Unsafe Chronic Suppurative Otitis Media with Cerebellar Abscess

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ABSTRACT
A 30-year-old female patient presented with fever, altered sensorium, vomiting, and right-sided ear discharge. She was diagnosed as right-sided squamosal chronic suppurative otitis media (CSOM) with cerebellar abscess for which she underwent modified radical mastoidectomy with transmastoid cerebellar abscess drainage. After surgery, the patient made an uneventful recovery. Brain abscess due to suppurative otitis media is a potentially fatal complication and needs to be treated aggressively.

Keywords: Abscess, Cerebellum, Cholesteatoma, Otitis media, Mastoiditis.

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INTRODUCTION
Unsafe (squamosal) CSOM in untreated cases can present with either extracranial complications like sensorineural hearing loss (progressive or sudden), facial nerve palsies, labyrinthitis, labyrinthine fistulas, Bezold’s abscess, apex petrositis, and postauricular abscess. Intracranial complications include meningitis, brain abscess, extradural abscess, subdural abscess, lateral venous sinus thrombosis, and otitic hydrocephalus. Traditionally, ears with squamous epithelial disease have been regarded as being more at risk of serious complications as opposed to those with mucosal disease. In fact, the evidence confirms that there is a significant risk with both types of diseases.

Intracranial complications most commonly occur due to direct erosion of osteitic bone by the inflammatory process or via the infected thrombophlebitis of the emissary veins traversing the bone and the dura. Infection may spread to the cranial vault via fractures in the temporal bones, preformed anatomical pathways, or normal anatomical structures, such as the round window, the oval window, and the cochlear aqueduct.

CASE REPORT
A 30-year-old female patient was brought to the Department of Emergency Medicine, Mahatma Gandhi Mission Medical College & Hospital, Navi Mumbai, Maharashtra, India, on November 5, 2016, with history of fever with chills for 3 days, right-sided otorrhea since 4 days, vomiting for 6 hours prior to admission, and altered sensorium for 6 hours. She had prior history of discharge from the right ear for last 4 years which was intermittent and mucopurulent.

Patient had undergone a left ear modified radical mastoidectomy 18 years back. On admission, her pulse was 108/min, blood pressure was 110/70 mm Hg, and she had neck rigidity. On admission, her provisional diagnosis was meningitis probably secondary to CSOM. In the intensive care unit, she was given injections—ceftriaxone, artemisinin, acyclovir, dexamethasone, and mannitol. Her plain computed tomography (CT) of the brain at the time of admission showed destruction of right sinodural plate, tegmen tympani and lateral wall of right mastoid, right-sided CSOM with cholesteatoma, bony destruction, and brain abscess. Cerebrospinal fluid examination showed presence of neutrophils with increased protein and decreased sugar suggestive of bacterial meningitis. Samples sent for culture were sterile. Ear, nose, and throat (ENT) examination showed presence of foul smelling mucopurulent discharge in the right external auditory canal. Magnetic resonance imaging (MRI) of brain (plain + contrast) was done on November 8, 2016, showing presence of 1 cm × 1 cm abscess in the right cerebellar lobe. Computed tomography venogram done on November 14, 2016, showed a cerebellar abscess measuring 2.4 × 1.4 × 2.2 cm and a mastoid abscess measuring 2.9 × 1.4 × 2.6 cm without sigmoid sinus involvement. On November 13, 2016, the patient developed a swelling in the postaural region. Using a wide-gauge 18G needle, the mastoid abscess was drained on November 14, 2016,
and approximately 6 mL pus was aspirated and sent for culture sensitivity (Figs 2 to 4).

Patient was taken up for surgery on November 16, 2016, by a joint ENT–neurosurgical team. Modified radical mastoidectomy was done. Intraoperatively, cholesteatoma was seen in the mastoid antrum, attic, and the middle ear cleft. The lateral wall of the mastoid was found to be destroyed with a large cavity occupying its place. There was patchy destruction of the tegmen tympani and the sinodural angle. However, the sinus plate was intact. Medial wall of the mastoid was destroyed. The dura of the cerebellum, which was covered with granulation tissue, was exposed with slight discoloration in one spot, suggesting presence of an abscess beneath. Using a transmastoid approach, the cerebellar abscess was drained using a wide-bore needle followed by gentle probing in the area of the granulation tissue over the dura. About 10 mL of pus was obtained. No ossicles were present in the middle ear cleft, and a temporalis fascia graft was placed by underlay technique (type IV tympanoplasty). Another temporalis fascia graft was used to cover the exposed dura followed by surgical closure (Figs 5 to 7). Postoperatively, patient was continued on parenteral ceftriaxone, metronidazole, vancomycin, and oral chloromycetin and...
acetazolamide. Culture showed presence of pseudomonas in the cerebellar abscess and *Escherichia coli* in the mastoid abscess, following which antibiotics were changed to injection cefotaxime, injection metronidazole, injection amikacin, and oral amoxicillin-clavulanic acid as per culture sensitivity. Histopathology report of the tissue recovered showed cholesteatoma. Antibiotic therapy was continued for 21 days. With this line of management, the patient made an uneventful recovery. Computed tomography brain (plain + contrast) done on postoperative day 12 showed no residual disease or abscess formation.

