

# Clinical, paraclinical features and the surgery outcomes of chronic otitis media with cholesteatoma at 108 Military Central Hospital

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## Summary

**Objective:** To assess the clinical features and the surgery outcomes of chronic otitis media with cholesteatoma. **Subjects and method:** A retrospective, descriptive study was conducted on fifty-six patients underwent a surgery to remove cholesteatoma at the Ear, Nose and Throat (ENT) Department at 108 Military Central Hospital from January 2019 to September 2023. **Result:** Most of patients presented at the late stage with years of clinical symptoms: Otorrhea (92.9%), hearing loss (100%). One-third of the subjects had a severe to profound hearing loss. 89.3% had scutum and ossicles erosion on CT scan images. Cholesteatoma was found at epitympanum location most of the time (83.9%). Incus was the most likely to be eroded ossicle (83.9%). No significant hearing improvement was found postoperatively. No complications and no recurrences in a long-term follow up. **Conclusion:** Although most of patients presented at the late stage, our micro-surgery for cholesteatoma removal still had favorable outcomes.

**Keywords:** Cholesteatoma, surgery outcomes, ENT department, 108 Military Central Hospital.

## 1. Background

Cholesteatoma or “Dangerous otitis media” is an aggressive form of chronic otitis media [11]. It normally consists of abnormal keratinizing squamous epithelium with a collection of keratin debris in the middle ear and mastoid. So, sometimes it is called “Skin in the wrong place”. Although cholesteatoma is histopathological benign, its destructive and locally invasive nature causes hearing loss as well as many other potential complications. Therefore, surgery is the treatment of choice for cholesteatoma. There are 2 types of surgery: A canal wall down mastoidectomy (modified or not) and a canal wall up mastoidectomy with or without tympanoplasty. The purposes of cholesteatoma surgery are not only to

eradicate the lesion but also to restore the hearing mechanism which can be done simultaneously or separately.

Ear surgery has been performed at ENT Department 108 Military Central Hospital for a long time. Especially since 2018, when microscopic ear surgery was done at a regular basis, many patients who diagnosed with chronic otitis media with cholesteatoma have been operated. This study was conducted to assess the main clinical characteristics of these patients and the postoperative outcomes.

## 2. Subjects and method

### 2.1. Study design

Retrospective, descriptive study.

### 2.2. Time scale

From January 2019 to September 2023.

### 2.3. Subject

Fifty-six patients were included in the study.

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**Received:** 20 October 2023, **Accepted:** 06 November 2023

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**Inclusion criteria:**

Diagnosed with chronic otitis media with cholesteatoma definitively pos-operatively.

Underwent a surgery to remove cholesteatoma at the ENT Department at 108 Military Central Hospital regardless of approaching method.

Had a fully recorded medical documents with relevant information.

**2.4. Studied variables**

Data were collected from the patients' medical records including: Name, age, gender.

Preoperative period, information such as history, presenting symptoms (otorrhea, tinnitus, hearing loss, facial paralysis, vertigo, earache) and duration of ear discharge were retrieved. Paraclinical tests including Air and bone conduction thresholds (in dB) of the operated ear were collected through the preoperative audiological results. Pure tone average (PTA) was the average of hearing threshold levels at a set of specified frequencies 500Hz, 1000Hz, and 2000Hz. PTA was then classified according to the Classification of Hearing Loss by the American Speech-Language-Hearing Association 2015 which were: normal, mild, moderate, severe and profound hearing loss [12].

Pre-operative high-resolution computed tomography (HRCT) of the temporal bones were reviewed to find any blunted or erosion of scutum or the ossicles.

Intra-operative findings including surgical approach, the site of cholesteatoma, ossicular erosion and other structure abnormalities were collected from the patient's operative document.

Postoperatively, surgical complications and hearing outcomes were evaluated by the surgeons at the following up appointments. Similar hearing variables to preoperative ones were collected at the time of a three-month follow up. Air-bone gap (ABG) closure was calculated by subtracting the postoperative ABG from the preoperative ABG [2].

