



Hearing Loss in Cholesteatoma

Khdim M, Douimi L*, Choukry K, Oukessou Y, Rouadi S, Abada R, Roubal M and Mahtar M

Department of ENT, 20 August Hospital, Morocco

Abstract

Objective: The purpose of our work is to define the relationship between severity of hearing loss caused by chronic cholesteatomatous otitis media, and reported data of clinical, paraclinical, surgical exploration findings.

Patients and Methods: This is a retrospective, descriptive and analytical study, performed at the ENT Department at August 20, Casablanca University Hospital, involving 100 cases of patients operated for chronic otitis media of cholesteatoma.

Results: The age of our patients ranged between 6 and 91 years with an average of 29.95 years and a peak between 10 and 20 years. Both sexes presented an equal percentage. Otological antecedents were found in 29% of our patients. The most common symptoms revealing are purulent otorrhea (46.34%) and hearing loss (32.68%). The patients with tympanic perforation presented the highest losses with an average of 61.9 dB and an average Rinne of 34.9 dB. The dominant type of hearing loss, in the audiogram, was transmission deafness (68 cases) with an average loss of 50.3 dB and an average Rinne of 33 dB. The lesions sought by CT scan, such as ossicular lysis, mastoid filling, meso tympanic and antro attic filling, presented loss and Rinne with approximate values. The several surgical techniques and ossiculoplasty represent the main means of auditory rehabilitation. During the surgical exploration the mastoid localization presented the most important losses with an average of 78.33 dB and an average Rinne of 35.83 dB, the other searched features presented approximate values.

Conclusion: Hearing loss, which is a common way of Cholesteatoma revelation, should be systematically explored and properly treated by using different surgical techniques and prostheses when needed.

Keywords: Hearing loss; Hearing loss of transmission; Hearing loss of perception; Mixed hearing loss; Cholesteatoma of the middle ear; Audiogram

OPEN ACCESS

*Correspondence:

Douimi L, Department of ENT, 20 August Hospital, Casablanca, Morocco, E-mail: loubnadouimi@gmail.com

Received Date: 28 Oct 2020

Accepted Date: 01 Dec 2020

Published Date: 04 Dec 2020

Citation:

Khdim M, Douimi L, Choukry K, Oukessou Y, Rouadi S, Abada R, et al. Hearing Loss in Cholesteatoma. Am J Otolaryngol Head Neck Surg. 2020; 3(8): 1115.

Copyright © 2020 Douimi L. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

Cholesteatoma is a chronic otitis media defined by the accumulation of epidermis inside the cavities of the middle ear, in the eardrum, behind the tympanic membrane and/or in other pneumatized areas of the temporal bone. The two main symptoms that can reveal cholesteatoma are: purulent otorrhea and hearing loss [1].

The purpose of our study is to define a link between clinical data, paraclinical and surgical exploration findings with the severity of the hearing impairment through a series of 100 patients operated in the ENT department of August 20 Hospital of Casablanca University Hospital.

Materials and Methods

Subjects

In this descriptive and analytical study, carried out in the ENT department at the Hospital August 20 in Casablanca, we reported the findings of 100 patients operated on for cholesteatoma of the middle ear between 2016 and 2019. Data were obtained from patients files which were reviewed retrospectively. Patients whose files were unusable, and those having chronic non cholesteatomatous otitis were excluded from the study.

The records were explored using a file containing the personal, clinical and paraclinical data as well as the results of each patient's surgical exploration.

Data extraction

The following variables were recorded and analyzed.

- Demographic features: Age, gender, and antecedents.

- Clinical data: Complaints at the initial visit, and otoscopic findings.
- Complementary examination based on audiogram and CT scan data were recorded and analyzed depending on otoscopic findings.
- Intra operative findings: Surgical exploration allows us to study the ossicular chain, the lining of the middle ear, and the location of the cholesteatoma.

Results

Epidemiological data

Age: The age of our patients varies between 6 and 91 years. The average age is 29.92 years. The age group between 10 and 20 is the most affected by cholesteatoma with a percentage of 32%, the pediatric population represents 13% of the population concerned (Graphic 1).

Gender: We found 50 men and 50 women with chronic cholesteatomatous otitis with a Sex-Ratio (M/F) of 1.

