

UNIVERSIDADE FEDERAL DE JUIZ DE FORA
CENTRO INTEGRADO DE SAÚDE – FACULDADE DE ODONTOLOGIA
PPG – MESTRADO EM CLÍNICA ODONTOLÓGICA

Lívia Machado Lima Makris

**AVALIAÇÃO DA TOPOGRAFIA DOS DENTES POSTERIORES E SUA
RELAÇÃO COM O SEIO MAXILAR**

JUIZ DE FORA

2017

LÍVIA MACHADO LIMA MAKRIS

**AVALIAÇÃO DA TOPOGRAFIA DOS DENTES POSTERIORES E SUA
RELAÇÃO COM O SEIO MAXILAR**

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

Área de concentração: Clínica Odontológica.

Orientador: Prof. Dr. Celso Neiva Campos

Juiz de Fora

2017

Ficha catalográfica elaborada através do programa de geração automática da Biblioteca Universitária da UFJF, com os dados fornecidos pelo(a) autor(a)

Makris, Livia Machado Lima.

AVALIAÇÃO DA TOPOGRAFIA DOS DENTES POSTERIORES E SUA REALAÇÃO COM O SEIO MAXILAR / Livia Machado Lima Makris. -- 2017.

70 f.

Orientador: Celso Neiva Campos

Dissertação (mestrado acadêmico) - Universidade Federal de Juiz de Fora, Faculdade de Odontologia. Programa de Pós Graduação em Clínica Odontológica, 2017.

1. sinusite odontogênica. 2. tomografia computadorizada de feixe cônico. 3. dentes posteriores. I. Campos, Celso Neiva, orient. II.

Título.

LÍVIA MACHADO LIMA MAKRIS

**AVALIAÇÃO DA TOPOGRAFIA DOS DENTES POSTERIORES E SUA
RELAÇÃO COM O SEIO MAXILAR**

Dissertação apresentada ao programa de Pós-graduação em Clínica Odontológica da Faculdade de Odontologia de Juiz de Fora da Universidade Federal de Juiz de Fora, como requisito para o exame de qualificação para obtenção do grau de Mestre. Área de concentração: Clínica Odontológica.

Aprovada em _____ de _____ de 2017.

BANCA EXAMINADORA

Prof. Dr. Celso Neiva Campos (Orientador)
(Universidade Federal de Juiz de Fora)

Prof^a. Dra. Karina Lopes Devito
(Universidade Federal de Juiz de Fora)

Prof. Dr. Paulo Sérgio dos Santos D'Addazio
(Faculdade de Ciências Médicas Suprema)

DEDICATÓRIAS

Ao meu filho Matheus, que de dentro do meu ventre, me deu forças para continuar e não me deixou desistir. E soube lidar com a minha ausência necessária para a conclusão do mestrado. A você, meu filho, todo meu amor e dedicação sempre.

Aos meus pais Márcia e Fernando, e minha irmã Isis, grandes incentivadores e apoiadores. Sem vocês não teria sido possível. Obrigada por tanto amor.

Ao meu marido Jean, que me incentivou e ajudou sempre. Obrigada por tudo amor, meu parceiro da vida. Sem seu apoio e seu amor não teria conseguido.

Ao meu tão amado avô Chico, que infelizmente não conseguiu estar aqui para ver minha defesa, pois Deus o quis antes, para me apoiar e me guiar lá de cima. Obrigada por todo amor que sempre dedicou a mim, toda força e incentivo que sempre me deu. Amor e saudade eternamente.

AGRADECIMENTOS

Em primeiro lugar agradeço à Deus por ter me permitido chegar até aqui.

Ao Prof. Celso Neiva Campos, pela confiança e oportunidade de poder trabalhar e apreender ao seu lado. Grande professor, amigo e orientador. Inspiração para carreira minha acadêmica.

À Prof^a. Karina Lopes Devito, por ser sempre tão disponível e me ajudar a realizar minha pesquisa. Excelente de profissional, professora e amiga. Apreendi muito com você. Obrigada pela confiança.

Às meninas da secretaria, Wanessa e Letícia, sempre dispostas a ajudar, ouvir, e tentar resolver qualquer imprevisto. Muito obrigada.

Aos meu colegas de turma, por toda parceria e amizade ao longo do curso.

A Carol por ter me ajudado nessa tão importante reta final.

Aos alunos da clínica de endodontia II e aos pacientes, por permitirem que eu ensinasse e apreendesse com eles todos os dias.

A toda a equipe de professores e funcionários da UFJF.

Aos professores Paulo Sérgio D'Addazio, Hugo de Andrade Filho e Antônio Márcio Resende por participarem da minha banca. Muito obrigada.

"Sonhos determinam o que você quer.
Ação determina o que você conquista."

Aldo Novak

RESUMO

A sinusite maxilar de origem odontogênica é encontrada em cerca de 10% a 12% dos casos de sinusite maxilar. Algumas raízes de dentes posteriores superiores podem estar muito próximas ou invaginadas para o interior do seio maxilar. Nestes casos podem facilitar o desenvolvimento ou perpetuação da sinusite crônica, quando associadas a problemas dentais. Assim, deve-se sempre considerar a relação anatômica do seio maxilar com as raízes dentárias no diagnóstico das alterações pulpares e periapicais, no tratamento endodôntico e procedimentos cirúrgicos. O objetivo deste trabalho foi avaliar, a partir de imagens de tomografia computadorizada de feixe cônico, a relação de proximidade entre os ápices radiculares de dentes superiores posteriores (segundo pré-molar, primeiro molar e segundo molar) com as corticais do seio maxilar e as corticais ósseas vestibular ou palatina. Para isso, serão determinadas as distâncias entre os ápices radiculares e as corticais mais próximas. As mensurações foram realizadas a partir de cortes axial e coronal no software i-CAT® Vision, e após, foram classificadas em três grupos, G1 – ápice radicular dentro do seio maxilar, G2 – ápice radicular até 1 mm da cortical do seio maxilar, G3 – ápice radicular com mais de 1 mm da cortical do seio maxilar. Observou-se que com o aumento da idade há uma maior proximidade dos dentes avaliados com a cortical óssea ($p < 0.05$) e uma menor proximidade do 2M ($p = 0.005$), com o seio maxilar. 207 molares (45,8%) apresentaram pelo menos uma das raízes dentro do SM. No grupo 2, não houve diferença entre os dentes avaliados. No grupo 3, os 2PM apresentaram-se mais frequentes (72%) que os 1M e 2M. Com o aumento da idade, existe uma maior proximidade dos dentes com a cortical óssea e uma menor proximidade com o seio maxilar. A raiz mésio-vestibular do 2M superior é a raiz mais próxima da cortical sinusal, enquanto o 1M superior é o dente mais próximo da cortical óssea alveolar.

Palavras chaves: sinusite maxilar odontogênica, tomografia computadorizada de feixe cônico, dentes posteriores.

ABSTRACT

The odontogenic maxillary sinusitis is found in about 5% to 10% of cases of maxillary sinusitis. Some roots of upper posterior teeth may be too close together or invaginated into the maxillary sinus. In these cases can facilitate the development and perpetuation of chronic sinusitis, when associated with dental problems. Like this, one should always consider the anatomical relationship of the maxillary sinus with the dental roots in the diagnosis of pulp and periapical changes in endodontic treatment and surgical procedures. The objective of this study is to evaluate, from images obtained through computed tomography cone-beam, the close relationship between the root tips of upper posterior teeth, second premolar, first molar and second molar, with the sinus cortical jaw, buccal and palatal. For this, the distances between the root apexes and the cortical ones will be determined. The roots will be distributed into three groups. The measurements will be held from axial and coronal sections in i-CAT® Vision software, and will be classified into four three, G1- root apex in maxillary sinus, G2- apex até 1mm the cortical bone of the maxillary sinus, G3- apex root more than 1 mm from the cortical bone of the maxillary sinus. It was observed that when increases the age, there is a greater proximity of the evaluated teeth regarding the maxillary cortical bone ($p < 0.05$) and less proximity of 2M to MS ($p = 0.005$). 207 molars (45.8%) had at least one of the roots within the MS. In the group G2, there was no difference between the evaluated teeth. In group G3, 2PM were more frequent (72%) than 1M and 2M. When increasing age, there is a greater proximity of the teeth to the maxillary cortical bone and a lesser proximity to the MS. The mesiobuccal root of the maxillary 2M is the closest root to the MS cortical, while the maxillary 1M is the closest tooth to the maxillary cortical bone.

Key words: odontogenic maxillary sinusitis, cone beam computed tomography, posterior teeth.

LISTA DE ABREVIATURAS E SIGLAS

CA	Corte axial
DV	Disto vestibular
FN	Fossa nasal
GN	Gênero
ID	Idade
mm	Milímetros
MV	Mésio vestibular
PAC	Paciente
SM	Seio maxilar
1M	Primeiro molar
2PM	Segundo pré-molar
2M	Segundo molar
TCFC	Tomografia computadorizada de feixe cônico
EUA	Estados Unidos das Américas
MPR	Multiplanar reconstruction
V	Vestibular
P	Palatina
TCCB	Tomografia computadorizada cone beam

LISTA DE SÍMBOLOS

<	menor que
>	maior que
μ	Micrometros
%	Porcentagem

LISTA DE ILUSTRAÇÕES

Figura 1	Imagem de corte axial de TCFC mostrando a menor medida entre o ápice radicular da raiz V do segundo pré-molar superior direito e a cortical óssea mais próxima, no caso a vestibular	19
Figura 2	Imagem de corte axial de TCFC mostrando a menor medida entre o ápice radicular da raiz P do primeiro molar superior direito e a cortical óssea mais próxima, no caso a palatina	20
Figura 3	Imagem de corte coronal de TCFC mostrando a menor medida entre o ápice radicular da raiz MV do segundo molar superior direito e a cortical do seio maxilar. O ápice encontra-se justaposto a cortical sinusal	21
Figura 4	Imagem de corte coronal de TCFC mostrando a menor medida entre o ápice radicular da raiz MV do primeiro molar superior direito e a cortical do seio maxilar	22
Figura 5	gráfico representando a distribuição das raízes nos grupos: G1 - ápice dentro do seio maxilar; G2- ápice até 1 mm da cortical do seio maxilar; G3 – ápice com mais de 1 mm da cortical do seio maxilar	40

LISTAS DE TABELAS

Tabela 1	Comparação de cada uma das raízes estudadas com as menores distâncias (mm) entre a cortical óssea e o seio maxilar.	36
Tabela 2	Comparação dos dentes estudados com as menores distâncias entre o ápice dental e a cortical óssea	37
Tabela 3	Comparação dos dentes estudados com as menores distâncias entre o ápice dental e a cortical sinusal	38
Tabela 4	Distribuição das raízes dos dentes em relação aos grupos (com base na raiz mais próxima à cortical sinusal).	39

SUMÁRIO

1. INTRODUÇÃO -----	14
2. PROPOSIÇÃO -----	17
3. MATERIAL E MÉTODOS -----	18
3.1 Desenho do estudo -----	18
3.2 Comitê de ética -----	18
3.3 Seleção da amostra -----	18
3.4 Exames por imagem -----	18
3.5 Tratamento estatístico -----	21
4. ARTIGO -----	23
5. CONSIDERAÇÕES FINAIS -----	41
REFERÊNCIAS -----	42
ANEXOS -----	45
Anexo A – Parecer do comitê de ética -----	46
Anexo B – Normas do periódico “International Endodontic Journal” -----	49
Anexo C – Comprovante de submissão do artigo -----	68

1 INTRODUÇÃO

No interior dos ossos da face e do crânio, localizam-se espaços preenchidos de ar, que se comunicam com a cavidade nasal, denominados seios paranasais – maxilar, frontal, etmoidal e esfenoidal. O seio maxilar (SM) é o maior dos seios paranasais e situa-se na maxila (HAJIOANNOU et al., 2010; MEHRA et al., 1999;). Ele possui variações em relação à forma e ao tamanho, de indivíduo para indivíduo, podendo, também, apresentar variações entre os lados direito e esquerdo, em um mesmo indivíduo (FREITAS et al., 2004). Suas dimensões dependem de fatores como idade, sexo, raça e condições individuais. Encontra-se em uma posição intermediária entre a cavidade nasal e a cavidade oral, sendo vulnerável à invasão de micro-organismos patogênicos através do óstio nasal ou da boca (MEHRA e MURAD, 2004).

