



# ACQUIRED EPILEPSY SECONDARY TO MIDDLE EAR PATHOLOGY

**Dr.RAJU S N MS(AYU) SHALAKYA TANTRA**

Assistant professor, Department of PG and Ph.D. studies in shalakya tantra

Shree Jagadguru Gavisiddeshwara ayurvedic medical college.

koppal-583231, Karnataka

Email id:[gonchigarraju@gmail.com](mailto:gonchigarraju@gmail.com) MOB: 8150820271

**ABSTRACT:** Epilepsy is the tendency to have unprovoked epileptic seizures. Anything causing structural or functional derangement of brain physiology may lead to seizures. The range of risk factors for the development of epilepsy varies with age and geographic location. Epilepsy is seen due to various viral, bacterial, fungal, and parasitic infectious diseases of CNS, head trauma, and tumors and can occur at any age, Congenital, developmental, and genetic conditions are mostly associated with the development of epilepsy in childhood, adolescence, and early adulthood. Brain infections caused by middle ear pathologies like Cholesteatoma and middle ear tumors may also lead to epilepsy. Cholesteatoma may cause destruction of ear ossicles, erosion of bony labyrinth, the canal of the facial nerve, sinus plate of tegmen tympani and cranial wall and thus causes several complications like Extra Dural abscess, Mastoiditis, Peri sinus abscess, Petrositis, Venous sinus, Facial nerve paralysis thrombosis, Otitic hydrocephalus, Brain abscess, Meningitis, Labyrinthitis, Subdural abscess which in turn lead to epilepsy and other life-threatening conditions. By ignoring the ear examination, we may miss the diagnosis of middle ear pathology which may spread the infection to the CNS so we should not neglect the history of discharge from the ear, pain, vertigo...Etc. and proper otoscopic examination should be done to diagnose in the early stages. By diagnosing in the initial stages, we can prevent further complications so potential strategies are needed in the early stage to prevent epilepsy resulting from brain infections and non-infectious inflammation caused by middle ear pathology.

**Keywords:** epilepsy, middle ear, early diagnosis, Cholesteatoma, seizures.

## INTRODUCTION

An accurate history gives insight into the disease process. Subacute onset is typical of infections like tuberculous meningitis, brain abscess, and some brain tumors. Methods of examination are modified according to the age of the child from the adult scheme in older cooperative children to the play method in younger children. Otitis media<sup>1</sup> is common early childhood morbidity that refers to viral or bacterial infection of the 'middle ear cleft'. The middle ear cleft is a term that includes the pneumatic spaces of the middle ear cavity medial to the tympanic membrane, the attic superiorly, the mastoid antrum posterior to the attic, and pneumatized air cells in the temporal bone that surround the mastoid antrum and extend to the petrous apex. The peak incidence of acute otitis media in childhood is in infancy and decreases with advancing age. The most common causative organisms<sup>2</sup> are Streptococcus pneumonia, Haemophilus influenza, and Moraxella

catarrhalis in -75% of cases; fewer common pathogens include *S. pyogenes*, *S. aureus*, and *Pseudomonas aeruginosa*; Viruses may be the sole pathogen in 15% of cases.

The condition is characterized by rapid onset of symptoms such as otalgia or ear tugging, fever, crying, and irritability. Older children may report impaired hearing. A history of recent upper respiratory tract infection is common. Otoscopy reveals a red and bulging tympanic membrane or perforation of the tympanic membrane with otorrhea (opaque, yellow-green, or reddish-brown fluid).

Untreated otitis media may cause serious complications<sup>3</sup> that are classified as extracranial or intracranial. Complications of acute otitis media usually occur in young children, while complications of chronic otitis with cholesteatoma are common in older children.

Complications of otitis media are Intra cranial Meningitis Epidural abscess Dural venous (sigmoid sinus) thrombosis Brain or subdural abscess Otitic hydrocephalus. Where these complications can lead to serious complications like acute symptomatic seizures and other life-threatening conditions.

### **CHOLESTEOTOMA<sup>4</sup>:**

**Cholesteatoma** is neither a tumor nor it contains cholesterol, hence it's called epidermis or keratoma or skin in the wrong place .this is a pathology of the attico antral type of disease of the middle ear. A sac or pocket in the middle ear cleft lined by keratinized squamous epithelium and contains desquamated keratin sheets in concentric circles and has bone eroding properties.

#### **Cholesteatoma consists of two parts**

**Matrix** is made up of keratinizing squamous epithelium and a **central white** mass consisting of keratin debris produced by the matrix.

Their various theories that explain how the cholesteatoma formed like

- **Korner's theory:** arises from embryonic epithelial cell nest outside the middle ear cleft in the temporal bone, frontal bone, etc.
- **Bezoid's theory:** retraction pocket formed from pars flaccida and collection of desquamated epitheliums.
- **Witt Mack's theory:** direct extension of stratified squamous epithelium from meatus through a marginal perforation.
- **Ruedi's theory:** due to irritation (such as in Otitis externa or Trauma), the basal cells of germinal layers of skin proliferate and keratinized squamous epithelium immigrates into the submucosal layer and forms cholesteatoma.
- **Sade's Theory:** recurrent sub-clinical infections cause metaplasia of pavement epithelium of middle ear cleft.
- **Haberman's Theory:** epithelium from the meatus grows into the middle ear through a pre-existing perforation (especially marginal type)
- **Implantation Theory:** implantation of squamous epithelium from skin pedicle or remnant epithelium under the graft.

