Labyrinthine Fistula, Complication of Chronic Otitis Media: A Case Report

Shachita¹, Shivbrat Sharma²

¹,²Medical Officer ENT Specialist, Zonal Hospital Dharamshala Distt Kangra (H. P), India
Corresponding Author: shivbratsharma[at]gmail.com

Abstract: Chronic otitis media is a significant health problem which is hampering person’s quality of life. Long-standing disease causes a spectrum of complications, among them one is labyrinthine fistula. Labyrinthine fistula frequencies vary from 4 to 12% and most common site is lateral semi-circular canal. Patients presenting with long-standing symptoms and feeling of unsteadiness, giddiness and vertigo should be cautiously looked for to rule out the disease.

Keywords: Labyrinthine fistula, lateral semicircular canal fistula, chronic otitis media, cholesteatoma

1. Introduction

Chronic Otitis Media (COM) remains a significant health problem in terms of prevalence, economics and sequelae worldwide and more so in developing countries. It is defined as chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharge or otorrhoea through tympanic membrane perforation [1]. This is further divided into safe type (tubo-tympanic or squamosal) and unsafe type (attico-antral or mucosal). The unsafe disease can be seen with or without cholesteatoma. Without management, it can cause diverse intracranial complications such as meningitis, extradural abscess, lateral sinus thrombophlebitis, otitic hydrocephalus, CSF otorrhoea and extracranial complications such as mastoiditis, hearing loss, labyrinthitis, facial nerve paralysis, petrotitis and lateral semicircular canal or labyrinthine fistula. The labyrinthine fistula continues to be one of the most common intra-temporal complications which is encountered in clinical practice. Cholesteatoma induced fistula most commonly involves lateral semi-circular canal (LSCC), but can involve other semicircular canals and rarely cochlea. Its frequency varies approximately from 4 to 12%. In nearly 90% of patients the labyrinthine fistula is located in LSCC.

Theory of Labyrinthine fistula formation

Labyrinthine fistulas can occur due to cholesteatoma, granulomatous chronic otitis media without cholesteatoma, as well as postoperative infection [2]. But the most common cause of Labyrinthine fistula is cholesteatoma. The mechanisms of Labyrinthine fistulas generation from cholesteatoma can be classified into three categories: pressure of the matrix, enzymatic osteolysis and inflammation [3]. Cholesteatoma sac—filled with keratin debris—can initiate osteolysis via the imposition of pressure without liquefaction [4]. Cholesteatoma in a confined space has no outlet for its growth and therefore exerts pressure on the surrounding structures, thereby leading to bone erosion. Second, the matrix of the cholesteatoma sac releases various enzymes like collagenases, proteases, metalloproteinases, tumour necrosis factor-α, which causes osteolysis along with liquefied debris and granulation tissue. In addition, inflammation initiated by cholesteatoma-related infections alters the surface pH of the surrounding bone and also leads to osteolysis [5].

2. Case Report

A 46 years male labourer by profession presented to ENT OPD with a history of chronic left ear discharge for the last 3 years, which is scatty, mucopurulent, foul smelling, vertigo for 2 months and associated hearing loss. On otoscopic examination a total perforation was seen in pars tensa, pars flacida was also found to be grade 4 retracted with erosion of both the malleolar folds and handle of malleus also found to be destroyed. Fistula test was positive on the left side, grade 1 nystagmus and vertigo. On Pure Tone Audiometry patient had mixed kind of hearing loss in left ear which was 58dB and right ear hearing was normal. HRCT of bilateral temporal bones of the patient was done and it was suggestive of some soft tissue density in the whole of middle ear and mastoid antrum. No ossicle was visualised on HRCT. A small fistula was noted over the bony labyrinth. Facial nerve canal was found to be intact. Patient was planned for mastoid exploration surgery under general anaesthesia. He underwent a canal wall up mastoidectomy using post auricul endoscopic approach. White sac was found in the mastoid antrum, attic, aditus and middle ear cavity. Malleus and incus were absent and stapes supra structure was absent and only stapes footplate was found which was mobile. Fistula 2mm in size was found over the lateral semicircular canal dome. It was carefully freed of the cholesteatoma matrix. No leak of perilymph was noticed from the fistula site, and it was ensured after gentle palpation. Fistula repair was done with bone dust and later on covered by the temporalis fascia graft. Type 4 tympanoplasty was done and wound closed in layers. Specimen was sent to histopathological examination which came out as stratified keratinised squamous epithelium most likely cholesteatoma. Post-operative period was uneventful; patient’s vertigo also improved and patient was discharged on day 7.
shown that risk of labyrinthine damage due removal of epithelium lining the fistula is very less compared to the long term risk of labyrinthitis due to residual epithelium over fistula [7]. The decision regarding preserving the posterior canal wall should also be taken thoughtfully, depending on disease extent, patient’s compliance, his occupation, degree of hearing loss and other complicating factors. Most surgeon’s prefer canal wall down procedure for better access of post-operative follow-ups and in non-compliant patients. But selective patients like ours, may be offered canal wall up procedures where hearing can be preserved and the patient promises to be compliant for regular follow-ups. Patients should be regularly assessed to rule out any recurrence.

4. Conclusion

To conclude, patients with longstanding COM should always be suspected of having labyrinthine fistula, especially those who have a history of giddiness, vertigo and bodily imbalance. During surgery, labyrinth should be evaluated carefully for any fistula or leak and it should be promptly addressed. Decision to choose between canal wall up or down procedure should be taken after ruling out concomitant complications, patient compliance, occupation and perseverance of hearing function.

References


Author Profiles

**Dr Shachita.** Medical officer ENT Specialis, Zonal Hospital Dharamshala Distt Kangra (H. P), India

**Dr Shivbrat Sharma.** (Corresponding Author), Medical officer ENT Specialist, Zonal Hospital Dharamshala Distt Kangra (H. P), India

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**Picture 1:** HRCT coronal cut of the patient showing breach in LSCC on left side suggestive of fistula. Also there is blunting of scutum on side with absence of ear ossicles

**Picture 2:** Endoscopic picture showing LSCC fistula

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3. Discussion

Lateral semicircular canal fistula is one of common extracranial intratemporal complication seen in unsafe or attico-antral type of COM. Patients with such a disease usually present with vertigo, giddiness, tinnitus and hearing loss along with regular symptoms of the disease. Labyrinthine fistula formation has been known to progress slowly and to be associated with a long history of chronic otitis media. The average age of presentation in earlier studies involving LSCC fistulas is between 38 and 56 year [6]. Cholesteatoma with an infection may cause bone erosion more quickly than that without infection. The infection causes squamous epithelium to become more destructive via the production of reactive oxygen free radicals, preventing the quiescent state and causing the acidosis of the keratin debris [4]. The controversies in surgical management of cholesteatoma induced fistula mostly revolve around removal of the matrix overlying the fistula and lowering of the posterior canal wall. Over the decades, the concepts are evolving and recently there has been a shift of consensus towards complete removal of the cholesteatoma matrix from the fistula. Many studies have