History: By studying the different cases that emerged, 29% of our patients presented with an ear infection history, in particular:

- Recurrent otitis with a percentage of 17%.
- Otological surgery with a percentage of 83% (Graphic 2).

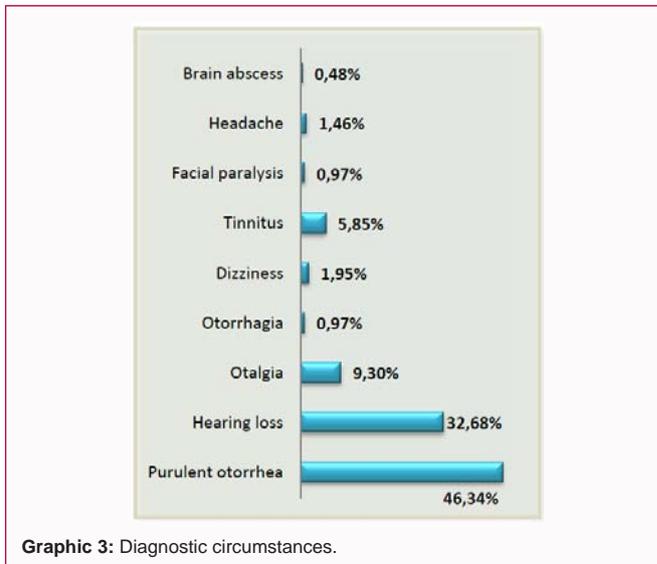
Clinical data

Mode of reveal: The disease can be revealed most frequently by:

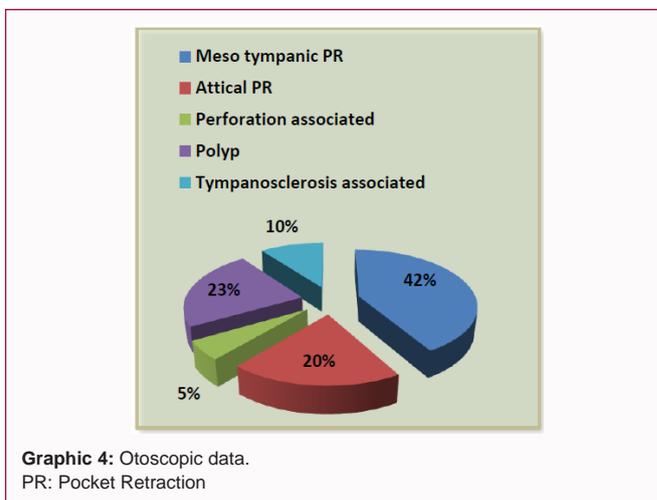
- Purulent otorrhea with a percentage of 46.34%.
- Hearing loss with a percentage of 32.68%.

Otoscopic examination under microscope: The examination under a microscope, after aspiration mainly showed:

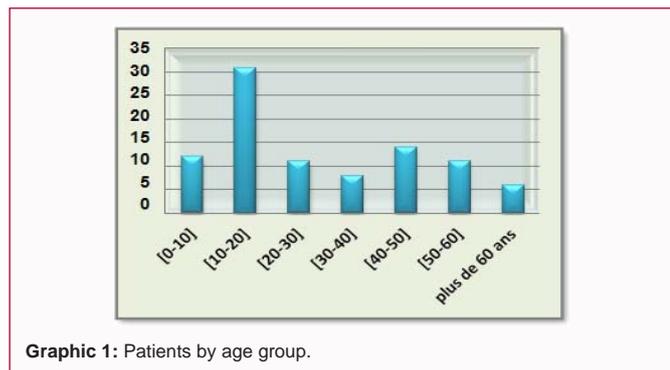
- Meso tympanic Pocket Retraction (PR) found in 85 patients
- A Polyp found in 47 patients,
- Attical PR found in 40 patients (Graphic 3).



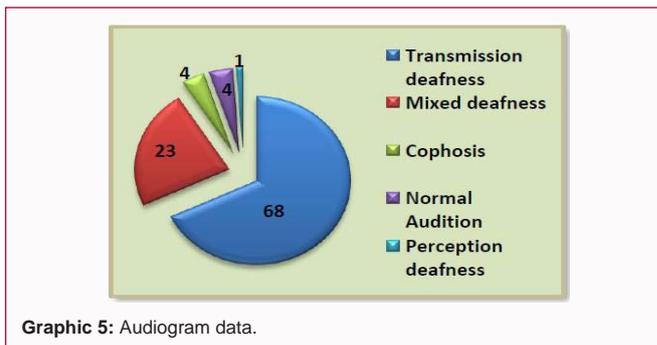
Graphic 3: Diagnostic circumstances.



