT) findings in the maxillary sinus with dental diagnoses: a retrospective cross-sectional study. Clin Oral Investig 2012;16:1023–1029.
11. Simuntis R, Kubilius R, Vaitkus S. Odontogenic maxillary sinusitis: A review. Baltic Dental Maxilofac J 2014;16:39-43.
12. Daines SM, Orlandi RR. Chronic rhinosinusitis. Facial Plast Surg Clin N Am 2012;20:1–10.
13. Carranza, FA: Clinical Diagnosis. In Newman, MG; Takei, HH; Carrana FA, editors: Carranza's Clinical Periodontology, 9th Edition. Philadelphia: W.B. Saunders Company, 2002. page 439.
14. Phothikhun S, Suphanantachat S, Chuenchompoonut V, et al. Cone beam computed tomographic evidence of the association between periodontal bone loss and mucosal thickening of the maxillary sinus. J Periodontol 2012;83:557–564.

15. Gomes AC, Nejaim Y, Silva AI, et al. Influence of endodontic treatment and coronal restoration on status of periapical tissues: a cone-beam computed tomographic study. J Endod 2015;41:1614–1618.
16. Ok E, Gungor E, Colak M, Altunsoy M et al. Evaluation of the relationship between the maxillary posterior teeth and the sinus floor using cone-beam computed tomography. Surg Radiol Anat 2014;26:907-914
17. Mehra P, Jeong D. Maxillary sinusitis of odontogenic origin. Curr Infect Dis Rep 2008;10:205–210.
18. Suomalainen A, Kiljunen T, Kaser Y, et al. Dosimetry and image quality of four dental cone beam computed tomography scanners compared with multislice computed tomography scanners. Dentomaxillofac Radiol 2009;38:367–378.
19. Nascimento EH, Pontual ML, Pontual AA, et al. Association between odontogenic conditions and maxillary sinus disease: a study using cone-beam computed tomography. J Endod 2016;42:1509–1515.
20. Nunes CA, Guedes OA, Alencar AH, et al. Evaluation of pulpar necrosiss and their association with maxillary sinus abnormalities on cone-beam computed tomographic images. J Endod 2016;42:42-46.
21. Matsumoto Y, Ikeda T, Yokoi H, et al. Association between odontogenic infections and unilateral sinus opacification. Auris Nasus Larynx 2015;42:288–293.
22. Jespersen JJ, Hellstein J, Williamson A et al. Evaluation of dental pulp sensibility tests in a clinical setting. J Endod. 2014;40:351-354.
23. Guerra-Pereira I, Vaz P, Faria-Almeida R, et al. CT maxillary sinus evaluation-A retrospective cohort study. Med Oral Patol Oral Cir Bucal 2015;1:e419-426
24. Janner SF, Caversaccio MD, Dubach P, et al. Characteristics and dimensions of the Schneiderian membrane: A radiographic analysis using cone beam computed tomography in patients referred for dental implant surgery in the posterior maxilla. Clin Oral Implants Res 2011;22:1446–1453.
25. Vallo J, Suominen-Taipale L, Huumonen S, et al. Prevalence of mucosal abnormalities of the maxillary sinus and their relationship to dental disease in panoramic radiography: results from the Health 2000 Health examination survey. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109:e80–87.
26. Feng Z, Weinberg A. Role of bacteria in health and disease of periodontal tissues. Periodontol 2000. 2006;40:50-76.

27. Pagin O, Centurion BS, Rubira-Bullen IRF, et al. Maxillary sinus and posterior teeth: accessing close relationship by cone-beam computed tomographic scanning in a brazilian population. J Endod 2013;39:748–751.
28. Arx TV, Fodich I, Bornstein MM. Proximity of premolar roots to maxillary sinus: a radiographic survey using cone-beam computed tomography. J Endod 2014;40:1541–1548.
29. Kang SH, Kim BS, Kim Y. Proximity of posterior teeth to the maxillary sinus and buccal bone thickness: a biometric assessment using cone-beam computed tomography J Endod 2015;41:1839–1846.
30. Estrela C, Nunes CABCM, Guedes O, et al. study of anatomical relationship between posterior teeth and maxillary sinus floor in a subpopulation of the brazilian central region using cone-beam computed tomography – part 2. Braz Dental J 2016;27:9-15.

Figures:

