

# Aspergillus mycetoma of the Maxillary Sinus Secondary to Overfilling of a Root Canal

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## Abstract

In nonimmunocompromised patients aspergillosis of the paranasal sinuses is a relatively rare disease. Root canal treated teeth with overextension of the root canal sealer or solid materials such as gutta-percha or silver cones into the sinus might be the main etiological factor for aspergillosis of the maxillary sinus in healthy patients. Root-filling materials based zinc oxide-eugenol is considered to be a growth factor for aspergillus. *Aspergillus fumigatus* needs heavy metals such as zinc oxide for proliferation and metabolism. Prognostic and histological studies showed that instrumentation and obturation should not extend beyond the apical foramen. When the sealer and/or gutta-percha is extruded within the sinus, this produce an inflammatory reaction and then Aspergillus growth. We report one case of healthy 60-yr-old male with overextension of root canal sealer in maxillary sinus. After surgical procedure, microscopic examination revealed aspergillosis. Overextension into the maxillary sinus with root canal cements has to be avoided. (*J Endod* 2006;32:692–694)

## Key Words

Aspergillosis, fungal ball, overfilling

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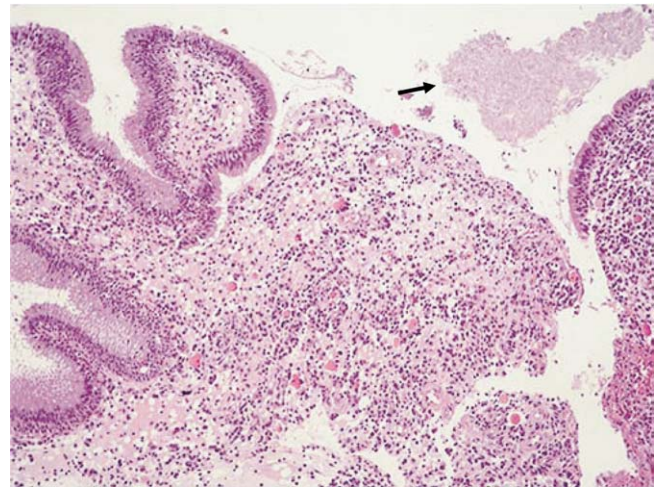
One complication that occurs after endodontic treatment is overfilling root canals, which can impinge on the maxillary sinus (1). It has been suggested that root canal treated teeth with overextension of the root canal sealer into the sinus might be the main etiological factor for aspergillosis of the maxillary sinus in healthy patients (2, 3). During obturation, the sinus may be invaded by either sealer or by solid materials such as gutta-percha (4) or silver cones. Mechanical irritation results from overfilling the root canal, thereby impinging foreign materials on the vital tissues. The material produces an inflammatory reaction with an area of rarefaction in the periapical tissues. Such inflammation is likely to persist until the foreign object is removed (5). One of the components of root canal sealers considered being a growth factor for aspergillus is zinc. Beck-Mannagetta et al. (3) demonstrated that maxillary sinus aspergillosis is in most cases caused by excess root-filling materials that contain zinc oxide and formaldehyde. Experimental studies with fungus cultures revealed considerable acceleration of the growth of different aspergillus species in the presence of zinc oxide in the culture medium (2). These authors also found that all of the 35 patients had either overextension of the filling in root canal-treated teeth or previous extraction. These findings were confirmed in a study by Legent et al. (6), who reported 85 cases of aspergillosis of the maxillary sinus, of which 85% were believed to be related to overextended root canal sealer in maxillary teeth. Kopp et al. (7) and Stammberger et al. (8) found that the typical radiopaque maxillary sinus concretions seen in more than 50% of the cases with diagnosis of sinus aspergillosis were iatrogenically placed endodontic materials. Stammberger et al. and Kopp et al. described the influence of root-filling materials containing zinc oxide-eugenol on the pathogenesis of sinus aspergillosis, confirming the microbiological findings of Ross (9) who demonstrated that *Aspergillus fumigatus* needs heavy metals such as zinc oxide for proliferation and metabolism. The aim of this study was to describe clinical, radiographical, and histological features of an aspergillosis, subsequent to overfilling within the right maxillary sinus cavity.

