Actinomycosis of the Middle Ear

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ABSTRACT

Title: Actinomycosis of the Middle Ear

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the diagnosis and treatment of Actinomycosis infection of the middle ear.

Objectives: 1) Present a rare pediatric case of ear actinomycosis. 2) Discuss the current literature on actinomycosis of the temporal bone reviewing presentation, diagnosis, and treatment.

Study Design: Case report.

Methods: Retrospective chart review.

Results: A 5-year-old girl with Treacher-Collins syndrome presented with a several-month history of right-sided otorrhea. The patient had failed multiple courses of oral and ototopical antibiotics. Examination revealed an opaque and full tympanic membrane (TM), actively draining ear, and mild-to-moderate mixed hearing loss with type B tympanometry. CT imaging demonstrated soft tissue density within the middle ear cavity and mastoid air cells concerning for cholesteatoma. The patient was taken to the operating room for tympanoplasty with mastoidectomy. Intraoperatively, the middle ear and mastoid antrum were filled with soft, honey-colored debris, and histopathologic analysis of these contents was consistent with actinomycosis.

Conclusions: Otitis media with Actinomyces species is an exceedingly rare condition, diagnosed more commonly in adults. Accurate diagnosis and treatment of this potentially aggressive infection with a combination of surgical debridement and systemic antimicrobial therapy results in favorable outcomes.

INTRODUCTION

Middle ear infection with Actinomyces is a rare entity in pediatric patients. Infection in the head and neck region is typically caused by Actinomyces israelii, a gram-positive, anaerobic, non-acid-fast filamentous bacterium believed to be a commensal organism in the upper aerodigestive tract.1,2 Actinomycosis infection most often involves the cervical fascia region followed by the abdomen and thorax.3,4 The oral cavity is most often affected in the pediatric patients. Infection in the head and neck region is typically rare and condition, diagnosed more commonly in adults. Accurate diagnosis and treatment of this potentially aggressive infection with a combination of surgical debridement and systemic antimicrobial therapy results in favorable outcomes.

CASE PRESENTATION

A 5-year-old female with a history of Treacher-Collins syndrome presented with a several-month history of right-sided otorrhea. The family reported an episode of bilateral acute otitis media that progressed to rupture of the right TM with purulent otorrhea, which was treated with oral amoxicillin, amoxicillin/clavulanic acid, clindamycin and several courses of ototopical ciprofloxacin/dexamethasone drops without improvement. At presentation, ear microscopy revealed scant debris and clear otorrhea within the right external auditory canal. The right tympanic membrane was thickened and mildly bulging, but without evident perforation. Audiogram and tympanometry testing demonstrated a mild-to-moderate conductive hearing loss and type B tympanogram with small ear canal volume in the right ear. Culture of the otorrhea was negative, and CT of the temporal bone showed soft tissue density within the right middle ear space and mastoid air cells concerning for cholesteatoma (Figure 1).

PATHOLOGY

Gross examination of the pathologic specimen consisted of 0.6 x 0.4 x 0.3 cm portion of grey-tan to beige soft tissue pieces. Hematoxylin-eosin (H&E) sections showed micro-colonies with dense purple centers (sulfur granules) and filamentous arms radiating outward from the center (Figure 2). The perimeter of these aggregates exhibited the typical feathery appearance of Actinomyces colonies as well as the presence of neutrophils. Grocott-Gomori methenamine silver (GMS) stain showed again outward radiating filaments (Figure 3). Gram stain demonstrated gram-positive rod-shaped organisms radiating toward the perimeter of the colony (Figure 4). No epithelium or other tissue was present in the sample and no features of cholesteatoma were seen.

DISCUSSION

Actinomycosis of the middle ear is a rare infection and challenging to diagnose. Most infections occur in adults, making diagnosis in a pediatric patient an extremely rare event. Often referred to as “the great masquerader”, its cervicofacial actinomycosis can present with a variety of symptoms, including pain, inflammation, drainage, as well as sinus or fistula tract formation.5,6 Typically a commensal organism in the upper aerodigestive tract, otologic infections are thought to be from direct spread via the eustachian tube.5,7 The highest concentrations of these bacteria tend to be in the tonsillar crypts and gingival crevicular fluid.8 The presentation is similar to chronic supplicative otitis media with a prolonged, indolent course of middle ear inflammation and chronic otorrhea that fails to respond to antibiotic treatment.9,10 The route of middle ear contamination is unclear in our patient, but most likely occurred by direct spread of pharyngeal colonization through the Eustachian tube.

Diagnosis typically requires histopathologic analysis because the organism is difficult to grow in culture, which can be negative in up to 70-80% of cases.1,3-5,7 Characteristic histopathologic findings include pale yellow clusters of sulfur granules seen as round or oval basophilic masses with a radiating arrangement of eosinophilic terminal “clubs” on H&E stain. Actinomyces can be difficult to see on H&E stains, however visualization is improved by the use of special stains such as GMS, p-aminosalicylic acid, MacCallen-Goodpasture stain, and Brown-Brenn stain.11

The mainstay of treatment for temporal bone actinomycosis is surgical debridement followed by long-term antibiotic therapy.1,2,3,5,7,11,13,17 The antimicrobial of choice is penicillin, with the route and duration of therapy depending on the severity of the infection.1,2 Reports on the route and duration of treatment vary widely, ranging from a few months up to one year of oral and/or parenteral antibiotics, and depend on the severity of the infection.1,2

CONCLUSIONS

Otitis media with Actinomyces species is an exceedingly rare condition, in pediatric patients. Actinomycosis should be included in the differential diagnosis of chronic infections of the middle ear and temporal bone that are not responsive to conservative management. Accurate diagnosis and treatment of this potentially aggressive infection with a combination of surgical debridement and systemic antimicrobial therapy results in favorable outcomes.

REFERENCES


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