Differential diagnosis of non-odontogenic sinusitis

José Burgos **PONCE**[1]
Bruno Martini **GUIMARÃES**[2]
Lidiane de Castro **PINTO**[3]
Celso Kenji **NISHIYAMA**[3]
Ana Lucia Pompeia Fraga de **ALMEIDA**[4]

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ABSTRACT

The close relationship between maxillary posterior teeth dental roots and pneumatic cavities poses difficulties in the clinical diagnosis of pathologies in this area. This article reports a differential diagnosis of non-odontogenic sinusitis in the region of molars with an intimate relationship with the maxillary sinus mucosa. Diagnosis was achieved by means of cone-beam computed tomography. The correct use of radiological evaluation associated with clinical findings is crucial for the diagnosis of sinusitis and can avoid unnecessary treatment procedures.

Keywords: Cone-beam computed tomography. Diagnosis. Sinusitis.

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[1]PhD resident in Pathology, School of Dentistry — Bauru/USP.

[2]PhD resident in Endodontics, School of Dentistry — Bauru/USP.

[3]Professor, Department of Endodontics, Hospital for Rehabilitation of Craniofacial Anomalies/ USP.

[4]Professor, Department of Prosthesis, School of Dentistry — Bauru/USP.

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Contact address: Bruno Martini Guimarães
Departamento de Endodontia - Al. Octávio Pinheiro Brisola, 9-75
Bauru - SP - Brazil - 17012-901 - E-mail: brunomgui@usp.br

Introduction

In the paranasal sinuses, maxillary teeth are the first to emerge. Their growth is directly related to the development and eruption of upper molars which do not achieve full size until permanent dentition. A close relationship is established between the roots of maxillary teeth, from canine to upper molars, and the sinus floor. These structures are separated by a thin layer of bone which is often represented by a mucous membrane.

Knowing the distance between the maxillary sinus floor and the apices of maxillary posterior teeth is of paramount importance for both surgical and non-surgical endodontic procedures, particularly due to the risk of penetration into the lower recess of the sinus. Measurements demonstrate a longer distance between the sinus and the roots of premolars in comparison to the roots of molars, with variations of existing bone thickness in different roots.[1]

The close relationship established between the roots of maxillary posterior teeth and the pneumatic cavities poses difficulties in the clinical diagnosis of pathologies in this area.[2] A total of 10% to 86% of pathologies in this area are of odontogenic origin,[3,4] and nearly 70% of individuals with odontogenic impairments in maxillary posterior teeth have alterations in the maxillary sinus.[3]

The high incidence of maxillary sinusitis resulting from odontogenic infection should be taken into account during diagnosis[5] so as to properly determine the cause of the disease and to avoid subjecting patients with sinusitis to long and unnecessary surgical procedures.[4,5]

Cone-beam computed tomography (CBCT) has been recently introduced into dento-maxillo-facial imaging and diagnosis as an alternative to conventional tomography (CT). It offers advantages such as lower radiation dose and significant features in comparison to conventional radiography.[5,6]

The objective of this research is to guide dentists and endodontists with regard to the correct diagnosis of odontogenic sinusitis by means of reporting a clinical case conducted at the Hospital for Rehabilitation of Craniofacial Anomalies/USP.

Case report

A female patient attended the Department of Endodontics at the Hospital for Rehabilitation of Craniofacial Anomalies/USP with chief complaint of pain in the region of upper molars. After the first interview and clinical examination, a periapical radiograph was obtained (Fig 1). The patient had previously sought an otorhinolaryngologist who assessed her case by means of orthopantomographic and lateral radiographs without finding any alterations.

Teeth #24 and 25 had undergone satisfactory endodontic treatment without pain at percussion. Teeth #26 and 27, however, had no endodontic treatment and tested positive for sensitivity. The presence of restorations on teeth #26 and 27, associated with the intimate relationship between dental roots and the maxillary sinus cavity was indicative of a change at that level. For this reason, patient's existing CBCT, which had been taken at the Department of Radiology of the Hospital for Rehabilitation of Craniofacial Anomalies/USP for previous orthognathic surgery follow-up, was then analyzed.

