Fungal Otitis Externa: A Snapshot of Diagnostic and Treatment Patterns Presenting to Specialty Clinics

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Abstract

Introduction: Fungal otitis externa (FOE) accounts for 10–15% of otitis externa (OE) cases and frequently presents first in primary care settings. This study investigates diagnostic and treatment patterns in primary care and the subsequent management of these patients in head and neck surgery (HNS) clinics.

Methods: A retrospective chart review was conducted for 129 patients diagnosed with FOE at a single outpatient center between 2022 and 2023. Data collected included demographics (gender, age, race), comorbidities, primary care diagnoses and examinations, number of appointments and treatments before HNS referral, initial HNS clinic management (treatment and cultures), and total visits required for disease resolution.

Results: Primary care examinations suggestive of FOE demonstrated a specificity of 0.80; however, only 13.2% of these cases received a specific diagnosis of FOE. Among patients with culture-confirmed FOE at the HNS clinic, 28.1% (16/57, p<0.001) presented with primary care findings consistent with FOE. Neither the number of appointments or treatments before HNS referral nor initial HNS clinic management (including culture collection) significantly influenced time to resolution.

Conclusion: A substantial proportion of patients presenting to HNS clinics with culture-confirmed FOE do not have primary care findings consistent with FOE. These findings suggest that many FOE cases may be iatrogenic in origin.

Introduction

Otitis externa (OE) is most commonly caused by bacterial infection of the external auditory canal. Up to 90% of bacterial OE cases are caused by Pseudomonas aeruginosa. Fungal otitis externa (FOE), also referred to as otomycosis, is primarily caused by the Aspergillus species then followed by the Candida species. FOE accounts for 10-15% of OE cases and frequently presents first in primary care settings [3].

Recent evidence suggests that environmental exposure to fungi, mismanagement of broad-spectrum antibiotics, and detection of fungal pathogens in head and neck surgery (HNS) clinics is associated with increased incidence of fungal otitis externa [1-3]. FOE is common in tropical countries, humid environments, exposure to contaminated water, and among diabetic or immunocompromised individuals using long-term topical antibiotic therapy [2-3, 11].

Diagnosis for FOE is primarily based on patient history and clinical examination of the ear canal and eardrum, and additional tests including imaging of the head and neck and direct microscopy may be requested in severe cases [3,6]. Confirmation of FOE is dependent on laboratory-based evidence, including cerumen swapping or debris and placing it on a fungal culture to confirm fungal pathogens [3,6-7]. For immunocompromised patients or rare cases like fungal skull base osteomyelitis, tissue and fluid samples are used for definitive diagnosis of FOE, but these samples are difficult to obtain [4,5]. Diagnostic complexity of FOE is largely due to biofilm formation and treatment resistance [8, 9]. Additionally, diagnosis of otomycosis remains a challenge because it is slow-growing and present with non-specific symptoms that overlap with bacterial OE [4, 10].

Methods and Materials

A retrospective analysis was conducted on 129 patients referred to a Head & Neck Surgery (HNS) clinic with suspected otitis externa. Descriptive statistics were computed for baseline distributions. To evaluate associations between clinical findings, cultures, and diagnosis categories:

- Chi-square (χ^2) tests were used for categorical comparisons:
  - Between initial culture results and PCP diagnosis
  - Between AFM diagnosis and ear exam findings
  - Between ear exam results and treatment prior to HNS referral
- Effect sizes for categorical associations were interpreted using standard thresholds for Chi-square significance.
- Independent samples t-test was used to compare the mean number of ENT visits between patients initially treated with antifungals vs. antibiotics
- Statistical significance was set at $p < 0.05$, and analyses were conducted using SPSS (version reported in file metadata).

Results

- **Culture vs. Diagnosis**
  - No significant association was found between initial HNS culture results and diagnostic category ascribed by PCP ($\chi^2 = 5.50$, df = 9, p = 0.789).
  - The majority of positive fungal cultures were observed in patients with either **fungal otitis externa (FOE)** or **non-specific otitis externa**.
- **Diagnosis vs. Ear Exam**
  - A strong association was identified between diagnosis and ear exam findings ($\chi^2 = 29.64$, df = 6, $p < 0.001$).
  - **FOE diagnoses** were more likely when the ear exam was consistent with fungal OE.
  - Patients with non-specific OE or otitis media were predominantly classified as not consistent with fungal OE on exam.
- **Ear Exam vs. Culture**
  - No significant association was found between culture result and clinical ear exam finding ($\chi^2 = 2.56$, df = 6, p = 0.862).
  - Positive fungal cultures appeared across all ear exam groups, including cases with normal or undocumented findings.
- **Ear Exam vs. Prior Treatment**
  - A strong correlation was observed between ear exam findings and treatment before HNS referral ($\chi^2 = 50.06$, df = 8, $p < 0.001$).
  - Antifungal treatment was most common among patients whose exams were consistent with fungal OE.
- **Treatment vs. ENT Follow-up**
  - No significant difference was found in the number of ENT visits between patients initially treated with antifungals (M = 2.34) and antibiotics (M = 2.61), t(102) = -0.81, p = 0.422.
  - Effect size was small and non-significant (Cohen's d = -0.176; 95% CI: -0.605 to 0.253).

