Primary mucocele of the mastoid: An incidental finding

Daniela Tonni1 | Michele Sessa2 | Luca O. Redaelli de Zinis3

1Department of Pediatric Otolaryngology Head Neck Surgery Division, Children Hospital ”ASST Spedali Civili”, Brescia, Italy
2Department of Otorhinolaryngology, G. Da Saliceto Hospital, Piacenza, Italy
3Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, Section of Audiology, University of Brescia, and Pediatric Otolaryngology Head Neck Surgery Division, Children Hospital ”ASST Spedali Civili”, Brescia, Italy

Correspondence
Luca O. Redaelli de Zinis, Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, Section of Audiology, University of Brescia, Italy.
Email: luca.redaellidezinis@unibs.it

Abstract
Mucocele is an accumulation of secretion products, desquamation, and inflammation within a body cavity: Localization in the mastoid is extremely rare. Erosion of bony walls and invasion of surrounding structures expose a patient to intra- and extracranial complications. Proper imaging work-up and complete removal through mastoidectomy is warranted.

KEYWORDS
hearing loss, mastoid, mucocele, neoplasm, surgical treatment

1 | INTRODUCTION

Mucoceles are slow-growing cysts due to distension of a hollow organ or cavity with mucus. They exhibit signs of a chronic sterile infection and have the capacity to cause bony remodeling or reabsorption. Mucoceles can be primary or secondary to chronic inflammation, trauma, scarring from previous surgery, or radiotherapy and more rarely neoplasms. The obstruction of a natural drainage pathway is considered the pathogenetic basis of a mucocele, although a mucous retention cyst that gradually enlarges has been suggested as an alternative hypothesis in temporal bone.1,2 Within temporal bone, primary or secondary mucoceles have been only rarely observed with few descriptions prevalently in the mastoid.1-11 We present a new case of primary mastoid mucocele that was an incidental finding during work-up for progressive sensorineural hearing loss.

2 | CASE REPORT

A 52-year-old man was referred for progressive right sensorineural hearing loss in the last 10 months. The patient’s medical history was negative for otitis media. Tympanic membranes were normal at otologic examination. Pure-tone audiometry confirmed high-frequency sensorineural hearing loss that was predominant on the right side (Figure 1).

Magnetic resonance (MR) was scheduled to rule out a possible lesion of the inner ear and cerebellopontine angle. MR revealed a 18 × 26 mm lesion in the right mastoid that was hyperintense in T2-weighted images and more hyperintense compared to cerebrospinal fluid in T1-weighted images. The lesion had sharp margins without restriction of diffusion at diffusion-weighted imaging (DWI). After gadolinium enhancement, a thin linear reactive impregnation of the margins was evident (Figure 2). The radiologist decided to complete the radiological work-up.
A study with high-resolution temporal bone computed tomography (CT), which showed expansion of the mastoid walls with thickened and sclerotic bone, whereas the posterior wall adjacent to the sigmoid sinus appeared markedly thinned and softened (Figure 3). The mastoid antrum and tympanic cavity were normally ventilated (Figure 3).

The tendency of expansion toward intracranial structures prompted us to propose surgical treatment that consisted of mastoid exploration to remove the lesion.

Intra-operative findings revealed a cystic lesion 2.5 cm in diameter occupying the lower two-thirds of the mastoid process (Figure 4). The lesion was filled with a watery yellowish liquid (Figure 3). The cyst was completely removed, revealing normal aspects of the other parts of the mastoid and epitympanum (Figure 4). Postoperative recovery was uneventful and hearing remained stable. Histological examination documented a simple, benign cyst. The cyst wall was fibrosclerotic with sparse areas of epithelium composed by single layer of squamous or cubic elements. The analysis of mastoid bone showed bone tissue with reactive changes characterized by nonspecific aspects of bone remodeling. Follow-up with MR 2 years later showed no evidence of residual disease. Informed consent to report clinical data was obtained from the patient.

