

## Condition of Contralateral Ear in Chronic Otitis Media

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### Abstract

**Background and objectives:** Chronic otitis media is defined as a continuous and enduring inflammation and infection of middle ear cleft and mastoid air cells for more than 6 weeks. It is characterized by its destructive disease of middle ear in nature. The contralateral ear is defined as an ear that the patient does not complaining off, because of either ignorance or not causing discomfort in comparison to the diseased ear, or it may be totally normal and have nothing to complain. The aim of this study was to declare the condition of contralateral ear in chronic otitis media. **Methods:** Two hundred patients were selected randomly. The diseased ear was marked as complaining ear and other as contralateral ear. Both ears examined by otoscope, microscope and endoscopically, thereafter tuning fork tests done for both ears (Rinne and Weber tests), and then patients were assessed audiologically by (pure tone audiometry and tympanometry). **Results:** According to the current study 35.5% of patients have had some problems in the contralateral ear, from which 8% of patients had tympanic membrane perforation. 19% of encircled patients had conductive hearing loss, followed by 11.5% of patients had sensorineural hearing loss and 5% of patients had mixed hearing loss. **Conclusions:** Current study concluded the result that most of the time there may be an abnormality in contralateral ear in chronic otitis media therefore thorough examination of contralateral ear is indicated in every case of chronic otitis media.

**Keywords:** Chronic otitis media; Hearing loss; Contralateral ear; Discharging ear.

### Introduction

Chronic otitis media (COM) is defined as a continuous and enduring inflammation and infection of middle ear cleft and mastoid air cells system for more than 6 weeks<sup>1, 2</sup>. It can be expressed in other words which include chronic mastoiditis, chronic tympanomastoiditis, and chronic suppurative otitis media<sup>3</sup>. The incidence and prevalence of the illness are different worldwide, in developed countries about 1-3% but in developing countries about 1-30% and causes a huge financial load to treat the illness itself and its complications. Children and adults are equally affected, with no gender difference<sup>4, 5</sup>. It is characterized by its destructive disease of middle ear in nature. Identifiable symptoms and signs of illness include tympanic membrane break, exudate from the ear, eroding of ossicles, bony walls of tympanic cavity, and hearing impairment<sup>6</sup>. Hearing impairment and exudative drainage from the ear are the most common problems which make patients to search for medical counsel<sup>7</sup>. Cholesteatoma is one of the sequels of COM and it is defined as a persistent inflam-

mation of middle ear cavity and mastoid air cell system which result from imposition and extension of keratinized stratified squamous epithelium into the middle ear<sup>8, 9</sup>. Pathogenesis of COM may be explained by a continuum theory which states that COM arise from unresolved secretory otitis media by several epithelial and sub epithelial incidents change to chronic state<sup>10</sup>. Etiology and risk factors for the development of the condition include repeated attacks of upper respiratory tract infection, poor socioeconomic status, overpopulated houses, exposure to smoke, insufficient sanitation and pharyngotympanic tube malfunctioning<sup>3, 11, 12</sup>. Pathologically it is classified in to the following subtypes: inactive mucosal COM (dry perforation), active mucosal COM (perforation with discharge), inactive squamous epithelial COM (invagination, atelectasis and epidermization), active squamous epithelial COM (cholesteatoma) and cured COM (healing of perforated tympanic membrane)<sup>13-17</sup>. The microorganisms which most commonly causes COM include *Pseudomonas aeruginosa*, *Staphylococcus aureus* and methicillin-resist-

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ant *S. aureus* (MRSA)<sup>4, 18</sup>.

