Automastoidectomy: A Rare Autocorrected Chronic Suppurative Otitis Media Sequelae

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Abstract

Aim: To study the various presentations of automastoidectomy cavity.

Materials and methods: A retrospective study was conducted in the Department of Otorhinolaryngology, SGT Hospital and Research Institute, Gurugram, Haryana, India from June 2021 to December 2021. We present a report of six cases who presented to the Department of ENT with a self-healing automastoidectomy cavity. The diagnosis of automastoidectomy was made based on history, clinical examination, and high-resolution computed tomography (HRCT) findings wherein there was no history of any ear surgery in the past and the HRCT findings were like that of postoperative changes following a post-mastoidectomy cavity.

Conclusion: Automastoidectomy cavity is an uncommon sequela of chronic cholesteatomatous otitis media. Spontaneous drainage of the cholesteatoma through the bony defect can explain the rare genesis of a self-treated automastoidectomy cavity which can mimic post-mastoidectomy changes on HRCT if proper history is not taken.

Clinical significance: The topic of automastoidectomy leads us to interesting challenges to be explored and evaluated. Constraint being lack of available literature; hence, more research is needed.

Keywords: Automastoid cavity, Automastoidectomy, Chronic otitis media, Complicated chronic otitis media.


Introduction

Chronic suppurative otitis media (CSOM) is a chronic middle ear disease and is defined as “chronic inflammation of the middle ear and mastoid cavity presenting as recurrent ear discharge or otorrhea through a tympanic membrane (TM) perforation.” Inflammation of the middle ear space can lead to permanent changes in the TM including atelectasis, dimer formation, perforation, tympanosclerosis, retraction pocket formation, or cholesteatoma.1

Abramson et al. defined Cholesteatoma as “a three-dimensional epidermal and connective tissue structure, usually in the form of a sac, and frequently conforming to the architecture of various spaces of the middle ear, attic and mastoid. This structure has the capacity for progressive and independent growth at the expense of underlying bone and tends to recur after removal.”2,3

A cholesteatoma usually runs a malignant course, destroying the adjacent structures and hearing, by the pressure effect of the expanding keratin mass and osteoclast-mediated enzyme activity. Bone resorption destroys mastoid trabeculae, ossicular erosion, labyrinthine fistulation, and leads to exposure of the dura, facial nerve, and lateral venous sinus. Superadded bacterial infection of the sac may cause labyrinthitis, facial paralysis, brain abscess, meningitis, and lateral venous sinus thrombophlebitis.1

However, at times cholesteatoma can undergo self-treatment, resulting in an entity called an automastoidectomy cavity. There is a lytic lesion of the temporal bone with a defect seen in the attic or the posterior wall of the external auditory canal (EAC) by the adjacent cholesteatoma in patients with no history of the previous operation.4

Study Design

We present a report of six cases who presented to the Department of ENT with a self-healing automastoidectomy cavity. A retrospective study was conducted in the Department of ENT, SGT Hospital and Research Institute, Gurugram, Haryana, India from June 2021 to December 2021.

The diagnosis of automastoidectomy was made based on history, clinical examination, and HRCT findings wherein:

- There was no history of any ear surgery in the past;
- High-resolution computed tomography findings were like that of postoperative changes following a post-mastoidectomy cavity.
Case Report 1
An 18-year-old female presented in outpatient department (OPD) with complaints of blocked sensation in right ear and earache for 10–15 days which was insidious in onset, intermittent, dull aching in nature, and non-radiating. The patient had right-sided hearing loss for 3–4 years which was insidious in onset, continuous, nonprogressive, patient can hear normal conversation, not affecting her daily life. The patient gave past history of right ear discharge for 8–9 years which was insidious in onset, intermittent, scanty in amount, foul-smelling, and occasionally blood-tinged with last active ear discharge 6 years back. The patient did not undergo any ear surgery in the past.

On local examination, no scar mark in the right post-auricular region. There was impacted wax visualized which was cleaned and a widened right EAC with an exposed but dry mastoid cavity was visualized (Figs 1 and 2). Pars tensa was intact but retracted.

Tuning fork tests revealed Rinne’s test for the right ear was negative for 256, 512, and 1,024 Hz with Weber’s lateralized to left. Pure tone audiometry suggested 58 dB mixed hearing loss.

High-resolution computed tomography of right ear revealed mastoid cavity with loss of mastoid air cells seen in continuity with the posterior part of the EAC. There was preservation of the ossicles. The above findings were similar to that of post-operative changes following a canal wall down (CWD) mastoidectomy of the right ear with preservation of the ear ossicles.