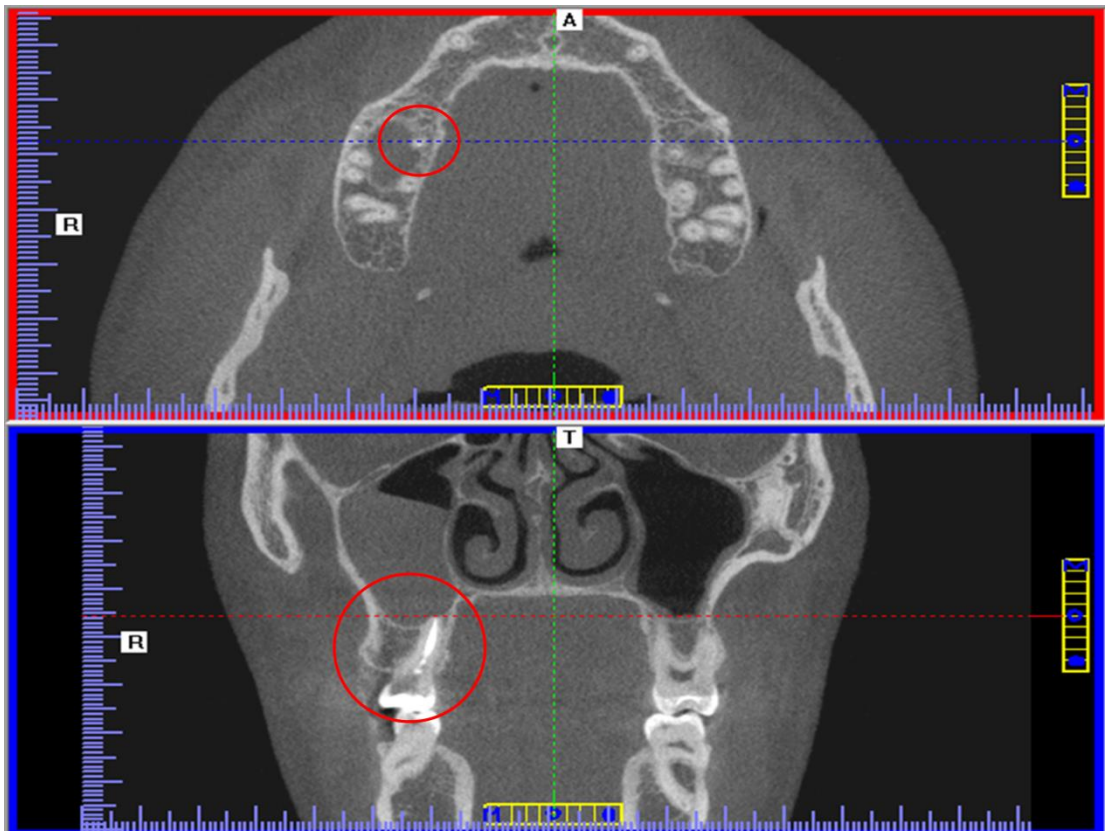

Figure 1: Axial section (red window) and coronal section corresponding to the pre-defined axial section (blue window)

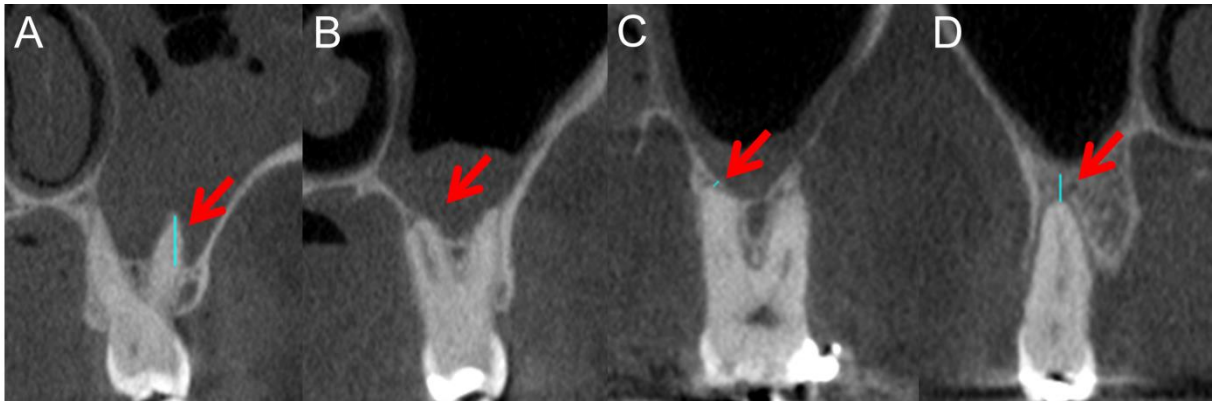

Figure 2: Maxillary CBCT images for the classification of the relationship between the root apex of the maxillary posterior teeth and the MSF. (A) I -the root apex protruded into the maxillary sinus; (B) II - the root apex was in contact with the MSF (a root in which the distance is 0); (C) III - the root apex was between 0.1 and 1 mm below the MSF; and (D) IV - the root apex was greater than 1 mm below the MSF

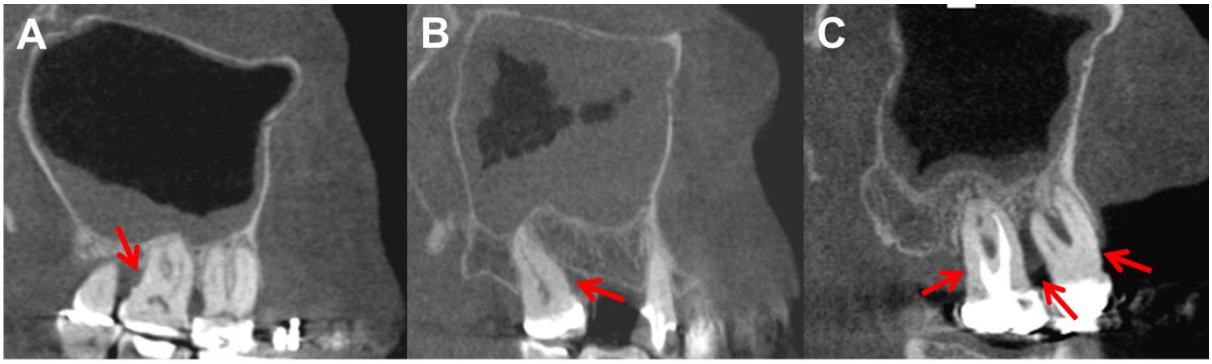

Figure 3: Periodontal bone loss (PBL) associated with chronic sinusitis (red arrow). (A) PBL in the distal of second molar; (B) PBL in the mesial of second molar; (C) PBL in the mesial and distal of fist na second molars.

5 CONSIDERAÇÕES FINAIS

Através do presente estudo, pode-se observar que a presença de mobilidade dos dentes maxilares posteriores está associada à sinusite maxilar crônica. Além disso, dentes mais distantes do assoalho do seio maxilar diminuem a chance do desenvolvimento da sinusite maxilar crônica. Com isso, sugere-se uma maior interação entre cirurgiões-dentistas e médicos otorrinolaringologistas na busca de uma maior eficácia no tratamento das sinusites maxilares crônicas não resolvidas.

