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A periapical disease aggravating maxillary rhinosinusitis

Bülent Yılmaz, Muzaffer Emir Dinçol, Handan Ersev

ABSTRACT

Introduction: The maxillary sinus exhibits a close anatomical relationship with maxillary posterior teeth. Therefore, maxillary sinusitis having a possible odontogenic infection may present a real diagnostic challenge in some cases. Case Report: A patient with a history of chronic maxillary rhinosinusitis was sent to our department by an otorhinolaryngologist for a dental consultation. A coronal computed tomography (CT) section showed that the left sinus had significant mucosal thickening and bone erosion in its floor and in the lateral wall. The oral examination demonstrated that none of the ipsilateral maxillary teeth had caries or had been restored before. Periapical radiography showed that a periapical lesion associated with the first molar tooth had elevated the sinus floor. Nonsurgical endodontic treatment was initiated because the established diagnosis of the endodontic lesion was a chronic periapical abscess. At the root-filling appointment, periapical radiography showed the finding of healing in the periapical lesion. A follow-up CT scan performed three years after initiation of the treatment revealed that the mucosal inflammation had resolved and the sinus floor had remodeled. The rhinologic findings such as another mucosal inflammation in the anterolateral wall and a mucous retention cyst have also been reported to exist in the same sinus. Conclusion: This case was classified as a chronic maxillary rhinosinusitis with a secondary endodontic source of infection because the rhinologic findings were still present after the elimination of endodontic infection and its local inflammatory effects on the sinus.

Keywords: Maxillary sinusitis, Odontogenic infection, Periapical diseases, Root canal therapy, Rhinosinusitis, Teeth

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INTRODUCTION

Maxillary posterior teeth and, less likely, canine teeth have a close anatomical relationship with the maxillary sinuses. The root apices of these teeth may protrude beyond the sinus floor. These protruding root apices are isolated from the sinus cavity merely by the Schneiderian membrane. Therefore, iatrogenic dental complications or various pathologies of the adjacent teeth or the maxillary alveolar bone may disrupt the integrity of this membrane, causing odontogenic maxillary sinusitis (OMS) [1].

Various studies using reliable diagnostic methods to identify odontogenic causes of maxillary sinusitis

revealed that the real incidence of odontogenic etiology might be higher than the anecdotal estimate of 10%. For instance, the frequency of an odontogenic cause was reported to be 40.6% in a study in which a routine examination was conducted and diagnostic oral surgery was performed on patients with chronic maxillary sinusitis [2]. Furthermore, another study reported that the likelihood of an odontogenic infection was 70% in unilateral cases [3]. Etiological studies also reported that periapical and periodontal diseases [2, 4] and iatrogenia [5] are the most common causes of OMS.

Based on these etiological studies, it is believed that OMS will continue to be clinically significant due to its high frequency. Therefore, the aims of this report are to present the elimination of an infection with endodontic source that had secondarily affected a maxillary sinus and to discuss the current diagnostic approaches in similar cases by means of the case presented in this paper.

CASE REPORT

A 30-year-old male patient with a history of chronic maxillary rhinosinusitis was sent to our department by an otorhinolaryngologist who suspected the existence of a secondary odontogenic infection. A coronal CT section showed a septal nasi deviated to right, a maxillary alveolar bone resorption in interradicular region of the first molar tooth, and that the left maxillary sinus had significant mucosal thickening and bone erosion in its floor and lateral wall whereas the right sinus had only a slight mucosal thickening (Figure 1). Intraoral digital periapical radiography showed that a periapical lesion associated with the buccal roots of the tooth had elevated the sinus floor, thereby creating an antral halo (Figure 2). The patient reported recurrent episodes of tooth sensitivity during chewing. The oral examination demonstrated that none of the ipsilateral maxillary teeth had caries or had been restored before. Periodontal probing did not reveal any defects in attachment or bleeding. The percussion and mobility tests were non-contributory. An oroantral fistula of approximately 2 mm in diameter was found above the mesiobuccal root apex of the diseased tooth. The result of the pulp vitality test for the tooth was negative. The tooth had been extruded and had an occlusion abnormality due to the prior extraction of the opposing mandibular first molar tooth. Nonsurgical endodontic treatment was initiated because the established diagnosis was a chronic periapical abscess. The root canals were instrumented using ProTaper Universal rotary system (Dentsply Maillefer, Ballaigues, Switzerland) and irrigated with a 5% sodium hypochlorite solution (ADR Mediko Kimya Ltd. Şti., İstanbul, Turkey). Calcium hydroxide (Merck KGaA, Darmstadt, Germany) was applied to the prepared root canals for a period of eight months at various intervals. Then, the root canals were obturated by using AH Plus sealer (Dentsply, DeTrey, Konstanz, Germany) and F2 gutta-percha cones (Dentsply Maillefer, Ballaigues, Switzerland). Periapical radiography taken immediately after the obturation procedure showed the finding of healing of the periapical lesion (Figure 3). A follow-up CT scan of the paranasal sinuses performed 3 years after initiation of the treatment revealed that the mucosal inflammation had resolved, the sinus walls had remodeled, and a new alveolar bone had formed (Figure 4). However, a mucosal inflammation in the anterolateral wall and a small mucous retention cyst of the left sinus (Figure 5), concha bullosa of the middle turbinates, and a left inferior turbinate hypertrophy have also been reported by a radiologist as the rhinologic findings.

