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Abstract

Background

Necrotising otitis externa (NOE) is an infection originating in the soft tissues of the external auditory canal (EAC) spreading to the surrounding bone and rarely causing intracranial complications. It is usually caused by *Pseudomonas aeruginosa*, and has historically occurred in elderly patients with diabetes or immunodeficiency. EAC foreign body is a risk factor for otitis externa, but has not been described in NOE.

Case

A healthy 31-year-old male presented with new-onset seizures and worsening left-sided otalgia, otorrhoea. Brain imaging revealed left temporal subdural abscesses superior to the petrous bone. A retained cotton bud was identified in the left EAC, along with mastoid granulation tissue. The foreign body was removed, a cortical mastoidectomy performed and intra-venous antibiotic administered.

Results

At ten weeks, the patient remained well, with no neurological deficit, no residual ear symptoms, and CT demonstrated complete resolution of the intracranial abscesses.

Conclusion

NOE complicated by subdural abscess may occur due to retained foreign body in a healthy, young individual.

Introduction

Necrotising (malignant) otitis externa (NOE) is an infection that originates in the soft tissues of the external auditory canal (EAC) with inflammation of the underlying temporal bone, which can progress to skull base osteomyelitis. The causative organism is usually *Pseudomonas aeruginosa*, and the disease has historically been described in elderly patients with diabetes or other immunodeficiency. Cranial neuropathies, and rarely, intracranial complications such as meningitis, dural sinus thrombosis and intracranial abscess can occur. The presence of a foreign body in the EAC is a recognised risk factor for developing otitis externa, but NOE due to retained foreign body has hitherto not been described.

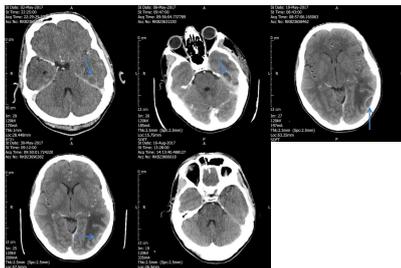


Image 1. CT head series at day 0, day 6, day 17, day 28 and week 15 demonstrating initially left temporal subdural abscess and later, left occipital subdural abscess. Both have completely resolved on the final scan including any oedema.

Image 2. Axial MRI image showing two discrete temporal subdural collections. A larger, posteromedial collection and a smaller, posterolateral collection.



Case Presentation

A 31-year-old male presented with collapse and new onset seizures. The normally fit and well man reported ten days history of left-sided otalgia and otorrhoea, progressing to left-sided headaches with associated nausea and vomiting. He had received two different courses of oral antibiotics from his GP for a "severe ear infection" and had a background of intermittent left ear pain and hearing loss for the past five years. He also admitted to being more forgetful of names in recent days. Examination found Glasgow coma score of 14/15 with reduced hearing in the left ear. There was discharge in the left EAC, obscuring a view of the tympanic membrane but mastoid tenderness was absent. He was afebrile, and physical examination was otherwise unremarkable.

Computed tomography (CT) imaging of the brain revealed a left superior tentorial subdural abscess (Image 1, day 0). In the temporal bone the left middle ear was opacified. The left external ear canal was filled with soft tissue density material. There was no erosion of the ossicles, tegmen or inner ear. Blood tests on admission showed C-reactive protein of 66mg/L, with otherwise normal results. Empirical antibiotic therapy was initiated and magnetic resonance imaging (MRI) of the brain demonstrated a 29 x 17 x 9 mm subdural collection at the surface of the left tentorial leaflet, superior to the petrous bone and an adjacent, smaller (16 x 11 x 9 mm) collection (Image 2). A swab of the ear discharge was sent for microbiological assessment. Subsequently, *Pseudomonas aeruginosa* sensitive to meropenem and ciprofloxacin was cultured.

Treatment

Initial treatment was with intravenous (IV) vancomycin, meropenem, levetiracetam and dexamethasone under the care of the neurosurgical team.

Following ENT assessment, the decision was taken to explore the ear under general anaesthetic. A retained cotton bud was noted in the left external auditory canal and removed. A cortical mastoidectomy was performed. No evidence of cholesteatoma was found, but granulation tissue and inflamed mucosa were present in the mastoid antrum, leading to the diagnosis of necrotising otitis externa. This was felt to be secondary to retained cotton bud and had become complicated by intracranial infection.

Conservative management of the subdural abscesses was continued, with intravenous meropenem and oral ciprofloxacin. CT scan performed at day six, demonstrated shrinkage of the abscess. The patient was clinically well and was discharged from hospital on day seven, with on-going oral and intravenous antibiotics (via a peripherally inserted central catheter) delivered at home for a total of eight weeks.

Further CT imaging at day 17 showed improvement of the temporal subdural abscess, but formation of a new occipital subdural abscess. This had reduced in size on interval CT imaging at day 28 (Image 1). A CT scan performed at ten weeks demonstrated complete resolution of the previously visualised abscesses. At the completion of his course of antibiotics, the patient remained systemically well with no neurological deficit and no residual ear symptoms.

Discussion

Features of severe otalgia, otorrhoea, hearing loss, unilateral headache and elevated CRP provided diagnostic clues of NOE in this case (1, 2).

In NOE, infection spreads from the EAC to the stylomastoid, jugular foramina and mastoid system (via the tympanomastoid suture). This can result in septic thrombosis of the lateral venous sinus and infection can subsequently extend via the posterior and/or middle fossa surfaces of the petrous bone to the petrous apex (3), as found in the present case.

Intracranial abscess in the context of NOE is rare, and usually denotes advanced disease and grave prognosis, as demonstrated by the case of an elderly non-diabetic patient with NOE who died as a result of a subdural abscess (4). Another case of NOE complicated by cerebral abscess in a diabetic patient was successfully treated with extensive surgical debridement and abscess drainage (5), and similarly aggressive treatment was successful in a healthy 60-year-old man free of diabetes and immunocompromise who developed NOE complicated by epidural abscess (6).

Several further reports of NOE occurring in patients free of diabetes and immunocompromise have been published (7), including in relatively young individuals (8). In fact, between 2002 and 2013, elderly, diabetic patients accounted for only 22.7% of NOE cases (9). A six-fold increase in the number of cases of NOE from 1999 to 2013 has also been observed (10).

The use of cotton buds inside ears is common, despite being recognised to cause trauma, tympanic membrane perforation, impacted earwax, infection, and retention of the cotton bud (11). Although foreign material (particularly cotton bud) in the EAC is a risk factor for otitis externa (12), here we describe it causing NOE and intracranial abscess formation for the first time.

Conclusions

- NOE has historically been considered a diagnosis exclusively in elderly patients with diabetes or immunocompromise.
- More recent studies show that the incidence of NOE is increasing, and it is more frequently affecting younger and healthy individuals, as with the case discussed herein.
- Intracranial complications from NOE are rare, and usually denote advanced disease and grave prognosis.
- This case suggests that intracranial abscess may form in fairly limited disease and may have a good prognosis when it occurs in a healthy young individual.
- Cotton bud use in the ear canal is a risk factor for multiple otological conditions, including otitis externa.
- This case suggests a retained cotton bud may also cause NOE.
- This case highlights that limited surgical intervention and long term antibiotics can have an excellent outcome for NOE complicated by subdural abscess in a healthy, young individual.

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