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Case Report

Aspergillus niger associated calcium oxalate otolith in the external auditory canal: an uncommon clinical presentation

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ABSTRACT

Otolith formation in the external auditory canal (EAC) can result from fungal colonization, particularly by *Aspergillus niger*, which secretes oxalic acid leading to calcium oxalate crystal deposition. While this mechanism is recognized in other anatomical sites, its clinical presentation in the EAC requires careful diagnostic consideration. This report describes a unique case of unilateral EAC calcium oxalate stone associated with *A. niger*, occurring alongside contralateral keratosis obturans. A 40-year-old immunocompetent male presented with bilateral ear discharge, hearing loss, and canal fullness. Otoscopy revealed hard masses in both EACs. The right-sided mass was removed under microscopy; the left required surgical excision via a postauricular approach. Specimens underwent histopathological examination and microbial cultures. Histology confirmed keratosis obturans on the right and calcium oxalate deposits on the left. Fungal culture from the left ear identified *A. niger*. The patient was treated with oral antibiotics and topical clotrimazole. Follow-up over six months showed complete symptom resolution with no recurrence. Post-treatment audiometry confirmed normal hearing thresholds. This case highlights the need for high clinical suspicion of fungal-induced otoliths in patients with chronic EAC obstruction. Bilateral pathology may have differing etiologies, warranting independent evaluation. Targeted surgical removal and antifungal therapy based on histopathology and culture findings can ensure complete recovery and prevent recurrence.

Keywords: *Aspergillus niger*, Calcium oxalate, Otolith, External auditory canal, Keratosis obturans, Otomycosis

INTRODUCTION

The external auditory canal (EAC) is an uncommon site for calculus formation, and such lesions are infrequently encountered in otologic practice.[1] Most EAC "stones" or concretions arise from gradual accumulation of keratin debris, cerumen, or retained foreign material, which can subsequently become mineralized. In contrast, calculi formed as a result of fungal colonization are rare, with very few documented instances in literature. Otomycosis is a superficial fungal infection of the EAC with a global prevalence ranging from approximately 9% to 30% among patients with outer ear infections.[2] *A. niger* is the most commonly reported etiology of otomycosis based on its morphological characteristics.[3] It a ubiquitous saprophytic mold with a unique pathogenic feature of its ability to secrete oxalic acid, which reacts with calcium in tissues to form insoluble calcium oxalate crystals.[4,5] While calcium oxalate deposition has been well described in allergic bronchopulmonary aspergillosis (ABPA), chronic pulmonary aspergillosis (CPA), Invasive pulmonary aspergillosis (IPA), its presence in otologic disease is markedly uncommon.[6] Notably, a landmark case documented calcified oxalate crystals within necrotic tissue of the EAC in invasive otomycosis caused by *A. niger,* underscoring the potential diagnostic significance of this finding.[1] Clinical suspicion should be especially high in tropical or subtropical climates, where warm, humid conditions favour fungal overgrowth, and in individuals with risk factors such as prior antibiotic use, poor ear hygiene, or immunosuppression.

Recognition of EAC calcium oxalate concretions is clinically important, as they could mimic more common entities such as keratosis obturans, EAC cholesteatoma, or impacted cerumen. Misdiagnosis may lead to delays in appropriate antifungal therapy, or unnecessary surgical intervention.

Herein, we present a rare case of a unilateral EAC calcium oxalate otolith associated with *A. niger*. The report is further distinguished by contrasting bilateral pathology, highlighting both the complex spectrum of fungal involvement in the ear canal and the need for heightened clinical vigilance in atypical cases.

CASE REPORT

A 40-year-old male presented with a 6-month history of bilateral ear discharge, described as whitish and non-foul smelling, along with progressive hearing loss and a sensation of fullness in both ears. He had no history of diabetes, immunosuppression, or prior otologic surgery. Two months earlier, he had sought care at an outside facility, where bilateral hard masses in the EACs were identified. Ear toileting was performed and samples were sent for histopathological examination (HPE).

Right ear HPE showed keratosis obturans.

Left ear was reported as containing calcified material of uncertain etiology. He was treated with oral and topical antibiotics, with temporary improvement.

On presentation to us, otoscopy revealed hard EAC masses bilaterally:

Right ear

Mass was removed under microscopy; tympanic membrane intact. Histopathology confirmed keratosis obturans; bacterial and fungal cultures were negative.

Left ear

A firm mass eroding canal skin prompted surgical removal via a post-auricular approach with conchomeatoplasty under general anesthesia. Tympanic membrane was intact.

Figure 1: Whitish stone excised from EAC.

Figure 2: Intact tympanic membrane after removal of stone.

DISCUSSION

Calcium oxalate crystal formation in the EAC is exceedingly rare. Its occurrence is often associated with *A. niger*, a saprophytic fungus capable of producing oxalic acid, which can bind with calcium ions in local tissue fluid or debris to form calcium oxalate.[4,5] While such deposition is well documented in pulmonary and sinus aspergillomas, its occurrence in the EAC is far less frequently reported.

Landry and Parkins were the first to report calcium oxalate deposition in necrotizing otomycosis due to *A. niger*, observing birefringent oxalate crystals within necrotic tissue and fungal elements in the EAC.[1] These crystals can precede or accompany fungal colonization and serve as a diagnostic clue to *A. niger* infection. The value of detecting oxalate crystals histologically, is also emphasized especially in cases where fungal elements are sparse or difficult to identify.[7] The metabolic ability of *A. niger* to secrete oxalic acid is well-documented. In the presence of calcium from inflammatory exudates or necrotic debris, this acid forms calcium oxalate, which can aggregate into a solid mass within the EAC.[8]

Interestingly, this case involved bilateral EAC obstruction with differing pathology: keratosis obturans on the right and a fungal-induced calcium oxalate stone on the left. Keratosis obturans typically results from keratin abnormal accumulation and consequently occlusion and expansion of the bony portion of the EAC by a plug of desquamated keratin and is not associated with fungal colonization.[9] This highlights the need to evaluate each ear independently, even in bilateral disease.

Management includes surgical removal of the stone, thorough debridement of the canal, and topical antifungal therapy. A postauricular approach with conchomeatoplasty allowed complete removal and access to healthy skin margins. Following histological diagnosis

and positive fungal culture, the patient was treated with topical clotrimazole, with resolution of symptoms and no recurrence at 6 months.

This case reinforces the importance of considering fungal otoliths in chronic or recurrent EAC obstruction, particularly in humid environments where otomycosis is endemic.[7] Histopathological analysis and fungal cultures are vital for accurate diagnosis and management.

CONCLUSION

A. niger induced calcium oxalate stone formation in the EAC is rare but must be considered in cases of chronic, recurrent otorrhea with hard canal debris. Management requires histopathologic diagnosis, culture-guided therapy, and surgical clearance to prevent recurrence. Early recognition and targeted management can lead to excellent long-term outcomes.

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