REFERÊNCIAS BIBLIOGRÁFICAS

ARIAS-IRIMIA, O.; BARONA-DORADO, C.; SANTOS-MARINO, J. A.; MARTÍNEZ-RODRÍGUEZ, M.; MARTÍNEZ-GONZÁLEZ, J. A. Meta-analisis of the etiology of odontogenic maxillary sinusitis. **Med Oral Patol Oral Cir Bucal.,** v. 15, n.1, p. e70-3, jan. 2010.

ARIJI, Y.; OBAYASHI, N.; GOTO, M; IZUMI, M.; NAITOH, M.; KURITA, K.; SHIMOZATO, K.; ARIJI, E. Roots of the maxillary first and second molars in horizontal relation to alveolar cortical plates and maxillary sinus: computed tomography assessment for infection spread. **Clin Oral Investig.,** v. 10, n. 1, p. 35–41, mar. 2010.

ARX, T. V.; FODICH, I.; BORNSTEIN, M. M. Proximity of premolar roots to maxillary sinus: a radiographic survey using cone-beam computed tomography. **J Endod.,** v. 40, n. 10, p. 1541–48, oct. 2014.

BREMKE, M.; SESTERHENN, A. M.; MURTHUM, T. AL HAIL, A.; BIEN, S.; WERNER, J. A. Digital volume tomography (DVT) as a diagnostic modality of the anterior skull base. **Acta Otolaryngol.,** v. 129, n. 10, p. 1106–14, oct. 2009.

BROOK, I. Sinusitis of odontogenic origin. **Otolaryngol Head Neck Surg.,** v. 135, n.3, p. 349–55, sept. 2006.

BRÜLLMANN, D. D.; SCHMIDTMANN, I.; HORNSTEIN, S.; SCHULZE, R. K.; Correlation of cone beam computed tomography (CBCT) findings in the maxillary sinus with dental diagnoses: a retrospective cross-sectional study. **Clin Oral Invest.,** v. 16, n. 4, p. 1023–29, aug. 2012.

CAKLI, H.; CINGI, C.; AY, Y.; OGHAN, F.; OZER, T.; KAYA, E. Use of cone beam computed tomography in otolaryngologic treatments.**Eur Arch Otorhinolaryngol.,** v. 269, n. 3, p. 711–20, mar. 2012.

CARRANZA, A. **Clinical Diagnosis**. In Newman, MG; Takei, HH; Carrana FA, editors: Carranza's Clinical Periodontology, 9th Edition. Philadelphia: W.B. Saunders Company, 2002. page 439.

CYMERMAN, J. J.; CYMERMAN, D. M.; O'DWYER, R. S. Evaluation of Odontogenic Maxillary Sinusitis Using Cone-Beam Computed Tomography: Three Case Reports. **J Endod.,** v. 37, n. 10, p. 1465–69, oct. 2011.

DAINES, S. M.; ORLANDI, R. R. Chronic Rhinosinusitis. **Facial Plast Surg Clin N Am.,** v. 20, n. 1, p. 1–10, 2012.

ESTRELA, C.; NUNES, C. A. B. C. M.; GUEDES, O.; ALENCAR, A. H. G.; ESTRELA, C. R. A.; SILVA, R. A.; PÉCORA, J. A.; SOUSA-NETO, M. D. Study of anatomical relationship between posterior teeth and maxillary sinus floor in a

subpopulationd of the brazilian central region using cone-beam computed tomography – Part 2. **Braz Dental J.,** v. 27, n. 1, p. 9-15, jan/feb. 2016.

FENG, Z.; WEINBERG, A. Role of bacteria in health and disease of periodontal tissues. **Periodontol 2000.,** v. 40, p. 50-76, 2006.

GOMES, A. C.; NEJAIM, Y.; SILVA, A. L.; HAITER-NETO, F.; COHENCA, N.; ZAIA, A. A.; SILVA, E. J. Influence of endodontic treatment and coronal restoration on status of periapical tissues: a cone-beam computed tomographic study. **J Endod.,** v. 41, n. 10, p. 1614–18, oct. 2015.

GOLLER-BULUT, D.; SEKERCI, A. E.; KÖSE, E.; SISMAN, Y. Cone beam computed tomographic analysis of maxillary premolars andmolars to detect the relationship between periapical and marginal bone loss and mucosal thickness of maxillary sinus. **Med Oral Patol Oral Cir Bucal.,** v. 20, n. 5, p. e572- 79, 2015.

GUERRA-PEREIRA, I.; VAZ, P.; FARIA-ALMEIDA, R.; BRAGA, A. C.; FELINO, A. CT maxillary sinus evaluation-A retrospective cohort study. **Med Oral Patol Oral Cir Bucal.,** v. 1, n. 20, p. e419-26, jul. 2015.

JANNER, S. F.; CAVERSACCIO, M. D.; DUBACH, P.; SENDI, P.; BUSER, D.; BORNSTEIN, M. M. Characteristics and dimensions of the Schneiderian membrane: A radiographic analysis using cone beam computed tomography in patients referred for dental implant surgery in the posterior maxilla. **Clin Oral Implants Res.,** v. 22, n. 12, p. 1446–53, dec. 2011.

KANG, S. H.; KIM, B. S.; KIM. Y. Proximity of posterior teeth to the maxillary sinus and buccal bone thickness: A biometric assessment using cone-beam computed tomography. **J Endod.,** v. 41, n. 11, p. 1839–46, nov. 2015.

KRETZSCHMAR, D. P.; KRETZSCHMAR, J. L. Rhinosinusitis: review from a dental perspective. **Oral Surg Oral Med Oral Pathol Oral Radiol Endod.,** v. 96, n. 2, p. 128–35, aug. 2003.

LECHIEN, J. R.; FILLEUL, O.; ARAUJO, P. C.; HSIEH, J. W.; CHANTRAIN, G.; SAUSSEZ, S. Chronic Maxillary Rhinosinusitis of Dental Origin: A Systematic Review of 674 Patient Cases. **Int J Otolaryngol.,** v. 2014, p. 1-9, 2014.