Hearing improvement was noted if the post-operative ABG was 10dB (or more) less than the preoperative ABG which was referred to as Air-bone gap closure.

**2.5. Data analysis**

Data were gathered into the Microsoft excel 2013.

Categorical variables were calculated their frequency and percentage.

Analytical tests were performed by Stata 16 Software.

**3. Result****3.1. Subjects' characteristics**

Among selected patients, one case underwent the surgery on both ears. Therefore, we considered this patient as two independent subjects. Overall, there were fifty-six selected studied subjects.

**3.1.1. Demographic data of the studied subjects****Table 1. Demographic data (n = 56)**

| Variables                                               | Frequency | Percentage % |
|---------------------------------------------------------|-----------|--------------|
| <b>Gender</b>                                           |           |              |
| Male                                                    | 38        | 67.86        |
| Female                                                  | 18        | 32.14        |
| Age, Max = 82, Min= 16, Mean $\pm$ SD = 49.7 $\pm$ 16.3 |           |              |
| <b>Affected ear</b>                                     |           |              |
| Left                                                    | 30        | 53.6         |
| Right                                                   | 26        | 46.4         |

Most of the patients were adults with mean age was 49.7 years.

**3.1.2. Iness history and presenting symptoms****Table 2. Subjects history and presenting symptoms (n = 56)**

| Variables                   | Frequency | Percentage % |
|-----------------------------|-----------|--------------|
| <b>Duration of otorrhea</b> |           |              |
| Years                       | 45        | 80.4         |
| Months                      | 11        | 19.6         |
| <b>Presenting symptoms</b>  |           |              |
| Otorrhea                    | 52        | 92.9         |
| Tinnitus                    | 54        | 96.4         |
| Hearing loss                | 56        | 100          |
| Facial paralysis            | 2         | 3.6          |
| Vertigo                     | 9         | 16.1         |
| Earache                     | 32        | 57.1         |

Most of the patients had a long duration of ear discharge. The most frequent symptoms were hearing loss (100%), tinnitus (96.4%) and otorrhea (92.9%).

### 3.2. Pre-operative status

#### 3.2.1. Pre-operative hearing status

**Table 3. Pre-operative hearing status (n = 56)**

| Variables                                           | Frequency | Percentage % |
|-----------------------------------------------------|-----------|--------------|
| <b>PTA (dB), Mean = 61.0, Max = 120, Min = 21.7</b> |           |              |
| ≤ 20dB                                              | 0         | 0            |
| 21-40dB                                             | 18        | 32.1         |
| 41-70dB                                             | 20        | 35.7         |
| 71-90dB                                             | 9         | 16.1         |
| >90dB                                               | 9         | 16.1         |
| <b>Air-Bone Gap (dB)</b>                            |           |              |
| < 30dB                                              | 46        | 82.1         |
| ≥ 30dB                                              | 10        | 17.9         |

Two-third of the subjects had a mild to moderate hearing loss. The rest had more severe hearing status. The most severe patient had profound hearing loss with PTA = 120dB.

#### 3.3.2. Intra-operative findings

**Table 6. Intra-operative findings (n = 56)**

| Variables              |                                 | Frequency | Percentage % |      |
|------------------------|---------------------------------|-----------|--------------|------|
| Cholesteatoma location | Mastoidair cells                | 40        | 71.4         |      |
|                        | Antrum                          | 44        | 78.6         |      |
|                        | Aditus                          | 43        | 76.7         |      |
|                        | Mesotympanum                    | 31        | 55.4         |      |
|                        | Epitympanum                     | 47        | 83.9         |      |
|                        | All above                       | 28        | 50           |      |
| Ossicles erosion       | No                              | 6<br>10.7 |              |      |
|                        | Yes                             | Malleus   | 43           | 76.8 |
|                        |                                 | Incus     | 47           | 83.9 |
|                        |                                 | Stapes    | 12           | 21.4 |
| Anomalies              | Sclerotic mastoid               | 34        | 60           |      |
|                        | Facial canal dehiscence         | 20        | 35.7         |      |
|                        | Tegmen erosion                  | 7         | 12.5         |      |
|                        | Lateral semicircular dehiscence | 11        | 19.6         |      |
|                        | Others                          | 2         | 3.6          |      |

Cholesteatoma was found at epitympanum location most of the time (83.9%). Incus was the most likely to be eroded ossicle (83.9%) a sclerotic mastoid was observed in many cases (60%).

