

# A conservative approach to Aspergillus sinusitis

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## Abstract

The aim of the case report was to present a new case of Aspergillus sinusitis with a conservative approach without apicoectomy. A twenty-two-year-old healthy female patient was presented. Unilaterally, the dense radiopacity of the maxillary sinus was detected in the dental examination. Radiopaque deposits within the right maxillary sinus, associated with the endodontically treated tooth #16 were monitored with the cone-beam computerized tomography taken as a diagnostic aid. Retreatment with surgery was planned. Following the chemomechanical preparation, orthograde calcium silicate cement (OrthoMTA, BioMTA Co., Seoul, Korea) was grafted into root canals prior to the surgery. The pathologic tissue adjacent to palatal root apices of tooth #16 located in the inferolateral wall of the right maxillary sinus floor was reached in Cadwell-Luc operation. The pathologic tissue was excised and root apices were not resected. Microscopically examination of the material revealed hyphae structures compatible with Aspergillus and furthermore, Aspergillus spp. was grown in microbiological culture. The definitive diagnosis was made as maxillary sinus aspergilloma according to the existing clinical, radiological and microbiological findings. No systemic antifungal treatment was performed in the postoperative period. The tooth has been followed up to 2 years. The asymptomatic clinical condition was maintained and radiographic healing was observed.

**Keywords:** Aspergillus; maxillary sinus; OrthoMTA; pathology; retreatment

## INTRODUCTION

Extrusion of the root canal filling materials into the periradicular tissues occurs mainly for lack of material control. The quantity of extrusion depends on the techniques used for root canal instrumentation and obturation, that involve accidental over instrumentation and improper working length determination. Moreover, complex root canal anatomy as open apices and larger minor foramen diameters could also be a reason for the complication. There is an adjacent relationship of the apices of maxillary molar teeth to the maxillary sinus. Iatrogenic devastation of the sinus floor may predispose a maxillary sinus or oroantral communication (1). Normally, exposure of the sinus membrane is well tolerated, with no overt repercussions on healing. However, the extrusion of root canal filling material into the maxillary sinus needs to be managed differently (2).

Over extrusion of foreign materials into the maxillary sinus may be the major cause for aspergillosis (3). However, aspergillosis of the paranasal sinuses is "so rare" finding in non-immunocompromised patients, it is known as an opportunistic infection (4). Although

there are no treatment guidelines of extruded root canal filling material-induced Aspergillus sinusitis, surgical intervention with tooth extraction is the most predictable method for removing extruded mass and allowing for adequate healing secondary to sinus complications (4, 5). The aim of this study was to describe a rare case and its clinical outcomes of total root canal grafting with mineral trioxide aggregate use in the treatment of extruded root canal filling material-induced Aspergillus sinusitis.

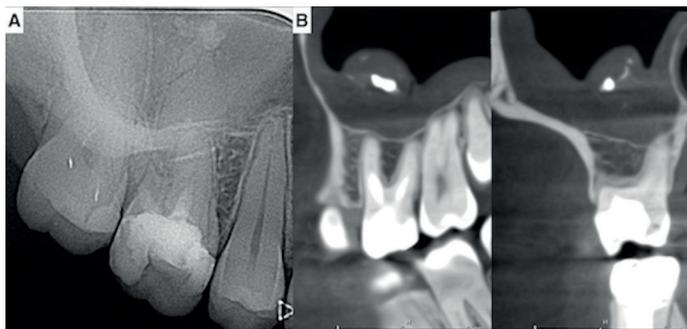
## CASE REPORT

### History and examination

Twenty-two-year-old healthy female patient was consulted to the Department of Endodontics, for tooth #16 due to the presence of a radiopaque lesion with homogeneous cloudy and metallic radiopaque resembling a foreign body in the maxillary sinus (Figure 1a). The patient has neither tenderness nor discomfort for tooth 16# function. Maxillary teeth and sinus were visualized by conical beam computed tomography (CBCT) (3D Max, Planmeca Oy, Helsinki, Finland) (Figure 1b). Excision of the sinus pathology was planned after the endodontic retreatment.

**Received:** 25.01.2020 **Accepted:** 06.08.2020 **Available online:** 26.08.2020

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**Figure 1.** Aspergillus sinusitis. A, Preoperative radiograph showing a lesion associated with the palatal root, from which the extrusion of the root filling materials occurred in the maxillary sinus.