LU, Y.; LIU, Z.; ZHANG, L.; ZHOU, X.; ZHENG, Q.; DUAN, X.; ZHENG, G.; WANG, H.; HUANG, D. Associations between maxillary sinus mucosal thickening and apical periodontitis using cone-beam computed tomography scanning: A retrospective study. **J Endod.,** v. 28, n. 8, p. 1069–74, aug. 2012.

MAILLET, M.; BOWLES, W. R.; MCCLANAHAN, S. L.; JOHN, M. T.; AHMAD, M. Cone-beam computed tomography evaluation of maxillary sinusitis. **J Endod.,** v. 37, n. 6, p. 753–57, jun. 2011.

MATSUMOTO, Y.; IKEDA, T.; YOKOI, H.; KOHNO, N. Association between odontogenic infections and unilateral sinus opacification. **Auris Nasus Larynx.,** v. 42, n. 4, p. 288-93, aug. 2015.

MEHRA, P.; JEONG, D. Maxillary sinusitis of odontogenic origin.**Curr Infect Dis Rep.,** v. 10, n. 3, p. 205–10, may. 2008.

MEHRA, P.; MURAD, H. Maxillary sinus disease of odontogenic origin. **Otolaryngol Clin North Am.,** v. 37, n. 2, p. 347–64, apr. 2004

NASCIMENTO, E. H. L.; PONTUAL, M. L. A.; PONTUAL, A. A.; FREITAS, D. Q.; PEREZ, D. E. C.; RAMOS-PEREZ, F. M. M. Association between odontogenic conditions and maxillary sinus disease: A study using cone-beam computed tomography.**J Endod.,** v. 42, n. 10, p. 1509-15, oct. 2016.

NUNES, C. A.; GUEDES, O. A.; ALENCAR, A. H.; PETERS, O. A.; ESTRELA, C. R.; ESTRELA, C. Evaluation of periapical lesions and their association with maxillary sinus abnormalities on cone-beam computed tomographic images. **J Endod.,** v. 42, n. 1, p. 42-6, jan. 2016.

OBAYASHI, N.; ARIJI, Y.; GOTO, M.; IZUMI, M.; NAITOH, M.; KURITA K.; SHIMOZATO, K.; ARIJI, E. Spread of odontogenic infection originating in the maxillary teeth: computerized tomographic assessment. **Oral Surg Oral Med Oral Pathol Oral Radiol Endod.,** v. 98, n. 2, p. 223–31, aug. 2004.

OBERLI, K.; BORNSTEIN, M. M.; VON ARX, T. Periapical surgery and the maxillary sinus: radiographic parameters for clinical outcome. **Oral Surg Oral Med Oral Pathol Oral Radiol Endod.,** v. 103, n. 6, p. 848-53, jun. 2007.

OK, E.; GUNGOR, E.; COLAK, M.; ALTUNSOY, M.; NUR, B. G.; AGLARCI, O. S. Evaluation of the relationship between the maxillary posterior teeth and the sinus floor using cone-beam computed tomography. **Surg Radiol Anat.,** v. 36, n. 9, p. 907-14, mai. 2014.

PAGIN, O.; CENTURION, B. S.; RUBIRA-BULLEN, I. R. F.; CAPELOZZA, A. L. A. Maxillary sinus and posterior teeth: Accessing close relationship by cone-beam computed tomographic scanning in a brazilian population. **J Endod.,** v. 39, n. 6, p. 748–51, jun. 2013.

PATEL, N. A.; FERGUSON, B. J. Odontogenic sinusitis: an ancient but under-appreciated cause of maxillary sinusitis. **Curr Opin Otolaryngol Head Neck Surg.,** v. 20, n. 1, p. 24-8, feb. 2012.

PHOTHIKHUN, S.; SUPHANANTACHAT, S.; CHUENCHOMPOONUT, V.; NISAPAKULTORN, K. Cone beam computed tomographic evidence of the association between periodontal bone loss and mucosal thickening of the maxillary sinus. **J Periodontol.,** v.83, n. 5, p. 557–64, sept. 2012.

SHANBHAG, S.; KARNIK, P.; SHIRKE, P.; SHANBHAG, V. Association between periapical lesions and maxillary sinus mucosal thickening: A retrospective cone-beam computed tomographic study. **J Endod.,** v. 39, n. 7, p. 853–57, jul. 2013.

SHEIKHI, M.; POZVE, N. J.; KHORRAMI, L. Using cone beam computed tomography to detect the relationship between the periodontal bone loss and mucosal thickening of the maxillary sinus. **Dent Res J (Isfahan).,** v. 11, n. 4, p. 495-501, jul/aug. 2014.

SIMUNTIS, R.; KUBILIUS, R.; VAITKUS, S. Odontogenic maxillary sinusitis: A review Stomatologija, **Baltic Dental Maxilofac J.,** v. 16, n. 2, p. 39-43, 2014.

SUOMALAINEN, A.; KILJUNEN, T.; KASER, Y.; PELTOLA, J.; KORTESNIEMI, M. Dosimetry and image quality of four dental cone beam computed tomography scanners compared with multislice computed tomography scanners. **Dentomaxillofac Radiol.,** v. 38, n. 6, p. 367–78, sept. 2009.

VALLO, J.; SUOMINEN-TAIPALE, L.; HUUMONEN, S.; SOIKKONEN K.; NORBLAD A. Prevalence of mucosal abnormalities of the maxillary sinus and their relationship to dental disease in panoramic radiography: results from the Health 2000 Health Examination Survey. **Oral Surg Oral Med Oral Pathol Oral Radiol Endod.,** v. 109, n. 3, p. e80-7, mar. 2010.