#### **Cholesteatoma is classified into two categories<sup>5</sup>**

- **Congenital:** Arises from an embryonic cell that rests in the middle ear cleft or temporal bone. Occurs at 3 important sites: Middle ear, Petrous Apex, and cerebellopontine angle.

- **Acquired: PRIMARY AND SECONDARY**

### **PRIMARY:**

No history of previous otitis media or pre-existing perforation.

- Invagination of pars flaccida:
- Basal cell hyperplasia:
- Squamous metaplasia

### **SECONDARY:**

There is a pre-existing perforation in pars tensa, maybe posters- superior marginal perforation or central perforation.

- Migration of squamous epithelium
- Implantation theory

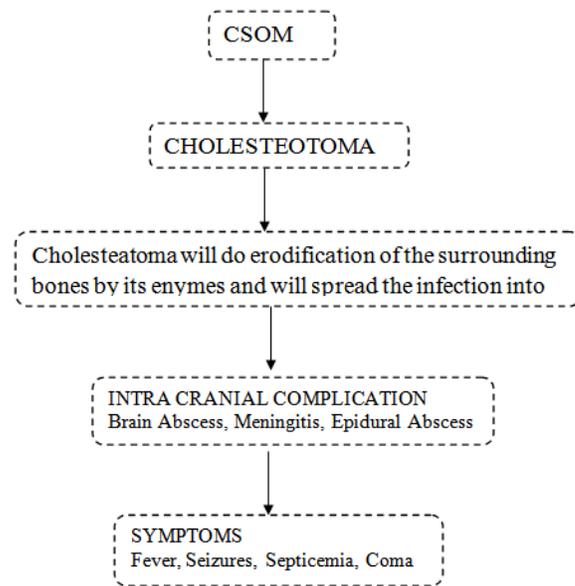
The Cholesteatoma which is present in the middle ear and will spread by Entering the middle ear cleft invades the surrounding structures first by following the path of least resistance, and then by enzymatic bone destruction. Cholesteatoma may cause destruction of ear ossicles, erosion of the bony labyrinth, the canal of the facial nerve, and sinus plate of tegmen tympani and thus cause several complications. By liberation of certain chemicals at the peri matrix and various enzymes produced by the peri matrix, osteoclasts and mononuclear inflammatory cells are seen in association with Cholesteatoma. (Most preferred theory)

The patient with Cholesteatoma will be having following symptoms

1. History of repeated ear infections.
2. Thick, smelly, painless discharge from ears.
3. Slow, progressive hearing loss.
4. Sudden onset of severe vertigo may be due to the disease eroding into the lateral semicircular canal of the inner ear.
5. Sudden onset of severe deafness can be due to the disease eroding into the inner ear.
6. A paralyzed face could be due to a disease affecting the facial nerve in the ear.
7. Other presenting features may be Meningitis, neck stiffness, severe headache, and photophobia.
8. Classic sign of Cholesteatoma is an **attic crust**. This is a brown flake of dried skin in the upper part of the eardrum extremely difficult and subtle sign to spot.
9. Unless it becomes actively infected, Cholesteatoma is usually missed altogether on examining the ear.
10. Until otitis externa has been treated, it is impossible to know if we are dealing with an underlying Cholesteatoma because the eardrum is not visible. The ear canal is swollen and blocked with infected material and dead skin.

### **Cholesteatoma can be diagnosed by**

- OTOSCOPIC EXAMINATION
- CT SCAN
- MRI SCAN



And we can prevent the intracranial complications of Cholesteatoma by treating the CSOM and Cholesteatoma in the initial stages. Diagnosing Cholesteatoma also plays an important role in treating children with seizures

### **AIM AND OBJECTIVES**

To study the etiopathogenesis involved in acquired epilepsy from middle ear pathology.

### **MATERIAL METHODS**

Acute symptomatic seizures and middle ear pathology were studied through different modern ENT and PEDIATRIC books.

### **ETIOLOGY**

The etiological factors responsible for acquired epilepsy from middle ear pathology are Cholesteatoma, where Cholesteatoma in turn will spread the infection into the brain by eroding the bony wall of the cranium. Infections like meningitis, septicemia, bacterial meningitis, tuberculous meningitis, aseptic meningitis, encephalitis, and Space occupying lesions like Brain abscesses and brain tumors are seen.

**ETIO PATHOGENESIS** Symptomatic seizures can be seen in the cases of chronic otitis media and Cholesteatoma. Cholesteatoma will spread the infection by Entering the middle ear cleft, invading the surrounding structures first by following the path of least resistance, and then by enzymatic bone destruction. Untreated otitis media may cause serious complications that are classified as extracranial or intracranial. Complications of acute otitis media usually occur in young children, while complications of chronic otitis with Cholesteatoma are common in older children.

### **DISCUSSION**

Seizures are structural or functional derangement of brain physiology. The seizures are the acute symptoms of the inflammation of the brain; seizures can be seen even in the infections spread by middle ear pathologies like cases of acute and chronic otitis media and Cholesteatoma. Ignoring the examination and history taking about CSOM in patients with seizures may miss leading the diagnosis, so early diagnosis and precautions are very much necessary in case of CSOM so that we can prevent intracranial complications. And in child seizures, the patient proper otoscopic examination of the ear with consideration of all other neurological examinations will help in the proper treatment of the child.

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