A inflamação da membrana mucosa que reveste o SM é denominada sinusite maxilar. As sinusites de origem odontogênica podem ser classificadas em sinusite maxilar aguda ou crônica (BROOK, 2007), sendo a forma crônica a mais frequentemente associada à origem dental (ARIAS IRIMIA et al., 2010). Os agentes etiológicos podem ser viróticos, fúngicos ou bacterianos (UNGICIUS et al., 2006).

A sinusite maxilar tem como uma das origens as infecções dentárias, em aproximadamente 10% a 12% dos casos. Uma origem odontogênica pode ser considerada em indivíduos com sintomas de sinusite e história de infecção dental, cirurgia dentoalveolar, cirurgia periodontal, ou naquelas resistentes à terapia convencional para sinusite. Podemos citar como os dentes anatomicamente mais próximos ao assoalho do seio, de acordo com a ordem de proximidade, os segundos molares, primeiros molares, terceiros molares, segundo pré-molares, primeiros pré-molares e caninos (BROOK, 2006).

O crescimento final do SM ocorre entre 12 e 14 anos de idade e corresponde à erupção dos dentes permanentes e o crescimento do processo alveolar do maxilar superior. Em crianças e jovens, há uma considerável distância entre o assoalho do seio e os ápices dos dentes maxilares (MEHRA E MURAD, 2004). Normalmente, as raízes dos molares e pré-molares são separadas do SM por uma cortical óssea densa com espessura variada. Porém, algumas vezes eles estão separados somente por uma membrana mucosa. Certamente, essa característica anatômica pode explicar que o aparecimento e o desenvolvimento de um processo inflamatório

dentário podem ter estreita relação com a sinusite maxilar (ARIAS IRIMIA et al., 2010; SHANBHAG et al., 2013).

Os exames por imagens são essenciais na elaboração de um diagnóstico, destacando a tomografia computadorizada de feixe cônico (TCFC). Outros exames também podem ser utilizados no auxílio ao diagnóstico da sinusite, são eles: ressonância magnética, ecografia e endoscopia (ESCODA & AYLES, 2004; MAILLET, et al., 2011).

Radiograficamente, o seio maxilar sem patologia caracteriza-se por uma imagem radiolúcida delimitada por corticais ósseas densas radiopacas, situado na maxila. Na presença de patologia associada, distingue-se por: existência de uma imagem radiopaca na parte interna da cavidade sinusal, modificação do contorno da cavidade do SM (expansão e compressão); existência de corpos estranhos na cavidade sinusal (WHAITES, 2003).

A sinusite maxilar aguda, clinicamente, caracteriza-se pela presença de dor intensa que irradia atingindo a hemiarcada, podendo provocar cefaléias, dor periodontal na região afetada, apesar da inexistência da causa. A presença de tecidos inflamados na zona da fossa canina pode provocar dor à percussão e pressão. Ainda, podem estar presentes: secreção nasal purulenta unilateral, rigidez e edema dos cornetos nasais, secreções purulentas no meato nasal médio e fístula oroantral sondável (HORCH, 1995; PETERSON, 2005).

A sinusite crônica distingue-se por um desenvolvimento assintomático ou com escassos sintomas, dentre eles as cefaleias, que aumentam com o movimento da cabeça, drenagem nasal, e dor na fossa canina quando aplicada uma pressão. Num processo agudo desta forma clínica, não só ocorre um acréscimo de secreção purulenta e mucosa, como também pode ocorrer uma intensificação da dor. O paciente, ocasionalmente, apresenta como queixa oclusão nasal correspondente à zona lesada (HORCH, 1995; PETERSON, 2005).

No tratamento da sinusite odontogênica é necessário atuar sobre causa dentária e sobre o seio maxilar. Somente assim é possível confirmar o fim da infecção existente e precaver de nova infecção ou complicações. A conjugação da terapêutica medicamentosa e cirúrgica, normalmente é necessária no seu tratamento (PETERSON, 2005; SHAHBAZIAN et al., 2012).

Dentes com infecção de origem endodôntica crônica, em geral podem ter seus produtos sépticos drenados por meio de fistulas, que podem se abrir na

mucosa vestibular, palatina ou, até mesmo cutaneamente. Normalmente, estas fístulas se abrem na superfície mais próxima do ápice radicular infectado. Dessa forma, considera-se que tais fístulas poderiam surgir também em outras superfícies como: cavidade nasal, canal nasopalatino e canal mandibular.

Assim, partimos da hipótese de que muitos dentes superiores portadores de necrose pulpar, podem estar perpetuando sinusites crônicas sem que esse processo seja detectado em qualquer exame radiográfico, considerando que a infecção periapical encontraria facilmente uma via de drenagem para o interior do seio maxilar, caso esta cortical se encontre mais próxima do ápice radicular que alguma das corticais do osso maxilar. Nesses casos, tais dentes poderiam não apresentar os sinais clínicos e radiográficos, devido à área disponível para drenagem, aqui no caso, o seio maxilar. Como a maioria dos estudos que apontam para incidência de sinusites associadas a infecções endodônticas tem como base dentes que, de alguma forma, se manifestaram clinicamente ou em exames radiográficos, acreditamos que a incidência de sinusites agudas e crônicas associadas a dentes infectados possa ser maior que aquela descrita na literatura.

Destarte, torna-se proposta neste estudo, realizar uma avaliação da distância existente entre os ápices de dentes posteriores superiores e as corticais do seio maxilar, vestibular e palatina do osso maxilar, por meio de imagens de TCFC.

2 PROPOSIÇÃO

O presente estudo tem por objetivo avaliar, em imagens de TCFC, a relação entre os ápices de dentes superiores posteriores – segundo pré-molar, primeiro molar e segundo molar – e:

- a cortical do seio maxilar;
- as corticais vestibulares e palatinas do osso maxilar.

3 MATERIAL E MÉTODOS

3.1 Desenho do estudo

Trata-se de um estudo retrospectivo observacional e transversal.

3.2 Comitê de ética

Este estudo foi aprovado pelo Comitê de Ética em Pesquisa da Universidade Federal de Juiz de Fora (CEP/UFJF, Juiz de Fora, Minas Gerais, Brasil), sob o parecer n.1.292.165, em quatorze de setembro de 2015 (ANEXO A).

3.3 Seleção da amostra

Para este estudo, foram selecionadas imagens de TCFC de 113 pacientes, em uma amostra de conveniência, totalizando 226 seios maxilares, do arquivo de imagens do Serviço de Radiologia Odontológica da Faculdade de Odontologia da Universidade Federal de Juiz de Fora (FO/UFJF, Juiz de Fora, Minas Gerais, Brasil).

Como critério de inclusão, os pacientes deveriam possuir, bilateralmente, os dentes a serem analisados (segundo pré-molar superior, primeiro molar superior e segundo molar superior) com raízes íntegras, restaurados ou não.

Como critérios de exclusão, foram considerados: idade inferior a 21 anos; infecção endodôntica; cirurgia parendodôntica em dentes posteriores; cirurgias na região de seio maxilar; cirurgia ortognática; ausência de qualquer um dos dentes a ser analisado.

3.4 Exames por imagem

Nas imagens dos seios maxilares, que foram selecionadas dentro dos critérios de inclusão pré-estabelecidos, foram mensuradas as menores distâncias encontradas entre os ápices radiculares dos dentes posteriores superiores e a cortical do seio maxilar, e também entre os ápices radiculares e as corticais vestibular e palatina do osso maxilar.

As medições foram realizadas através da ferramenta disponível no software i-CAT[®] Vision (i-Cat[®] Next Generation (Imaging Sciences International, Hatfield, Pennsylvania, EUA), o mesmo utilizado para a realização dos exames. Foi utilizado o modo de visualização MPR (*Multipplanar reconstruction*), com corte em 0,25 mm de espessura, e o filtro SharpenMild.

A ordem de análise dos dentes partiu dos segundos pré-molares, seguida dos primeiros molares e por último os segundos molares superiores. Primeiramente no lado direito e, em seguida, no lado esquerdo. Foi, ainda, determinada uma ordem de análise das raízes, iniciando pela raiz vestibular (V) e, em seguida, caso houvesse, a raiz palatina (P) dos segundos pré-molares. Nos molares, a análise iniciou-se pela raiz palatina (P), seguida pela raiz méso-vestibular (MV) e, por último, a raiz disto-vestibular (DV).

A primeira análise realizada no corte axial (CA) foi a medição em relação à cortical óssea (V ou P) que se apresentava mais próxima do ápice analisado (Figuras 1 e 2). O corte axial padrão utilizado para a realização dessa medida foi definido como aquele que mostrava a porção mais apical da raiz. Vale destacar que cada raiz teve seu corte axial padrão individualizado.



Figura 1: imagem de corte axial de TCFC mostrando a menor medida entre o ápice radicular da raiz V do segundo pré-molar superior direito e a cortical óssea mais próxima, no caso a vestibular.



Figura 2: imagem de corte axial de TCFC mostrando a menor medida entre o ápice radicular da raiz P do primeiro molar superior direito e a cortical óssea mais próxima, no caso a palatina.

No corte coronal correspondente ao corte axial padrão foi obtida a menor distância entre a raiz e a cortical sinusal (Figuras 3 e 4). Isso possibilitou verificar a relação anatômica do SM com as raízes dos dentes, identificando a menor distância que separa os ápices radiculares da cortical sinusal.



Figura 3: imagem de corte coronal de TCFC mostrando a menor medida entre o ápice radicular da raiz MV do segundo molar superior direito e a cortical do seio maxilar. O ápice encontra-se justa posto a cortical sinusal.

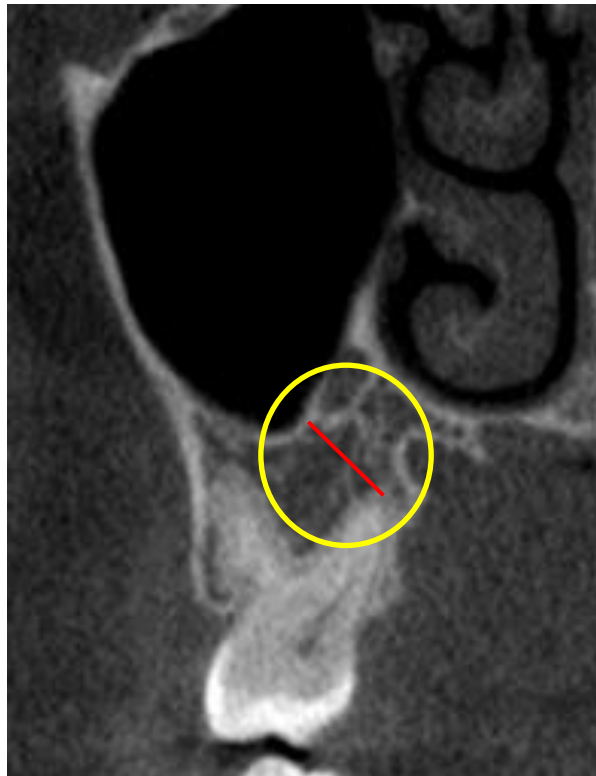


Figura 4: imagem de corte coronal de TCFC mostrando a menor medida entre o ápice radicular da raiz MV do primeiro molar superior direito e a cortical do seio maxilar.

As imagens foram analisadas e, após as mensurações das distâncias entre as raízes e o seio maxilar, os ápices radiculares foram agrupados em:

G1 – ápice radicular dentro do seio maxilar

G2 – ápice radicular até 1 mm da cortical do seio maxilar

G3 – ápice radicular com mais de 1 mm da cortical do seio maxilar

A análise dos exames foi realizada por um único cirurgião-dentista, endodontista, experiente neste tipo de exame. Trinta dias após a primeira avaliação, 10% da amostra foi reavaliada para cálculo de concordância intra-examinador.

3.5 Tratamento estatístico

Para a análise da concordância intra-examinador foi utilizado o coeficiente de correlação de Pearson. O teste de correlação de Spearman foi aplicado na análise da correlação das distâncias das corticais ósseas e sinusais com a idade. Para

comparação das menores distâncias das raízes com as corticais ósseas e sinusais e também na comparação, entre os dentes, das menores distâncias obtidas, foi utilizado o teste não paramétrico de Wilcoxon. Estabeleceu-se o grau de confiança de 95% para todos os testes aplicados.