B, CBCT image in sagittal view showing the relation between mucositis on the maxillary sinus floor (left). CBCT image in frontal view showing the relation between sinus floor, mucositis and palatal root (right).

### Tooth preparation

Local anesthetic (Lidocaine 2% 1:100,000 epinephrine) was performed. After tooth isolation, tooth #16 surface was disinfected 2% chlorhexidine (ProChex, Promida, Eskisehir, Turkey) access cavity preparation was performed with ISO 012 abrasives (Super-coarse, Drendel + Zweiling, Diamant GmbH, Kalletal, Germany) and ISO 014 tungsten-carbide bur (TCB1SNX, Drendel + Zweiling, Diamant GmbH) under magnification. Root canal sealer was removed by rotary instruments (ProTaper-D, Dentsply-Sirona, Balleagues, Switzerland) at 500 rpm and 1.0 Ncm torque. Gutta-percha remnants were not observed. Clove oil odour during the removing root canal remnants was noted. The working length determination was performed in combination with electronic apex finder (Raypex 6, VDW GmbH, Munich, Germany) and two-dimensional X-ray (ProScanner®, Planmeca Oy).

All root canals were instrumented with a single-file reciprocating system (R50 Reciproc System, VDW GmbH) apical size were 50/05. Each root canal was copiously irrigated 2.5% hypochlorite (ProChloride, Promida) during instrumentation. Final irrigation procedures were performed with 20 mL of 17% Na<sub>4</sub> EDTA (ProEDTA, Promida) for 1 minute, 20 mL of 2.5% NaOCl, respectively.

Root canals were diluted with 20mL sterile distilled water (Lot#C-1910013, Polifarma, Tekirdag, Turkey); dried with paper points (R50 paper, VDW GmbH).

### Application of the orthograde calcium silicate cement

Sterile distilled water (Polifarma) was dropped on powder of OrthoMTA. Powder was gently hydrate for 60 s in Eppendorf tube. After mixing, excess moisture of the cement was dried with cotton buds. A mta carrier (Biofilling kit, BioMTA, Seoul, Korea) was used to deliver OrthoMTA into canal orifices. A nickel titanium rotary compacter size 25/.02 (BioMTA) was gently inserted into canal. The compacter gently operated with endodontic motor (X-Smart-Plus, Dentsply-Sirona) at 250rpm and 0.6Ncm. The delivery process of OrthoMTA and operating of the

compacter was performed immediately after hydrating. OrthoMTA was delivered incrementally in accordance with the manufacturers' instructions. A hand plugger was used to adapted material to the canal orifices. Wet cotton pellet was placed into the cavity the tooth then temporarily restored using Interim Restorative Material (Dentsply Sirona, York, PA) for 48 hours.

### Core build-up

Under rubber dam isolation, the temporary restorative material was removed and the tooth was built up using light-cured resin composite (Estelite Sigma Quick, Tokuyama, Tokyo, Japan) with a two-step self-etch adhesive system (Clearfield SE Bond, Kuraray, Osaka, Japan) according to manufacturer's instructions.

### Surgical procedure

The vertical relationship between the tooth root apex and floor of the maxillary sinus is classified as type 3 (Jun & Cho 2009) (Figure 1B). CBCT cross-sections were showed a 4x5 cm hyperdense mass in the inferolateral wall of the right maxillary sinus (Figure 1B). The Cadwell-Luc operation was planned for the patient with no premedication. After providing local anesthesia with (Lidocaine 2% 1:100,000 epinephrine), a mucoperiosteal flap was removed and trepanation was performed by Physio-Dispenser (ST-923, W&H Dentalwerk Bürmoos GmbH, Bürmoos, Austria) under sterile saline cooling. Pathologic tissue was removed and the tissue was sent for pathological examination (Figure 3). Palatal root apex within the sinus was only scaled using a curette. The flap was sutured. Non-steroidal anti-inflammatory was prescribed postoperatively (Figure 2B).