WATZEK, G.; BERNHART, T.; ULM, C. Complications of sinus perforations and their management in endodontics. **Dent Clin North Am.,** v. 41, n. 3, p. 563-83, 1997.

ANEXO A – Parecer Consubstanciado do Comitê de Ética em Pesquisa

HOSPITAL UNIVERSITÁRIO DA UNIVERSIDADE FEDERAL DE JUIZ DE FORA-MG

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Avaliação da relação entre a presença de sinusite crônica com diagnóstico de alterações nos dentes maxilares posteriores

Pesquisador: Celso Neiva Campos

Área Temática:

Versão: 2

CAAE: 52337715.4.0000.5133

Instituição Proponente: UNIVERSIDADE FEDERAL DE JUIZ DE FORA UFJF

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 1.461.931

Apresentação do Projeto:

O Projeto de pesquisa apresenta um estudo que pretende avaliar 120 indivíduos divididos em dois grupos,provenientes do ambulatório de Otorrinolaringologia do Hospital Universitário da Universidade Federal de Juiz de Fora. Grupo I: Serão observados pacientes diagnosticados com sinusite maxilar crônica por Otorrinolaringologista. Excluindo os pacientes com sinusite maxilar comprovadamente alérgica, edentulismo da rcada superior.Grupo 2: Serão avaliados 60 pacientes da Clínica de Endodontia, cujo Critério de inclusão será: Pacientes que apresentarem necrose pulpar em pelo menos um dente maxilar posterior, diagnosticada após a avaliação clínica pelo pesquisador

especialista em Endodontia e não possuir histórico de sinusite crônica.Critérios de exclusão) Pacientes com edentulismo da arcada superior e com histórico de sinusite crônica. Os dados clínicos obtidos serão tabulados no software SPSS 21 e submetidos a uma análise estatística. O teste utilizado dependerá da análise de normalidade dos dados. O nível de significância será de 5%.

Objetivo da Pesquisa:

Avaliar a relação entre a presença de sinusite maxilar crônica com diagnóstico de alterações nos dentes posteriores maxilares em uma amostra de pacientes diagnosticados com sinusite crônica

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que realizarão a Tomografia computadorizada Cone Beam, de modo a estabelecer uma correlação entre estas patologias e avaliar possíveis alterações do seio maxilar em pacientes diagnosticados com necrose pulpar e lesão periapical; Verificar a existência de relação entre a proximidade das lesões periapicais e das raízes dos dentes maxilares posteriores com o seio maxilar.maxilares posteriores.

Avaliação dos Riscos e Benefícios:

Entre os benefícios pode se considerar que através deste estudos poderá vir a contribuição para um melhor esclarecimento sobre a associação entre alterações sinusais e problemas dentários, o que ajudará no diagnóstico diferencial entre sinusite de origem nasal e de origem odontogênica. Com isso, o paciente poderá ter a possibilidade de

obter a cura de uma doença que se arrasta por anos. Além disso, permitirá uma maior interação entre os Otorrinolaringologistas e os Cirurgiões- Dentistas para realizarem um plano de tratamento adequado para os pacientes em questão. A pesquisa pode ser considerada de riscos mínimo pois apenas o desconforto da tomografia é considerado.

Comentários e Considerações sobre a Pesquisa:

A presença de sinusite crônica pode estar relacionada com problemas nos dentes maxilares posteriores e com isto grande sofrimento para os pacientes e perda dos dentes pelas doenças periodentais. Assim sendo este estudo tem importância e relevância para a comunidade científica e para os participantes dela.

Considerações sobre os Termos de apresentação obrigatória:

Os critérios de inclusão e exclusão estão bem definidos. Será realizada em instituição habilitada e por profissionais com curriculo coerente com a proposta. Os exames a serem realizados, no caso as Tomografias serão feitas dentro do tratamento já existente no ambulatório e está declarado pelo órgão competente.No TCLE estão descritos os procedimentos, riscos e ressarcimento em caso de alguma evnetualidadee por parte dos pesquisadores. Todos os documentos anexos,carta de encaminhamento, declaração de concordância, orçamento,declaração de infraestrutura,curriculo lates dos

pesquisadores estão anexos e correspondem ao solicitado na Resolução 466.

Conclusões ou Pendências e Lista de Inadequações:

Projeto aprovado.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_612517.pdf	16/02/2016 13:01:39		Aceito
Declaração de Pesquisadores	declaracao_tomografia_pesquisador.pdf	16/02/2016 13:01:01	Carolina Oliveira de Lima	Aceito
Declaração de Instituição e Infraestrutura	declaracao_sem_custo_tomografia_assinada.docx	14/02/2016 15:50:29	Carolina Oliveira de Lima	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	Termo_de_Compromisso_livre_e_esclarecido_modificado.docx	14/02/2016 15:42:42	Carolina Oliveira de Lima	Aceito
Declaração de Instituição e Infraestrutura	Declaracao_de_infraestrutura_faculdade_odontologia_assinada.docx	28/01/2016 12:11:49	Carolina Oliveira de Lima	Aceito
Orçamento	orcamento_assinado_pelo_orientador.docx	08/01/2016 09:42:54	Carolina Oliveira de Lima	Aceito
Folha de Rosto	folha_de_rosto.pdf	08/01/2016 09:32:17	Carolina Oliveira de Lima	Aceito
Outros	comprovante_cadastro_do_projeto.pdf	11/12/2015 20:31:58	Carolina Oliveira de Lima	Aceito
Outros	comprovante_registro_cadastro_pesquisador.pdf	11/12/2015 20:31:15	Carolina Oliveira de Lima	Aceito
Outros	declaracao_de_concordancia_faculdade_odontologia_tomografia_assinada.pdf	11/12/2015 20:30:29	Carolina Oliveira de Lima	Aceito
Outros	carta_de_encaminhamento.pdf	11/12/2015 20:29:00	Carolina Oliveira de Lima	Aceito
Outros	aprovacao_do_orcamento_comite_hospital_universitario.pdf	11/12/2015 20:27:37	Carolina Oliveira de Lima	Aceito
Outros	termo_de_confidencialidade_e_sigilo_assinado.pdf	11/12/2015 20:25:07	Carolina Oliveira de Lima	Aceito
Outros	declaracao_concordancia_hospital_universitario_assinado.pdf	11/12/2015 20:24:09	Carolina Oliveira de Lima	Aceito
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Projeto Detalhado / Brochura Investigador	projeto_de_pesquisa.doc	11/12/2015 20:06:53	Carolina Oliveira de Lima	Aceito
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Outros	curriculo_lattes_Carolina.pdf	25/11/2015 20:06:27	Carolina Oliveira de Lima	Aceito