Medical management of COM includes repeated cleaning of debris and granulation tissue from the external auditory canal that accumulate with time, this cleaning is very important so as to local antimicrobial preparation reaching the exact site to decrease the effect of pathology<sup>2</sup>. Sometimes medical treatment may fail to make the ear dry because in case of cholesteatoma the original pathology cannot be removed by medical treatments therefore surgical intervention is the only solution to eliminate the pathology<sup>17</sup>. The aim of surgical management of COM is to make the ear dry and harmless to the health of the patient. Improvement of hearing is not a main goal of treatment. Definite indications of surgery include; presence of cholesteatoma, patient not responding to medical management, and patients present with complications of COM (either intratemporal or intracranial complications)<sup>5, 12</sup>. There are several choices of surgical interventions to treat COM which depend on bulk and character of the illness, also surgeon's experience have an impact on decision to choose which type of mastoid operation done to eliminate the pathology. Surgical techniques include close technique (intact canal wall mastoidectomy) and open technique (canal wall down mastoidectomy) with or without tympanoplasty<sup>4, 13, 19</sup>.

The contralateral ear is defined as an ear that the patient does not complaining off, because of any cause either ignorance or not causing discomfort in comparison to the diseased ear, or it may be totally normal and have nothing to complain. The aim of this study was to declare the condition of contralateral ear in chronic otitis media.

## Patients and methods

A prospective cohort study was performed in 200 patients (83 males and 117 females) in ENT, Head and Neck surgery – Sulaimani Teaching center and Middle East ENT Head and Neck private center from November 2016 to December 2017. Patients were randomly selected. Inclusion criteria any patient diagnosed with unilateral chronic otitis media and age more than 10 years old. Exclusion criteria: any patient less than 10 years old.

After the agreement of the ethics and scientific committee of Kurdistan Board for Medical Specialties and taking patients' consent, the data were collected using direct in-

terview, clinical examination and audiological assessment. The questionnaire had been divided in to 4 sections: demographic characteristics including (name, age, gender, occupation, residency and telephone number), medical history including (main complaint from diseased ear and its duration, main complaint of contralateral ear and its duration), clinical examination of contralateral ear by otoscope, microscope and endoscopic examination by 30 degree telescope, audiological examination by tuning fork test (Rinne and Weber tests), pure tone audiometry and tympanometry. Each patient was examined and diagnosed by an otolaryngologist. The "IBM SPSS Statistics version 20" was used for the data analysis. Moreover, a p-value of ( $\leq 0.05$ ) was considered statistically significant.

## Results

In this study, 83 (41.5%) males and 117(58.5%) females with a mean  $\pm$ SD (Standard Deviation) age of  $35 \pm 12.7$  years (ranged from 10 to 67 years), Figure (1).

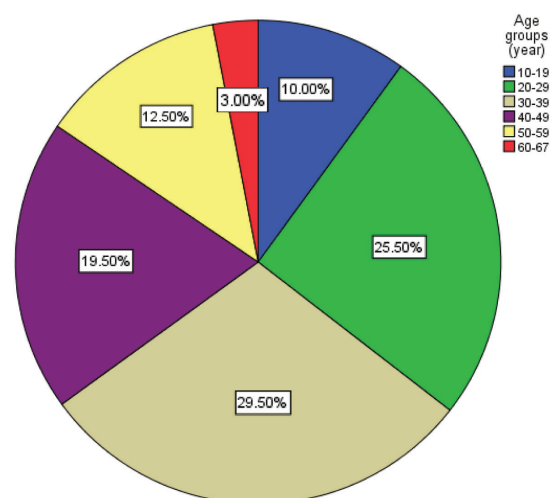


Figure (1): Age groups.