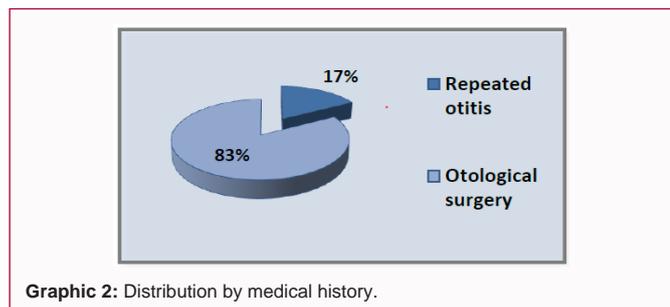
Graphic 4: Otoscopic data. PR: Pocket Retraction



Graphic 1: Patients by age group.



Graphic 5: Audiogram data.

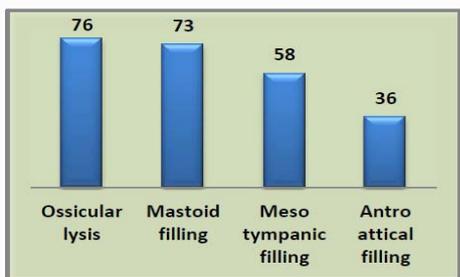


Graphic 2: Distribution by medical history.

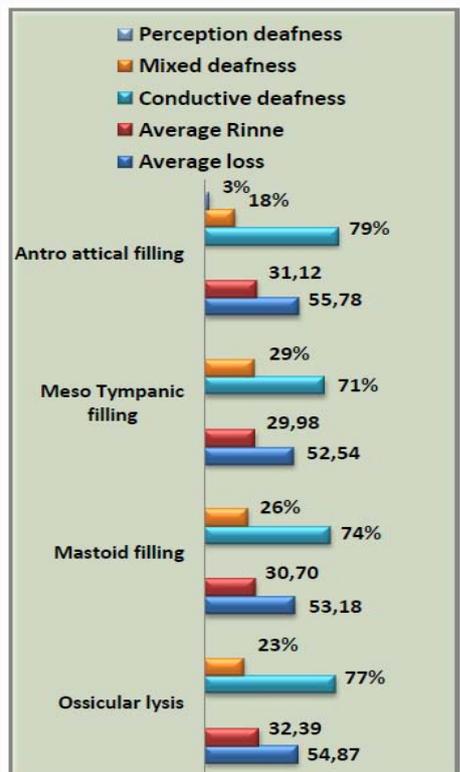
Paraclinical data

Audiogram: For the 100 cases studied for which the average loss is 53.34 dB and the average Rinne is 32.45 dB we found that:

- 68 cases presented transmission deafness, with an average loss of 50.3 dB, and an average Rinne of 33 dB;
- 23 cases presented mixed deafness, with an average loss of 64.5 dB, and an average Rinne of 33 dB;
- 1 case presented perception deafness with an average loss of 55 dB;
- 4 cases presented a cophosis,



Graphic 6: CT scan data.



Graphic 7: CT scan data correlated to audiogram.

- 4 cases presented normal hearing (Graphic 5).

B- Hearing and otoscopic examination: Otosopic examination reveals several types of lesions (Graphic 4).