DISCUSSION

Maxillary sinusitis can pose a diagnostic challenge in cases suspected to have an endodontic infection. In the

Figure 1: Preoperative coronal computed tomography image. The arrow showing a small gap in the sinus wall, indicating oroantral fistula.

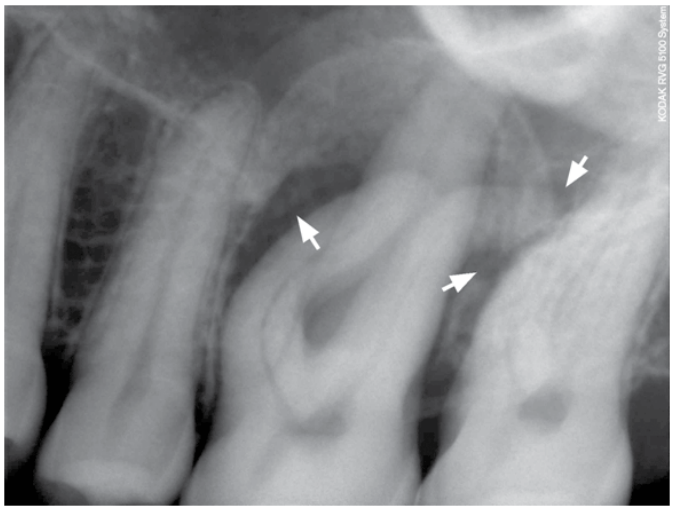

Figure 2: Preoperative intraoral digital periapical radiography showed that the periapical lesion (arrows) created an antral halo.

present case, the findings of an alveolar bone resorption and a local thickening of the sinus mucosa were observed to be in a nested form in preoperative coronal CT sections. These sections were not informative about the type of the alveolar bone disease, but they could show that this disease had elevated the cortical bone of the sinus floor before its erosion. That the bone resorption was in the interradicular region of the tooth could not be displayed by periapical radiography because of superposition of the buccal roots with palatal one. However, the same dental imaging modality could reveal that the alveolar bone resorption was associated with a large periapical disease rather than periodontal disease. Cone-beam computed tomography, as another dental imaging modality, can be used in similar patients who first admitted to a dental specialist before an otorhinolaryngologist. As an adjunctive method, single-photon emission CT can be used to detect sinus wall involvement and periapical lesions in cases that present diagnostic challenges [6]. To establish an endodontic diagnosis, however, the imaging modalities should be supported by clinical examination of all of the teeth adjacent to the diseased sinus, including pulp vitality tests of the teeth that protrude into a sinus. If these examinations demonstrate that the root apex of a non-vital tooth protrudes into a diseased sinus or if a