4 ARTIGO

O artigo abaixo está apresentado nas normas do periódico International Endodontic Journal, classificado no Qualis da CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), na Área de Avaliação de Odontologia, como A1 (ANEXOS B e C).

Evaluation of posterior teeth's topography and its relationship with maxillary sinus

L. M. L. Makris ⁽¹⁾

K. L. Devito ⁽²⁾

P.S.S. D'Addazio⁽³⁾

C.O. Lima ⁽¹⁾

C. N. Campos ⁽²⁾

¹ Master's Program in Dental Clinic, School of Dentistry, Federal University of Juiz de Fora, Juiz de Fora, Minas Gerais, Brazil.

² Department of Dental Clinic, School of Dentistry, Federal University of Juiz de Fora, Juiz de Fora, Minas Gerais, Brazil.

³ School of Medical Sciences and Health-SUPREMA, Terezinha de Jesus Hospital and Maternity, Juiz de Fora.

Running title: Topography of the posterior teeth and the relation with the maxillary sinus.

Keywords: Odontogenic maxillary sinusitis, maxillary sinus, conical beam computed tomography, upper posterior teeth.

Corresponding author:

Celso Neiva Campos

Department of Dental Clinics - School of Dentistry - Federal University of Juiz de Fora,
Campus Universitário, s/n CEP: 36036-900 – Juiz de Fora, Minas Gerais, Brazil

E-mail: cncampos@terra.com.br

Abstract

Aim: To evaluate the relationship between the apices of maxillary posterior teeth – second premolar (2PM), first molar (1M) and second molar (2M) regarding the cortical of the maxillary sinus (MS); and regarding both, buccal and palatal cortices of the maxillary bone, by means of concomitant cone-beam computed tomography (CBCT) analysis.

Methodology: 1660 roots from 678 teeth were analyzed using CBCT. It was determined the shortest distance between the selected dental apices to the MS cortical; and to both, buccal and palatal cortices of the maxillary bone. After measurements, the root apices were grouped as follows: G1 - root apex inside the MS; G2- root apex up to 1 mm from the cortical of the MS; G3 - root apex with more than 1 mm from cortical of the MS.

Results: It was observed that when increases the age, there is a greater proximity of the evaluated teeth regarding the maxillary cortical bone ($p < 0.05$) and less proximity of 2M to MS ($p = 0.005$). 207 molars (45.8%) had at least one of the roots within the MS. In the group G2, there was no difference between the evaluated teeth. In group G3, 2PM were more frequent (72%) than 1M and 2M.

Conclusion: When increasing age, there is a greater proximity of the teeth to the maxillary cortical bone and a lesser proximity to the MS. The mesiobuccal root of the maxillary 2M is the closest root to the MS cortical, while the maxillary 1M is the closest tooth to the maxillary cortical bone.

Introduction

Inside the face and skull bones, there are air spaces called paranasal sinuses which communicate with the nasal cavity – maxillary, frontal, ethmoidal and sphenoidal. The maxillary sinus (MS) is the largest of the paranasal sinuses and lies in the maxilla (Mehra et al. 1999, Hajjioannou et al., 2010). It has variations with respect to shape and size from person to person, also presenting variations between the right and left sides in the same individual (Freitas et al. 2004). Meanwhile, these variations depend on factors such as age, gender, race, and individual conditions. Due to its intermediate position between the nasal cavity and the oral cavity, it becomes vulnerable to the invasion of pathogenic microorganisms through the nasal or oral ostium (Mehra & Murad 2004), generating maxillary sinusitis.

Dental infections are indicated as one of the causes of maxillary sinusitis in approximately 10% to 12% of the cases, denominated as odontogenic origin. The diagnosis of maxillary odontogenic sinusitis can be considered in individuals with sinusitis symptoms and history of dental infection, dentoalveolar surgery, periodontal surgery, or those resistant to conventional sinusitis therapy. Among the anatomically closest maxillary teeth to the sinus floor are, in order of proximity, the second molars, first molars, third molars, second premolars, first premolars and canines (Brook 2006).

The final growth of MS occurs between 12 and 14 years of age and corresponds to eruption of permanent teeth and growth of the alveolar process of the maxilla. In children and young people, there is a considerable distance between the sinus floor and the apexes of the maxillary teeth (Mehra & Murad 2004). Normally, the roots of the molars and premolars are separated from the MS by a dense bone cortical with varying thickness, but may also be separated only by the Schneiderian mucous membrane. This anatomical feature may suggest that the appearance and development of a dental inflammatory process may be closely related to maxillary sinusitis (Arias-Irimia et al. 2010, Shanbhag et al., 2013).

The radiographic image is essential in the elaboration of a clinical diagnosis, in conjunction with the cone beam computed tomography (CBCT). Other more modern tests are also used to aid in the diagnosis of sinusitis, such as magnetic resonance imaging, echography and endoscopy (Escoda & Aytes 2004, Maillet et al. 2011).

In general, teeth with chronic infection of endodontic origin, may drain their septic products through fistulas, which may open up in the buccal or palatal mucosa of the maxilla or even on the cutaneous surface. Typically, these fistulas open on the closest surface to the infected root apex. Thus, it can be considered that such fistulas could also appear on other surfaces such as the nasal cavity, nasopalatine canal, mandibular canal and, also, the MS.

Therefore, it is possible that many maxillary teeth with pulp necrosis may be perpetuating chronic sinusitis without this process being detected by any radiographic examination, because, with small bone sequestration, the infection would find a drainage pathway into the MS, if the sinus cortical is closer to the infected root apex than to one of the cortices of the maxillary bone.

Most studies that point the incidence of sinusitis associated with endodontic infections, are based on teeth that have somehow manifested clinically or by radiographic examinations (Berkovitz et al. 2004, Garcia et al. 2010, Kilic et al. 2010, Ok et al. 2014). The great doubt that stimulates this study is based on the fact that since the roots of posterior teeth may be juxtaposed or inside the sinus cavity, such teeth, in case of infection, could not present the clinical and/or radiographic signs, due to the presence of available area for drainage, in this case, to the MS. They could also present no visible osteolytic lesion on radiographs, since the inflammatory process would develop into the sinus cavity and not into the adjacent bone structure. Individuals in this situation could suffer chronic sinusitis, with their respective treatments, for an indefinite period of time, since the involved teeth are not usually investigated in a deeper way, such as by the CBCT associated with other clinical dental examinations. It is believed that the incidence of acute and chronic sinusitis associated with infected teeth may be higher than that described in the literature.

Thus, it is proposed in this study to perform an evaluation of the distance between the apices of the maxillary posterior teeth regarding the MS, buccal and palatal cortices bone in the maxilla, by means of CBCT.

Material and Methods

This study was approved by the Research Ethics Committee (No. 1.292.165) and is an observational and cross-sectional retrospective study.

Sample selection

For this study, CBCT images from 113 patients were selected in a convenience sample, totaling 226 maxillary sinuses, from the image datasets of the Public Dental Radiology Service (UFJF, MG, Brazil).

As inclusion criteria, the patients should have, bilaterally, the teeth to be analyzed (second maxillary premolar, first maxillary molar and second maxillary molar) with intact roots, restored or not.

As exclusion criteria, the following were considered: age less than 21 years; endodontic infection; periapical surgery on posterior teeth; surgeries in the maxillary sinus region; orthognathic surgery; absence of any of the teeth to be analyzed.

Image exams

From the images of the maxillary sinuses that were selected within the pre-established inclusion criteria, were measured the shortest distance found between the root apexes of the maxillary posterior teeth and the cortical of maxillary sinus, and also between the mentioned root apexes and the buccal and palatal cortices of the maxillary bone.

Exams and measurements were performed using the i-CAT® Vision software (i-Cat® Next Generation, Imaging Sciences International, Hatfield, Pennsylvania, USA). The used view mode was multiplanar reconstruction (MPR), with a 0.25 mm slice thickness, using the SharpenMild filter.

The order of teeth analysis started from the second premolars, followed by the first molars and finally the second maxillary molars. First on the right side and then on the left side. Starting with the axial cut and later the coronal cut.

An order of roots analysis was also determined, starting with the buccal root (B) and then, if was present, the palatine root (P) of the second premolars. As for the molars, the analysis was initiated by the palatine root (P), followed by the mesiobuccal root (MB) and, finally, the distobuccal root (DB).

The first analysis performed in the axial cut (AC) was the measurement in relation to the maxillary cortical bone (B or P) that was closer to the analyzed apex. The standard axial cut used to perform this measurement was defined as the one that presented the most apical portion of the root. It is worth mentioning that each root had its individualized standard axial cut.

The shortest distance between the root and sinus cortical was obtained in the coronal cut corresponding to the standard axial cut. This made it possible to verify the anatomical relationship of MS with the roots of the teeth, identifying the smaller distance that separates the root apices from the sinusal cortical.

The images were analyzed and, after measuring the distances between the roots and the maxillary sinus, the root apices will be grouped as follows: G1 – root apex inside the MS; G2 – root apex up to 1 mm from the cortical of the MS; G3 - root apex with more than 1 mm from cortical of the MS (modified from Pagin et al., 2013).

The analysis of the exams was performed by a single endodontist, experienced in this type of examination. Thirty days after the first evaluation, 10% of the sample was reevaluated for intra-examiner concordance calculation.

Statistical Analysis

Pearson's correlation coefficient was used to analyze the intra-examiner agreement. The Spearman correlation test was applied for the analysis of the correlation between distances of bone and sinus cortical regarding age. The Wilcoxon nonparametric test was used to compare the shortest distances of the roots regarding the bony and sinus cortices and also in the comparison, between the teeth, of the shortest distances obtained. The confidence level of 95% was established for all tests applied.

Results

Two hundred and twenty-six tomographic images of maxillary sinuses from 113 patients were analyzed, looking for the anatomical relation between 1,660 roots of 678 teeth regarding the MS, and also between the mentioned roots and the cortices of the alveolar bone.

To verify the intra-examiner agreement, the Pearson correlation test was applied ranged from 0.93 to 1.00, indicating an almost perfect agreement between the evaluators.

The patients' ages ranged from 20 to 72 years, with a mean of 34.58 (\pm 14.06). A significant and negative correlation between age and distance regarding the maxillary cortical bone was detected for the second premolar ($p = 0.010$ / $r_s = - 0.17$), first molar ($p < 0.001$ / $r_s = - 0.33$) and second molar ($p = 0.012$ / $r_s = - 0.16$), indicating that with the increase of the age, there is a greater proximity of the roots with the maxillary cortical bone. Moreover, a significant positive correlation was observed between age and distance since the sinus cortical to the second molar ($p = 0.005$ / $r_s = 0.18$), indicating a lesser proximity from the roots to the maxillary sinus, with increasing age.

Table 1 shows the comparison of the shortest detected distances between the cortical bone and the MS for each of the roots of the studied teeth. It can also be observed that all the roots of the studied teeth, except the second uniradicular premolars and the buccal root of the second birradicular premolars, are significantly closer to the MS than to any of the cortices of the alveolar bone. The mesiobuccal root of the maxillary second molar was detected as the closest one to the sinus cortical.

In the evaluation of the shortest distances detected between the dental apex and the cortical of the alveolar bone for each type of studied tooth, it is noted that a greater proximity to the cortical bone occurs with the first maxillary molars than with the other evaluated teeth (Table 2).

As regards the assessment of the shortest distances between the dental apex and the sinus cortical, it was observed that the first and second molars had the shortest distances, with the root apices being significantly closer to the sinus cortical than the premolars (Table 3).

From the measurements of the distances between the root apices and the maxillary sinus and based only on the closest root of each analyzed tooth to the maxillary sinus, the roots were distributed in the respective groups, as shown in table 4.

From the presented distribution, it can be observed that the 1M and 2M presented a high prevalence of root apices inside the maxillary sinus (G1). Of the 452 evaluated molars, 207 presented at least one of the roots within the MS (45.8%), without much distinction between 1M and 2M.

Considering the distance of up to 1 mm for MS (G2), we can affirm that there seems to be no great difference between the three types of teeth. However, considering a distance greater than 1 mm to sinus cortical (G3), 2P were more frequent, with a significant difference in relation to 1M and 2M (Table 4 and Figure 1).