CBCT analysis revealed thickening of the maxillary sinus mucosa, a condition that might be considered as sinusitis (Figs 2A, and 2C). CBCT also highlighted the close relationship established between the apices of upper left premolars and molars and the maxillary sinus (Fig 3). Following the diagnostic criteria for sinusitis established by Maillet et al,[2] we concluded that it was a case of non-odontogenic sinusitis. The patient was then referred to the otorhinolaryngologist with a copy of the CBCT scan.

Two months later, the patient returned to the Department of Endodontics of the Hospital for Rehabilitation of Craniofacial Anomalies/USP. She was then resubmitted to CBCT which revealed regression of inflammation in the sinus mucosa and absence of painful symptomatology (Fig 2B, 2D).

Discussion

The present study reports a case of differential diagnosis of non-odontogenic sinusitis in the region of upper molars with intimate relationship with the

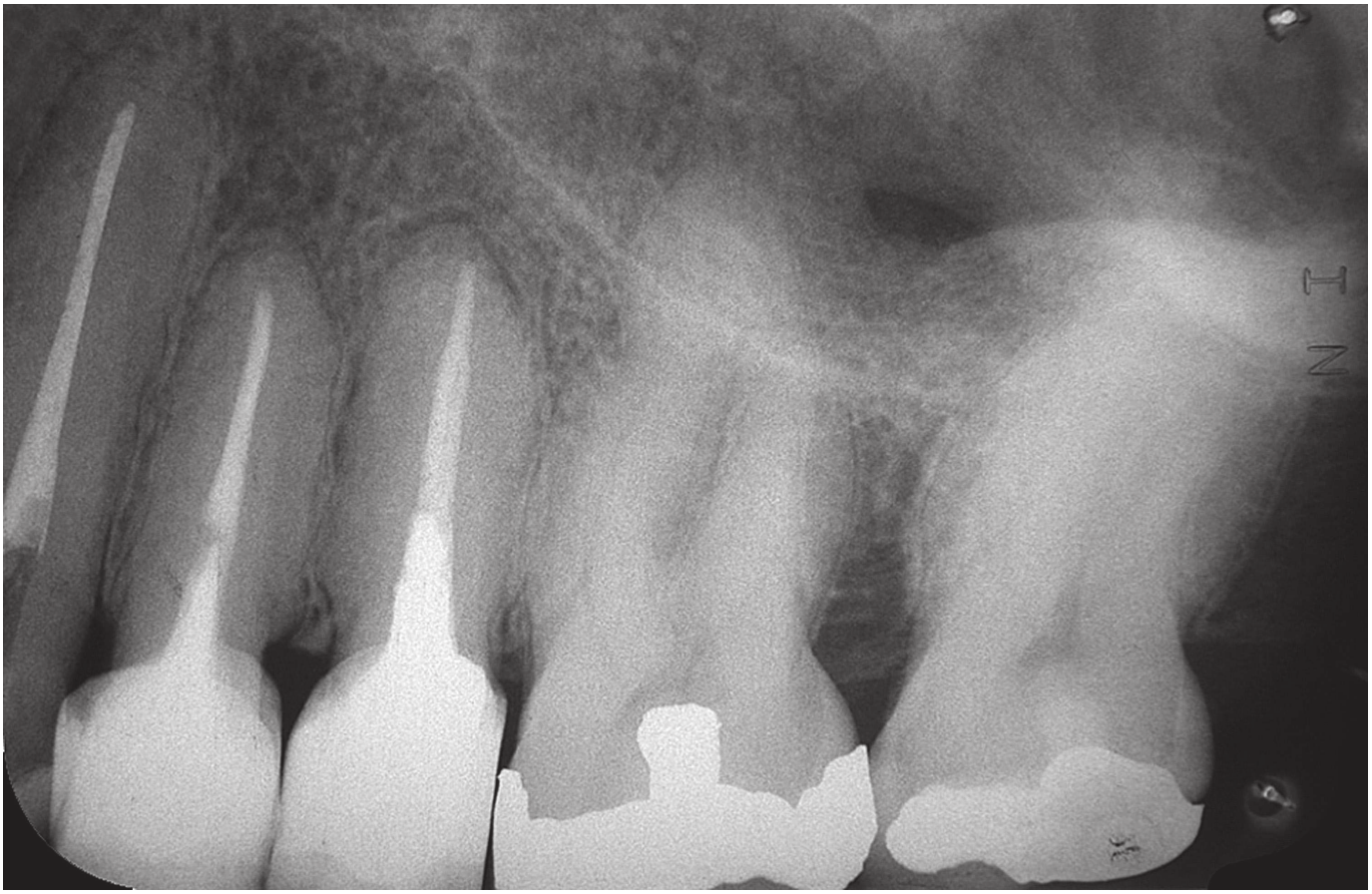

Figure 1. Periapical region of right upper teeth.