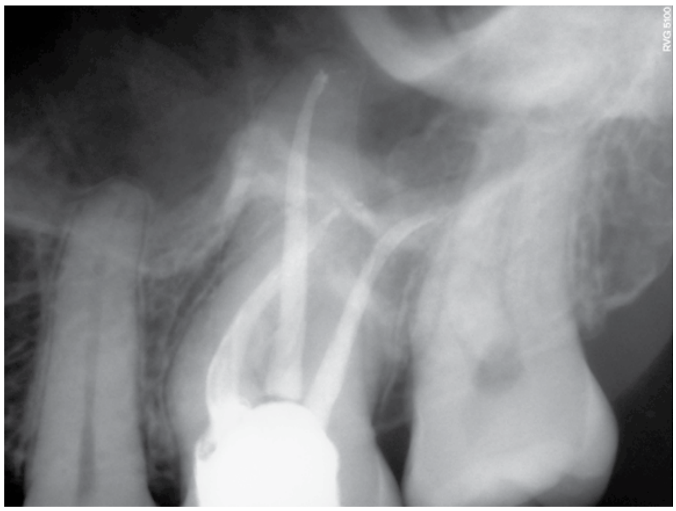

Figure 3: Postoperative intraoral digital periapical radiography.

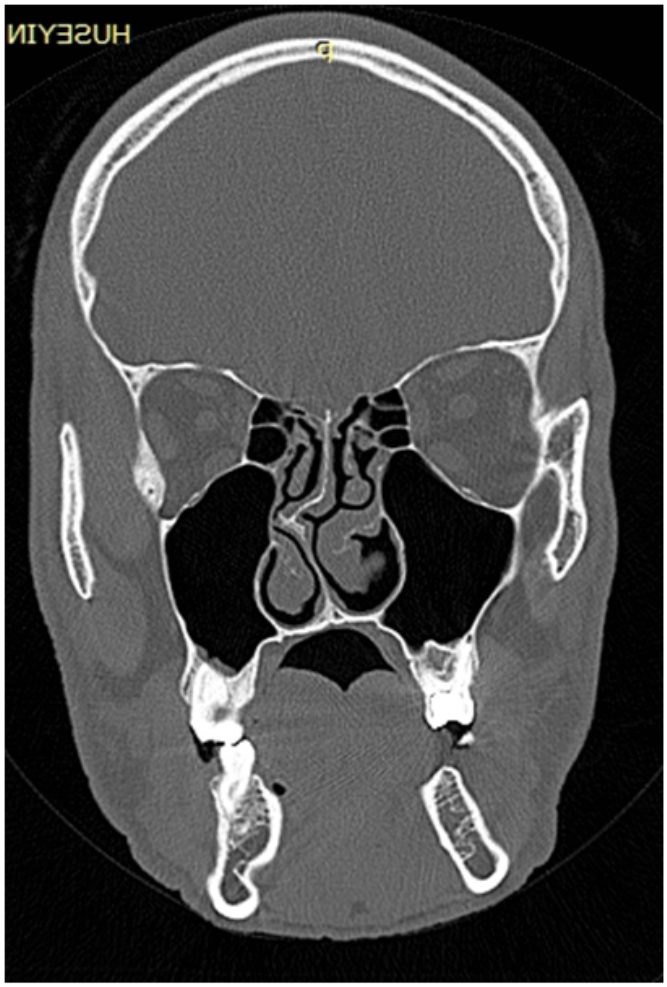

Figure 4: Follow-up coronal computed tomography image.