Perforation + Cholesteatoma

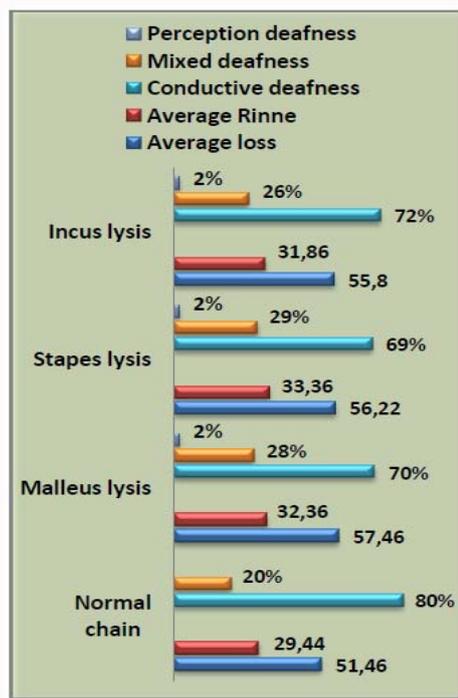
This condition was found in 11 patients, the latter present two types of deafness, namely transmission deafness and mixed deafness with a percentage of 50%. The average loss of these patients is 61.9 dB while their average Rinne is 34.9 dB.

Meso tympanic PR

This lesion was found in 85 patients, who present a dominant type of deafness which is transmission deafness with a percentage of 76%. The average loss of these patients is 53.7 dB while their average Rinne is 30.5 dB.

Attical PR

Attical PR was found in 40 patients, the most common type of



Graphic 8: Ossicular chain lesions correlated to audiogram.

hearing loss being conductive hearing loss with a percentage of 73%. These patients presented an average loss of 54.2 dB and an average Rinne of 31.2 dB.

Polyp

The Polyp was found in 47 patients, and the most common type of deafness was transmission deafness with a percentage of 72%. They presented an average loss of 53.8 dB and an average Rinne of 32 dB.

Tympanosclerosis + Cholesteatoma

This condition was found in 21 patients, for whom the most common type of deafness was transmission deafness with a percentage of 72%. They presented an average Loss of 56.7 dB and an average Rinne of 32.2 dB.

First, otoscopic examination enabled us to note that, patients with a tympanic perforation presented equally the 2 types of deafness (transmission and mixed one). Yet, conductive deafness dominates all other otoscopic lesions.

In a second place, the study allowed us to note that patients with a tympanic perforation presented the largest losses with an average of 61.9 dB and an average Rinne of 34.9 dB. In the others conditions average losses varied between 53.7dB and 56.7 dB, and the average Rinne between 30.5 dB and 32.2 dB.

Computed tomography and hearing: CT is a paraclinical examination that allows us to refine the diagnosis. It has revealed several lesions distributed as follows (Graphic 6):

This paraclinical exam has allowed us to deduce that the dominant type of deafness is conductive deafness, for which losses and Rinne have presented approximate values.

Comparing findings of the audiogram and the state of the ossicular chain, transmission hearing loss seems to be the most

Table 1: Otoscopic data correlated to audiogram.

	Average Loss	Average Rinne
Perforation + cholesteatoma (n=11)	61.9	34.9
Tympanosclerosis + cholesteatoma (n=21)	56.7	32.2
Attical PR (n=40)	54.2	31.2
Polyp (n=47)	53.8	32
Meso tympanic PR (n=85)	53.7	30.5

Table 2: Cholesteatoma location correlated to audiogram.

	Deafness		Average	
	T	M	Loss	Rinne
Antro attical cholesteatoma (n=80)	76%	24%	54.1	31.35
Meso tympanic (n=19)	83%	17%	51.5	33.03
Mastoid (n=5)	75%	25%	78.3	35.83

T: Transmission; M: Mixed

common type of hearing loss for patients with both intact and lysed ossicles. Losses and Rinne presented approximate values (Graphic 7).

Hearing and surgical exploration

Surgical exploration allows us to study several elements, namely:

- Ossicular chain,
- The lining of the middle ear,
- Location of the cholesteatoma

Ossicular chain: The state of the ossicular chain is distributed as follows:

- Intact chain found in 17 cases,
- Lysed incus found in 74 cases,
- Lysed stapes found in 51 cases,
- Lysed malleus found in 61 cases.

Polypoid mucosa: The polypoid mucosa was found in 76 patients, for whom transmission deafness was the most common with a percentage of 69%. These patients had an average loss of 54.4 dB and an average Rinne of 30.15 dB (Graphic 8).

Location of cholesteatoma: The main locations of cholesteatoma are:

- Antro attical: 80 patients,
- Meso tympanic: 19 patients,
- Mastoid: 5 patients.

According to the findings of surgical exploration concerning location of cholesteatoma and the results of the audiogram, transmission deafness is the most common, with an average loss largest when mastoid location.