**DISCUSSION**

The incidence of intracranial complications of chronic otitis media (COM) is estimated to be between 0.02 and 1.97%. The extracranial and intracranial complications occur when chronic infection within the middle ear and mastoid spaces extends to the region beyond the bony confines. Osama et al reviewed 2,890 cases of COM from 1990 to 1999 and found that 57 (1.92%) cases had intracranial and 39 (1.35%) extracranial complications. They observed that meningitis and brain abscess were common among the intracranial complications group, whereas subperiosteal abscesses (Mastoid and Bezold’s abscess) were common complications in the extracranial complications group. Despite widespread use of antibiotics, brain abscess following CSOM remains a major problem for the pediatricians, neurologists, otologists, and neurosurgeons. Otogenic brain abscesses constitute about 70% of brain abscesses. Middle ear suppurative disease may extend to temporal lobe or cerebellum due to destruction by cholesteatoma, through fracture lines, preformed pathways, or the Haversian system of veins or the periarterial space of Virchow Robin. Management of intracranial abscesses differs in various stages of evolution. Antibiotics are quite effective in early and late cerebritis stage, but their efficacy is reduced in the stage of capsule formation due to acidic medium in the abscess cavity and the inability to have adequate therapeutic concentration of antibiotic within the abscess. Therefore, surgical intervention is essential once the capsule is formed.
In their study, Asma et al. noted that cholesteatoma was seen in all cases of otogenic brain abscess. They presented with a history of chronic ear discharge, headache, otalgia, and fever. The underlying pathology for cerebellar abscess was cholesteatoma. Cholesteatoma produces enzymes that cause demineralization of bone. The infection can spread through this bony erosion into the posterior cranial fossa and cause cerebellar abscess.12

Less than 50% of patients with brain abscess present with the classical triad of fever, headache, and neurological deficit.13 Youngs and Harker and Shelton described signs and symptoms of brain abscess according to the stages of its development. The first stage corresponds to the encephalitis stage that results from the invasion of brain tissue. The symptoms are general malaise, headache, fever, chills, nausea, and vomiting. They are usually quite mild and often mimic an exacerbation of COM. During the second stage or “latent stage,” the abscess localizes and the symptoms may disappear. The third stage is characterized by signs and symptoms associated with both increased intracranial pressure and compression of specific structures in the brain. Severe headache is present in 50 to 60% of patients. Nausea and vomiting (often projectile) occur in 25 to 50% of cases. About 20 to 30% of patients may present with seizures.16 Untreated abscess may rupture into the ventricle or the subarachnoid space. This will result in rapid clinical decline and even death due to severe ventriculitis.

Computed tomography scan with and without intravenous (IV) contrast remains the most important investigation in the diagnosis of brain abscesses and for observing its progress during treatment. Magnetic resonance imaging is equally useful.17 Conditions to be differentiated from brain abscess include meningitis, subdural abscess, lateral sinus thrombophlebitis, and otitic hydrocephalus. Brain abscess is the dreaded otogenic complication, both in severity and difficulty of management.18 Management requires a combined neurosurgical and otologic approach, along with use of large doses of systemic antibiotics. Surgery of the abscess includes aspiration through a burr hole or formal craniotomy, open drainage, or rarely total excision. This may be carried out simultaneously with surgery for CSOM, or it may precede management of the ear if the intracranial problem is life-threatening. Surgical management for CSOM is based on the extent of the underlying disease.

In their case series of eight cases of cerebellar bacterial brain abscess, Hsu et al. noted that dizziness is a frequent symptom. Early diagnosis and a combination of antimicrobial and neurosurgical intervention is important for its treatment. Three out of eight patients with cerebellar brain abscesses had ear symptoms. One patient had cholesteatoma, one patient had acute suppurative otitis media, and one had mastoiditis with diabetes mellitus.

Computed tomography with IV contrast is the imaging modality of choice in screening for complications of CSOM. It can demonstrate the site of complications, the extent of the abscess, and any bone involvement.13 Magnetic resonance imaging with contrast and magnetic resonance angiography are useful in the definitive diagnosis of certain intracranial complications, such as lateral sinus thrombosis. Both contrast-enhanced CT and MRI will demonstrate ring enhancement for brain abscesses.20-21 The abscess is usually encircled by an area of low density representing edema in the surrounding brain tissue.22 Intravenous antibiotic therapy should be started as early as possible. Polymicrobial infection is common in CSOM and its complications.12 Therefore, broad-spectrum antibiotic coverage for aerobic and anaerobic organisms is recommended. Combination drug therapy may be necessary to accomplish this goal. Surgical treatment may involve aspiration or excision of the abscess.23 The treatment of the condition is tailored to the clinical presentation of each patient and neurological considerations. The importance of early and appropriate treatment of the abscess cannot be overemphasized.

With prompt treatment and a proper regimen of antibiotics, otogenic brain abscesses are curable and patient recovers fully with no long-term sequelae, as shown in the present case.

CONCLUSION

Otogenic brain abscess is a life-threatening condition if left untreated. It can prove fatal if immediate intervention is not done. In addition to medical management, early surgical intervention in the form of removing the septic foci in the ear is of vital importance to ensure complete recovery.

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REFERENCES