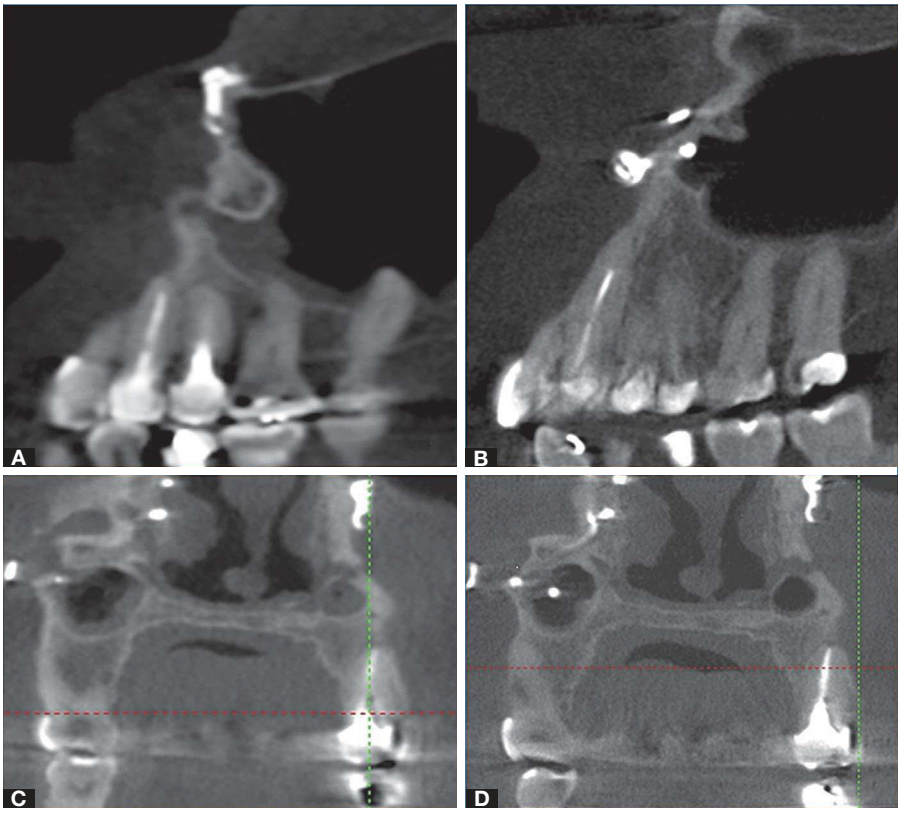

Figure 2. Axial scans of the relationship between posterior teeth and maxillary sinus: **A**) Initial CBCT; **B**) Control CBCT after medical treatment. Coronal scans of the relationship between posterior teeth and maxillary sinus: **C**) Initial CBCT highlighting right maxillary sinus anterior extension filled with mucosal inflammation; **D**) Control CBCT after medical treatment.