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Continuação do Parecer: 1.461.931

Outros	curriculo_lattes_Karina.docx	25/11/2015 20:02:49	Carolina Oliveira de Lima	Aceito
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TCLE / Termos de Assentimento / Justificativa de Ausência	Termo_de_Compromisso_livre_e_esclarecido.docx	25/11/2015 19:40:34	Carolina Oliveira de Lima	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

JUIZ DE FORA, 22 de Março de 2016

Assinado por:
Gisele Aparecida Fófano
(Coordenador)

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ANEXO B – Normas do periódico “Journal of Endodontics”

Introduction

The *Journal of Endodontics* is owned by the American Association of Endodontists. Submitted manuscripts must pertain to endodontics and may be original research (eg, clinical trails, basic science related to the biological aspects of endodontics, basic science related to endodontic techniques, case reports, or review articles related to the scientific or applied aspects of endodontics). Clinical studies using CONSORT methods (http://www.consort-statement.org/consort-statement/) or systematic reviews using meta-analyses are particularly encouraged. Authors of potential review articles are encouraged to first contact the Editor during their preliminary development via e-mail at *JEndodontics@UTHSCSA.edu*. Manuscripts submitted for publication must be submitted solely to *JOE*. They must not be submitted for consideration elsewhere or be published elsewhere.

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Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:
• E-mail address
• Full postal address
All necessary files have been uploaded:
Manuscript:
• Include keywords
• All figures (include relevant captions)
• All tables (including titles, description, footnotes)
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• Indicate clearly if color should be used for any figures in print
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Supplemental files (where applicable)

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• Journal policies detailed in this guide have been reviewed• Referee suggestions and contact details provided, based on journal requirements
For further information, visit our Support Center

Before You Begin

Ethics in publishing
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.
Human and animal rights
If the work involves the use of human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; Uniform Requirements for manuscripts submitted to Biomedical journals. Authors should include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed.
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Preparation

General Points on Composition

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a. The paragraph is the ideal unit of organization. Paragraphs typically start with an introductory sentence that is followed by sentences that describe additional detail or examples. The last sentence of the paragraph provides conclusions and forms a transition to the next paragraph. Common problems include one-sentence paragraphs, sentences that do

not develop the theme of the paragraph (see also section “c,” below), or sentences with little to no transition within a paragraph.
b. Keep to the point. The subject of the sentence should support the subject of the paragraph For example, the introduction of authors’ names in a sentence changes the subject and lengthens the text. In a paragraph on sodium hypochlorite, the sentence, “In 1983, Langeland et al, reported that sodium hypochlorite acts as a lubricating factor during instrumentation and helps to flush debris from the root canals” can be edited to: “Sodium hypochlorite acts as a lubricant during instrumentation and as a vehicle for flushing the generated debris (Langeland et al, 1983).” In this example, the paragraph’s subject is sodium hypochlorite and sentences should focus on this subject.
c. Sentences are stronger when written in the active voice, that is, the subject performs the action. Passive sentences are identified by the use of passive verbs such as “was,” “were,” “could,” etc. For example: “Dexamethasone was found in this study to be a factor that was associated with reduced inflammation,” can be edited to: “Our results demonstrated that dexamethasone reduced inflammation.” Sentences written in a direct and active voice are generally more powerful and shorter than sentences written in the passive voice.
d. Reduce verbiage. Short sentences are easier to understand. The inclusion of unnecessary words is often associated with the use of a passive voice, a lack of focus, or run-on sentences. This is not to imply that all sentences need be short or even the same length. Indeed, variation in sentence structure and length often helps to maintain reader interest. However, make all words count. A more formal way of stating this point is that the use of subordinate clauses adds variety and information when constructing a paragraph. (This section was written deliberately with sentences of varying length to illustrate this point.)
e. Use parallel construction to express related ideas. For example, the sentence, “Formerly, endodontics was taught by hand instrumentation, while now rotary instrumentation is the common method,” can be edited to “Formerly, endodontics was taught using hand instrumentation; now it is commonly taught using rotary instrumentation.” The use of parallel construction in sentences simply means that similar ideas are expressed in similar ways, and this helps the reader recognize that the ideas are related
f. Keep modifying phrases close to the word that they modify. This is a common problem in complex sentences that may confuse the reader. For example, the statement, “Accordingly, when conclusions are drawn from the results of this study, caution must be used,” can be edited to “Caution must be used when conclusions are drawn from the results of this study.”
g. To summarize these points, effective sentences are clear and precise, and often are short, simple and focused on one key point that supports the paragraph’s theme.
h. Authors should be aware that the JOE uses iThenticate, plagiarism detection software, to ensure originality and integrity of material published in the journal. The use of copied sentences, even when present within quotation marks, is highly discouraged. Instead, the information of the original research should be expressed by the new manuscript author’s own words, and a proper citation given at the end of the sentence. Plagiarism will not be tolerated and manuscripts will be rejected or papers withdrawn after publication based on unethical actions by the authors. In addition, authors may be sanctioned for future publication.