Since there was no trace of residual disease or recurrence, and patient had hearing complaints the patient underwent ossicular reconstruction.

Case Report 2
A 54-year-old female presented with complaints of bilateral ear discharge since childhood. The patient had bilateral ear discharge, which was insidious in onset, intermittent, purulent foul-smelling discharge, scanty in amount, and occasionally blood-tinged with no aggravating or relieving factors. The last active discharge in the right ear was 1 month back and in the left ear was 25 years back. The patient had complaints of decreased hearing in the left ear for 25 years, which was continuous and progressive, patient could not hear loud sounds which affected her daily life and in the right ear for 5–6 years, which was continuous, progressive, and patient could hear normal conversation. The patient did not undergo any surgery in the past.

On local examination, the right TM had a single subtotal perforation occupying all the quadrants of pars tensa with well epithelialized margin. Cholesteatoma flakes were seen in the middle ear in the anterosuperior and posterosuperior quadrant (Fig. 3).

No scar mark was seen in the left post-auricular region (Fig. 4). There was widening of left EAC with scanty discharge and the posterior wall was absent. External auditory canal was seen communicating with a dry mastoid cavity (Fig. 5). Pars tensa of the left ear was intact but retracted.

Tuning fork tests revealed Rinne’s test which was negative for 256 and 512 Hz in the right ear and 256, 512, and 1,024 Hz in the left ear with Weber’s lateralized to right. Pure tone audiometry suggested conductive hearing loss of 35 dB in the right ear and mixed hearing loss of 54 dB in the left ear.

High-resolution computed tomography of right ear revealed soft tissue density noted in mesotympanum extending superiorly into epitympanum, reaching mastoid antrum via aditus with erosive...
changes noted in tegmen tympani and lateral wall of bony facial canal (Fig. 6).

The left ear had a large mastoid cavity measuring approximately 1.9 cm × 1.5 cm which was communicating with the posterior part of the EAC. Middle ear ossicles were not visualized. Minimal soft tissue attenuation thickening was seen along the walls of the cavity. The above findings were like that of post-operative changes following a CWD mastoidectomy of the right ear with loss of the ear ossicles (Fig. 7).

The patient underwent mastoid exploration of the right ear wherein cholesteatoma sac was removed from the middle ear cavity, extending into the mastoid antrum, and confirmed on histopathological examination.

**Case Report 3**

A 27-year-old female presented in OPD with complaints of right-sided earache for 2 days which was insidious in onset, intermittent, dull aching in nature, and non-radiating. The patient had right-sided hearing loss for 14 years which was insidious in onset, continuous, the patient could not hear loud sounds, which affected her daily life. The patient had a history of right ear discharge since infancy which was insidious in onset, intermittent, scanty in amount, foul-smelling, and occasionally blood tinged. She took medications following which her complaints resolved and she had her last active ear discharge 16 years back. The patient did not undergo any ear surgery in the past.

On local examination, no scar mark in the right post-auricular region. There was widening of right EAC with an exposed, dry mastoid cavity. Pars tensa was intact.

Tuning fork tests revealed Rinne’s test for the right ear was negative for 256, 512, and 1,024 Hz with Weber’s lateralized to right. Pure tone audiometry suggested conductive hearing loss of 68 dB in the right ear.

High-resolution computed tomography revealed mastoid cavity with loss of mastoid air cells which was continuous with the posterior part of the EAC (Figs 8 and 9). There was loss of the ossicles with minimal soft tissue attenuation thickening is seen along the walls of the cavity. The above findings were similar to that of post-operative changes following a CWD mastoidectomy of the right ear with the loss of the ear ossicles.

Since there was no trace of residual disease or recurrence, the patient underwent ossicular reconstruction for better hearing.
Case Report 4

A 76-year-old male presented with complaints of bilateral ear discharge since childhood. The patient had bilateral ear discharge, which was insidious in onset, intermittent, purulent discharge, scanty in amount, non-foul-smelling, and non-blood tinged with no aggravating or relieving factors. The patient had active discharge in the right ear while the last active discharge in the left ear was 30 years back.

The patient had complaints of impaired hearing in the bilateral ear for 35 years, which was continuous and progressive, patient could not hear loud voices, which affected his daily life. The patient did not undergo any surgery in the past.

On local examination, the right ear had active green-colored discharge, and the TM had an oval-shaped, moderate-sized perforation in the posterior quadrant. Swab culture of the left ear was suggestive of Pseudomonas aeruginosa.

The left ear had widened EAC with an exposed but dry mastoid cavity. Pars tensa was intact. There was no scar mark in the post-auricular region.