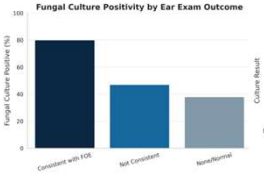

Figure 1. Bar chart displaying the proportion of positive fungal cultures among patients stratified by ear exam findings. Patients whose ear exam was *consistent with fungal otitis externa (FOE)* had the highest fungal culture positivity rate (80%), compared to 47% in the "not consistent" group and 38% in the "normal or undocumented" group.

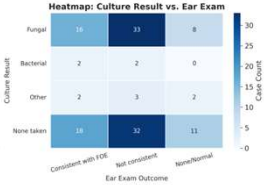

Figure 2. Heatmap of the relationship between culture results (rows) and ear exam outcomes (columns). While fungal organisms were identified across all exam groups, there was no statistically significant association between exam consistency and culture type ($\chi^2 = 2.56$, df = 6, p = 0.862).

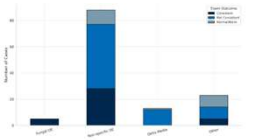

Figure 3. Stacked bar chart showing the distribution of AFM diagnostic categories by clinical ear exam findings. A majority of *fungal OE* and *non-specific OE* diagnoses occurred in patients with exams consistent with FOE, while *otitis media* and *other* diagnoses were more common among patients with non-consistent or normal findings.

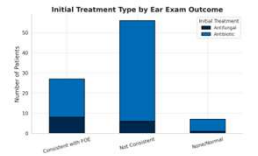

Figure 4. Comparison of the mean number of ENT visits among patients initially treated with antifungals vs. antibiotics. No significant difference was observed (p = 0.422), with a small, non-significant effect size (Cohen's d = -0.176), indicating similar follow-up burden between the two groups.

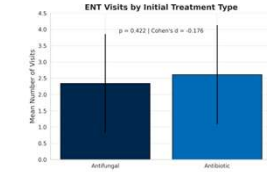

Figure 5. Comparison of the mean number of ENT visits among patients initially treated with antifungals vs. antibiotics. No significant difference was observed (p = 0.422), with a small, non-significant effect size (Cohen's d = -0.176), indicating similar follow-up burden between the two groups.

Variable	Summary
Gender Distribution	F: 73 (56.6%) M: 56 (43.4%)
Age (mean ± SD)	50.2 ± 17.1 years
Race	White: 51 (39.5%) Hispanic/Latino: 30 (23.3%) Asian: 18 (14.0%) Other: 30 (23.2%)
Top Co-morbidities	None: 95 (73.6%) Prediabetes: 17 (13.2%) Diabetes: 11 (8.5%) Other immunocompromise: 6 (4.7%)

Discussion

- **Diagnostic accuracy:**
  - Primary care ear exams suggestive of FOE had a specificity of ~80%.
  - Despite this, only 13.2% of cases received a specific FOE diagnosis in primary care, highlighting under-recognition.
- **Culture data:**
  - A majority of patients with exams consistent with FOE were fungal culture-positive (80%), underscoring the clinical value of the physical exam.
  - Most patients with positive fungal cultures at HNS clinic presentation did not have initial exam findings consistent FOE.
- **Treatment misalignment:**
  - Many patients with FOE-consistent exams were initially prescribed antibiotics rather than antifungals, suggesting empiric mismanagement.
  - This treatment mismatch may contribute to persistence or recurrence of disease.
- **Referral patterns and outcomes:**
  - Neither number of primary care visits/treatments nor initial HNS clinic management strategies significantly impacted time to resolution.
  - Suggests that delays in referral or initial management variations may not prolong overall course — though inappropriate empiric therapy remains problematic.
- **Potential iatrogenic cases:**
  - A significant portion of culture-confirmed FOE cases presented without primary care findings consistent with FOE.
  - This raises the possibility of **iatrogenic FOE**, potentially due to unnecessary or prolonged antibiotic use.

Conclusions

- FOE can be may be confidently diagnosed in primary care based on ear exam findings, yet under-diagnosis and empiric mismanagement remain common.
- Treatment misalignment — particularly empiric antibiotic use in FOE-consistent cases — highlights an opportunity for improved primary care education.
- Findings support the hypothesis that iatrogenic FOE may contribute to cases presenting at specialty clinics.

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