Discussion

Odontogenic maxillary sinusitis is caused by iatrogenies during dental treatment, presence of dental inflammation or endodontic infection in teeth that present root apices near the MS (Arias Irimia et al. 2010, Shanbhag et al. 2013). It is usually diagnosed through clinical and radiographic findings, affecting 10% to 12% of cases of maxillary sinusitis (Mehra & Murad 2004).

The applicability and importance of the use of CBCT in endodontic treatments involving the maxillary sinus region was described by Tsurumachi et al. (2007), due to the possibility of three-dimensional visualization of the structures. Since then, several studies (Maillet et al. 2011, Pagin et al. 2013, Arx et al. 2014, Ok et al. 2014, Shahbazian et al. 2015) have showed that CBCT should be used to detect periapical changes and the relation of apices.

The aim of this study was to evaluate the topography of the maxillary posterior teeth through CBCT analysis, and its relationship regarding the cortical bone and the MS, in order to verify if root apices juxtaposed or inside the maxillary sinus, could not present the clinical

and radiographic signs of odontogenic maxillary sinusitis, due to the available area of drainage into the MS.

Pagin et al. (2013) examined the proximity of the maxillary posterior teeth with the maxillary sinus and divided these teeth into two groups, I – teeth with root apexes in contact with the cortical of the maxillary sinus and II – teeth with radicular apexes protruded inside the maxillary sinus. In the present study, a modified methodology of Pagin et al. (2013) was used. The shortest distance between the root apexes (2nd PM, 1st M, e 2nd M) regarding the floors of the MS and regarding the maxillary cortical bone was measured. Then the teeth were divided into three groups, according to the proximity to the MS.

Regarding the distance between the apexes of the teeth studied with the nearest cortical bone, it was observed that all the roots, except for the root of the unirradicular 2nd PM and the buccal root of the birradicular 2nd PM, were closer to the maxillary sinus than to the cortical bone of the alveolar bone. In addition, it was verified that the root apex of the mesiobuccal root of the maxillary 1st M was closer to the cortical bone when compared to the other roots. Arijji et al. (2006) found that more than 60% of the 1st M roots came into contact with the palatal and buccal cortices, whereas this contact was not observed in 60% of 2nd M.

According to Ok et al. (2014), the relationship between the maxillary posterior teeth and the MS floor varies according to age. In the present study, it was verified with significant statistical difference that, with the increase of the age, there is a greater proximity of the root apices with the cortical of the maxillary bone and a smaller proximity with the MS.

It is believed that maxillary posterior teeth with periapical lesions, with apexes near or projecting into the MS, could have the MS as a drainage pathway for endodontic infections, leading to the development of maxillary odontogenic sinusitis. According to Garcia et al. (2010), the relationship of intimate contact of MS with the roots of the posterior teeth causes procedures, such as periapical surgery, to be evaluated and performed carefully. They believe that contamination by microorganisms and the introduction of foreign bodies into the sinus cavity, aseptic in 80% to 100% of the population, leads to mucosal thickening or a sinusitis.

Arx et al. (2014) evaluated the proximity of the roots of the maxillary premolars with MS and found that only a few pre-molars presented a risk of penetration into the MS during conventional or surgical endodontic treatment, or in case of extraction of tooth. This fact is in agreement with the present study, where it was verified that the roots of unirradicular 2nd PM and the buccal root of the birradicular 2nd PM, were significantly more distant of the MS when compared the other studied roots.

Regarding the relationship between the MS floor and the roots of the posterior superior teeth, Berkovitz (2004) reported that the 2nd M, especially the palatine root, are the closest teeth to the MS, followed by the 1st M, third molars, 2nd PM, first premolars and,

incidentally, canines. Their report is in line with part of the results found in this study, since the mesiobuccal roots of the maxillary 2nd M were closer to the maxillary sinus. However, Pagin et al. (2013) showed that the mesiobuccal root of the maxillary 2nd M is the closest root to the sinus cortical, which corroborates with the present study.

Shahbazian et al. (2015) stated that the proximity of the roots to the MS floor, could be a probable cause of odontogenic maxillary sinusitis. The CBCT showed an intimate relationship of the maxillary 1st M and 2nd M with the MS in 50% and 45% of the cases, respectively. In the present study, it was detected that half of the 1st and 2nd maxillary molars have at least one root in direct contact with MS. Moreover, Shahbazian et al. (2015) emphasized that all surgical and endodontic procedures in this area should be performed with a complete understanding of this anatomical relationship, in order to avoid posttreatment complications. However, they point out that because of the higher radiation dose, CBCT should be used only in selected cases and after a complete clinical examination.

In this study, G2 presented teeth with root apex situated between 0 mm and 1 mm of the sinus cortical. The proximity of these roots to the sinus cortical shows that these teeth can be considered as a potential source for maxillary sinusitis in case of pulp and/or periodontal infection. Thus, they should have their numbers associated with those of G1, which have at least one root apex situated inside the MS. Thus, it can be affirmed that 57% of the molars present a potential risk for maxillary odontogenic sinusitis, both by the pulp alterations with consequent root canal infection, and poorly executed endodontic treatments favoring the development of infections. However, considering a distance greater than 1 mm from sinus cortical (G3), the 2PM were more frequent, with a significant difference in relation to 1M and 2M, a fact that could possibly explain a lower chance of 2PM being responsible for maxillary odontogenic sinusitis.

The possibility that the MS is functioning as a drainage pathway for endodontic infections, is a fact. Through the analysis of the images and measurements performed, we were able to show that a large part of the 1M have their root apexes within the MS when compared with the other teeth studied. When we compare the measurements of the shortest distances of the studied roots, we found the mesiobuccal root of the 2M as the root that presents the root apex closest to the sinus cortical or already inside the MS. We emphasize the importance of the CBCT for these diagnoses, measurements and treatments of maxillary sinusitis of odontogenic origin.

The results found in this study are stimulating for the development of clinical and microbiological studies in the search for a better correlation between infections of maxillary posterior teeth and maxillary sinusitis.

Conclusion

It can be affirmed that with the increase of the age, there is a greater proximity of the root apices with the maxillary cortical bone and a lesser proximity with the maxillary sinus.

All roots, except for the root of the uniradicular 2nd PM and the buccal root of the birradicular 2nd P were closer to the maxillary sinus than to the maxillary cortical bone.

The mesiobuccal root of the maxillary 2nd M is the closest root to the sinusal cortical, while the maxillary 1st M is the tooth that has the closest root to the maxillary cortical bone.

A little less than half of the 1st M and 2nd M have at least one of the roots with the apex inside the MS.

References

- Arias-Irimia O, Barona-Dorado C, Santos-Marino J. A., Martínez-Rodríguez ., Martínez González J. M., (2010) Meta-analisis of the etiology of odontogenic maxillary sinusitis. *Medicina Oral, Patologia Oral y Cirurgia Bucal*. **15**, 70-73.
- Ariji Y. *et al.* (2006) Roots of the maxillary first and second molars in horizontal relation to alveolar cortical plates and maxillary sinus: computed tomography assessment for infection spread. *Clinical Oral Investigations*. **10**, 35–41.
- Arx T, Fodichi I, Bornstein M. (2014) Proximity of premolar roots to maxillary sinus: a radiography survey using cone-beam computed tomography. *Journal of endodontics*. **40**, 1541-8.
- Berkovitz B, Holland G, Moxhom B. (2004) *Anatomia, embriologia e histologia*. 3. ed. São Paulo, Brasil, Artmed, 9-10.
- Brook I. (2006) Sinusitis of odontogenic origin. *Otolaryngology–Head and Neck Surgery*. **135**, 349-355.
- Escoda C., Aytes L. (2004) Sinusitis odontogenica. *Tratado de Cirurgia Bucal*. Espanha. p. 687-708.
- Freitas T, Faria J, Mendonça R, Alves M, Ramos J, Cancio A. (2004) Fístulas oroantrais: diagnóstico e propostas de tratamento. *Revista Brasileira de Otorrinolaringologia*. **69**, 838-844.
- Garcia B, Penarrocha M, Penarrocha MA, Von Arx T. (2010) Apical surgery of a maxillary molar creating a maxillary sinus window using ultrasonics: a clinical case. *International endodontic journal*. **43**,1054-61.
- Hajjiioannou J, Koudounarakis E, Alexopoulos K, Kotsani A, Kymizalis D. (2010) Maxillary sinusitis of dental origin due to oroantral fistula, treated by endoscopic sinus surgery and primary fistula closure. *Journal of laryngology and otology*. **124**, 986-989.
- Kilic C, Kamburoglu K, Yuksel SP, Ozen T. (2010) An assessment of the relationship between the maxillary sinus floor and the maxillary posterior teeth root tips using dental cone-beam computerized tomographic. *European journal of dentistry*. **4**, 462-467.
- Maillet M, Bowles WR, McClanahan SL et al. (2011) Cone-beam computed tomography evaluation of maxillary sinusitis. *Journal of endodontics*. **37**, 753-7.
- Mehra P, Caiazzo A, Bestgen S. (1999) Odontogenic sinusitis causing orbital cellulites: a case report. *Journal of the American Dental Association*. **130**, 1086-1092.
- Mehra P, Murad H. (2004) Maxillary sinus disease of odontogenic origin. *Clinical otolaryngology and allied sciences*. **37**, 347–364.
- Metska M, Liem V, Parsa A, Koolstra J, Wesselink P, Ozok A. (2014) Cone-beam computed tomography scans in comparison with periapical radiographs for root canal length measurement: an in situ study. *Journal of endodontics*. **40**, 1206-1209.

Ok E, Gungor E, Çolak M, Altunsoy M, Nur B, Aglaril O. (2014) Evaluation of the relationship between the maxillary posterior teeth and the sinus floor using cone-beam computed tomography. *Surgical and radiologic anatomy*. **36**, 907-914.

Pagin O, Centurion BS, Rubira-Bullen RF, Capelozza ALA. (2013) Maxillary sinus and posterior teeth. Accessing close relationship by cone beam computed tomographic scanning in a Brazilian population. *Journal of endodontics*. **39**, 748-751.

Shanbhag S, Karnik P et al. (2013) Association between periapical lesions and maxillary sinus mucosal thickening: a retrospective cone-beam computed tomographic study. *Journal of endodontic*. **39**, 853-857.

Shahbazian M, Vandewoude C, Wyatt J, Jacobs R. (2015) Comparative assessment of periapical radiography and CBCT imaging for radiodiagnostics in the posterior maxilla. *Odontolog*. **103**, 97-104.

Tsurumachi T, Honda K. (2007) A new cone beam computerized tomography system for use in endodontic surgery. *International endodontic journal*. **40**, 224-232.

Tables

Table 1. Comparison of the studied roots with distances (mm) between the cortical maxillary bone and the maxillary sinus.

Roots of studied teeth	N	Median (maxillary cortical bone)	Median (Maxillary sinus)	P value
2 PM Unirradicular	148	2.56	2.94	0.030*
2 PM B	78	2.30	2.75	0.015*
2 PM P	78	2.82	1.86	0.003*
1M MB	226	2.26	1.91	0.009*
1M DB	226	2.50	1.86	<0.001*
1M P	226	2.30	1.50	<0.001*
2M MB	226	3.25	1.31	<0.001*
2M DB	226	3.00	2.00	<0.001*
2M P	226	2.50	2.02	0.002*

* Significant differences from the Wilcoxon test ($p \leq 0.05$).

Table 2. Comparison of the studied teeth with the distances between the dental apex and the maxillary cortical bone.

Studied teeth	N	Median (maxillary cortical bone)
2 PM	226	2.50 A
1M	226	2.00 B
2M	226	2.24 C

* Medians followed by distinct letters indicate a statistically significant difference by the Wilcoxon test ($p \leq 0.05$).

Table 3. Comparison of the distances between the apices of the studied teeth and the sinusal cortical.