#### 3.2.2. CT scan imaging

**Table 4. CT scan imaging (n = 56)**

| Erosion location         | Frequency | Percentage % |
|--------------------------|-----------|--------------|
| No erosion found         | 1         | 1.8          |
| Scutum only              | 5         | 8.9          |
| Ossicles only            | 0         | 0            |
| Both scutum and ossicles | 50        | 89.3         |

Almost all cases had scutum and ossicles destruction on CT scan images.

### 3.3. Intra-operative findings

#### 3.3.1. Surgical approach

**Table 5. Surgical approach (n = 56)**

| Surgical approach             | Frequency | Percentage % |
|-------------------------------|-----------|--------------|
| Canal-wall-down mastoidectomy | 36        | 64.3         |
| Canal-wall-up mastoidectomy   | 15        | 26.8         |
| Atticostomy                   | 5         | 8.9          |

### 3.4. Surgery outcomes

#### 3.4.1. Hearing recovery

**Table 7. Hearing outcomes**

| Variables | Pre-op<br>(n = 56)   | Post-op<br>(n = 30) | P     |
|-----------|----------------------|---------------------|-------|
| Mean PTA  | 61.0                 | 54.7                | >0.05 |
| ≤ 20dB    | 0                    | 0                   |       |
| 21-40dB   | 18 (32.1)            | 12 (40.0)           |       |
| 41-70dB   | 20 (35.7)            | 14 (46.7)           |       |
| 71-90dB   | 9 (16.1)             | 2 (6.6)             |       |
| >90dB     | 9 (16.1)             | 2 (6.7)             |       |
| Mean ABG  | 28.84<br>(25.7-32.0) | 27.3<br>(20.9-33.7) | >0.05 |
| < 40dB    | 46 (82.1)            | 25 (83.3)           |       |
| ≥ 40dB    | 10 (17.9)            | 5 (16.7)            |       |

There were no differences found between the pre- and post-operative hearing ability of the studied subjects ( $p>0.05$ ).

#### 3.4.2. Air-bone gap closure outcomes

**Table 8. Hearing status regarding Air-bone gap closure (n = 30)**

| Hearing improvement | Frequency | Percentage |
|---------------------|-----------|------------|
| Yes                 | 7         | 23.3       |
| No                  | 23        | 76.7       |

Among those subjects had a postoperative hearing checked, seven of them had hearing improvement (23.3%).

#### 3.4.3. Complications

There was only one case which resulted in grade 2 facial paralysis during the first few days of postoperative period (House-Brackmann grade). No other severe complications recorded among 56 cases. No recurrences found during the follow-up time.

## 4. Discussion

### 4.1. Demographic data of the studied subjects

A total number of 56 subjects were included in this study, consisted of 18 females (32.2%) and 38 males (67.8%). Most of the patients were adults

(mean age was 49.7 years) with the oldest and the youngest patients were 82 and 16 years old, respectively. Most of the time, gender was equally distributed among cholesteatoma cases, however, in our study, two third of the subjects was male. This might be due to the characteristic of the 108 hospital's patient cohort. Out of these subjects, 53.6% of them (30 cases) had the surgery on their left ear which seemed equal to the right side.

Regarding subject's history and presenting symptoms, most of them (80.4%) had a history of prolonged otorrhea for years, only few had intermittent ear discharge for some months. These symptoms suggested the diagnosis of acquired cholesteatoma which was defined as a sequel of the tympanic membrane retraction that would accumulate the epithelium. Meanwhile, secondary acquired cholesteatoma was considered as the result of migration of the epithelium through a marginal perforation in the tympanic membrane [5]. None of them was suspected to have congenital cholesteatoma.

