

# Ear Cholesteatoma Surgery in South Sahara: Our Experience in Bamako

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## Abstract

In Mali, cholesteatoma surgery remains a challenge due to the limited number of otological practitioners, and the low socio-economic level of patients reflecting the difficulties in performing CT or MRI for post-operative follow-up. We therefore initiated this work with the objective of analyzing, through a broad bibliographic review, the clinical, paraclinical, topographical, therapeutic and progressive aspects of a series of ear cholesteatoma. **Materials and Method:** This was a retrospective and prospective, descriptive study that took place in the ENT and head and neck surgery department of the Gabriel Touré University Hospital over 36 months from November 2020 to October 2023. These were patients admitted to the department for chronic cholesteatomatous otitis media. **Result:** In total, we collected 34 files of patients admitted for cholesteatoma. This represented 9% of cases compared to all otological surgeries carried out during the same period, *i.e.* 362 cases. The average age of our patients was 35.31 years, with extremes ranging from 7 years to 80 years, there were 24 men and 10 women, *i.e.* a M/F ratio of 2.4. The average time to diagnosis was 7 years. The main functional signs were dominated by chronic fetid purulent otorrhea associated with hypoacusis in 94.6% of cases. One case of meningeal complication and three cases of cerebral empyema were reported. Clinically, a postero-superior and marginal tympanic perforation was observed in 53%, a retraction pocket in 5.9%, the sentinel polyp in 9%, and a non-marginal tympanic perforation in 32%. Pure-tone audiometry performed preoperatively for all patients showed conductive hearing loss in 83%. In 82% of cases we created a recess with the creation of a mini box. An ossiculoplasty was performed immediately with fragments of cartilage. The postoperative course found the dis-

appearance of otorrhea (88.23%), the persistence of otorrhea in one case, two cases of facial paralysis, and one case of tinnitus. We did not identify any cases of scar stenosis of meatoplasty. Hearing was improved or preserved in 91.17% of cases and 3 cases of worsening hypoacusis.

## Keywords

Cholesteatoma, CT, TTO, TTF

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## 1. Introduction

Cholesteatoma is defined by the presence of keratinizing squamous epithelium in the middle ear cavities [1] [2]. It poses problems in particular due to its complications, and is often referred to as a dangerous chronic otitis due to the evolving risks of potentially serious complications (labyrinthine, facial paralysis, meningitis and brain abscess) fully justifying the exclusive use of surgical treatment.

The main recent advances are represented by the generalization of the use of cartilage as material for reconstruction of the frame and the tympanic membrane, by the use of otoendoscopy in certain locations [2]. Recurrences represent a real problem in cholesteatoma surgery. Moroccan studies have revealed a significant rate of patients lost to follow-up of up to 50% after 2 years of follow-up [3]. Epidemiological studies carried out estimate an annual incidence of 6 to 15 per 100,000 [4] [5].

In Mali, cholesteatoma surgery remains a challenge due to the limited number of otological practitioners and the low socio-economic level of patients reflecting the difficulties in performing CT or MRI for post-operative follow-up. We therefore initiated this work with the objective of analyzing, through a broad bibliographic review, the clinical, paraclinical, therapeutic and evolving aspects of a series of ear cholesteatoma.

## 2. Materials and Method

### 2.1. Type and Period of the Study

This is a retrospective and prospective descriptive study that took place in the ENT and head and neck surgery department of the Gabriel Touré University Hospital.

It took place over a period of 36 months from November 2020 to October 2023.

### 2.2. Study Population

These were patients admitted to the ENT-CCF department of the Gabriel TOURE University Hospital for chronic cholesteatomatous otitis media.

### 2.3. Sampling

We conducted an exhaustive sampling of all patients admitted for chronic cholesteatomatous otitis. We therefore collected 34 patients. The data support was

the patient files and the operative report register of the ENT CCF department.

#### **2.4. Inclusion Criteria**

Any patient who has undergone surgery for cholesteatomatous CME at CHU Gabriel TOURE in the ENT-CCF department with a complete medical file.

#### **2.5. Non-Inclusion Criteria**

Patients with incomplete records who have not undergone surgery for cholesteatomatous CME.