Studied teeth	N	Median (sinusal cortical)
2 PM	226	2.26 A
1M	226	0.50 B
2M	226	0.87 B

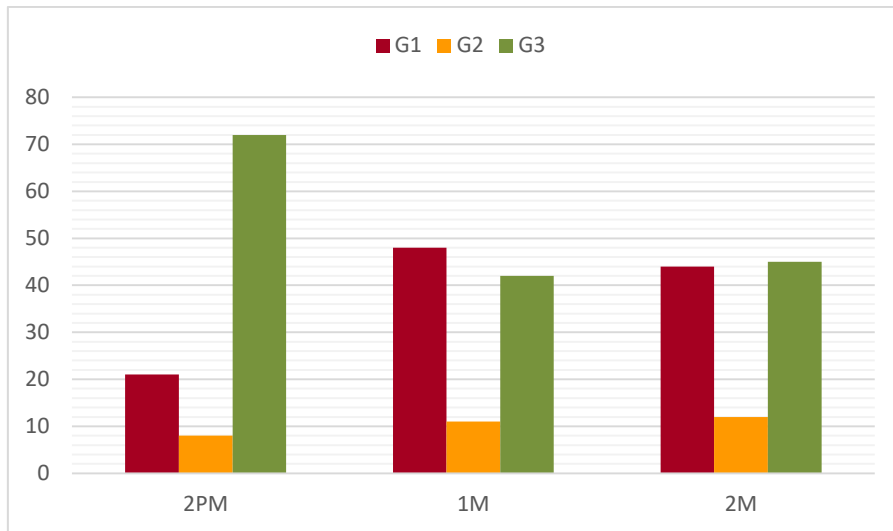
* Medians followed by distinct letters indicate a statistically significant difference by the Wilcoxon test ($p \leq 0.05$).

Table 4. Result after the analyzes and measurements of each studied tooth in relation to the shortest measurement to the sinusal cortical.

Groups	2PM (%)	1M (%)	2M (%)
G1	47 (21)	108 (48)	99 (44)
G2	17 (08)	24 (11)	26 (12)
G3	162 (72)	94 (42)	101 (45)

Figure Legends

Figure 1: Group G1 – apex within the maxillary sinus; Group G2 – apex up to 1 mm from the maxillary sinus cortical; Group G3 – apex more than 1 mm from the maxillary sinus cortical.



5 CONSIDERAÇÕES FINAIS

A partir da metodologia aplicada e resultados obtidos, pode-se concluir que:

Com o aumento da idade, existe uma maior proximidade dos ápices radiculares com a cortical óssea maxilar e uma menor proximidade com o seio maxilar.

Todas as raízes, com exceção, da raiz dos 2ºPM unirradiculares e da raiz vestibular dos 2ºPM birradiculares estavam mais próximas do seio maxilar do que da cortical do osso alveolar

A raiz méso-vestibular do 2ºM superior é a raiz mais próxima da cortical sinusal, enquanto o 1ºM superior é o dente que possui raiz mais próxima da cortical óssea.

Pouco menos da metade dos primeiros e segundos molares possuem pelo menos uma das raízes com o ápice dentro do seio maxilar.

REFERÊNCIAS

- ARIAS-IRIMIA O., BARONA-DORADO C., SANTOS-MARINO J.A. MARTÍNEZ-RODRIGUEZ N, MARTÍNEZ-GONZÁLEZ JM. Meta-análsis of the etiology of odontogenic maxillary sinusitis. **Med Oral Patol Oral Cir Bucal**, Valencia, v. 15, n. 1, Jan, 2010.
- ARIJI Y. et al. 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 Invest**, Berlim, v. 10, n. 1, p. 35–41, Jan, 2006.
- ARX TV, FODICH I, BORNSTEIN M. Proximity of premolar roots to maxillary sinus: a radiography survey using cone-beam computed tomography. **J Endod**. Baltimore v. 40 n. 10, p.1541-8, Out, 2014.
- BERKOVITZ B, HOLLAND G, MOXHOM B. **Anatomia, embriologia e histologia**. 3. ed., São Paulo, Artmed, 2004, p. 9-10.
- BROOK I. Acute and Chronic Bacterial Sinusitis. **Infect Dis Clin**, Chicago, v. 21, n. 2, p. 427–448, Fev, 2007.
- BROOK I. Sinusitis of odontogenic origin. **Otolaryngol–Head and Neck Surg**, Rochester, v. 135, n.3, p. 349-355, Mar, 2006.
- ESCODA C, AYLES L. Sinusitis odontogenica. **Tratado de Cirurgia Bucal**., 1 ed., Espanha, 2004, p. 687-708.
- FREITAS T, FARIA J, MENDONÇA R, ALVES M, RAMOS J, CANCIO A. (2004) Fístulas oroantrais: diagnóstico e propostas de tratamento. **Revista Brasileira de Otorrinolaringologia**, Rio de Janeiro, v. 69, n.6, p. 838-844, Dec, 2004.
- GARCIA B, PENARROCHA M, PENARROCHA MA, VON ARX T. Apical surgery of a maxillary molar creating a maxillary sinus window using ultrasonics: a clinical case. **Int Endod J**, Baltimore,v. 43, n. 11, p. 1054-1061, Nov, 2010.

HAJIOANNOU J, KOUDOUNARAKIS E, ALEXPOULOS K, KOTSANI A, KYMIZALIS D. Maxillary sinusitis of dental origin due to oroantral fistula, treated by endoscopic sinus surgery and primary fistula closure. **J Laryngol Otol**, v. 124, n. 9, p. 986-989, Sep, 2010.

HORCH H. Patologia Odontogena de Los Senos Maxilares. Cirurgia Oral y Maxilofacial. , 2 ed., Barcelona, Masson, 1995, p. 244-280.

KILIC C, KAMBUROGLU K, YUKSEL SP, OZEN T. An assessment of the relationship between the maxillary sinus floor and the maxillary posterior teeth root tips using dental cone-beam computerized tomographic. **Eur J Dent**, Ankara, v. 4, n. 4, p. 462-467, Apr, 2010.

MAILLET M., BOWLES WR., McCLANAHAN SL, et al. Cone-beam computed tomography evaluation of maxillary sinusitis. **J Endod**, Baltimore, v. 37, n. 6, p. 753-757, June, 2011.

MEHRA P, CAIAZZO A, BESTGEN S. Odontogenic sinusitis causing orbital cellulites: a case report. **J Am Dent Assoc**, Chicago, v.130, n. 7, p. 1086-1092, July, 1999.

MEHRA P., MURAD H. Maxillary sinus disease of odontogenic origin. **Otolaryngol Clin**, Oxford, v. 37, n.2, p. 347–364, Fev, 2004.

OK E, GUNGOR E, ÇOLAK M, ALTUNSOY M, NUR B, AGLARI O. Evaluation of the relationship between the maxillary posterior teeth and the sinus floor using cone-beam computed tomography. **Surg Radiol Anat**, Paris, v. 36, n. 5, p. 907-914, May, 2014.

PAGIN O.; CENTURION BS.; RUBIRA-BULLEN RF.; CAPELOZZA ALA. Maxillary sinus and posterior teeth. Accessing close relationship by cone beam computed tomographic scanning in a Brazilian population. **J Endod**, Baltimore, v. 39, n. 6, p. 748-751, June, 2013.

PETERSON L et al. Doenças odontogênicas do seio maxilar. In: Schow, S. (Ed) Cirurgia oral e maxilofacial contemporânea. 4. ed., Rio de Janeiro, Elsevier, 2005, p. 443-549.

SHANBHAG, S., KARNIK, P., et al. Association between periapical lesions and maxillary sinus mucosal thickening: a retrospective cone-beam computed tomographic study. **J Endod**, Baltimore, v. 39, n. 7, July, 2013.

SHAHBAZIAN M., VANDEWOUDE C., WYATT J., JACOBS R. Comparative assessment of periapical radiography and CBCT imaging for radiodiagnostics in the posterior maxilla. **Odontology**, Belgium, v. 103, n. 3, p. 97-104, Mar., 2015.

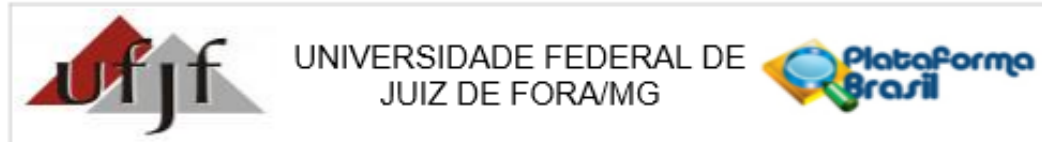
TSURUMACHI, T.; HONDA, K. A new cone beam computerized tomography system for use in endodontic surgery. **Int Endod J**, Oxford, v. 40, n. 3, p. 224-232, Mar., 2007.

UGINCIUS, P. et al. Chronic odontogenic maxillary sinusitis. **Stomatologia, Baltic Dental and Maxillofacial Journal**, v. 8, n. 2, p. 44-48, Fev, 2006.

WHAITES, E. Princípios de Radiologia Odontológica. 3a Ed., Porto Alegre, Artmed, 2003.

ANEXOS

ANEXO A – Parecer Comitê de Ética



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Avaliação da distância entre a cortical do seio maxilar e os ápices radiculares de dentes posteriores.

Pesquisador: Celso Neiva Campos

Área Temática:

Versão: 1

CAAE: 49232814.7.0000.5147

Instituição Proponente: FACULDADE DE ODONTOLOGIA

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 1.292.165

Apresentação do Projeto:

Apresentação do projeto esta clara e detalhada de forma objetiva. Descreve as bases científicas que justificam o estudo.

Objetivo da Pesquisa:

Apresenta clareza e compatibilidade com a proposta de estudo.

Avaliação dos Riscos e Benefícios:

O risco que o projeto apresenta é caracterizado como risco mínimo, considerando que os indivíduos não sofrerão qualquer dano ou sofrerão prejuízo pela participação ou pela negação de participação na pesquisa e benefícios esperados, estão adequadamente descritos.

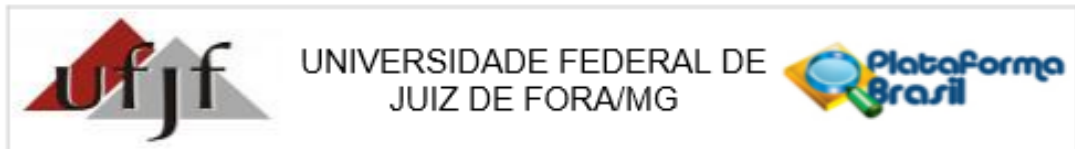
Comentários e Considerações sobre a Pesquisa:

O projeto está bem estruturado, delineado e fundamentado, sustenta os objetivos do estudo em sua metodologia de forma clara e objetiva, e se apresenta em consonância com os princípios éticos norteadores da ética na pesquisa científica envolvendo seres humanos elencados na resolução 486/12 do CNS e com a Norma Operacional Nº 001/2013 CNS.

Considerações sobre os Termos de apresentação obrigatória:

Solicita dispensa de TCLE

Endereço: JOSE LOURENCO KELMER S/N
Bairro: SAO PEDRO **CEP:** 36.036-900
UF: MG **Município:** JUIZ DE FORA
Telefone: (32)2102-3788 **Fax:** (32)1102-3788 **E-mail:** cep.propesq@ufjf.edu.br



Continuação do Parecer: 1.292.165

Recomendações:

Conclusões ou Pendências e Lista de Inadequações:

Diante do exposto, o projeto está aprovado, pois está de acordo com os princípios éticos norteadores da ética em pesquisa estabelecido na Res. 486/12 CNS e com a Norma Operacional Nº 001/2013 CNS. Data prevista para o término da pesquisa: Janeiro de 2017.

