American Journal of Case Reports

e-ISSN 1941-5923
© Am J Case Rep, 2020; 21: e925369
DOI: 10.12659/AJCR.925369

Received: 2020.04.23
Accepted: 2020.07.02
Available online: 2020.08.17
Published: 2020.09.22

Tympanic Cholesterol Granuloma and Exclusive Endoscopic Approach

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

BEF 1 Diletta Angeletti
ABE 1 Annalisa Pace
ADF 1 Giannicola Iannella
BDF 1 Valeria Rossetti
BDF 1 Andrea Colizza
BDEF 2 Cira Di Gioia
ABDEF 1 Giuseppe Magliulo

1 Department of Sense Organs, Sapienza University of Rome, Rome, Italy
2 Department of Radiology, Oncology and Anatomopathological Sciences, Sapienza University of Rome, Rome, Italy

Corresponding Author: Giuseppe Magliulo, e-mail: giuseppemagliuloorl@yahoo.com, giuseppe.magliulo@uniroma1.it
Conflict of interest: None declared

Patient: Male, 65-year-old
Final Diagnosis: Tympano-mastoid cholesterol granuloma
Symptoms: Hearing impairment
Medication: —
Clinical Procedure: Endoscopic surgery of the ear
Specialty: Otolaryngology

Objective: Unusual or unexpected effect of treatment

Background: Cholesterol granuloma is a histological entity containing cholesterol crystals surrounded by foreign-body giant cells and chronic inflammation. Tympanic cholesterol granuloma is a rare disease, while petrous bone cholesterol granuloma is more common. Surgery consists of elective management in most cases of CGs. There are several types of surgery described to treat cholesterol granuloma; however, a case treated by primary endoscopic ear surgery has not yet been described.

The aim of this case report is to present the endoscopic characteristics of cholesterol granulomas and show how endoscopic ear surgery is possible in isolated and selected cases with this pathology.

Case Report: We report the case of a 65-year-old patient affected by a cholesterol granuloma of the middle ear, with progressive hearing impairment and fullness of the left ear. The granuloma was diagnosed via medical imaging using magnetic resonance imaging, which identified the typical high signal intensity in T1- and T2-weighted images. In this case, cholesterol granuloma was limited to the epitympanic and mesotympanic regions. For small cholesterol granulomas confined to the middle ear, a canal wall-up or wall-down tympanoplasty plus ventilation tube insertion are usually performed. In this case, primary endoscopic surgery was performed under general anaesthesia to remove the presumed cholesterol granuloma. It was completely removed by this approach, without facial nerve injuries or postoperative complications. The patient had no disease recurrence at clinical and radiological investigation at 1-year follow-up.

Conclusions: An exclusive endoscopic approach to remove cholesterol granuloma is feasible. However, it should only be performed in selected cases.

MeSH Keywords: Endoscopy • Granuloma • Otitis Media

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/925369

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

Background

Endoscopic surgery is performed as an adjuvant approach to traditional microscopic surgery to ensure a complete removal of the cholesteatoma in hidden areas or as a primary and exclusive surgical technique in selected cases of middle ear cholesteatoma [1–3].

There are 2 distinct forms of cholesterol granulomas (CGs): petrous apex cholesterol granuloma (PACG) and tympanomastoid cholesterol granuloma (TMCG). TMGCs frequently appear as bluish masses and can cause bulging of the tympanic membrane (TM) [4–8].

The surgical approach for treating this pathology depends on the size and location of the cholesterol granuloma (CG). CGs limited to the middle ear are usually treated with a canal wall-down or wall-up tympanoplasty plus insertion of a ventilation tube [4–8].

In this paper we present 1 patient with a middle ear CG treated by an exclusive endoscopic approach. To the best of our knowledge, no cases of middle ear CG treated with exclusive endoscopic surgery have been reported before. The aim of this case report is to present the endoscopic characteristics of CGs and to show how endoscopic ear surgery is possible in isolated and selected cases with this pathology.

Case Report

A 65-year-old patient was referred to hospital for a 15-year history of progressive hearing impairment and fullness of the left ear. The patient also had vitiligo. He referred a history of recurrent otitis media treated with a left canal wall-down tympanoplasty 10 years earlier in another hospital.

At otological clinical examination, a left retrotympanic, bluish mass causing bulging of the tympanic membrane was visualized. The membrane appeared slightly thickened and with granulation tissue visible on its surface (Figure 1). An audiogram showed the presence of a moderate conductive hearing loss. Magnetic resonance imaging (MRI) revealed high signal intensity in T1- and T2-weighted images with a high suspicion of CG.