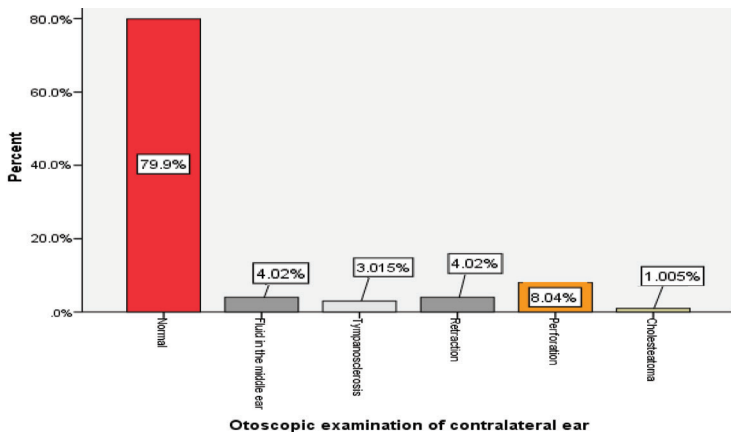
The contralateral ear was not complaining in 129 (64.5%), and 71 (35.5%) patients have had complaining from contralateral ear, from which 37 (52%) in the right ear and 34 (48%) in the left ear. Furthermore, there was a statistically very highly significant relationship between the main complain and the duration of symptoms—they mostly suffered from hearing loss (p-value of  $< 0.001$ ). Additionally, there was a statistically very highly significant relationship between the lateralization of the contralateral ear (right or left) and the main complain — right ear suffered more (p-value of  $< 0.001$ ) and the duration of symptoms — left

ear suffered for longer periods (p-value of <0.001), Table (1).

**Table (1):**Distribution of the main complains of contralateral ear and its duration.

Contralateral ear			Duration of symptoms of contralateral ear			Total
			(months)			
			< 3	3-6	> 6	
Right	Main	Pain	0 (0%)	1 (1.4%)	0 (0%)	1 (1.4%)
	complain of	Discharge	1 (1.4%)	5 (7%)	2 (2.8%)	8 (11.2%)
	contralateral	Hearing loss	3 (4.2%)	5 (7%)	19 (26.8%)	27 (38%)
	ear	Tinnitus	0 (0%)	0 (0%)	1 (1.4%)	1 (1.4%)
	Total		4 (5.6%)	11 (15.4%)	22 (31%)	37 (52%)
Left	Main	Pain	0 (0%)	1 (1.4%)	0 (0%)	1 (1.4%)
	complain of	Discharge	0 (0%)	2 (2.8%)	11 (15.4%)	13 (18.3%)
	contralateral	Hearing loss	3 (4.2%)	4 (5.6%)	12 (16.9%)	19 (26.8%)
	ear	Tinnitus	0 (0%)	0 (0%)	1 (1.4%)	1 (1.4%)
	Total		3 (4.2%)	7 (9.8%)	24 (33.7%)	34 (48%)
Total	Main	Pain	0 (0%)	2 (2.8%)	0 (0%)	2 (2.8%)
	complain of	Discharge	1 (1.4%)	7 (9.8%)	13 (18.3%)	21 (29.6%)
	contralateral	Hearing loss	6 (8.4%)	9 (12.7%)	31 (43.7%)	46 (64.8%)
	ear	Tinnitus	0 (0%)	0 (0%)	2 (2.8%)	2 (2.8%)
	Grand total		7 (9.8%)	18 (25.3%)	46 (64.8%)	71 (100%)

Otoscopic examinations of contralateral ears were done which revealed 79.9% normal, whereas 20.1% were abnormal, Figure (2).



**Figure (2):**Otoscopic examination of contralateral ear.

All patients were sent for pure tone audiometry examination, which shows a statistically very high significant relationship between the complains from contralateral ear and pure tone audiometry finding, Table (2).

**Table (2):**Relationship between the complains from contralateral ear and pure tone audiometry finding, p-value of <0.001.

