Chronic Otitis Media

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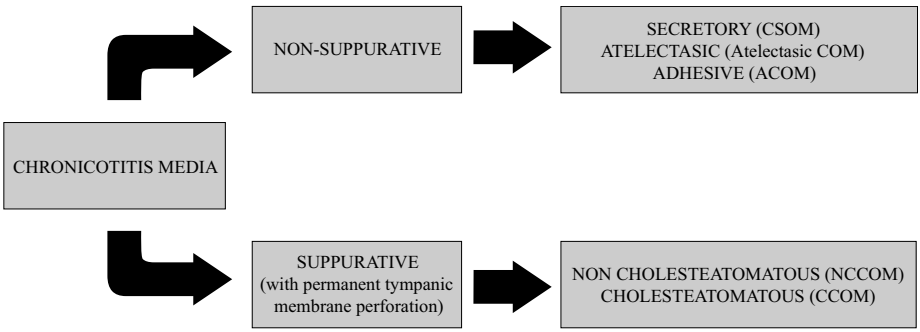
Definition

Otologic pathology caused by the presence of chronic alterations of the middle ear mucosa. The tympanic membrane (TM) may be preserved or perforated. A perforated TM implies drainage from the middle ear. Suppuration can be persistent or intermittent. Depending on the duration of the middle ear suppuration, chronic otitis media (COM) can be classified as suppurative or non-suppurative.

Classification



Cholesteatoma may be classified as either primary or secondary. **Primary cholesteatoma** occurs when its formation precedes the TM perforation and **Secondary cholesteatoma** develops from an ingrowth of skin through a TM perforation.

Chronic Secretory Otitis Media (CSOM)

In chronic secretory otitis media, fluid may be present for more than two months in the middle ear behind a TM with increased vascularization and opacification but there are no infectious signs such as bulging or pressure in the middle ear.

Atelectatic Chronic Otitis Media (Atelectatic COM)

Atelectatic COM occurs with inward displacement of the TM. This pathology is commonly believed to be related to Eustachian tube dysfunction causing a negative pressure in the middle ear; congenital amniotic fluid keratin implantation causing focal middle ear inflammation that medializes a segment of the tympanic membrane is a another hypothetical etilogy. The pressure generates circumscribed or generalized TM retraction, either central or peripheral. The chronic condition of the ear affection may generate tympanic areas that have lost their middle layer,

called *bimeric eardrum*. The recurrent perforations in the same areas during acute otitis media episodes and the insertion of tympanostomy tubes (TT) may also generate bimeric eardrum.

A retrospective study showed that 10% of the cases of CSOM generates bimeric eardrums. If the bimeric eardrum appears after the placement of the TT, the percentage reaches 25% of all patients with CSOM. Therefore, CSOM may progress to atelectatic COM so that the bimeric eardrum displaces toward the medial wall of the middle ear and it attaches to the ossicular chain and the promontory. This causes total or partial destruction of ear ossicles, especially in the long process of the incus, leading to significant conductive hearing loss.

Retractions circumscribed to the eardrum may also be generated, especially in the posterosuperior quadrant of the ear, called a **retraction pocket** (RP). The prognosis is better when the RP is self-cleaning (normally eliminating the epidermis laterally), otherwise there may be epidermal debris retention within the RP, associated with hypertrophy of the basal layer and ear infection together with suppuration, granulation and marginal perforation, already accompanied by cholesteatoma.

The patient presents to the physician with conductive hearing loss, previous history of acute otitis media and / or recurrent or chronic secretory otitis media. Pain is less frequently reported.

Otomicroscopy is essential for detailed evaluation. By performing otomicroscopy, atelectatis and moist areas in the middle ear may be observed.

The audiologic tests determine the level of hearing loss (audiometry) and the persistence of negative pressure (impedance audiometry).

Poor mastoid pneumatization is generally observed using plain radiographic studies, especially in children in whom this process had started before three years of age.

Treatment: If the negative pressure persists, a long-term (more than a year) TT should be placed. Despite the treatment, the patient should be kept under observation.