Primary endoscopic surgery was performed under general anaesthesia to remove the presumed CG. By endoscopic approach, the granulation tissue on the tympanic membrane was initially removed. Then, a tympano-metal flap was incised starting from the skin covering the lateral semicircular canal end, extending it towards the remnant of the inferior posterior canal wall. It was elevated to allow access to the middle ear. A 2×2 cm brown-yellow mass with a fibrous capsule occupying the epitympanic

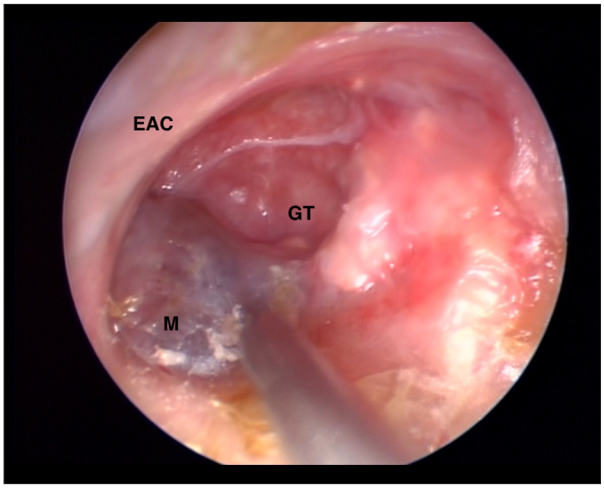

Figure 1. Endoscopic vision of the mass (M), external auditory canal (EAC), granulation tissue (GT) on the tympanic membrane.

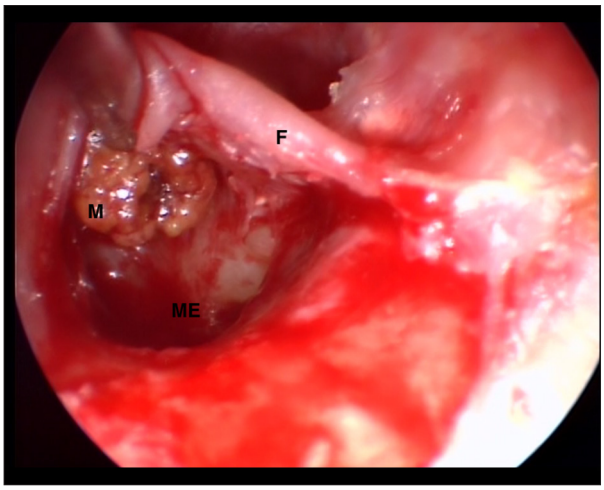

Figure 2. Intraoperative view during mass excision (M), middle ear (ME), tympanomeatal flap (F).

and mesotympanic regions and reducing the ventilation status at that level was identified (Figure 2). The head of the malleus and the incus, as well as the mastoid cells, had been removed during the previous surgery. The mass was totally removed under endoscopic view, with preservation of the stapes and facial nerve. The eustachian tube orifice was disease-free and open. Silastic was put on the promontory, and the tympanomeatal flap was repositioned in its previous location after the tympanic insertion of a ventilation tube.

In accordance with typical CG characteristics, the cysts contained a watery, chocolate-colored fluid due an accumulation of hemosiderin. Postoperative histopathological analysis of the lesion confirmed the diagnosis of CG (Figure 3).

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

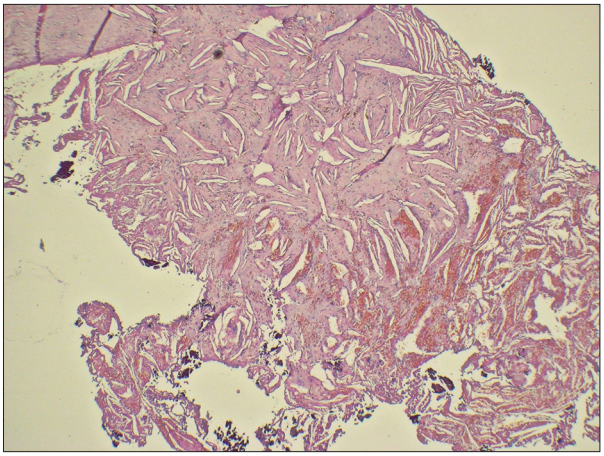

Figure 3. Cholesterol granuloma. Connective tissue de-epithelialized with some capillary-size blood vessels, numerous cholesterol clefts with some foreign body-type giant cells and focal hemorrhage. There are small fragments of bone tissue (hematoxylin and eosin 5×).

The patient had no disease recurrence at clinical and radiological investigation at 1-year follow-up. Written informed consent was obtained from the patient who participated in this case report.

Discussion

TMCG is typically observed as a primary disease of the middle ear and mastoid, or may be secondary to surgery of the tympano-mastoid compartments [4–8].

In both cases, 2 theories exist to explain the genesis of CGs: the traditional obstruction-vacuum theory and the recently described exposed marrow hypothesis [4–8]. Moreover, recent clinical, radiological, and immunohistochemical studies suggest that hemorrhage from exposed marrow elements or vascular connection could be the driving force responsible for the progressive expansion of the cyst [5,8].

The presence of a CG can be suspected on the basis of medical history and otoscopy [6].

MRI is accurate for locating and evaluating CGs, which typically appear with a high signal intensity on T1- and T2-weighted images. CG may also exhibit high signal intensity on fluid-attenuated inversion recovery ('FLAIR') MRI and low signal intensity on diffusion-weighted MRI [4–8].