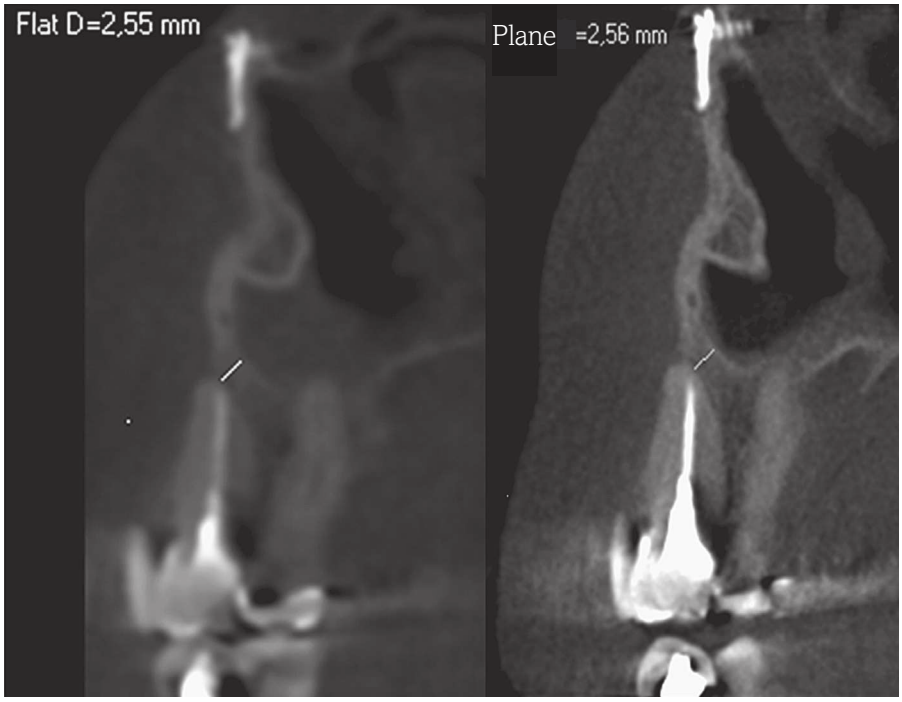

Figure 3. A) Initial CBCT scan (voxel: 0.4 mm) **B**) Follow-up CBCT scan two months after medical treatment (voxel: 0.2 mm).

maxillary sinus mucosa. The average distance from molars and premolars to the maxillary sinus floor ranges from 0.83 mm in the buccal roots of the second molar to 7.05 mm in the roots of the first premolar.[1] This close relationship requires that we conduct a detailed survey to assess the communication between the aforementioned anatomical structures. Importantly, canines and posterior teeth with odontogenic infection can cause changes in the maxillary sinus mucosa in approximately 70% of cases.[3]

Pulp sensitivity tests revealed vital molars and asymptomatic premolars. Additionally, periapical radiograph revealed satisfactory endodontic treatment in premolars, and no evident radiographic changes on molars. CBCT proved an essential tool not only in determining inflammation of the sinus mucosa, but also in reaching the diagnosis of sinusitis. These findings were associated with the diagnostic criteria advocated by Maillet et al,[2] and disregarded odontogenic sinusitis. The patient was then referred to an otolaryngologist.

CBCT is a useful tool used in the differential diagnosis of non-endodontic pathologies.[2,7] Voxel size plays an important role in tomographic diagnosis. Studies demonstrate that the smaller the voxel size, the better the results yielded by observation of anatomical and endodontic pathologies.[8,9] In this study, initial CBCT scan was conducted with a voxel size of 0.4 mm and a field of view (FOV) of 22 cm as a follow-up approach for orthognathic surgery. The second CBCT scan was requested by the Department of Endodontics of the Hospital for Rehabilitation of Craniofacial Anomalies/USP, with a voxel of 0.2 mm and 6 cm FOV, since the field of observation was only in the upper jaw, only. The differences between voxel size in both CT scans are shown in Figure 3.

Panoramic and bitewing radiographs do not prove to be a reliable alternative for the differential diagnosis of maxillary sinusitis, as they do not estimate the amount of bone loss. Furthermore, periapical radiograph routinely used for endodontic diagnosis

also have major limitations, since it cannot diagnose oro-antral communication.[5]

Careful analysis of maxillary sinuses by means of CT scans might be a more sensitive tool to detect potential causes of sinusitis.[4] CBCT was specifically designed for imaging of the head and neck. Nevertheless, it has proved particularly useful in the different aspects of endodontic treatment.[6,7,10]

The lower radiation dose emitted by CBCT is another interesting advantage over conventional CT scans.[7] Furthermore, it also reaches diagnosis of periapical pathologies with greater accuracy in comparison to digital periapical radiographs, as demonstrated by Lofthag-Hansen et al.[10]

Conclusion

The correct use of radiological evaluation associated with clinical findings is crucial for the diagnosis of sinusitis and can avoid unnecessary treatment procedures.

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