Considerações Finais a critério do CEP:

Diante do exposto, o Comitê de Ética em Pesquisa CEP/UFJF, de acordo com as atribuições definidas na Res. CNS 486/12 e com a Norma Operacional Nº001/2013 CNS, manifesta-se pela **APROVAÇÃO** do protocolo de pesquisa proposto. Vale lembrar ao pesquisador responsável pelo projeto, o compromisso de envio ao CEP de relatórios parciais e/ou total de sua pesquisa informando o andamento da mesma, comunicando também eventos adversos e eventuais modificações no protocolo.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_409455.pdf	14/09/2015 14:37:38		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	Dispensa.docx	14/09/2015 14:35:36	Celso Neiva Campos	Aceito
Projeto Detalhado / Brochura Investigador	ProjetoPesquisa.pdf	11/09/2015 16:21:35	Celso Neiva Campos	Aceito
Outros	TCUBD.pdf	12/11/2014 17:19:22		Aceito
Folha de Rosto	Folha de Rosto.pdf	12/11/2014 17:15:51		Aceito

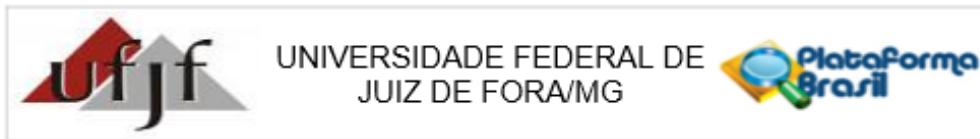
Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

Endereço: JOSE LOURENCO KELMER S/N
 Bairro: SAO PEDRO CEP: 36.036-900
 UF: MG Município: JUIZ DE FORA
 Telefone: (32)2102-3788 Fax: (32)1102-3788 E-mail: cep.propesq@ufjf.edu.br



Continuação do Parecer: 1.292.165

JUIZ DE FORA, 22 de Outubro de 2015

Assinado por:
Francis Ricardo dos Reis Justi
(Coordenador)

Endereço: JOSE LOURENCO KELMER S/N
Bairro: SAO PEDRO **CEP:** 36.036-900
UF: MG **Município:** JUIZ DE FORA
Telefone: (32)2102-3788 **Fax:** (32)1102-3788 **E-mail:** cep.propesq@ufjf.edu.br

ANEXO B – Normas do periódico “International Endodontic Journal”



International Endodontic Journal

© International Endodontic Journal. Published by John Wiley & Sons Ltd



Edited By: PMH Dummer

Impact Factor: 2.842

ISI Journal Citation Reports © Ranking: 2015: 12/89 (Dentistry Oral Surgery & Medicine)

Online ISSN: 1365-2591

Author Guidelines

Content of Author Guidelines: [1. General](#), [2. Ethical Guidelines](#), [3. Manuscript Submission Procedure](#), [4. Manuscript Types Accepted](#), [5. Manuscript Format and Structure](#), [6. After Acceptance](#)

Useful Websites: [Submission Site](#), [Articles published in International Endodontic Journal](#), [Author Services](#), [Wiley's Ethical Guidelines](#), [Guidelines for Figures](#)

The journal to which you are submitting your manuscript employs a plagiarism detection system. By submitting your manuscript to this journal you accept that your manuscript may be screened for plagiarism against previously published works.



1. GENERAL

International Endodontic Journal publishes original scientific articles, reviews, clinical articles and case reports in the field of Endodontology; the branch of dental sciences dealing with health, injuries to and diseases of the pulp and periradicular region, and their relationship with systemic well-being and health. Original scientific articles are published in the areas of biomedical science, applied materials science, bioengineering, epidemiology and social science relevant to endodontic disease and its management, and to the restoration of root-treated teeth. In addition, review articles, reports of clinical cases, book reviews, summaries and abstracts of scientific meetings and news items are accepted.

Please read the instructions below carefully for details on the submission of manuscripts, the journal's requirements and standards as well as information concerning the procedure after a manuscript has been accepted for publication in *International Endodontic Journal*. Authors are encouraged to visit [Wiley Author Services](#) for further information on the preparation and submission of articles and figures.

2. ETHICAL GUIDELINES

International Endodontic Journal adheres to the below ethical guidelines for publication and research.

2.1. Authorship and Acknowledgements

Authors submitting a paper do so on the understanding that the manuscript has been read and approved by all authors and that all authors agree to the submission of the manuscript to the Journal.

International Endodontic Journal adheres to the definition of authorship set up by The International Committee of Medical Journal Editors (ICMJE). According to the ICMJE, authorship criteria should be based on 1) substantial contributions to conception and design of, or acquisition of data or analysis and interpretation of data, 2) drafting the article or revising it critically for important intellectual content and 3) final approval of the version to be published. Authors should meet conditions 1, 2 and 3.

Acknowledgements: Under acknowledgements please specify contributors to the article other than the authors accredited. Please also include specifications of the source of funding for the study and any potential conflict of interests if appropriate. Please find more information on the conflict of interest form in section 2.6.

2.2. Ethical Approvals

Experimentation involving human subjects will only be published if such research has been conducted in full accordance with ethical principles, including the World Medical Association [Declaration of Helsinki](#) (version 2008) and the additional requirements, if any, of the country where the research has been carried out. Manuscripts must be accompanied by a statement that the experiments were undertaken with the understanding and written consent of each subject and according to the above mentioned principles. A statement regarding the fact that the study has been independently reviewed and approved by an ethical board should also be included. Editors reserve the right to reject papers if there are doubts as to whether appropriate procedures have been used.

When experimental animals are used the methods section must clearly indicate that adequate measures were taken to minimize pain or discomfort. Experiments should be carried out in accordance with the Guidelines laid down by the National Institute of Health (NIH) in the USA regarding the care and use of animals for experimental procedures or with the European Communities Council Directive of 24 November 1986 (86/609/EEC) and in accordance with local laws and regulations.

All studies using human or animal subjects should include an explicit statement in the Material and Methods section identifying the review and ethics committee approval for each study. The authors MUST upload a copy of the ethical approval letter when submitting their manuscript. Editors reserve the right to reject papers if there is doubt as to whether appropriate procedures have been used.

2.3 Clinical Trials

2.3.1 Randomised control clinical trials

Randomised control clinical trials should be reported using the guidelines available at www.consort-statement.org. A CONSORT checklist and flow diagram (as a Figure) should also be included in the submission material. The *International Endodontic Journal* asks that authors submitting manuscripts reporting from a clinical trial to register the trials in any of the following public clinical trials registries: www.clinicaltrials.gov, <https://www.clinicaltrialsregister.eu/>, <http://isrctn.org/>. Other primary registries if named in the WHO network will also be considered acceptable. The clinical trial registration number and name of the trial register should be included in the Acknowledgements at the submission stage.

2.3.2 Epidemiological observational trials

Submitting authors of epidemiological human observations studies are required to review and submit a 'strengthening the reporting of observational studies in Epidemiology' (STROBE) checklist and statement. Compliance with this should be detailed in the materials and methods section. (www.strobe-statement.org)

2.4 Systematic Reviews

Systematic reviews should be reported using the PRISMA guidelines available at <http://prisma-statement.org/>. A PRISMA checklist and flow diagram (as a Figure) should also be included in the submission material.

2.5 DNA Sequences and Crystallographic Structure Determinations

Papers reporting protein or DNA sequences and crystallographic structure determinations will not be accepted without a Genbank or Brookhaven accession number, respectively. Other supporting data sets must be made available on the publication date from the authors directly.

2.6 Conflict of Interest and Source of Funding

International Endodontic Journal requires that all authors (both the corresponding author and co-authors) disclose any potential sources of conflict of interest. Any interest or relationship, financial or otherwise that might be perceived as influencing an author's objectivity is considered a potential source of conflict of interest. These must be disclosed when directly relevant or indirectly related to the work that the authors describe in their manuscript. Potential sources of conflict of interest include but are not limited to patent or stock ownership, membership of a company board of directors, membership of an advisory board or committee for a company, and consultancy for or receipt of speaker's fees from a company. If authors are unsure whether a past or present affiliation or relationship should be disclosed in the manuscript, please contact the editorial office at lejeditor@cardiff.ac.uk. The existence of a conflict of interest does not preclude publication in this journal.

The above policies are in accordance with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals produced by the International Committee of Medical Journal Editors (<http://www.icmje.org/>).

It is the responsibility of the corresponding author to have all authors of a manuscript fill out a conflict of interest disclosure form, and to upload all forms together with the manuscript on submission. The disclosure statement should be included under Acknowledgements. Please find the form below:

[Conflict of Interest Disclosure Form](#)

2.7 Appeal of Decision

The decision on a paper is final and cannot be appealed.

2.8 Permissions

If all or parts of previously published illustrations are used, permission must be obtained from the copyright holder concerned. It is the author's responsibility to obtain these in writing and provide copies to the Publishers.

2.8 Copyright Assignment

If your paper is accepted, the author identified as the formal corresponding author for the paper will receive an email prompting them to login into Author Services; where via the Wiley Author Licensing Service (WALS) they will be able to complete the license agreement on behalf of all authors on the paper. Your article cannot be published until this has been done.

For authors choosing OnlineOpen

If the OnlineOpen option is selected the corresponding author will have a choice of the following Creative Commons License Open Access Agreements (OAA):

Creative Commons Attribution License OAA

Creative Commons Attribution Non-Commercial License OAA

Creative Commons Attribution Non-Commercial - No Derivs License OAA

To preview the terms and conditions of these open access agreements please visit the Copyright FAQs hosted on Wiley Author Services http://exchanges.wiley.com/authors/faqs---copyright-_301.html and visit <http://www.wileyopenaccess.com/details/content/12f25db4c87/Copyright-License.html>.

If you select the OnlineOpen option and your research is funded by certain funders [e.g. The Wellcome Trust and members of the Research Councils UK (RCUK) or the Austrian Science Fund (FWF)] you will be given the opportunity to publish your article under a CC-BY license supporting you in complying with Wellcome Trust and Research Councils UK requirements. For more information on this policy and the Journal's compliant self-archiving policy please visit: <http://www.wiley.com/go/funderstatement>.

3. OnlineOpen

OnlineOpen is available to authors of primary research articles who wish to make their article available to non-subscribers on publication, or whose funding agency requires grantees to archive the final version of their article. With OnlineOpen, the author, the author's funding agency, or the author's institution pays a fee to ensure that the article is made available to non-subscribers upon publication via Wiley Online Library, as well as deposited in the funding agency's preferred archive. For the full list of terms and conditions, see http://wileyonlinelibrary.com/onlineopen#OnlineOpen_Terms

Any authors wishing to send their paper OnlineOpen will be required to complete the payment form available from our website at:

https://authorservices.wiley.com/bauthor/onlineopen_order.asp

Prior to acceptance there is no requirement to inform an Editorial Office that you intend to publish your paper OnlineOpen if you do not wish to. All OnlineOpen articles are treated in the same way as any other article. They go through the journal's standard peer-review process and will be accepted or rejected based on their own merit.

3.1 MANUSCRIPT SUBMISSION PROCEDURE

Manuscripts should be submitted electronically via the online submission site <http://mc.manuscriptcentral.com/iej>. The use of an online submission and peer review site enables immediate distribution of manuscripts and consequentially speeds up the review process. It also allows authors to track the status of their own manuscripts. Complete instructions for submitting a paper is available online and below. Further assistance can be obtained from iejeditor@cardiff.ac.uk.

3.2. Getting Started

- Launch your web browser (supported browsers include Internet Explorer 5.5 or higher, Safari 1.2.4, or Firefox 1.0.4 or higher) and go to the journal's online Submission Site:

<http://mc.manuscriptcentral.com/iej>

- Log-in, or if you are a new user, click on 'register here'.

- If you are registering as a new user.

- After clicking on 'register here', enter your name and e-mail information and click 'Next'. Your e-mail information is very important.

- Enter your institution and address information as appropriate, and then click 'Next.'

- Enter a user ID and password of your choice (we recommend using your e-mail address as your user ID), and then select your areas of expertise. Click 'Finish'.

- If you are registered, but have forgotten your log in details, please enter your e-mail address under 'Password Help'. The system will send you an automatic user ID and a new temporary password.

- Log-in and select 'Author Centre'

3.3. Submitting Your Manuscript

- After you have logged into your 'Author Centre', submit your manuscript by clicking on the submission link under 'Author Resources'.

- Enter data and answer questions as appropriate. You may copy and paste directly from your manuscript and you may upload your pre-prepared covering letter.

- Click the 'Next' button on each screen to save your work and advance to the next screen.
- You are required to upload your files.
- Click on the 'Browse' button and locate the file on your computer.
- Select the designation of each file in the drop down next to the Browse button.
- When you have selected all files you wish to upload, click the 'Upload Files' button.
- Review your submission (in HTML and PDF format) before completing your submission by sending it to the Journal. Click the 'Submit' button when you are finished reviewing.

3.4. Manuscript Files Accepted

Manuscripts should be uploaded as Word (.doc) or Rich Text Format (.rtf) files (not write-protected) plus separate figure files. GIF, JPEG, PICT or Bitmap files are acceptable for submission, but only high-resolution TIF or EPS files are suitable for printing. The files will be automatically converted to HTML and PDF on upload and will be used for the review process. The text file must contain the abstract, main text, references, tables, and figure legends, but no embedded figures or Title page. The Title page should be uploaded as a separate file. In the main text, please reference figures as for instance 'Figure 1', 'Figure 2' etc to match the tag name you choose for the individual figure files uploaded. Manuscripts should be formatted as described in the Author Guidelines below.

