



ORIGINAL ARTICLE

Association between maxillary sinus pathologies and healthy teeth^{☆,☆☆}



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KEYWORDS

Molar tooth;
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Maxillary sinus;
Dental root;
Cone beam computed tomography

Abstract

Introduction: The proximity of the roots to the maxillary sinus can create a variety of risks.
Objective: To evaluate the relationship between the roots of healthy teeth and the maxillary sinus, as well as the occurrence of sinus pathologies.
Methods: Three radiologists analyzed 109 cone beam computed tomography (CBCT) images. The Kappa test was used to assess the intra- and inter-rater agreement. The chi-squared test and prevalence ratio were used to test the hypothesis that roots of healthy teeth in the maxillary sinus favored the occurrence of sinus pathologies ($p=0.01$).
Results: Intra- and inter-rater agreement ranged from good to excellent. The chi-squared test demonstrated a statistically significant difference ($p=0.006$) between the tooth roots in diseased maxillary sinuses (6.09%) and those in normal sinuses (3.43%). The prevalence ratio test showed a statistically significant higher prevalence of tooth roots in diseased sinuses than in normal sinuses ($p<0.0001$). Roots in the maxillary sinus were 1.82 times more associated with diseased sinuses.

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Conclusion: Dental roots in the maxillary sinus are almost twice as likely to be associated with diseased sinuses than normal sinuses. Healthy teeth whose roots are inside the maxillary sinus may induce an inflammatory response in the sinus membrane. It is suspected that dental procedures may exacerbate the condition.

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PALAVRAS-CHAVE

Dente molar;
Dente pré-molar;
Seio maxilar;
Raiz dentária;
Tomografia
computadorizada
de feixe cônico

Relação entre doenças no seio maxilar e dentes hígidos

Resumo

Introdução: A proximidade das raízes com o seio maxilar pode criar uma variedade de riscos.

Objetivo: Avaliar a relação entre as raízes dos dentes hígidos com o seio maxilar, assim como com a ocorrência de doenças sinusais.

Método: Três radiologistas analisaram 109 imagens de tomografia computadorizada de feixe cônico (TCFC). O teste Kappa avaliou a concordância intra e interexaminadores. Os testes de Qui-quadrado e Razão de Prevalência foram utilizados para testar a hipótese de que raízes de dentes hígidos dentro do seio maxilar favorecem a ocorrência de doenças sinusais (nível de significância = 0,01).

Resultados: A concordância intra e interexaminadores variou de boa a excelente. O teste Qui-quadrado mostrou uma diferença estatisticamente significativa ($p = 0,006$) entre as raízes dentárias dentro do seio maxilar patológico (6,09%) e aquelas dentro do seio normal (3,43%). O teste de Razão de Prevalência mostrou uma ocorrência de raízes dentárias dentro de seios patológicos estatisticamente maior do que dentro de seios normais ($p < 0,0001$). As raízes dentro do seio maxilar foram encontradas 1,82 vezes mais associadas a seios patológicos.

Conclusão: Raízes dentárias dentro do seio maxilar são quase duas vezes mais associadas a seios patológicos do que a seios normais. Dentes hígidos que têm raízes dentro do seio maxilar podem induzir uma resposta inflamatória da mucosa sinusal. Suspeita-se que procedimentos odontológicos possam agravar tal situação.

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Introduction

Maxillary sinuses can vary in size and shape from one individual to another, or even between the right and left sides in the same individual. In approximately half of the population, their length also varies. The floor of the maxillary sinus extends into the alveolar process between the roots of adjacent teeth, creating elevations and depressions called "extensions," with narrow cortical areas.^{1,2} Through histological sections, it has been radiographically demonstrated that most of the roots projecting into the maxillary sinus were in fact surrounded by a thin layer of cortical bone, with perforations present in 14–28% of cases.³ Under normal conditions, the relationship between the tooth and the floor of the maxillary sinus consists of either a thin layer of compact bone that provides support to the apical periodontal ligament fibers, to which it firmly adheres, or there is a direct relationship with the maxillary sinus mucosa. The inner lining of the maxillary sinus cavity is devoid of periosteum; therefore, in the absence of a thin layer of intervening bone, the periodontal tissues are in direct contact with the basal surface of the sinus mucosa.²

The roots of the upper premolars, molars, and occasionally the canine teeth have a close relationship with the

maxillary sinus; in some cases, they may even protrude into it.^{4–6} It has been demonstrated that the closer the tooth apex is to the floor of the maxillary sinus, the greater the impact on antral tissue.⁷ This relationship can result in a variety of risks, especially for certain surgical procedures, such as tooth extraction and implant placement, or during endodontic or orthodontic treatments.^{4,5,8} An accurate description of the relationship between the apices of the upper teeth and the lower wall of the maxillary sinus, as well as the thickness of the cortical bone between these structures, is essential for planning dental procedures.

Dental radiographs, such as panoramic radiography, consist of two-dimensional images and, as such, are inappropriate and/or of little use for accurate morphometric assessment of bone relationships.⁴ In cases where the panoramic radiograph reveals a possible relationship between a tooth that has undergone intervention and its contact with the adjacent maxillary sinus, evaluation by cone beam computed tomography (CBCT) can assist in dental treatment planning. This imaging modality allows for a thorough analysis of the anatomical relationship between the maxillary sinus and the roots of the upper teeth,^{4,6,9,10} thus overcoming the limitations of panoramic radiography, providing multiplanar views without magnification, distortion, or

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