Rinne’s test for the left ear was negative for 256, 512, and 1,024 Hz; and 256, 512 Hz in the right ear with Weber’s lateralized to right. Pure tone audiometry suggested mixed hearing loss of 74 dB in the left ear and conductive hearing loss of 40 dB in the right ear.

High-resolution computed tomography of left ear revealed a large mastoid cavity measuring approximately 2.1 cm × 1.7 cm which is communicating with the posterior part of the EAC. Middle ear ossicles were not visualized. The above findings were similar to that of post-operative changes following a CWD mastoidectomy of the left ear. Right ear had features suggestive of mastoiditis.

As the patient refused any surgery, he underwent a hearing aid trial following antibiotics cover.

Case Report 5

A 34-year-old female presented in OPD with complaints of reduced hearing in both the ears for 20 years which was insidious in onset, continuous, the patient could not hear loud voices, which affected her daily life. The patient complained of left ear discharge for 20 years which was insidious in onset, intermittent, scanty in amount, foul-smelling, and blood-tinged. She had tinnitus in the right ear for 15 years which was insidious in onset, continuous, low-pitched roaring which accentuated at night. The patient did not undergo any ear surgery in the past.

On local examination of the left ear, there is active discharge in the EAC with pearly white cholesteatoma flakes seen in the attic region. In the right ear, no scar mark in the post-auricular region. There was widened right EAC with an exposed, dry mastoid cavity. Pars tensa was intact.

Tuning fork tests revealed Rinne’s test for the right ear was negative for 256, 512, and 1,024 Hz while it was negative for 256 and 512 Hz in the left ear with Weber’s lateralized to left and reduced absolute bone conduction test in the right ear. Pure tone audiometry suggested mixed hearing loss of 68 dB in the right ear and conductive hearing loss of 45 dB in the left ear.

High-resolution computed tomography revealed soft tissue density in left middle ear cavity involving epitympanum,
mesotympanum, and hypotympanum extending to mastoid aditus via antrum and Prusak’s space with blunting of scutum.

The right mastoid cavity is noted with loss of mastoid air cells was seen in continuity with the posterior part of the EAC. The ossicles were preserved with minimal soft tissue attenuation thickening was seen along the walls of the cavity. The above findings were similar to that of post-operative changes following a CWD mastoidectomy of the right ear with preservation of the ear ossicles.

The patient underwent mastoid exploration for the left ear, histopathological report of tissue samples sent from the middle ear was consistent with that of cholesteatoma.

**Case Report 6**

A 42-year-old female patient was referred to our OPD with complaints of worsening, throbbing pain over the left ear for 15 days. She noticed a painful swelling behind her left ear which was accompanied by yellowish discharge from the ear canal. She has no complaint about the right ear.

On further questioning, she complained of left-sided ear discharge for 10 years which was insidious in onset, intermittent, scanty in amount, foul-smelling, and blood-tinged with last active ear discharge 2 years back. She took treatment from various doctors over the last 10 years. Left-sided reduced hearing for 10 years which was insidious in onset, continuous, the patient could not hear loud voices, affecting her daily life. The patient did not undergo any ear surgery in the past.

On local examination, there was a soft, erythematous, warm, and tender swelling measured 5.0 cm × 2.5 cm over the left postauricular region. The whole left EAC was occupied with non-foul smelling, and yellowish discharge. There was no scar mark over the right post-auricular region. The EAC was widened with an exposed, dry mastoid cavity. Pars tensa was intact.

Rinne’s test was negative for 256 and 512 Hz in both the ears with Weber’s lateralized to left. Pure tone audiometry suggested mixed hearing loss of 40 dB in the right ear and conductive hearing loss of 50 dB in the left ear.

High-resolution computed tomography revealed left mastoid abscess with soft tissue density seen occupying the left middle ear space engulfing the ear ossicles within it and extending till the aditus. There was a big mastoid cavity with loss of mastoid air cells is seen continuous with the posterior part of the right EAC. There was preservation of the right ossicular chain. The above findings were similar to that of post-operative changes following a CWD mastoidectomy of the right ear with preservation of the ear ossicles.

The patient underwent modified radical mastoidectomy of the left ear.

**Results and Discussion**

It was interesting to note that all the patients, from an age of 18 years to 76 years, who presented to the OPD had impaired hearing but did not have any operative history. A total of four out of six patients came with complaints of the other ear, while two patients who had impaired hearing in the same ear came to OPD for treatment of their distressing earache. Among the six patients, five of them gave a history of chronic ear discharge which was suggestive of chronic otitis media with cholesteatoma. Over a period of time, their otorrhea resolved on its own and patients have learned to cope with their respective lives along with impaired hearing. This probably reflects the negligence toward otogenic problems that is more frequently seen in the rural population.\(^5,^6\) Gradually progressive hearing loss, occasionally scanty ear discharge, and tinnitus are not as distressing to the patient as earache, ear bleed, painful swelling, profuse foul smelling otorrhea, fever, or dizziness, which affects the daily routine activities of the patient and often presents as a late complication of cholesteatoma.\(^7\) However, none of the patients who presented to us, developed complications related to cholesteatoma.