3.5. Blinded Review

Manuscript that do not conform to the general aims and scope of the journal will be returned immediately without review. All other manuscripts will be reviewed by experts in the field (generally two referees). International Endodontic Journal aims to forward referees' comments and to inform the corresponding author of the result of the review process. Manuscripts will be considered for fast-track publication under special circumstances after consultation with the Editor.

International Endodontic Journal uses double blinded review. The names of the reviewers will thus not be disclosed to the author submitting a paper and the name(s) of the author(s) will not be disclosed to the reviewers.

To allow double blinded review, please submit (upload) your main manuscript and title page as separate files.

Please upload:

- Your manuscript without title page under the file designation 'main document'
- Figure files under the file designation 'figures'
- The title page and Acknowledgements where applicable, should be uploaded under the file designation 'title page'

All documents uploaded under the file designation 'title page' will not be viewable in the html and pdf format you are asked to review in the end of the submission process. The files viewable in the html and pdf format are the files available to the reviewer in the review process.

3.6. Suspension of Submission Mid-way in the Submission Process

You may suspend a submission at any phase before clicking the 'Submit' button and save it to submit later. The manuscript can then be located under 'Unsubmitted Manuscripts' and you can click on 'Continue Submission' to continue your submission when you choose to.

3.7. E-mail Confirmation of Submission

After submission you will receive an e-mail to confirm receipt of your manuscript. If you do not receive the confirmation e-mail after 24 hours, please check your e-mail address carefully in the system. If the e-mail address is correct please contact your IT department. The error may be caused by some sort of spam filtering on your e-mail server. Also, the e-mails should be received if the IT department adds our e-mail server (uranus.scholarone.com) to their whitelist.

3.8. Manuscript Status

You can access ScholarOne Manuscripts any time to check your 'Author Centre' for the status of your manuscript. The Journal will inform you by e-mail once a decision has been made.

3.9. Submission of Revised Manuscripts

To submit a revised manuscript, locate your manuscript under 'Manuscripts with Decisions' and click on 'Submit a Revision'. Please remember to delete any old files uploaded when you upload your revised manuscript.

4. MANUSCRIPT TYPES ACCEPTED

Original Scientific Articles: must describe significant and original experimental observations and provide sufficient detail so that the observations can be critically evaluated and, if necessary, repeated. Original Scientific Articles must conform to the highest international standards in the field.

Review Articles: are accepted for their broad general interest; all are refereed by experts in the field who are asked to comment on issues such as timeliness, general interest and balanced treatment of controversies, as well as on scientific accuracy. Reviews should generally include a clearly defined search strategy and take a broad view of the field rather than merely summarizing the authors' own previous work. Extensive or unbalanced citation of the authors' own publications is discouraged.

Mini Review Articles: are accepted to address current evidence on well-defined clinical, research or methodological topics. All are refereed by experts in the field who are asked to comment on timeliness, general interest, balanced treatment of controversies, and scientific rigor. A clear research question, search strategy and balanced synthesis of the evidence is expected. Manuscripts are limited in terms of word-length and number of figures.

Clinical Articles: are suited to describe significant improvements in clinical practice such as the report of a novel technique, a breakthrough in technology or practical approaches to recognised clinical challenges. They should conform to the highest scientific and clinical practice standards.

Case Reports: illustrating unusual and clinically relevant observations are acceptable but they must be of sufficiently high quality to be considered worthy of publication in the Journal. On rare occasions, completed cases displaying non-obvious solutions to significant clinical challenges will be considered. Illustrative material must be of the highest quality and healing outcomes, if appropriate, should be demonstrated.

Supporting Information: *International Endodontic Journal* encourages submission of adjuncts to printed papers via the supporting information website (see submission of supporting information below). It is encouraged that authors wishing to describe novel procedures or illustrate cases more fully with figures and/or video may wish to utilise this facility.

Letters to the Editor: are also acceptable.

Meeting Reports: are also acceptable.

5. MANUSCRIPT FORMAT AND STRUCTURE

5.1. Format

Language: The language of publication is English. It is preferred that manuscript is professionally edited. A list of independent suppliers of editing services can be found at http://authorservices.wiley.com/bauthor/english_language.asp. All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication

Presentation: Authors should pay special attention to the presentation of their research findings or clinical reports so that they may be communicated clearly. Technical jargon should be avoided as much as possible and clearly explained where its use is unavoidable. Abbreviations should also be kept to a minimum, particularly those that are not standard. The background and hypotheses underlying the study, as well as its main conclusions, should be clearly explained. Titles and abstracts especially should be written in language that will be readily intelligible to any scientist.

Abbreviations: *International Endodontic Journal* adheres to the conventions outlined in *Units, Symbols and Abbreviations: A Guide for Medical and Scientific Editors and Authors*. When non-standard terms appearing 3 or more times in the manuscript are to be abbreviated, they should be written out completely in the text when first used with the abbreviation in parenthesis.

5.2. Structure

All manuscripts submitted to *International Endodontic Journal* should include Title Page, Abstract, Main Text, References and Acknowledgements, Tables, Figures and Figure Legends as appropriate

Title Page: The title page should bear: (i) Title, which should be concise as well as descriptive; (ii) Initial(s) and last (family) name of each author; (iii) Name and address of department, hospital or institution to which work should be attributed; (iv) Running title (no more than 30 letters and spaces); (v) No more than six keywords (in alphabetical order); (vi) Name, full postal address, telephone, fax number and e-mail address of author responsible for correspondence.

Abstract for Original Scientific Articles should be no more than 250 words giving details of what was done using the following structure:

- **Aim:** Give a clear statement of the main aim of the study and the main hypothesis tested, if any.
- **Methodology:** Describe the methods adopted including, as appropriate, the design of the study, the setting, entry requirements for subjects, use of materials, outcome measures and statistical tests.
- **Results:** Give the main results of the study, including the outcome of any statistical analysis.
- **Conclusions:** State the primary conclusions of the study and their implications. Suggest areas for further research, if appropriate.

Abstract for Review Articles should be non-structured of no more than 250 words giving details of what was done including the literature search strategy.

Abstract for Mini Review Articles should be non-structured of no more than 250 words, including a clear research question, details of the literature search strategy and clear conclusions.

Abstract for Case Reports should be no more than 250 words using the following structure:

- **Aim:** Give a clear statement of the main aim of the report and the clinical problem which is addressed.
- **Summary:** Describe the methods adopted including, as appropriate, the design of the study, the setting, entry requirements for subjects, use of materials, outcome measures and analysis if any.
- **Key learning points:** Provide up to 5 short, bullet-pointed statements to highlight the key messages of the report. All points must be fully justified by material presented in the report.

Abstract for Clinical Articles should be no more than 250 words using the following structure:

- **Aim:** Give a clear statement of the main aim of the report and the clinical problem which is addressed.
- **Methodology:** Describe the methods adopted.
- **Results:** Give the main results of the study.
- **Conclusions:** State the primary conclusions of the study.

Main Text of Original Scientific Article should include Introduction, Materials and Methods, Results, Discussion and Conclusion

Introduction: should be focused, outlining the historical or logical origins of the study and gaps in knowledge. Exhaustive literature reviews are not appropriate. It should close with the explicit statement of the specific aims of the investigation, or hypothesis to be tested.

Material and Methods: must contain sufficient detail such that, in combination with the references cited, all clinical trials and experiments reported can be fully reproduced.

(i) Clinical Trials should be reported using the CONSORT guidelines available at www.consort-statement.org. A [CONSORT checklist](#) and flow diagram (as a Figure) should also be included in the submission material.

(ii) Experimental Subjects: experimentation involving human subjects will only be published if such research has been conducted in full accordance with ethical principles, including the World Medical Association [Declaration of Helsinki](#) (version 2008) and the additional requirements, if any, of the country where the research has been carried out. Manuscripts must be accompanied by a statement that the experiments were undertaken with the understanding and written consent of each subject and according to the above mentioned principles. A statement regarding the fact that the study has been independently reviewed and approved by an ethical board should also be included. Editors reserve the right to reject papers if there are doubts as to whether appropriate procedures have been used.

When experimental animals are used the methods section must clearly indicate that adequate measures were taken to minimize pain or discomfort. Experiments should be carried out in accordance with the Guidelines laid down by the National Institute of Health (NIH) in the USA regarding the care and use of animals for experimental procedures or with the European Communities Council Directive of 24 November 1986 (86/609/EEC) and in accordance with local laws and regulations.

All studies using human or animal subjects should include an explicit statement in the Material and Methods section identifying the review and ethics committee approval for each study, if applicable. Editors reserve the right to reject papers if there is doubt as to whether appropriate procedures have been used.

(iii) Suppliers: Suppliers of materials should be named and their location (Company, town/city, state, country) included.

Results: should present the observations with minimal reference to earlier literature or to possible interpretations. Data should not be duplicated in Tables and Figures.

Discussion: may usefully start with a brief summary of the major findings, but repetition of parts of the abstract or of the results section should be avoided. The Discussion section should progress with a review of the methodology before discussing the results in light of previous work in the field. The Discussion should end with a brief conclusion and a comment on the potential clinical relevance of the findings. Statements and interpretation of the data should be appropriately supported by original references.

Conclusion: should contain a summary of the findings.

Main Text of Review Articles should be divided into Introduction, Review and Conclusions. The Introduction section should be focused to place the subject matter in context and to justify the need for the review. The Review section should be divided into logical sub-sections in order to improve readability and enhance understanding. Search strategies must be described and the use of state-of-the-art evidence-based systematic approaches is expected. The use of tabulated and illustrative material is encouraged. The Conclusion section should reach clear conclusions and/or recommendations on the basis of the evidence presented.

Main Text of Mini Review Articles should be divided into Introduction, Review and Conclusions. The Introduction section should briefly introduce the subject matter and justify the need and timeliness of the literature review. The Review section should be divided into logical sub-sections to enhance readability and understanding and may be supported by up to 5 tables and figures. Search strategies must be described and the use of state-of-the-art evidence-based systematic approaches is expected. The Conclusions section should present clear statements/recommendations and suggestions for further work. The manuscript, including references and figure legends should not normally exceed 4000 words.

Main Text of Clinical Reports and Clinical Articles should be divided into Introduction, Report, Discussion and Conclusion. They should be well illustrated with clinical images, radiographs, diagrams and, where appropriate, supporting tables and graphs. However, all illustrations must be of the highest quality

Acknowledgements: *International Endodontic Journal* requires that all sources of institutional, private and corporate financial support for the work within the manuscript must be fully acknowledged, and any potential conflicts of interest noted. Grant or contribution numbers may be acknowledged, and principal grant holders should be listed. Acknowledgments should be brief and should not include thanks to anonymous referees and editors. See also above under Ethical Guidelines.

5.3. References

It is the policy of the Journal to encourage reference to the original papers rather than to literature reviews. Authors should therefore keep citations of reviews to the absolute minimum.

We recommend the use of a tool such as [EndNote](#) or [Reference Manager](#) for reference management and formatting. The EndNote reference style can be obtained upon request to the editorial office (iejeditor@cardiff.ac.uk). Reference Manager reference styles can be searched for here: www.refman.com/support/rmstyles.asp

In the text: single or double authors should be acknowledged together with the year of publication, e.g. (Pitt Ford & Roberts 1990). If more than two authors the first author followed by *et al.* is sufficient, e.g. (Tobias *et al.* 1991). If more than 1 paper is cited the references should be in year order and separated by “,” e.g. (Pitt Ford & Roberts 1990, Tobias *et al.* 1991).

Reference list: All references should be brought together at the end of the paper in alphabetical order and should be in the following form.

- (i) Names and initials of up to six authors. When there are seven or more, list the first three and add *et al.*
- (ii) Year of publication in parentheses
- (iii) Full title of paper followed by a full stop (.)
- (iv) Title of journal in full (in italics)
- (v) Volume number (bold) followed by a comma (.)
- (vi) First and last pages

Examples of correct forms of reference follow:

Standard journal article

Bergenholtz G, Nagaoka S, Jontell M (1991) Class II antigen-expressing cells in experimentally induced pulpitis. *International Endodontic Journal* **24**, 8-14.