The differential diagnosis includes petrous bone cholesteatoma, vascular malformations, chondromas, chondrosarcomas, and arachnoid cysts [4–8].

Surgery consists of elective management in most cases of CG. A number of surgical techniques have been reported in the literature. These include infra-labyrinthine, middle cranial fossa, retrosigmoid, transotic, and translabyrinthine approaches [1–3,9,10]. Obviously, the choice of the best surgical approach depends on the extension of the disease and on preoperative otoscopic and radiological findings. For small CGs confined to the middle ear, a canal wall-up or wall-down tympanoplasty plus ventilation tube insertion are usually performed [1–3,9,10].

In this report, we describe the case of a middle-ear CG limited to the epitympanic and mesotympanic regions that was treated by an exclusively endoscopic approach.

Ear endoscopic surgery for treating middle ear pathologies has considerably improved over the last few years [1–3,9,10].

Endoscopy was initially used as an adjuvant approach to traditional microscopic surgery for visualizing spaces considered difficult to evaluate by microscopy, such as the anterior epitympanum and retrotympanum, as well as to verify the quality of excision in regions inaccessible to the microscope [1–3,9]. Subsequently, an increasing number of authors experimented with use of the endoscope as the exclusive tool in middle ear surgery [1–3,10].

In 2004, Tarabichi et al. [11] demonstrated that the endoscopic technique allows for transcanal, minimally invasive eradication of limited attic cholesteatoma with a higher probability of preservation of the coupled ossicles. Gradually, endoscopic ear surgery has been extended to cholesteatomas of the entire tympanic cavity.

The main disadvantages of this type of surgery include the loss of binocular vision, the potentially long learning curve necessary to become familiar with single-handed work, and the space-related constraints of using instruments and an endoscope in the ear canal [1–3,9,10].

To date, no cases of CG removal by means of ear endoscopic approach have been reported in the literature.

In the case described here, the epitympanic-mesotympanic GC was completely removed by this approach, without facial nerve injuries or postoperative complications. In our opinion, similarly to that observed for cholesteatomas of the middle ear, the endoscope allows a detailed vision of the lesion and its use in limited middle-ear CGs can result in total and safe removal of the lesion.

However, an extended mastoidectomy (both in open and closed techniques) is not easily obtainable with an endoscopic approach, and in this type of patient the absence of ventilation

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

could favor recurrence of the granuloma in accordance with the obstruction-vacuum theory. In our case, open mastoidectomy had been performed in a previous surgical procedure and the insertion of a ventilation tube was therefore regarded as sufficient. Moreover, it should be emphasized that in tympano-mastoid CGs, those limited to the middle ear are rare.

Conclusions

There are several types of surgical procedures used for the treatment of tympano-mastoid CG. In our experience, an exclusively endoscopic approach to remove CGs is feasible, but should only be performed in selected cases.

Conflict of interest

None.

References:

1. Presutti L, Gioacchini FM, Alicandri-Ciufelli M et al: Results of endoscopic middle ear surgery for cholesteatoma treatment: A systematic review. Acta Otorhinolaryngol Ital, 2014; 34: 153–57
2. Marchioni D, Villari D, Mattioli F et al: Endoscopic management of attic cholesteatoma: A single-institution experience. Otolaryngol Clin North Am, 2013; 46: 201–9
3. Iannella G, Magliulo G: Endoscopic versus microscopic approach in stapes surgery: Are operative times and learning curve important for making the choice? Otol Neurotol, 2016; 37: 1350–57
4. Isaacson B, Nogueira JF: Endoscopic management of middle ear and temporal bone lesions. Otolaryngol Clin North Am, 2016; 49: 1205–14
5. Gore MR, Zanation AM, Ebert CS, Senior BA: Cholesterol granuloma of the petrous apex. Otolaryngol Clin North Am, 2011; 44: 1043–58
6. Iannella G, Stasolla A, Pasquariello B et al: Tympanomastoid cholesterol granuloma: Radiological and intraoperative findings of blood source connection. Eur Arch Otorhinolaryngol, 2016; 273: 2395–401
7. Sweeney AD, Osetinsky LM, Hunter JB et al: Cholesterol granuloma development following temporal bone surgery. Otolaryngol Head Neck Surg, 2016; 154: 1115–20
8. Jackler RK, Cho M: A new theory to explain the genesis of petrous apex cholesterol granuloma. Otol Neurotol, 2003; 24: 96–106
9. Iannella G, Di Gioia C, Carletti R, Magliulo G: Tympanomastoid cholesterol granulomas: Immunohistochemical evaluation of angiogenesis. Laryngoscope, 2017; 127: E283–90
10. Iannella G, Savastano E, Pasquariello B et al: Giant petrous bone cholesteatoma: Combined microscopic surgery and an adjuvant endoscopic approach. J Neurol Surg Rep, 2016; 77: 46–49
11. Tarabichi M: Endoscopic management of limited attic cholesteatoma. Laryngoscope, 2004; 114: 1157–62

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]