#### **2.6. Variables Studied**

Sociodemographic data: age, sex, ATCDS, clinical data: reason for consultation, consultation time, affected ear, otoendoscopic examinations, pure-tone audiometry with hearing loss on frequencies 500, 1000, 2000, 4000, and Rinne average audiometric, CT rocks, therapeutic data: TTF, TTO, postoperative clinical and paraclinical monitoring, the average follow-up time was 6 months.

#### **2.7. Data Collection Technique**

A complete ENT examination was performed on all patients. The data were recorded on a survey sheet designed for this purpose after re-reading the clinical observations, operative and hospitalization reports.

#### **2.8. Data Analysis**

Data were entered into Word and Excel 2013 software and analyzed using Epi Info 7.1 software.

### **3. Results**

In total, we collected 34 files of patients admitted for cholesteatoma. This represented 9% of cases compared to all otological surgeries carried out during the same period, *i.e.* 362 cases. The 20 - 40 year old age group was the most represented with 65% (**Table 1**). The male gender was the most represented in 70.58%. ATCDS of recurrent otitis were the most represented with 75% of cases. The main functional signs were dominated by chronic fetid purulent otorrhea associated with hypoacusis in 94.6% of cases. One case of meningeal complication and three cases of cerebral empyema were reported. Clinically, a postero-superior and marginal tympanic perforation was observed in 53%, a retraction pocket in 5.9%, the sentinel polyp in 9%, and a non-marginal tympanic perforation in 32%. The left ear was the most affected in 67.64%. Conductive hearing loss accounted for 88.23% and mixed hearing loss was 11.77%. The average hearing loss of 40 - 70 dB was the most represented in 61.76% of cases and the average preoperative audiometric Rinne was 35 to 40 dB in 21 cases or 61.76% of cases. The CT of the rocks showed a total filling of the EAC with erosion of the wall of the cubicle and the tympanic bone in one case or 2.94%, a total filling of the middle ear with ero-

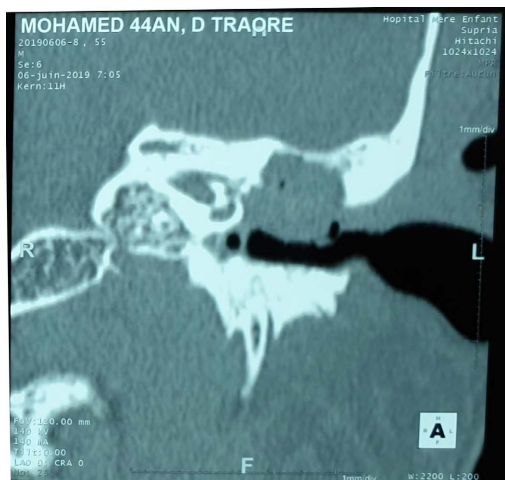
sion of the wall of the cubicle and lysis of the ossicular chain in 50.00% of cases, total filling of the middle ear with lysis of the tegmen tympani and extradural empyema in 3 cases or 8.83% (**Figure 1, Figure 2**), in 2 cases extension was associated with lysis of the facial canal and also 2 cases of lysis of the mastoid cortex. In 6 cases the location was purely attical (**Table 2**).

**Table 1.** Distribution according to age.

Age	Number	Percentage
0 - 20 years	1	2.94%
20 - 40 years	22	64.70
40 - 60 years old	09	26.47%
60 - 80 years old	02	5.88%
Total	34	100%