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Introduction, Methods, Results, Conclusions

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The authors deny any conflicts of interest related to this study.

Original Research Article Guidelines

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The Abstract concisely describes the purpose of the study in 250 or fewer words. It must be organized into sections: Introduction, Methods, Results, and Conclusions. The hypothesis is described in the Abstract Introduction. The Abstract describes the new contributions made by this study. The Abstract word limitation and its wide distribution (eg, PubMed) make it challenging to write clearly. This section is written last by many authors. Write the abstract in past tense because the study has been completed. Provide 3-5 keywords.

Introduction

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Tables

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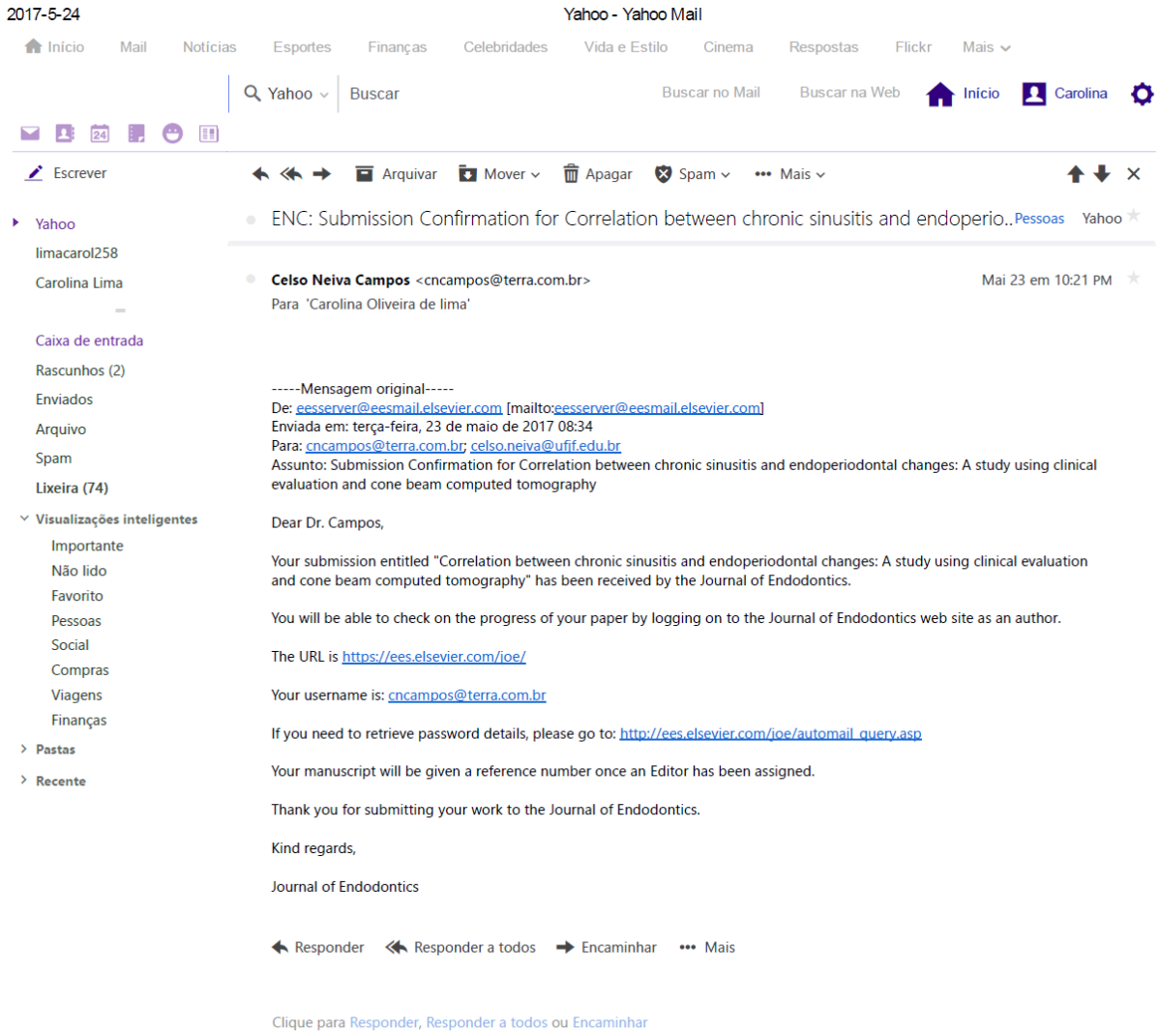

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ENC: Submission Confirmation for Correlation between chronic sinusitis and endoperio.. Pessoas Yahoo

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Title: Correlation between chronic sinusitis and endoperiodontal changes: A study using clinical evaluation and cone beam computed tomography

Article Type: Clinical Research

Keywords: maxillary sinus; maxillary sinusitis; dental pulp necrosis; alveolar bone loss; teeth.

Corresponding Author: Prof. Celso Neiva Campos, Ph.D.

Corresponding Author's Institution: Federal University of Juiz de Fora

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Abstract: Introduction: The proximity of the roots of maxillary posterior teeth to the maxillary sinus floor can be associated with the development of chronic maxillary sinusitis. Therefore, this study evaluated the correlation between odontogenic endoperiodontal change conditions in maxillary posterior teeth and the presence of maxillary sinusitis. Methods: A total of 83 patients (159 maxillary sinuses) were selected and underwent clinical dental examination to assess tooth mobility and tooth pulp condition. In addition, cone beam computed tomography was performed to evaluate the presence of periapical lesions, periodontal bone loss and measure the distance from the root apices to the cortical boundary of the maxillary sinus. The patients were divided into two groups: G1- maxillary sinuses with sinusitis; G2 - maxillary sinuses without sinusitis. Data were tabulated and analysed using Pearson's chi-square test ($p<0.05$). Results: Tooth mobility was positively associated with maxillary sinusitis, leading to a 3.45-fold increased risk of developing the disorder ($p=0.007$). Maxillary sinusitis (G1) is associated with teeth with endoperiodontal changes near the maxillary sinus, whereas teeth with endoperiodontal changes were more distant from the maxillary sinus in G2 ($p<0.05$). To the extent that the tooth is more distant from the maxillary sinus floor, the risk of presenting maxillary sinusitis is reduced up to 2.5-fold ($p=0.003$). Conclusion: Tooth mobility and proximity to the maxillary sinus are associated with cases of maxillary odontogenic sinusitis, requiring better interactions between dental surgeons and an otolaryngology specialists for treatment of the disorder.