## Case Report

A 60 yr-old male was referred to Brescia Dental School with a history of right-side maxillary pain and purulent nasal discharge. The patient was in good general health and he had no history of diseases caused by immunosuppression and had taken no immunosuppressive drugs or steroids. He mentioned that his dentist had endodontically treated his painful right maxillary second premolar approximately 2 yr ago. The discomfort had started after dental treatment. Radiographic examinations [orthopantomography and paranasal sinuses computed tomography (CT)] were performed. Orthopantomography showed a radiopaque mass in the right maxillary sinus (Fig. 1). CT examinations revealed an abnormal soft tissue mass in the right maxillary sinus and a dense, well-defined radiopaque mass (~9 mm) in the middle of the soft tissue (Fig. 2). A Caldwell-Luc procedure under general anesthesia was done and inflammatory tissue around the overfilled material were removed from the maxillary sinus and collected for histological examination. The specimen was fixed for 48 h in 10% neutral buffered formalin, dehydrated in increasing concentrations of ethyl alcohol, clarified in xylene and embedded in paraffin. A series of approximately 20 4- $\mu$ m sections was made and then sections were stained by hematoxylin and eosin (H&E) and periodic acid-Schiff



**Figure 1.** Panoramic radiograph showing foreign body (white arrow) in the right maxillary sinus.



**Figure 3.** Fungal ball and dense accumulation of chronic inflammatory cells near the fungal mass (black arrow). PAS 40 $\times$ .

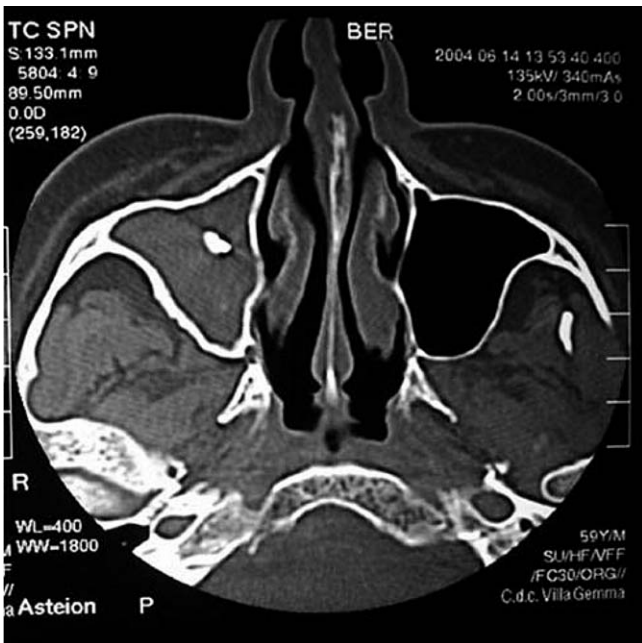
(PAS). Microscopic examination of a biopsy specimen from the maxillary sinus showed chronic sinusitis and numerous branching hyphal organisms (Figs. 3 and 4). A diagnosis of aspergillosis was made. The postoperative course was satisfactory and chronic maxillary pain and purulent nasal discharge were totally eliminated. After 1-year the patient remained pain free and CT examinations showed no evidence of pathological soft tissue and transparency of right maxillary sinus (Fig. 5).

### Discussion

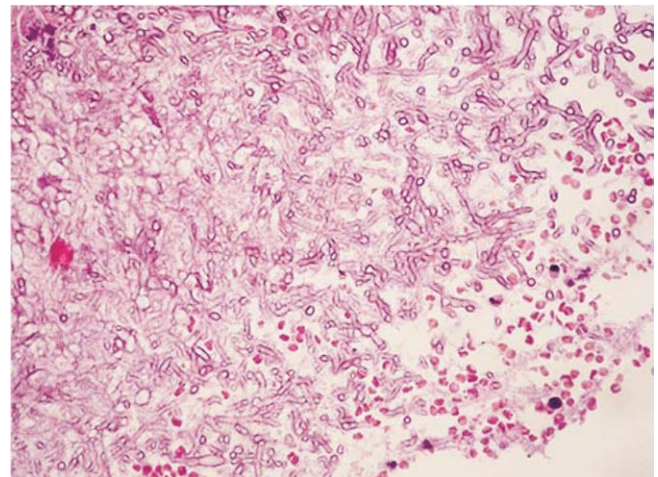
In a clinical follow-up study on 775 endodontically treated roots, reviewed up to 10 yr after treatment, Strindberg (11) concluded that the highest success rate in endodontics was obtained when obturation terminated 1 mm short of the radiographic apex. In vivo histological study involving apical and periapical tissues following root canal therapy