**Figure 1.** Chronic right otomastitis, erosive suppurative with a small cerebellar extradural empyema.



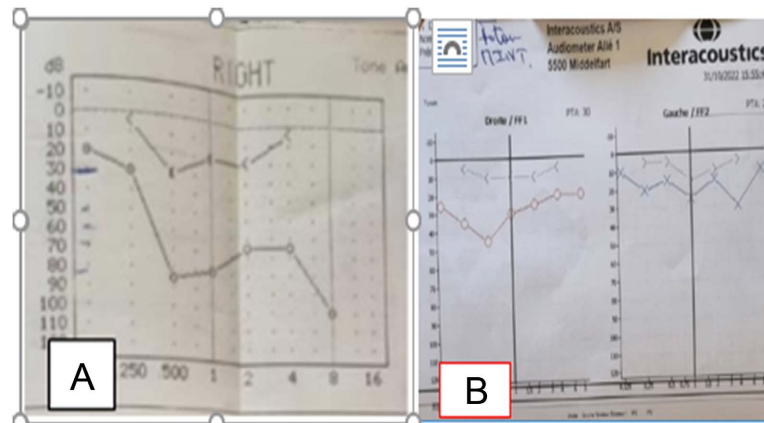
**Figure 2.** CT Rock in sagittal section showing convex tissue hypodensity with lysis of ossicles, cubicle wall and thickening of the tegmen tympani.

**Table 2.** Distribution according to CT results.

Rock CT Results	Number	Percentage
Total filling of the CAE with erosion of the cubicle wall and the tympanal bone	1	2.94%
Total filling of the middle ear with erosion of the cubicle wall and lysis of the ossicular chain	17	50.00%
Total filling of the middle ear with lysis of the tegmen tympani and extradural empyema	03	8.82%
Erosion of the facial canal wall	02	5.88%
Mastoid cortex lysis	02	5.88%
Pure attical location	06	17.64%
Mesotympanal location	03	8.82%

Open technique tympanoplasty (TTO) was performed in 82.35% of cases. An ossiculoplasty was performed immediately with fragments of cartilage from the concha for ossicular repair, a meatoplasty was performed in all cases. In 6 cases or 17.64%, closed technique tympanoplasty (TTF) was performed (**Figure 3**). Postoperatively, otorrhea was absent in 67% of cases. After 6 months of postoperative monitoring, there was the persistence of otorrhea in 2 cases of closed technique, the persistence of peripheral facial paralysis in 2 cases including 1 transient, persistence of tinnitus in 1 case, persistence of vertigo in 1 case with sign of fistula. We have not recorded any cases of scar stenosis of meatoplasty. Control pure tone audiometry was performed after 1 month, 3 months and 6 months postoperatively (**Figure 4**). Hearing was improved or preserved in 31 of our patients or 91.17%, we noted 3 cases of worsening hypoacusis (**Table 3**).

**Figure 3.** Intraoperative view of the left ear with visualizing a whitish mass in the mastoid cavity in favor of the cholesteatoma.



**Figure 4.** (A) Audiogram showing conductive hearing loss with an average PAM of 78.75 db with an audiometric signal average at 55 dB; (B) Control audiometry 9 months post-operative significant closure of the rinne going from 55 db to 21.25 and the PAM from 78.75 to 30 db.

**Table 3.** Distribution of patients according to post-operative hearing gain.

Audiometric gain 6 months postoperative	Number	Percentage
0 - 10 dB	12	35.29%
10 - 20 dB	19	55.88%
No gain/Worse	03	08.82%
Total	34	93.75%

## 4. Discussions

### 4.1. Sociodemographic Data

#### 4.1.1. Prevalence

The hospital frequency of middle ear cholesteatoma surgery in our series was 9% of cases compared to all otological surgeries performed during the same period (362 cases). Epidemiological studies carried out estimate an annual incidence of 6 to 15 per 100,000 [4] [5]. Unfortunately, we do not have an epidemiological study on cholesteatoma in Mali.

#### 4.1.2. Age and Sex

It is a pathology that can occur at any age. In our series, the average age was between 20 and 40 years. This has been shared by many authors in the literature [1] [6] [7]. In our study, we noted a male predominance of 71%. Our data agree with those of certain authors [3] [5]. On the other hand, others have reported a female predominance [1] [8]. In general, the distribution of the disease according to sex varies according to the authors [4] [6].