Corporate author

British Endodontic Society (1983) Guidelines for root canal treatment. *International Endodontic Journal* **16**, 192-5.

Journal supplement

Frumin AM, Nussbaum J, Esposito M (1979) Functional asplenia: demonstration of splenic activity by bone marrow scan (Abstract). *Blood* **54** (Suppl. 1), 26a.

Books and other monographs

Personal author(s)

Gutmann J, Harrison JW (1991) *Surgical Endodontics*, 1st edn Boston, MA, USA: Blackwell Scientific Publications.

Chapter in a book

Wesselink P (1990) Conventional root-canal therapy III: root filling. In: Harty FJ, ed. *Endodontics in Clinical Practice*, 3rd edn; pp. 186-223. London, UK: Butterworth.

Published proceedings paper

DuPont B (1974) Bone marrow transplantation in severe combined immunodeficiency with an unrelated MLC compatible donor. In: White HJ, Smith R, eds. *Proceedings of the Third Annual Meeting of the International Society for Experimental Rematology*; pp. 44-46. Houston, TX, USA: International Society for Experimental Hematology.

Agency publication

Ranofsky AL (1978) *Surgical Operations in Short-Stay Hospitals: United States-1975*. DHEW publication no. (PHS) 78-1785 (Vital and Health Statistics; Series 13; no. 34.) Hyattsville, MD, USA: National Centre for Health Statistics. 8

Dissertation or thesis

Saunders EM (1988) *In vitro and in vivo investigations into root-canal obturation using thermally softened gutta-percha techniques (PhD Thesis)*. Dundee, UK: University of Dundee.

URLs

Full reference details must be given along with the URL, i.e. authorship, year, title of document/report and URL. If this information is not available, the reference should be removed and only the web address cited in the text.

Smith A (1999) Select committee report into social care in the community [WWW document]. URL <http://www.dhss.gov.uk/reports/report015285.html> [accessed on 7 November 2003]

5.4. Tables, Figures and Figure Legends

Tables: Tables should be double-spaced with no vertical rulings, with a single bold ruling beneath the column titles. Units of measurements must be included in the column title.

Figures: All figures should be planned to fit within either 1 column width (8.0 cm), 1.5 column widths (13.0 cm) or 2 column widths (17.0 cm), and must be suitable for photocopy reproduction from the printed version of the manuscript. Lettering on figures should be in a clear, sans serif typeface (e.g. Helvetica); if possible, the same typeface should be used for all figures in a paper. After reduction for publication, upper-case text and numbers should be at least 1.5-2.0 mm high (10 point Helvetica). After reduction, symbols should be at least 2.0-3.0 mm high (10 point). All half-tone photographs should be submitted at final reproduction size. In general, multi-part figures should be arranged as they would appear in the final version. Reduction to the scale that will be used on the page is not necessary, but any special requirements (such as the separation distance of stereo pairs) should be clearly specified.

Unnecessary figures and parts (panels) of figures should be avoided: data presented in small tables or histograms, for instance, can generally be stated briefly in the text instead. Figures should not contain more than one panel unless the parts are logically connected; each panel of a multipart figure should be sized so that the whole figure can be reduced by the same amount and reproduced on the printed page at the smallest size at which essential details are visible.

Figures should be on a white background, and should avoid excessive boxing, unnecessary colour, shading and/or decorative effects (e.g. 3-dimensional skyscraper histograms) and highly pixelated computer drawings. The vertical axis of histograms should not be truncated to exaggerate small differences. The line spacing should be wide enough to remain clear on reduction to the minimum acceptable printed size.

Figures divided into parts should be labelled with a lower-case, boldface, roman letter, a, b, and so on, in the same typesize as used elsewhere in the figure. Lettering in figures should be in lower-case type, with the first letter capitalized. Units should have a single space between the number and the unit, and follow SI nomenclature or the nomenclature common to a particular field. Thousands should be separated by a thin space (1 000). Unusual units or abbreviations should be spelled out in full or defined in the legend. Scale bars should be used rather than magnification factors, with the length of the bar defined in the legend rather than on the bar itself. In general, visual cues (on the figures themselves) are preferred to verbal explanations in the legend (e.g. broken line, open red triangles etc.)

Figure legends: Figure legends should begin with a brief title for the whole figure and continue with a short description of each panel and the symbols used; they should not contain any details of methods.

Permissions: If all or part of previously published illustrations are to be used, permission must be obtained from the copyright holder concerned. This is the responsibility of the authors before submission.

Preparation of Electronic Figures for Publication: Although low quality images are adequate for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit EPS (lineart) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented programmes. Scans (TIFF only) should have a resolution of 300 dpi (halftone) or 600 to 1200 dpi (line drawings) in relation to the reproduction size (see below). EPS files should be saved with fonts embedded (and with a TIFF preview if possible). For scanned images, the scanning resolution (at final image size) should be as follows to ensure good reproduction: lineart: >600 dpi; half-tones (including gel photographs): >300 dpi; figures containing both halftone and line images: >600 dpi.

Further information can be obtained at Wiley Blackwell's guidelines for figures:
<http://authorservices.wiley.com/bauthor/illustration.asp>.

Check your electronic artwork before submitting it:
<http://authorservices.wiley.com/bauthor/eachecklist.asp>.

5.5. Supporting Information

Publication in electronic formats has created opportunities for adding details or whole sections in the electronic version only. Authors need to work closely with the editors in developing or using such new publication formats.

Supporting information, such as data sets or additional figures or tables, that will not be published in the print edition of the journal, but which will be viewable via the online edition, can be submitted. It should be clearly stated at the time of submission that the supporting information is intended to be made available through the online edition. If the size or format of the supporting information is such that it cannot be accommodated on the journal's website, the author agrees to make the supporting information available free of charge on a permanent Web site, to which links will be set up from the journal's website. The author must advise Wiley Blackwell if the URL of the website where the supporting information is located changes. The content of the supporting information must not be altered after the paper has been accepted for publication.

The availability of supporting information should be indicated in the main manuscript by a paragraph, to appear after the References, headed 'Supporting Information' and providing titles of figures, tables, etc. In order to protect reviewer anonymity, material posted on the authors Web site cannot be reviewed. The supporting information is an integral part of the article and will be reviewed accordingly.

Preparation of Supporting Information: Although provision of content through the web in any format is straightforward, supporting information is best provided either in web-ready form or in a form that can be conveniently converted into one of the standard web publishing formats:

- Simple word-processing files (.doc or .rtf) for text.
- PDF for more complex, layout-dependent text or page-based material. Acrobat files can be distilled from Postscript by the Publisher, if necessary.
- GIF or JPEG for still graphics. Graphics supplied as EPS or TIFF are also acceptable.
- MPEG or AVI for moving graphics.

Subsequent requests for changes are generally unacceptable, as for printed papers. A charge may be levied for this service.

Video Imaging: For the on-line version of the Journal the submission of illustrative video is encouraged. Authors proposing the use such media should consult with the Editor during manuscript preparation.

6. AFTER ACCEPTANCE

Upon acceptance of a paper for publication, the manuscript will be forwarded to the Production Editor who is responsible for the production of the journal.

6.1. Figures

Hard copies of all figures and tables are required when the manuscript is ready for publication. These will be requested by the Editor when required. Each Figure copy should be marked on the reverse with the figure number and the corresponding author's name.

6.2 Proof Corrections

The corresponding author will receive an email alert containing a link to a web site. A working email address must therefore be provided for the corresponding author. The proof can be downloaded as a PDF (portable document format) file from this site. Acrobat Reader will be required in order to read this file. This software can be downloaded (free of charge) from the following Web site: www.adobe.com/products/acrobat/readstep2.html. This will enable the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof. Hard copy proofs will be posted if no e-mail address is available; in your absence, please arrange for a colleague to access your e-mail to retrieve the proofs. Proofs must be returned to the Production Editor within three days of receipt. As changes to proofs are costly, we ask that you only correct typesetting errors. Excessive changes made by the author in the proofs, excluding typesetting errors, will be charged separately. Other than in exceptional circumstances, all illustrations are retained by the publisher. Please note that the author is responsible for all statements made in his work, including changes made by the copy editor.

6.3 Early Online Publication Prior to Print

International Endodontic Journal is covered by Wiley Blackwell's Early View service. Early View articles are complete full-text articles published online in advance of their publication in a printed issue. Early View articles are complete and final. They have been fully reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after online publication. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the traditional way. They are therefore given a Digital Object Identifier (DOI), which allows the article to be cited and tracked before it is allocated to an issue. After print publication, the DOI remains valid and can continue to be used to cite and access the article.

6.4 Online Production Tracking

Online production tracking is available for your article through Blackwell's Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The author will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript. Visit <http://authorservices.wiley.com/bauthor/> for more details on online production tracking and for a wealth of resources including FAQs and tips on article preparation, submission and more.

6.5 Author Material Archive Policy

Please note that unless specifically requested, Wiley Blackwell will dispose of all hardcopy or electronic material submitted two months after publication. If you require the return of any material submitted, please inform the editorial office or production editor as soon as possible.

6.6 Offprints

Free access to the final PDF offprint of your article will be available via Author Services only. Please therefore sign up for Author Services if you would like to access your article PDF offprint and enjoy the many other benefits the service offers.

Additional paper offprints may be ordered online. Please click on the following link, fill in the necessary details and ensure that you type information in all of the required fields: [Offprint Cosprinters](#). If you have queries about offprints please email offprint@cosprinters.com

The corresponding author will be sent complimentary copies of the issue in which the paper is published (one copy per author).

6.7 Author Services

For more substantial information on the services provided for authors, please see [Wiley Blackwell Author Services](#)

6.8 Note to NIH Grantees: Pursuant to NIH mandate, Wiley Blackwell will post the accepted version of contributions authored by NIH grant-holders to PubMed Central upon acceptance. This accepted version will be made publicly available 12 months after publication. For further information, see www.wiley.com/go/nihmandate

7 Guidelines for reporting of DNA microarray data

The *International Endodontic Journal* gives authors notice that, with effect from 1st January 2011, submission to the *International Endodontic Journal* requires the reporting of microarray data to conform to the MIAME guidelines. After this date, submissions will be assessed according to MIAME standards. The complete current guidelines are available at http://www.mged.org/Workgroups/MIAME/miame_2.0.html. Also, manuscripts will be published only after the complete data has been submitted into the public repositories, such as GEO (<http://www.ncbi.nlm.nih.gov/geo/>) or ArrayExpress (http://www.ebi.ac.uk/microarray/submissions_overview.html), in MIAME compliant format, with the data accession number (the identification number of the data set in the database) quoted in the manuscript. Both databases are committed to keeping the data private until the associated manuscript is published, if requested.

Prospective authors are also encouraged to search for previously published microarray data with relevance to their own data, and to report whether such data exists. Furthermore, they are encouraged to use the previously published data for qualitative and/or quantitative comparison with their own data, whenever suitable. To fully acknowledge the original work, an appropriate reference should be given not only to the database in question, but also to the original article in which the data was first published. This open approach will increase the availability and use of these large-scale data sets and improve the reporting and interpretation of the findings, and in increasing the comprehensive understanding of the physiology and pathology of endodontically related tissues and diseases, result eventually in better patient care.

ANEXO C – Comprovante de submissão do artigo

2017-4-26

ScholarOne Manuscripts

 International Endodontic Journal[# Home](#)[# Author](#)

Submission Confirmation

[Print](#)

Thank you for your submission

Submitted to

International Endodontic Journal

Manuscript ID

IEJ-17-00241

Title

Evaluation of posterior teeth's topography and its relationship with maxillary sinus

Authors

Makris, Livia

Devito, Karina

D'Addazio, Paulo

Lima, Carolina

Campos, Celso

Date Submitted

26-Apr-2017

[Author Dashboard](#)

© Thomson Reuters | © ScholarOne, Inc., 2017. All Rights Reserved.

ScholarOne Manuscripts and ScholarOne are registered trademarks of ScholarOne, Inc.
ScholarOne Manuscripts Patents #7,257,767 and #7,263,655.

[@ScholarOneNews](#) | [System Requirements](#) | [Privacy Statement](#) | [Terms of Use](#)

<https://mc.manuscriptcentral.com/iej>

1/2