3 | DISCUSSION

Only a few reports of primary mastoid mucocele have been published in the literature (Table 1).3,4,6,8,9,11 Most cases were asymptomatic and discovered due to a silent swelling that eroded the mastoid lateral or anterior wall.3,6,8 Symptoms correlated with an inflammatory process were sometimes reported,4,8,9 whereas only once was the mucocele an incidental finding as in our patient.11 The only patient where the cyst caused hearing loss was due to ear...
canal collapse secondary to erosion of the anterior wall of the mastoid cavity. Our patient can be considered primary because medical history was negative for any predisposing cause.

The main feature of a mucocele is expansion of the cavity where it is contained, causing bone erosion or bone remodeling. It has been postulated that these effects on the bone can be due not only to the direct effects of positive pressure within the mucocele, but also to the effect of various cytokines detected in the fluid or at the interface between the paranasal sinus mucocele and bone.  

Differential diagnosis of lesions causing erosion of the temporal bone includes inflammatory lesions such as cholesterol granuloma or cholesteatoma, extracranial cysts like epidermoid or dermoid cysts, intracranial lesions such as epidermoids or subarachnoidal cysts, histiocytosis, lymphoproliferative disorders, and solid tumors like schwannomas, tympanic-jugular paragangliomas, meningiomas, gliomas, giant cell tumors, osteomas, ossifying fibromas chordomas, and primary or metastatic carcinomas.

Adequate radiological assessment is based on CT and MR. Complete opacification, an enlarged cavity with bony defects, and sometimes peripheral calcifications and possible peripheral enhancement, if a contrast agent is administered, are the features seen by CT. The MR signal is variable according to the proportions of water, mucus, and protein: A low signal in water-rich content and high signal in protein-rich content is evident in T1-weighted images, a high signal in water-rich content, and a low signal in protein-rich content in T2-weighted images. The presence of hyperintense foci on DWI sequence depends on restriction of fluid content. Rim enhancement after gadolinium enhancement indicates peripheral inflammatory tissue.

Classical treatment of mucoceles is marsupialization, enlarging the usual drainage pathways, while sparing the mucosa. In case of mastoid mucoceles, surgical treatment is indicated because of their expansive tendency causing bone erosion and invasion of surrounding structures with the risk of developing infections and intra-extracranial complications. Appropriate surgical treatment is complete removal of the lesion through mastoidectomy to reduce the risk of recurrence without increasing the risk of morbidity.

In conclusion, primary mastoid mucoceles are extremely rare lesions. Diagnosis is based on complete otologic history, physical examination, and correct radiological imaging by CT and MR. The treatment of choice is surgical removal to prevent complications secondary to progressive expansion of the lesion.
| Author                  | Age | Sex | Side | Symptoms                        | Signs                                      | Hearing loss | Bone reabsorption                                      | Fluid content                      | Cyst wall histology                                                                 |
|------------------------|-----|-----|------|---------------------------------|--------------------------------------------|--------------|--------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------|
| Waltner & Karatay      | 17  | M   | Left | No                              | Postauricular painless swelling             | No           | Mastoid cortex, ear canal, tegmen antri, sinodural angle | Dark, brownish lipiodol-like       | Low cuboidal epithelial lining                                                      |
| Richardson             | 34  | F   | Left | Sore throat, chills, fever, recurrent malaise | Lymph node enlargement                      | No           | No                                                     | Sanguineous material                | Endothelial cells, fibrous tissue, inflammatory cells, connective tissue          |
| Nomura et al           | 28  | F   | Left | No                              | Postauricular painless swelling             | No           | Tegmen antri                                           | Dark, greenish brown serous         | Multiloculated, mostly no epithelial lining only in small part cuboidal epithelium |
| Kavanagh et al         | 35  | M   | Right| Ear discharge, canal occlusion   | Skin thickening, external ear canal collapse | Conductive    | Ear canal and posterior mastoid wall                   | Dark, serous                       | Dense fibrocollagenous tissue, inflammatory cells, areas of single layer of transitional cells from squamous to cuboidal, areas of multiple layers |
| Hwang & Jackler        | 24  | F   | Left | Hemifacial twitch, “burning” dysgeusia, otalgia | No                                         | No           | Facial canal                                           | Clear, straw-colored               | Mucocele confirmed                                                                 |
| Tan et al              | 34  | F   | Left | No                              | No                                         | No           | No                                                    | Clear, watery fluid and fibrinous exudate | Simple, benign cyst with a fibrous wall, which was low in cellularity and devoid of epithelium along its internal aspect. The cystic wall was lined with occasional lymphocytes and foam cells |
| Present case           | 52  | M   | Right| Sensorineural hearing loss      | No                                         | Sensorineural | Posterior mastoid wall                                 | Watery yellowish                   | Fibrous tissue, areas with squamous or cuboidal cells                                |
CONFLICT OF INTEREST
No conflict of interest to declare.