Discussion

Cholesteatoma is considered to be an aggressive disease [2]. It is defined by the presence of a squamous keratinizing epithelium in the middle ear and mastoid, which is capable of bone resorption [3]. Actually, it can occur at any age, but we recognize a peak between 10 and 30 years, and according to other studies it can goes up to 40 years, as the case of our study. Hearing loss and otorrhea are the most common call signs in our study and many others in the literature [4].

In fact hearing impairment is thought to occur mainly as a result of destruction of the ossicular chain by the cholesteatoma causing h its subsequent discontinuity [5].

Several studies showed that the destructive effect of cholesteatoma on the ossicular chain erosion is due to osteoclast activation, pressure necrosis, acid lysis, inflammatory mediators, and some biomolecules. This erosion mostly affects the incus followed by stapes and malleus; however, multi ossicular erosion is more common than single ossicular erosion. Hence, it seems that progressive destruction of the ossicles by the cholesteatoma and the discontinuity of the ossicular chain would cause an increasing and progressive conductive hearing loss.

Diagnosis is based in most cases on otoscopic examination [3]. In the literature, some studies have reported a predominance of tympanic perforations, notably the bouaity [1] in 2014 and Jose Evandro [6] in 2011. Others have showed a higher frequency of tympanic retraction as shown in the Taali [7] study in 2015. Polypoid and attic lesions are often the least frequent [8]. In our series, mesotympanic retraction pocket was the most dominating lesion with a percentage of 48% as showed many studies in literature. However, unlike the latter, the lowest percentages were in favor of tympanic perforation (7%).

Audiogram is a key test before surgery [9], not only to make a functional assessment of the operated ear, but also to assess the other ear, in order to adapt surgery in case of cophosis of contra- lateral ear. It usually reveals a conductive deafness. Yet, in case of extensive cholesteatoma, it can show a mixed deafness due to an associated labyrinthization. This latter when it's suppurative, can lead to a cophosis. In fact, hearing loss was conduction type in 68% vs. 70% in literature [10,11], 1 patient had perception hearing loss and 23% had a mixed hearing loss versus 13.3% in the Zarhoune series in 2013 and a percentage of 33.3% in the Skanoure series in 2011 [12,13]. Nonetheless, 4% of our patients had a normal audition. This can be secondary to the columella effect of cholesteatoma matrix. The latter can artificially maintain the continuity of the ossicular chain and ensure the transmission of sound vibrations.

Indeed, CT scan is currently considered as a systematic and an essential examination, for the initial assessment of chronic cholesteatomatous otitis media [4]. Ossicular chain lysis, although frequent, due to the destructive potential of the cholesteatomatous process, is not very specific because, it can also be seen in other chronic ear infections [14]. This lysis was in 76% of our patients which is almost similar to the Okari series in 2016 whose percentage was 73, 12% and the Mojab series in 2017 with a percentage of 70% [15,16]. The incus is the most frequently affected by cholesteatoma; its involvement varies from 60% to 90% in the literature [5,17,18], same case in our study. In fact, CT also studies the filling and localization of the cholesteatoma.

The mastoid filling in our series had a significant percentage of 73%; value consistent with the literature [19], whereas the mesotympanic filling was 58% close to that of the other series, in particular in the OKARI 2016 series where it was 63.12% [15].

As far as treatment, surgical procedures of cholesteatoma first consist in definitively eradicating the cholesteatoma by a careful dissection of its matrix and mucosa underlying, as well as to avoid recurrence, and finally to allow an improvement in hearing by a possible ossiculoplasty [19]. However, it is very important to remind the patient that the eradication of cholesteatoma must remain the

priority objective, taking precedence over functional considerations. There are two main types of surgical procedures. Yet, indications are a subject of inexhaustible controversy opposing conservative technique and the other sacrificing the ear canal [3,14].

Allan out of 36 patients found that 66.7% had lysis of the ossicular chain [20]. Ouakri meanwhile in 2016 found an intact chain without erosion or lysis in 15.6% of cases [14], and a total ossicles lysis in 40%. The latter concerned the incus at 71.25%, malleus at 46.25% and stapes at 41.87%. Which agree with our series where the chain was intact in 17% of cases, the incus was lysed in 74% of cases, the malleus in 61% and the stapes in 51% of cases.