Adhesive Chronic Otitis Media

This is the final stage of atelectatic COM. Both the symptomalogy (hearing loss) and the otomicroscopy (immobility of the adhesive TM) are the deciding factors for the diagnosis. Generally there is no free tympanic area for TT placement and the prognosis is poor. The adhesive tympanic membrane frequently perforates leading to NCCOM or CCOM.

Non Cholesteatomatous Chronic Otitis Media (NCCOM)

This disease is featured by the presence of a permanent TM perforation accompanied by chronic alterations of the middle ear mucosa. Suppuration can be persistent or intermittent. This condition is seven times more frequent than CCOM. The lower the social-economic-cultural level, perhaps the more frequent CCOM and subsequent complications.

The most common symptoms are otorrhea, hearing loss, tinnitus and rarely pain. Otorrhea may be serous, serosanguenous or mucopurulent. Suppuration may be classified as **transient (**developing due to reinfection caused by bacteria from

the external auditory canal through TM perforation or from the Eustachian tube) or **persistent** (due to chronic infection of the middle ear mucosa or the mastoid bone). A conductive hearing loss is often present. The level of hearing loss is strongly related to the degree of erosion caused by the previous suppurative processes in the ossicular chain and to tympanic perforation size and location. Tinnitus ranges mainly from low pitch to high pitch only if it affects the cochlea. Pain is observed only if the patient suffers from external otitis or if there is COM complication.

Otoscopy and especially otomicroscopy are the basic procedures to accurately observe the TM. To perform otomicroscopy, one will first have to correctly clean the external auditory canal. Secretions should be aspirated and obstructing wax removed. Then, one can generally observe central tympanic perforation rather than a peripheral one. Central or mesotympanic perforations may be either localized or total. The remnant of the TM may be hyalinized as a whitish plate which can be attached to the promontory or the ossicular chain.

Simple radiology, in Schuller and Chaussé III projections, are becoming less useful, bingn replaced by mastoid computed tomography using axial and coronal sections, showing valuable information: full attic observation, mastoid pneumatization status and possible pathology, roof height, ossicular chain assessment, and more. However, we should be aware of the fact that this is not an essential test for NCCOM diagnosis.

Audiological tests will show the degree of hearing loss caused by this chronic inflammatory process.

Differential diagnosis: a) with other chronic inflammatory processes of the middle ear, b) with histiocytosis encompassing a granuloma from the middle ear without epidermis that results in a local form of the general process; c) with malignant tumors that are generally conjunctival disorders such as rhabdosarcoma or leiomyosarcomas.

Evolution and prognosis: NCCOM does not cure spontaneously and can develop complications.

Treatment: The main treatment of NCCOM is to try to eliminate the chronic ear suppuration. Procedures are the following: aspiration of secretions, cleaning of the possible middle ear granulation, substance instillation such as boric acid to modify the pH of the medium, oral antibiotic therapy, topical antibiotic ear drops, avoidance of water penetration through the external auditory canal. Finally, surgical treatment when clinical treatment fails to simultaneously solve the suppuration and correct the perforation.

When the ear does not suppurate persistently, the best solution is simple myringoplasty if only a perforation exists. Tympanoplasty and ossiculoplasty are performed simultaneously for the reconstruction of a perforated TM and the correction of defects in the ossicular chain.

The surgery performed in a dry ear has better prognosis than in a suppurative ear. The prognosis is also better when surgery is carried out in patients without upper respiratory tract infections and without rhinosinusal affection present in previous months.

Although age is controversial, the authors prefer surgery in children above six

years of age. Earlier operations could be considered premature as the small MT perforations can act as tympanostomy tubes in ears capable of having negative pressure. Additionally, an evaluation of adenoid status and observation of the contralateral intact ear be performed before the correcting the perforation.

The graft to be placed depends on the surgeon's experience. Grafting from the temporal muscle fascia and the perichondrium of the tragus are the most frequently used. They are divided into autologous (from the same patient), homologous (from other patient, alive or dead) or heterologous (from other species).

Endoaural and retroauricular approaches are the most commonly used. The retroauricular approach allows better visualization of the anterior tympanum, therefore it is widely applied.