The commonest presenting symptom in this study was hearing loss (100%), followed by tinnitus and otorrhea (96.4% and 92.9%, respectively) which was similar to other studies [2, 11]. In the literature, other symptoms such as facial paralysis, vertigo which suggested the progression of cholesteatoma, were rare. Noticeably, there were two subjects (3.6%) who came to our hospital when they had facial paralysis and nine of them (16.1%) already had vertigo attacks.

### 4.2. Preoperative status

In the preoperative assessment, all of the subjects had hearing loss at varied grades. Among which, two-third of the subjects had a mild to moderate hearing loss. The rest had more severe hearing status. Remarkably, there was one case had a profound hearing loss with PTA = 120dB before the surgery. Investigating the air bone gap values, 82.1% of the subjects had a mean ABG smaller than 30dB. This borderline was chosen based on the mechanism of the middle ear ossicles which amplify

the sound from the outer ear by approximately 30dB [4]. If ABG is a reliable indicator of the ossicle status, we would expect to find quite a large proportion of intact middle ear structures. However, on CT scan, only one case had an intact ossicle while the rest had at least one spot of destruction. Therefore, the only possible explanation for this was the direct sound transmission through the suprastructure of the stapes or through the round window membrane.

### **4.3. Intra-operative findings**

Theoretically, the goals of cholesteatoma surgery are to properly eradicate the lesion, provide the patient with a trouble-free ear (safe and dry) and no recurrences. There are many surgical approaches to achieve these goals. Two main options are the canal-wall-up (CWU) and canal-wall-down (CWD) mastoidectomy. Of which, CWD is indicated for extensive cholesteatoma cases. In our study, unfortunately, CWD or more specifically- modified radical mastoidectomy was the most performed approach (64.3%). This was due to the fact that most of the patients came to us at a late stage when cholesteatoma had invaded some surrounding structures. The advantages of this approach were the better control of the disease and the decrease of recurrent risk [10]. In our series, we performed atticostomy on five patients. This type of technique was indicated for those with minimal invaded cholesteatoma in the epitympanum space. This minimal approach provided with faster recovery and better preservation of surrounding structures.

Intraoperatively, cholesteatoma was found mostly at the epitympanum, more specifically at the Prussak's space (in 83% of the cases) which was consistent with Huy N report 52.2% [1]. This finding seemed to match with explanation of forming cholesteatoma due to Eustachian tube dysfunction and retracted pocket at the epitympanum space as the first stage of middle ear disorders [7]. However, in his review, Yusof reported cholesteatoma located in the mastoid antrum for most of the time [2]. This difference might be due to the author's sample with 57 patients who 100% had extensively progress cholesteatoma.

Consistent with the finding of cholesteatoma location and CT scan images, in this study, we found that incus was the most likely to be eroded ossicle (83.9%) while stapes was the least affected (48.3%). Compared to the previous studies, the prevalence of partial erosion of the incus ranged from 30.7% up to 85% [9]. Some researchers suggested that incus necrosis could be predicted with the presentation of persistent ear discharge and extension of cholesteatoma on CT scan images. However, except from this, in our series, there were six patients who had intact ossicles chain. These patients had quite early presentation when only the scutum was slightly eroded.

Beside the site of cholesteatoma origin, there were also other involving abnormalities which we found during the surgeries such as sclerotic mastoid (60%), facial canal dehiscence (35.7%), tegmen erosion (12.5%), lateral semicircular dehiscence (19.6%) and two patients with erosion of sigmoid sinus wall (3.6%). These findings were different from Bizakis's report in which tegmen erosion accounted for 26%, facial nerve dehiscence 16% and the least found was sclerotic mastoid (10.5%) [3]. In fact, the characteristics of cholesteatoma varies significantly on each stage which explained the different findings between authors.