APÊNDICE A - Termo de Consentimento Livre e Esclarecido

UNIVERSIDADE FEDERAL DE JUIZ DE FORA
COMITÊ DE ÉTICA EM PESQUISA – CEP HU/UFJF
JUIZ DE FORA – MG – BRASIL

Departamento de Clínica Odontológica da Faculdade de Odontologia da Universidade Federal de Juiz de Fora

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TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

O Sr. (a) está sendo convidado (a) como voluntário (a) a participar da pesquisa **"Avaliação da correlação entre a presença de sinusite crônica com diagnóstico de alterações nos dentes maxilares posteriores".** Nesta pesquisa pretendemos **analisar a relação entre a presença de alterações dentárias, como infecção ou inflamação nos dentes superiores posteriores com a presença de sinusite maxilar crônica. O motivo que nos leva a realizar este trabalho deve-se ao fato de que existem poucos estudos que avaliam a associação entre estas doenças. Estas avaliações podem ajudar a identificar alterações sinusais e explicar casos de pacientes com sinusite maxilar crônica, que se arrastam por anos, mesmo com tratamento. Isto pode ser causado por uma sinusite de origem nos dentes e não de origem nasal.**

Para esta pesquisa, adotaremos os seguintes procedimentos: **uma avaliação clínica da condição dos seus dentes e um exame por Tomografia Computadoriza de Feixe Cônico, no Departamento de Radiologia Odontológica, da Faculdade de Odontologia da Universidade Federal de Juiz de Fora, para avaliarmos a presença de problemas dentários e alterações no seio maxilar. Há a existência de risco mínimo previsível em função da execução de exame clínico e exame tomográfico, destacando que nenhum dos exames são invasivos ou requerem preparação prévia para o mesmo. Os exames seguirão os protocolos recomendados para suas execuções. A pesquisa contribuirá para um melhor esclarecimento sobre a possível associação entre alterações no seio maxilar e problemas dentários, o que ajudará no diagnóstico diferencial entre estes dois problemas. Além disso, permitirá uma maior interação entre os Otorrinolaringologistas e os Cirurgiões-Dentistas para realizarem um plano de tratamento adequado e eficaz para cada paciente. De acordo com os resultados do seu exame, você será encaminhado para o tratamento de canal nas Clínicas de Endodontia ou Clínicas Integradas de Atenção Secundária, do Departamento de Clínica Odontológica da Universidade Federal de Juiz de Fora e/ou para o Serviço de Otorrinolaringologia do Hospital Universitário da Universidade Federal de Juiz de Fora.**

Para participar deste estudo o Sr (a) não terá nenhum custo, nem receberá qualquer vantagem financeira. Apesar disso, caso sejam identificados e comprovados danos provenientes desta pesquisa, o Sr.(a) tem assegurado o direito a indenização. O Sr. (a) terá o esclarecimento sobre o estudo em qualquer aspecto que desejar e estará livre para participar ou recusar-se a participar. Poderá retirar seu consentimento ou interromper a participação a qualquer momento. A sua participação é voluntária e a recusa em participar não acarretará qualquer penalidade ou modificação na forma em que o Sr. (a) é atendido (a) pelo pesquisador, que tratará a sua identidade com padrões profissionais de sigilo. Os resultados da pesquisa estarão à sua disposição quando finalizada. Seu nome ou o material que indique sua participação não será liberado sem a sua permissão.

O (A) Sr (a) não será identificado (a) em nenhuma publicação que possa resultar desta pesquisa.

Este termo de consentimento encontra-se impresso em duas vias originais, sendo que uma será arquivada pelo pesquisador responsável, na **Secretária do Mestrado em Clínica Odontológica da Faculdade de Odontologia da Universidade Federal de Juiz de Fora**e a outra será fornecida ao Sr. (a). Os dados e instrumentos utilizados na pesquisa ficarão arquivados com o pesquisador responsável por um período de 5 (cinco) anos, e após esse tempo serão destruídos. Os pesquisadores tratarão a sua identidade com padrões profissionais de sigilo, atendendo a legislação brasileira (Resolução Nº 466/12 do Conselho Nacional de Saúde), utilizando as informações somente para os fins acadêmicos e científicos.

Eu, _____, portador do documento de Identidade _____ fui informado (a) dos objetivos da pesquisa **"Avaliação da relação entre a presença de sinusite crônica com diagnóstico de alterações nos dentes maxilares posteriores",** de maneira clara e detalhada e esclareci minhas dúvidas. Sei que a qualquer momento poderei solicitar novas informações e modificar minha decisão de participar se assim o desejar.

Declaro que concordo em participar. Recebi uma via original deste Termo de Consentimento Livre e Esclarecido e me foi dada à oportunidade de ler e esclarecer as minhas dúvidas.

Juiz de Fora, _____ de _____ de 2016.

_____ _____

Nome e assinatura do(a) participante Data

_____ _____

Nome e assinatura do(a) pesquisador Data

_____ _____

Nome e assinatura da testemunha Data

Em caso de dúvidas com respeito aos aspectos éticos deste estudo, você poderá consultar o CEP HU – Comitê de Ética em Pesquisa HU/UFJF – Hospital universitário Unidade Santa Catarina

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