In addition to the condition of the ossicular chain, surgical data also provide the condition of lining of middle ear (normal or polypoid) as well as cholesteatoma location.

Conclusion

Hearing loss is one of the most suggestive signs of chronic cholesteatomatous otitis media. It varies between conduction type mainly, mixed and perception type. In fact, cholesteatoma can lead to various severe complications [4], such as paralysis of the facial nerve, meningitis and brain abscess by the erosion of bone and ossicular chain. Which require an early surgical management and possible hearing rehabilitation.

References

- Bouaity B, Chihani M, Nadour K, Moujahid M, Touati M, Darouassi Y, et al. Cholestéatome de l'oreille moyenne - étude rétrospective à propos de 145 cas. *Pan Afr Med J.* 2014;17:163.
- Gulustan F, Yazici ZM, Sayin I, Abakay MA, Gunes S, Akidil AO. Evaluation of the presence of sensorineural hearing loss and the relationship with intraoperative findings in cholesteatoma. *Ear Nose Throat J.* 2019;145561319877763.
- Skandour A, Raji D. Prise en charge du cholestéatome de l'oreille moyenne: A propos de 60 cas Expérience du service d'ORL du CHU Mohammed VI. 2005- 2010.
- Ayache D, Schmerber S, Lavieille JP, Roger G, Gratacap B. Cholestéatome de l'oreille moyenne. 2016;123(3):120-37.
- Akarcay M, Kalcioğlu MT, Tuysuz O, Timurlenk E, Guclu H. Ossicular chain erosion in chronic otitis media patients with cholesteatoma or granulation tissue or without those: Analysis of 915 cases. *Eur Arch Otorhinolaryngol.* 2019;276(5):1301-5.
- de Aquino JEAP, Cruz Filho NA, de Aquino JNP. Epidemiology of middle ear and mastoid cholesteatomas: Study of 1146 cases. *Braz J Otorhinolaryngol.* 2011;77(3):341-7.
- Taali L. L'imagerie préopératoire dans l'otite chronique moyenne cholesteatomateuse: une étude prospective descriptive de 90 cas.
- Touati MM, Darouassi Y, Chihani M, Bouaity B, Ammar H. L'otite moyenne chronique cholesteatomateuse de l'enfant: à propos de 30 cas. *Pan Afr Med J.* 2015;21:24.
- Beltaief N, Sellami M, Tababi S, Zainine R, Charfeddine A, Sahtout S, et al. Le cholestéatome de l'oreille moyenne. 2012.
- Duclos JY, Darrouzet V, Portmann D, Portmann M, Bébéar JP. Cholestéatomes congénitaux de l'oreille chez l'enfant.
- Mohammed MR. M. El Alami El Amine Mohamed Nour- Dine Professeur d'Oto- Rhino-Laryngologie. 184.
- Zarhoun K, Ammar H. Les otites moyennes chroniques cholesteatomateuses chez l'enfant à propos de 15 cas et revue de la littérature.
- Zylberg F, Williams M, Ayache D, Piekarski JD. Tomodensitométrie des cholestéatomes secondaires de l'oreille moyenne.
- Ouakri S. Corrélations radio- chirurgicales du cholestéatome de l'oreille moyenne: à propos de 160 cas Expérience du service d'ORL.
- Mojab L. Étude clinique, paraclinique, complications et prise en charge thérapeutique du cholestéatome au service d'ORL de l'hôpital militaire My ISMAIL DE MÉKNES (à propos de 20 cas).
- Albera R, Canale A, Piumetto E, Lacilla M, Dagna F. Ossicular chain lesions in cholesteatoma. *Acta Otorhinolaryngol Ital.* 2012;32(5):309-13.
- Mohammadi G, Naderpour M, Mousaviagdas M. Ossicular erosion in patients requiring surgery for cholesteatoma. *Iran J Otorhinolaryngol.* 2012;24(68):125-8.
- Hajjij A. Corrélations radio- chirurgicales dans la chirurgie du cholestéatome: fiabilité du scanner dans le bilan préopératoire.
- Nekro C. Traitement chirurgical des otites moyennes chroniques cholesteatomateuses: A propos de 173 cas. 2016.
- Allan Roux. Technique de dépose- repose du méat acoustique externe dans la chirurgie du cholestéatome.