#### 4.1.3. Clinical Data

Fetid purulent otorrhea plus hypoacusis represented 94% of our series as the reason for consultation. The same observation is shared by certain authors [3]

[7]. Otorrhea is an important sign, the fetid nature or the presence of “whitish flakes” in otorrhea are in no way sufficient to characterize cholesteatoma [2] [4]. Sometimes, cholesteatoma is diagnosed during one of its complications [7]. In our study, we had 3 cases of complications at the time of diagnosis. The average consultation period was 7 years. Same observation shared by Skandour [3], unilateral involvement of the left ear was predominant with 67.64 cases in our study. This is equivalent to the studies carried out by Bouaity B. [7]. The otoscopy examination found a marginal postero-superior tympanic perforation in 53%, a retraction pocket in 5.9%, and the sentinel polyp in 9%. This result is similar to that of certain authors [6] [7] but contrary to the series by D. Skandour [3] where the retraction pocket was the most encountered lesion at 58.33%, followed by the polypoid lesion with 21.67%.

## 4.2. Paraclinical Data

### 4.2.1. Pure-Tone Audiometry

Pure-tone audiometry performed preoperatively for all patients showed conductive hearing loss, *i.e.* 87.50% of cases with an average hearing loss between 40 - 70 db in 62.50% of cases and an average pre-operative audiometric Rinne of 35 to 40 dB in 62.50% of cases. This same observation was shared by authors [3] [5] [6].

### 4.2.2. CT of the Rocks

In our series, the CT of the rocks showed a total filling of the EAC with erosion of the wall of the cubicle and the tympanal bone in one case, *i.e.* 2.94%, a total filling of the middle ear with erosion of the wall of the ear. the cubicle and lysis of the ossicular chain in 50.00% of cases, total filling of the middle ear with lysis of the tegmen tympani and extradural empyema in 3 cases or 8.83%, in 2 cases the extension was associated with lysis of the facial canal and also 2 cases of lysis of the mastoid cortex. In 6 cases the location was purely attical. Our study is equivalent to those of the authors [3] [7]-[9]. This is explained by the fact that modern imaging currently occupies a preponderant place in the preoperative and postoperative management of ear cholesteatoma [5]. Preoperatively, performing a CT scan is systematically recommended, to clarify the extensions of the cholesteatoma, screen for possible complications, assess the anatomy of the tympanomastoid cavities (in particular the surgical risk variants) and compare the diagnosis. in the rare cases where the otoscopic examination was unable to resolve the problem [6] [10]. As part of the initial assessment of a cholesteatoma of the middle ear, non-enhanced CT is the examination of choice. MRI can sometimes be useful to complement CT data in certain limited indications [3] [11]. Postoperatively, monitoring of operated cholesteatoma has also greatly benefited from advances in modern imaging, with CT and sometimes MRI, making it possible to better identify the indications for surgical revision [3]. Complications, intratemporal and endocranial, can be indicative of cholesteatomatous otitis. These are the complications that make this potentially fatal pathology serious [12].

### 4.3. Therapeutic Data

#### 4.3.1. Surgical Treatment

The treatment of chronic cholesteatomatous otitis is exclusively surgical. It must eradicate the cholesteatoma and its matrix, improve hearing and finally avoid as much as possible recurrence which remains the main problem despite the evolution of surgical techniques. There are classically two main types of interventions depending on whether or not the bony conduit is preserved: the bone conduit preserving technique or closed tympanoplasty, consisting of a mastoantratticotomy, most often with a posterior and/or superior tympanotomy, and the technique with sacrifice of the bony conduit or tympanoplasty in open technique with or without posterior filling, also called petro-mastoid recess cavity [6] [13].

In our series, tympanoplasty in open technique represented 81.25% of cases. An ossiculoplasty was performed immediately with fragments of cartilage from the concha for ossicular repair, and a meatoplasty was performed in all cases. The advantages of this ossiculoplasty are availability, modeling reliability and biocompatibility. No use of ossicular prostheses in our context due to the low socio-economic level and the high cost of ossicular prostheses.

