

MCQ Explanations:

MCQ 1: How did the cholesteatoma form in this child?

MCQ 1 Answer: D. Epidermal hyperplasia forming invasive cones in the retraction pocket.

Cholesteatoma is a pocket of keratin debris lined by metabolically active squamous epithelium with the capability of eroding bone. It occurs in 3 per 100,000 children (1), 9 to 12.6 per 100,000 adults (2) and is 1.4 times more common in boys (1).

Sub-optimal Eustachian tube function due to recurrent otitis media and seasonal allergies result in poor middle ear ventilation. As oxygen and carbon dioxide are absorbed from the middle ear space, negative middle ear pressure develops that can no longer be regulated by the Eustachian tube. The negative pressure thus created in the middle ear cleft pulls the pars flaccida medially forming a retraction pocket. Keratin debris accumulates in the retraction pockets and becomes lined by hyperplastic epidermis. Chronic retractions are associated with loss of fibrous component of the tympanic membrane and helps hyperplastic epidermis to cone into the middle ear. Cholesteatoma, by expansion, infection or inflammation perforates the tympanic membrane and enters the middle ear cavity (1).

Metaplasia theory of the development of acquired cholesteatoma is no longer considered a likely etiology (1).

As the debris was seen in the middle ear attic, away from the site of a tympanostomy tube, this is not the origin of cholesteatoma in this case.

MCQ 2: What is the intraoperative diagnosis?

MCQ 2 Answer: B. Acute Suppurative Otitis Media

In the image, the external auditory canal wall and tympanic membrane are edematous and erythematous. The previously atelectatic tympanic membrane is now bulging from pressure, and the attic retraction pocket has ballooned outward, obscuring landmarks. Retraction pockets have remained in the anteroinferior quadrant, extending into the hypotympanum. A central perforation present in the posteroinferior quadrant has helped drain the accumulated purulent material. These are the features of acute suppurative otitis media.

Under binocular microscopy, cholesteatoma appears as a pearl-grey colored collection in an un-inflamed background, usually in the attic, but is obscured by infection. In bullous myringitis painful vesicles form on the tympanic membrane. Edema, erythema and suppurative drainage from a perforation suggests acute suppurative otitis media as a more appropriate intra-operative diagnosis.

MCQ 3: What is the next best step in management?

MCQ 3 Answer: C. Administer antibiotic ear drops for the infection and consider surgery in 6 weeks, after confirming that the ear is dry

Performing definitive surgery on an acutely inflamed ear presents an increased risk of complications and delaying an operation to allow for initial medical treatment is advisable whenever possible. Edematous, friable, bleeding mucosa and granulation tissue associated with acute infection can obscure the surgical view, risking injury to critical structures and increasing the likelihood of incomplete removal of disease. Granulation tissue presents a particular challenge as it can surround the ossicles or appear to fuse to structures such as a swollen, dehiscant facial nerve. Following acute infection, it takes at least three weeks and up to an estimated 6 weeks for inflammation to resolve completely and mucosa to return to its usual state. Hence surgery can be better performed once the ear is confirmed to be dry after 6 weeks. Cholesteatoma that may not have been visible in the acutely inflamed state will become apparent when the ear is dry and no longer inflamed.

References:

1. Persaud R, Hajioff D, Trinidad A, Khemani S, Bhattacharyya MN, Papadimitriou N, Kalan A, Bhattacharyya AK. Evidence-based review of aetiopathogenic theories of congenital and acquired cholesteatoma. *J Laryngol Otol.* 2007 Nov;121(11):1013-9.
2. Chin-Lung Kuo, An-Suey Shiao, Matthew Yung, et al. Updates and Knowledge Gaps in Cholesteatoma Research. *BioMed Research International* 2015; 2015:854024.