demonstrated the most favorable histological condition when obturation remained at apical constriction. When the sealer and/or gutta-percha was extruded into the periapical tissue there was always a severe inflammatory reaction (12). The overall success rate of endodontic treatment in 356 cases that underwent a follow-up for 10 yr was 91%. The best prognosis was founded for roots in which the filling reached within 0 to 2 mm of the apex (13). In the present study, the patient's dental history contains a previous endodontic treatment in crowned right upper second premolar, revealing the extrusion of root canal sealer into the periradicular area. In nonimmunocompromised patients, aspergillosis of the paranasal sinuses is a relatively rare disease. It is purely an opportunistic infection (10). Mycotic odontogenic sinusitis is often correlated with endodontic sealer that has been pushed up into the sinus (1, 4). Root-filling materials based zinc oxide-eugenol is considered to be a growth factor for aspergillus (2, 3).

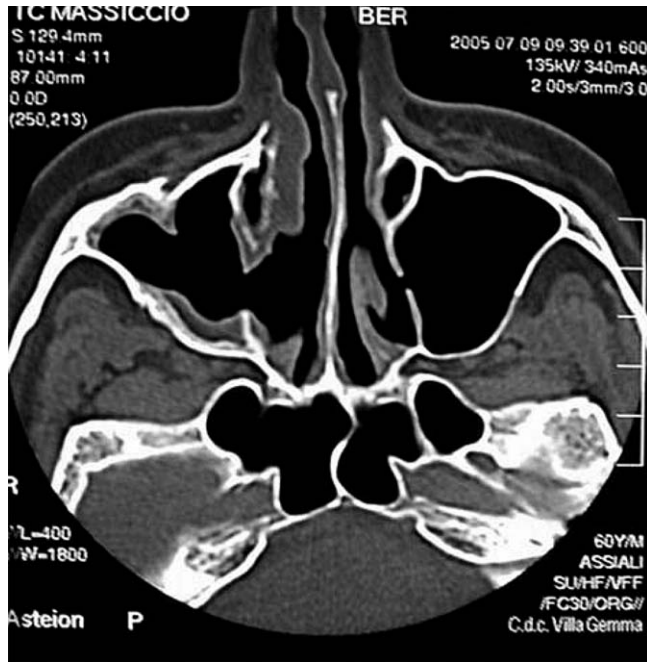
In a bacteriological study, Karapinar (14) showed that eugenol has fungicidal and fungistatic activities against hyphae and blastospores of *A. parasiticus*. Mensi et al. (15) instead concluded that eugenol gradually loses its ability to inhibit the growth of *A. fumigatus*, leaving the zinc oxide, which is essential for the growth of *Aspergillus*. According to Khongkhunthian (10), sinus mycoses can be classified as: noninvasive,



**Figure 2.** Axial sinus CT scan. Fungal ball completely fills the maxillary sinus. A dense, well-defined radiopaque mass (~9 mm) in the middle of the pathological soft tissue is evident.



**Figure 4.** At higher magnification numerous branching, septate hyphae are seen. PAS 400 $\times$ .



**Figure 5.** A 1 yr postoperative axial sinus CT scan showing no evidence of pathological soft tissue and transparency of right maxillary sinus.

invasive, and allergic variants. The noninvasive form called *A. mycetoma*, occurs mostly in healthy individual subjects and has the classic symptoms of sinusitis with nasal secretions and pain. Based on clinical, radiographic, CT examination, and histological findings this case was showed as aspergillosis caused by overextension of root canal sealer into right maxillary sinus. Previous studies (11–13) state that a better success rate is achieved when endodontic treatment includes obturation short of the apex.

**Conclusions**

We conclude that endodontic sealers pushed up into the sinus should be avoided to prevent *Aspergillus* growth and additional surgical treatment.

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