AUTHOR CONTRIBUTIONS
DT and MS: collected the data and drafted the manuscript. LORDZ: operated the patient and revised the manuscript. All authors approved the final version to be published.

ORCID
Luca O. Redaelli de Zinis https://orcid.org/0000-0001-6524-1815

REFERENCES
1. Karandikar A, Goh J, Loke SC, Yeo SB, Tan TY. Mucous retention cyst of temporal bone: a mimic of cholesteatoma on DW-MRI. *Am J Otolaryngol*. 2013;34(6):753-754.
2. Ata N, Erkılıç S. Mucous retention cyst of mastoid bone mimicking cholesteatoma. *Ear Nose Throat J*. 2017;96(1):E41-E42.
3. Waltner JC, Karatay S. Cysts of the mastoid bone. *Arch Otolaryngol*. 1947;46(3):398-404.
4. Richardson GS. A cyst of the mastoid; report of a case. *Ann Otol Rhinol Laryngol*. 1956;65(1):214-217.
5. Weichselbaumer W, Kotscher E. Pseudomucocele des mastoids bei chronischer otitis media [Pseudomucocele of the mastoid in chronic otitis media]. *HNO*. 1964;12(9):289-292.
6. Nomura Y, Takemoto K, Komatsuaki A. The mastoid cyst. Report of a case. *Laryngoscope*. 1971;81(3):438-446.
7. Zimmerman BE, Proud GO. Primary cysts of the mastoid process. *Laryngoscope*. 1983;93(6):805-807.
8. Kavanagh KT, Gillman LI, Babin RW. Erosive mucosal cysts of the temporal bone. A case report with review of the pathogenesis. *Am J Otol*. 1986;7(4):270-274.
9. Hwang PH, Jackler RK. Facial nerve dysfunction associated with cystic lesions of the mastoid. *Otolaryngol Head Neck Surg*. 1998;119(6):668-672.
10. Broto D, Caserta E, Lovo E, et al. Mastoid mucocele: an uncommon alert of fibrous dysplasia onset: case report and literature review. *Ann Clin Case Rep*. 2017;2(1486):1-3.
11. Tan CY, Chong S, Shaw CK. Primary mastoid cyst. *J Laryngol Otol*. 2013;127(suppl 2):S48-50.
12. Kariya S, Okano M, Hattori H, et al. Expression of IL-12 and T helper cell 1 cytokines in the fluid of paranasal sinus mucoceles. *Am J Otolaryngol*. 2007;28(2):83-86.
13. Phelps PD, Toland JA, Sheldon PW. Erosions of the petrous temporal bone. *J Laryngol Otol*. 1970;84(12):1205-1230.

How to cite this article: Tonni D, Sessa M, Redaelli de Zinis LO. Primary mucocele of the mastoid: An incidental finding. *Clin Case Rep*. 2020;8:461-465. https://doi.org/10.1002/ccr3.2690