There was female preponderance (5:1) in this study. This can be attributed to negligence toward female’s health, less willingness to visit a doctor for ear-related problems, and less awareness about chronic otitis media and its complication among the masses, less accessibility, and availability of an ENT surgeon, and ignorance toward health issues of the other gender in a patriarchal society. However, more research is needed to understand the etiopathogenesis of this rare condition.

Cholesteatoma is a destructive lesion of the temporal bone that gradually expands and causes complications by erosion of the adjacent bony structures. Cholesteatoma can either advance to its complications by osteoclastic and osteoblastic remodeling or can progress toward healing.

Advancement of disease to its complication occurs with enlargement of the lesion by osteitis or bone erosion. Bone erosion in cholesteatoma occurs in the absence of acute inflammation and granulation tissue formation however in some cases, the disease process is associated with chronic granulation tissue formation with osteitis in the adjacent bone.\(^8\) As a good clinician, one should have a high index of suspicion for early detection of extracranial complications such as mastoid abscess, facial nerve palsy, and labyrinthine fistula or more severe intracranial complications such as meningitis and brain abscess that may lead to serious morbidity or even mortality.\(^9\) With the use of antibiotics, such complications of cholesteatoma are less commonly seen nowadays. High-resolution computed tomography is used for diagnoses of inflammatory middle ear diseases, such as chronic otitis media or cholesteatoma, and in the evaluation of the middle ear following mastoidectomy or tympanoplasty.\(^10\)

Canal wall down and canal wall up (CWU) are the surgical techniques used in the treatment of cholesteatoma with the aim of surgery being complete eradication of the disease with satisfactory hearing. These techniques are mainly distinguished by the preservation of the external ear canal. Canal wall down is considered a more effective method as it allows the evaluation of mastoid and middle ear structures with a wide-angle of view. However, a self-cleaning cavity cannot usually be obtained in the CWU technique, and the patient leads a life with social limitations. These problems are avoided in the CWU technique because the anatomy is preserved.\(^11\)

Cholesteatoma can progress toward healing with spontaneous reversion to inactivity. In these cases, presumably, the disease process has selectively resulted in bone erosion of the outer attic wall or the whole posterior meatal wall. The epithelial migration pattern is restored from the medial to the lateral direction and the ear develops a “normal” but widened external meatus or “automastoidectomy” cavity.\(^8\)

Spontaneous drainage of the cholesteatoma through the bony defect can explain the rare genesis of a self-treated automastoid cavity. This can be confirmed by the presence of air in the mastoid cavity which points toward the expulsion of cholesteatoma as a part or in toto.\(^8\)
In cholestatomatous chronic otitis media, an ENT surgeon explores mastoid cavity, the posterior wall of EAC and the facial ridge is lowered, facial bridge is broken, cholesteatoma sac is removed with saucerization of the mastoid cavity is done, connecting it with the EAC and a single wide cavity is made. Similar changes were seen in these patients with automastoid cavity, imitating the findings of a post operative mastoid cavity.

An “automastoidectomy” cavity is intriguing yet poorly known entity due to lack of literature. It is described as a destructive condition of the temporal bone in a patient with no previous surgical history, where middle ear cholesteatoma exenterates and destroys mastoid air cells and middle ear structures with the result resembling a post mastoidectomy appearance. An "automastoidectomy" cavity is intriguing yet poorly known entity due to lack of literature. It is described as a destructive condition of the temporal bone in a patient with no previous surgical history, where middle ear cholesteatoma exenterates and destroys mastoid air cells and middle ear structures with the result resembling a post mastoidectomy appearance.

**Conclusion**

Automastoidectomy cavity is an uncommon sequela of chronic cholesteatomatous otitis media. As the cholesteatoma destroys the adjacent structures, it erodes the attic and the posterior wall of the EAC. Spontaneous drainage of the cholesteatoma through the bony defect can explain the rare genesis of a self-treated automastoid cavity. It can mimic post-mastoidectomy changes on HRCT if proper history is not taken.

The topic of automastoidectomy leads us to interesting challenges to be explored and evaluated. Constraint being lack of available literature; hence, more research is needed.

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**References**