Auricle and retroauricular tissues are moved forward and the external auditory canal is rectified.

The chosen graft is placed under or over the remnant of the TM. The graft is placed within the malleus, similarly to the resection technique of the perforation fibrous edge. The graft rests on previously prepared Gelfoam®.

In some cases in which the ossicular chain is interrupted but has mobile stapes, ossiculoplasty performed simultaneously with myringoplasty may be carried out; in that case, the procedure is called tympanoplasty.

An ossiculoplasty using the incus or mastoid cortical bone prosthesis are frequently performed techniques.

Cholesteatomatous chronic otitis media (CCOM)

The cholesteatoma is a tumor-like formation made up of epidermal corneal masses exfoliated from the epidermal basal layer within the middle ear.

Cholesteatoma has been grouped into 2 different categories: a) primary cholesteatoma (the more frequent type) b) secondary cholesteatoma. The latter classification depends on the existence of a previous perforation prior to the occurrence of the cholesteatoma. This disease is manifested by a cholesteatoma located behind a permanent tympanic perforation which is usually marginal or epitympanic.

Different theories have been provided to explain the cholesteatoma etiology:

Ruedi's Theory. The epidermal layer of retraction pockets of Schrapnell's membrane causes epidermal basilar layer thickening leading to the onset of digitiform (finger-shaped) expansions from the germinal layer towards the sub-mucosal layer, producing attic penetration.

Ulrich's Theory. The chronic inflammatory process leads to the metaplastic transformation of the middle ear mucosa, which becomes epidermal epithelium.

Bezold's Theory. According to this theory, the cholesteatoma appears in response to the middle ear atelectasis as a consequence of permanent Eustachian tube dysfunction.

Habermann's Theory. The cholesteatoma is the result of a cellular encounter confrontation between the middle ear mucosa and the external ear canal epithelium along the perforation border, in which the latter penetrates the middle ear.

Embryonary Epidermal Inclusion in the middle ear. This theory only applies to primitive or congenital cholesteatoma.

Congenital amniotic fluid keratin cellular debris implantation theory. Temporal bones of stillborn infants frequently demonstrate lanugo hair and squamous epithelial cells in the middle ear; animal studies have extended the theory.

In an actively infected ear, suppuration is usually fetid and purulent due to superinfection and debris detachment. Conductive hearing loss depends on the degree of cholesteatoma damage. The ossicular chain impairment varies and in some cases defects may become visible. Pain is usually not present yet can occur in the event of complication such as mastoiditis.

Otomicroscopy is the first choice of examination to be performed. To do so, the external ear canal must be completely cleaned. Then the tympanic perforation, which is usually marginal, may be inspected. The perforation may also be epitympanic (Schrapnell's membrane). Epitympanic perforations are normally extremely small and often covered by minor seromucoid crust which very often conceals the perforation. Therefore, the crust should be carefully removed by light aspiration.

It is possible to examine the cholesteatoma epidermis and/or granulation through the perforation. The cholesteatoma may be encapsulated or diffuse.

CAT scans are more significant to confirm in greater detail the degree of opacification and osteitis affecting the middle ear and mastoid.

Audiometry confirms the level of hearing loss and provides the basis to assess the best time to perform the tympanoplasty.

Diagnosis is based on clinical data, physical examination and imaging.

Evolution and prognosis: CCOM becomes worse with time. Such aggravation leads to complications, which may be localized to the ear (e.g., facial paralysis, semicircular canal fistula) or intracranial (e.g., brain abscess, meningitis). CCOM always implies a serious prognosis, perhaps even worse in children, as the cholesteatoma has invasive, expansive and destructive capacity.

Treatment: **surgery in all cases.** Surgery is to remove cholesteatoma, to attempt to repair the era in a fashion that the cholesteatoma is less likely to recur, to attempt to improve hearing and to maintain external cosmetic appearance. The recommended surgery is open and closed mastoidectomy (whether preserving or slitting the posterosuperior ear wall) and tympanoplasty.

Recommended readings

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