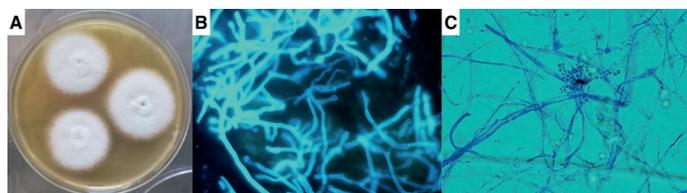
**Figure 2.** A, Periapical X-ray after orthograde canal grafting with calcium silicate cement, B: post-operative X-ray after surgery, C: two-year follow-up X-ray



**Figure 3.** Surgically excised pathological tissue

### Immunofluorescence evaluation

The tissue was fixed and was stained with Calcofluor White. Septic fungal hyphae branching at a narrow angle were observed in fluorescence microscopy. After two days of incubation, mold colonies began to grow on all routine media: Initially white, two-week incubation on the Sabouraud dextrose agar showed pale green, cottony mold colonies (Figure 4). Microscopic examination of the colonies showed hyaline, narrow branched septa hyphae compatible with *Aspergillus* spp, conidophore, vesicle and phialitis structures and unicellular conidia (Figure 4). As the microscopic and macroscopic properties were not compatible with the common *Aspergillus* species as *A. fumigatus*, *A. flavus*, *A. niger*, *A. terreus*, the result was reported as *Aspergillus* spp. Thus, maxillary sinus aspergilloma was diagnosed with clinical, radiological and microbiological findings. However, no systemic antifungal treatment was applied in the postoperative period.



**Figure 4.** A, *Aspergillus* colonies grown on Sabouraud dextrose agar medium (5 days after incubation). B, Appearance of fungal hyphae in fluorescence microscopy with Calcofluor White staining (x400). C, view of the colonies stained with lactophenol cotton blue colonies grown on Sabouraud dextrose agar (x400)

24 months after treatment, the patient was complaint-free. Neither apical periodontitis nor sinus pathology was observed during the follow-up period. There was no fracture or loss of function of the tooth. No root fracture and secondary caries were present. Orthodontic treatment was launched for Angle Class I malocclusion (Figure 2C).

### DISCUSSION

The contemporary approach in endodontic materials is to assess various alternative obturation materials to gutta-percha and sealers. Hydraulic calcium silicate cement (CSC) acts as an alternative dentin replacement material. CSCs are indicated to use in multiple clinical conditions such as vital pulp treatments, tooth revitalization, immature roots, iatrogenic perforations and root canal obturation (6). First-representatives of CSCs has introduced as a perforation repair and retrograde grafting material (7). CSCs could promote osteogenic activity in resorptive defects, and apicoectomies (7). Although root canal sealers or different adhesive strategies can establish firm adhesion of filling materials to the dentin substrate, the resinous-based relation may leave gaps (8). Contrary, the adhesive properties of the CSCs to dentin differ from resinous-based obturation materials. OrthoMTA (BioMTA, Seoul, Korea) as the novel CSC material, was introduced for total root canal grafting (7). The use of CSC could overcome polymerization related problems associated with resins since it does not depend on polymerization

and has self-setting characteristics. Especially, OrthoMTA as a CSC has been developed for root canal grafting (9). it could also act as repair and sealing material in case of procedural errors such as root perforations and dentin cracks since they have good sealing ability and could induce chemical bond with dentin and formation of apatite-like structure (7). Consistency of OrthoMTA with the Biofilling system allows easy application into the root canal. The rationale for orthograde total canal grafting with a CSC was to eliminate retrograde filling and apicoectomy procedures and procedure-related potential errors.

*Aspergilloma* is frequently seen in the respiratory system in immunocompromised patients whereas, it may also be seen in cases where microenvironment is damaged in healthy patients (3,4). Endodontic complications that perforate the sinus membrane lead to disruption of microcirculation and consequently dysfunction of the sinus epithelium. To assess the proximity between apices of the maxillary molars and sinus level is very important prior to plan any treatment procedure to avoid any procedural complication. Especially, during root canal treatment, there is an increased risk of perforation of the sinus floor with instruments in Type 1 and 3 relationships (10). Natural sinus drainage may be disrupted and an anaerobic environment associated with hypoxia may occur in the local tissue by over extrusion of sealers. Metallic ions, monomers, and corticosteroids as hydrocortisone acetate contained in canal sealers may provide an advantage for the development of specific pathogens in the maxillary sinus. Therefore, the extruded material must be removed surgically.

### CONCLUSION

This case presented that orthograde calcium silicate cement technique is a promising treatment modality for healing extruded root canal filling material-induced *Aspergillus* sinusitis without performing root apicoectomy/ tooth extraction.

*Conflict of interest:* The authors declare that they have no competing interest.

*Financial Disclosure:* There are no financial supports.

*Patient informed consent :* The family of the patient had given an informed consent for participation in this study.

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