### **4.4. Surgery outcomes**

Out of 56 subjects included in this study, only 30 of them had an audiological re-assessment at three-month follow-up or later. Although there was a slight decrease (from 61dB pre-op to 54.7dB post-op) in the mean PTA re-assessment, Table 7 showed no differences between the pre and the post-operative ( $p>0.05$ ) when compared the two points. This outcome was similar to many other studies' findings especially with the one conducted on the radical mastoidectomy surgery. As mentioned in the introduction, restoring hearing ability is the secondary purpose following cholesteatoma removal and might be performed simultaneously or at the second step. In his study, Lailach concluded that based on the intact posterior canal wall and a present stapes suprarstructures, one could predict a

hearing outcome after cholesteatoma surgery [6]. According to this, our result was quite consistent with 64.3% of the patients underwent CWD surgery and 21.4% of stapes erosion. Besides, there were some patients who had had a sensorineural loss at presentation which could not be fixed by the surgery. No worsening hearing abilities were found on the studied subjects overall.

Regarding the complications of the surgery during a 4-year period, we had a quite favorable outcome. There was only one case that resulted in grade 2 facial paralysis occurred at the first few days of postoperative period (House-Brackmann grade) and no other severe complications recorded among 56 cases. The prior incidence occurred in a patient who presented at a late stage with a totally exposed facial nerve found intraoperatively. 11 cases of Lateral semicircular dehiscence just had a mild vertigo a few days following the surgery. None of them had a problems of vertigo attack after that period. No recurrence had been reported until the time of this study. When compared to some long-term study, we had quite similar outcomes [8].

## 5. Conclusion

Most of patients diagnosed with cholesteatoma in this study presented at the late stage with years of clinical symptoms (ear discharge, hearing loss) and extensive cholesteatoma found in paraclinical test and in the surgery. Although there was no significant hearing improvement postoperatively, fifty-six patients underwent all types of cholesteatoma micro-surgery had had favorable outcomes with no complications and no recurrences in a long-term follow up.

## References

1. Nguyễn Hoàng Huy (2018) *Đánh giá kết quả chỉnh hình màng nhĩ xương con đồng thời với phẫu thuật khoét chũm tiết căn*. Luận án Tiến sĩ, Đại học Y Hà Nội.
2. Asma A, Shaharudin MH, Muhd Almyzan A, Lokman S (2013) *Outcome of canal wall down mastoidectomy: Experience in sixty three cases*. J Med J Malays 68(3): 217-221.
3. Bizakis JG, Chimona TS, Hajjiioannou JK, Prokopakis EP, Karampekios S, Papadakis CE, Helidonis ES (2006) *Canal wall down mastoidectomy for cholesteatoma: Experience at the University of Crete*. Journal of otolaryngology 35(1): 48-52.
4. Hermes DJ (2023) *"The Ear", The Perceptual Structure of Sound*. Springer: 89-140.
5. Ji C, Zhang X, Yan X, Cao S, Fu T (2023) *Cholesteatoma in chronic otitis media secondary to pars tensa perforation*. Acta Oto-Laryngologica 143(5): 376-381.
6. Lailach S, Zahnert T, Lasurashvili N et al (2016) *Hearing outcome after sequential cholesteatoma surgery*. European Archives of Oto-Rhino-Laryngology 273: 2035-2046.
7. Louw L (2010) *Acquired cholesteatoma pathogenesis: Stepwise explanations*. The Journal of Laryngology 124(6): 587-593.
8. Mocanu H, Mocanu AI, Bonciu A, Coadă G, Schipor MA, Rădulescu M (2021) *Analysis of long-term functional results of radical mastoidectomy*. Experimental Therapeutic Medicine 22(5): 1-13.
9. Mohammadi G, Naderpour M, Mousaviagdas M (2012) *Ossicular erosion in patients requiring surgery for cholesteatoma*. Iranian Journal of Otorhinolaryngology 24(68): 125.
10. Roy R, Gupta Y and Roy PK (2022) *A comparative analysis of canal wall reconstruction mastoidectomy over canal wall down mastoidectomy*. J The Egyptian Journal of Otolaryngology 38(1): 107.
11. Rutkowska J, Özgirgin N, Olszewska E (2017) *Cholesteatoma definition and classification: A literature review*. The journal of international advanced otology 13(2): 266.
12. American Speech-Language-Hearing Association and American Speech-Language-Hearing Association Journal Audiology Information Series (2015) *Type, degree, and configuration of hearing loss*. Audiology Information Series 10802(2).