In six cases or 17.64%, closed technique tympanoplasty was performed. The opposite was observed in the series [3] [6] [14] [15]. This is explained by the effect that a second surgical stage is not possible or when rigorous follow-up is impossible or in the event of recurrences. Most of our patients do not have the financial means to carry out correct surgical follow-up. There is a possibility of loss of vision. The choice of technique depends on many parameters: the condition of the diseased ear and the contralateral ear, hearing, otological and general history, the nasal area and the preoperative CT scan. However, the operative indications are the subject of an inexhaustible controversy opposing closed technique and open technique. Proponents of the closed technique restore the normal anatomy of the middle ear and the external ear canal, which preserves adequate hearing and frees postoperative care problems, despite the fact that it exposes one to a greater risk of recidivism. Proponents of the open technique create a new anatomic-physiological status of the ear in order to modify the local conditions which caused the cholesteatomatous disease. Currently, although most authors favor the conservative technique, open technique tympanoplasty still has its place, particularly when a second surgical stage is not possible or when rigorous monitoring is impossible or even in cases of recurrences. The indication for a second surgical stage is no longer systematic for 2 reasons: the increasing use of oto-video endoscopy which has reduced the risk of residual cholesteatoma by controlling the entire excision in difficult access areas, and the evolution of imaging allowing the selection of indications for these surgical revisions [6]. Hearing rehabilitation in cholesteatoma surgery involves either different types of ossiculoplasty, carried out from the first operation if the mucosa appears healthy, or conventional or bone-anchored hearing aids. Despite the development of operating techniques and means of otoendoscopy and imaging,

recurrences still represent a real problem in cholesteatoma surgery, making rigorous and close monitoring of all operated patients necessary. Unfortunately, we still find in the literature a significant rate of loss to follow-up of up to 50% after 2 years of follow-up [3]. In the literature, 28% of patients were lost to follow-up over a period of 11 years, 26 cases of recurrence were noted after a closed technique and 14 cases of recurrence after an open technique [6].

#### 4.3.2. Post-Operative Follow-Up

##### Clinical monitoring:

**Immediate consequences:** The first dressing was carried out on the 8th post-operative day, the average length of hospitalization was 5 days with extremes of 3 to 10 days. There were 2 cases of facial paralysis, 2 cases of dizziness and 1 case of tinnitus.

**Remote monitoring before 6 months:** The postoperative course was marked by the absence of otorrhea in 30 cases or 88.23%, the persistence of otorrhea in 2 cases, facial paralysis in 2 cases and 2 cases of dizziness and tinnitus.

Monitoring after 6 months: After 6 months of postoperative monitoring, there was persistence of otorrhea in 2 cases of closed technique, persistence of peripheral facial paralysis in 1 case, persistence of tinnitus in 1 case, persistence of vertigo in 1 case with the sign of fistula. In the literature, peripheral facial paralysis is the complication most frequently found by certain authors [15] [16].

##### Paraclinical Monitoring:

Control pure tone audiometry was performed after 1 month, 3 months and 6 months postoperatively.

Hearing was improved or preserved in 31 of our patients or 91.17%, we noted 3 cases of worsening hypoacusis. The same observation was made by authors [7] [17] [18].

In our study after 3 months of follow-up, the majority of our patients were unable to perform postoperative CT due to lack of financial resources, others were lost to follow-up. Unfortunately, we still encounter in the literature a significant number of people lost to follow-up, up to 50% after 2 years of follow-up [3].

For otologists, recurrences represent the main problem of cholesteatomatous pathology. It is necessary to closely and indefinitely monitor any patient operated on for cholesteatoma, since the incidence of recurrence increases with time. No cure can be confirmed for five years [12]. The mechanisms of recurrence differ depending on the type of surgical intervention, the same observation has been shared in the literature [5]-[7] [19]-[22].

#### 4.4. The Limitations of this Study Were

Poor archiving of files.

Change of address and contact of certain patients.

Non-compliance with appointments by some patients.

The low socio-economic level of patients testifies to the difficulties in performing post-operative CT.

The non-availability of LIRM in public structures. Only available privately is extremely expensive.

The limited number of otologist practitioners in Mali.

## 5. Conclusion

At the end of our study of a series of 16 cases through a broad review of the literature we can conclude that cholesteatoma of the middle ear remains a serious pathology hence the interest of a clinical examination in the diagnosis and especially modern imaging in the preoperative assessment and postoperative monitoring remains essential. The treatment of choice remains surgical. Finally, the more regulated and better-codified choice of surgical technique, as well as the systematic introduction of otoendoscopy optics, make it possible to minimize the rate of residual cholesteatoma and recurrence. Preventing recurrence remains a challenge.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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