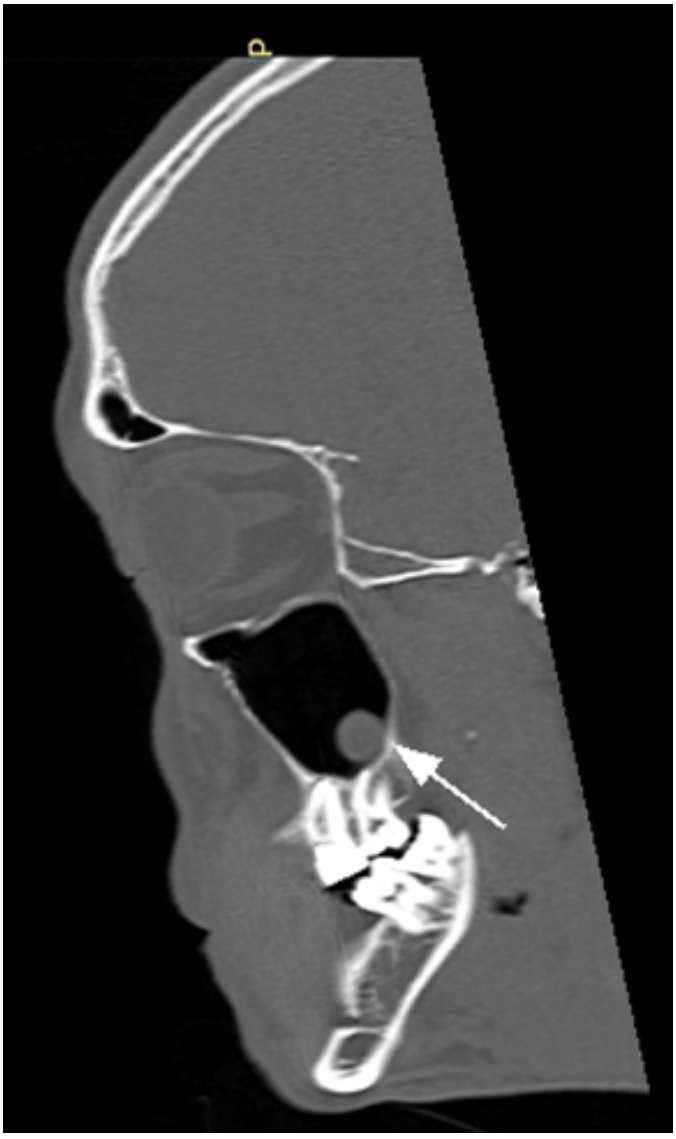

Figure 5: Follow-up sagittal computed tomography image. The arrow shows a small mucous retention cyst.

periapical lesion lacks a definitive border or is in close proximity to a sinus, endodontic infection should be considered one of the possible causes of the sinusitis [2].

An OMS usually causes chronic inflammatory reactions in only a limited area of the sinus mucosa at an early stage of the pathophysiological process. However, a secondary (additional) rhinogenic infection may also become involved in the ongoing process due to the mucosal changes and the subsequent ostial obstruction, increasing the inflammation in the tissues surrounding the sinus cavity [7]. In addition, some patients may already have a primary rhinogenic disease before the odontogenic involvement occurs. Considering these processes, Yoshiura et al. [8] classified some severe cases of sinusitis as 'mixed'. In patients affected bilaterally, the sinusitis on one side may have a rhinogenic origin, while the sinusitis on the other side may have an odontogenic origin [2].

It is essential to perform thorough clinical and radiological examinations and to obtain a patient history that includes both the dental and otorhinolaryngological aspects for an accurate diagnosis. A dental specialist may not detect any evidence of a rhinogenic etiology, such as an ostiomeatal complex pathology. Similarly, an odontogenic cause of sinusitis may not be detected by other medical specialists. In some cases, the only feature that leads to a definitive diagnosis may be the course of the sinusitis after the odontogenic cause has been eliminated. The diagnostic challenges have led to a considerable percentage of unilateral cases being classified as 'inconclusive (10.5%)', as occurred in a study that also included electric pulp testing as well as otorhinolaryngological examination in its methodology [3]. In our case, resolution of the mucosal inflammation and remodeling of the sinus walls were observed after elimination of the endodontic infection, and this proved the existence of a cause-effect relationship between the periapical disease and the inflammatory findings of the sinus. However, the absence of an objective etiologic cause for the endodontic pathology, such as caries, restoration or periodontal disease, presented a diagnostic challenge that was specific to this case. The diseased tooth had an occlusion abnormality due to the prior extraction of the opposing mandibular first molar tooth. Therefore, chronic occlusal trauma and bacteremia could be considered possible etiologic cause for the irreversible pulpal damage and the subsequent periapical disease. A previous rhinologic inflammatory disease of the sinus is also considered as another possible cause. However, a detailed literature review revealed that a case of irreversible pulpal damage caused by any inflammatory or expansive disease of the maxillary sinus has yet to be reported.

CONCLUSION

This case was classified as a maxillary rhinosinusitis with a secondary endodontic source of infection because the rhinologic findings were still present after the elimination of endodontic infection and its local inflammatory effects on the sinus. Close cooperation between an otorhinolaryngologist and an endodontist is of great importance for an accurate diagnosis in similar cases. A consensus report on the radiological and clinical criteria for a diagnosis of OMS may be required to increase the number of accurate diagnoses and to provide terminological uniformity for the various types of OMS.

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Author Contributions

Bülent Yılmaz – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Muzaffer Emir Dinçol – Substantial contributions to conception and design, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Handan Ersev – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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