Pure tone Audiometry	Complaining from contralateral ear		Total	p-value
	Yes	No		
Conductive hearing loss	37	1	38	<0.001
Sensorineural hearing loss	23	0	23	
Mixed hearing loss	10	0	10	
No hearing loss	1	128	129	
Total	71	129	200	

## Discussion

Chronic otitis media is regarded as a main health trouble in both developed and developing world<sup>20</sup>. Chronic otitis media is regarded as middle ear inflammation and infection for long time, which has different impacts on function of the affected ear<sup>11,21</sup>. The frequency of chronic otitis media differ throughout the world, which is about 30% in between Alaskan, and in African countries about 4% to 6%, but in England, United States and Brazil are less than 1%<sup>15,22</sup>. It is regarded as a main cause of acquired hearing impairment<sup>23</sup>. In uncomplicated type of COM, the patients mostly complaining of conductive type of hearing loss and the disease usually comes across safely without any serious complications, but if COM complicated by cholesteatoma and granulation tissue formation it might be associated with mixed type of hearing loss and several other serious complications<sup>5,6,24</sup>. Because of high prevalence of abnormality in contralateral ear point that the two ears must be viewed as a pair<sup>13</sup>. Studying the status of contralateral ear will guide us to know the progress of chronic otitis media in respect of direction and speed; briefly we can say the contralateral ear is nowadays what the complaining ear was yesterday<sup>10</sup>. As former studies declared that; COM infrequently is a solitary disease because factors which present for causing COM in one ear already present for the other ear as both ears have a common drainage pathway i.e. nasopharynx<sup>5,18,23</sup>. One of the studies that were performed previously, founded that 75% of patients who have COM will have some changes in the other ear<sup>19</sup>. In another study they were uncover that 50% of the diseased patients will have some problems in the other ear, therefore they stated that COM should not be regarded as a disease restricted to a single ear<sup>26</sup>. In another study they concluded that the status of contralateral ear is intimately related to the diseased ear as the original pathology is common for both<sup>27</sup>. In another study they were found that 30.6% of contralateral ears which included in their study had tympanic membrane perforation<sup>10</sup>. De Costa et al reported a series of 500 cases of contralateral ear in chronic otitis media. They founded that 75.2% of the patients the contralateral ear was found to have some structural abnormalities; 60.4% of the patients presented with COM without cholesteatoma, and in this group, 69.9% had

an abnormal contralateral ear<sup>28</sup>. Maurício Noschang et al were studying 75 cases of chronic otitis media; they were concluded that 54.7% of the patients have had abnormal contralateral ear<sup>16</sup>. Jae Ho Chung et al were studying 52 cases of contralateral ear in unilateral chronic otitis media and they were found that 28% of patients have had abnormality in contra lateral ear<sup>8</sup>. This correlates with our study wherein 71 (35.5%) patients have had abnormality in contralateral ear in the form of tympanic membrane perforation, hearing loss, tinnitus and pain. Bayır et al and Damghani were concluded that the most common abnormality of contralateral ear was tympanic membrane perforation<sup>22, 26</sup>. This correlates with current study which found that 16(8%) patients have had tympanic membrane perforation which was the most common abnormality of contralateral ears. This contradict with a study conducted by Adhikari et al, which they found that retraction of tympanic membrane was the most common abnormality of contralateral ear<sup>15</sup>. Damghani conducted a study on 100 patients and they were found that 48% have hearing problem in contralateral ear by pure tone audiometry (85.4% conductive hearing loss, 12.5% sensorineural hearing loss and 2.1% mixed hearing loss)<sup>26</sup>. Abushahma K et al conducted a study on 110 patients, they concluded that 57.1% of patients have had hearing loss on pure tone audiometry (46.4% conductive hearing loss, 8.9% sensorineural hearing loss and 1.8% mixed hearing loss)<sup>11</sup>. This correlates with the current study, which we were found that most of encircled patients have had conductive hearing loss 38 (19%), followed by sensorineural hearing loss 23(11.5), and then mixed hearing loss 10 (5%).

In current study we reach a result that most of the times the pathology that exist for the diseased ear may be presented for the contralateral ear because they have the common pathway which is nasopharynx.

## Conclusions

We concluded in nearly half of patients with COM, numerous disorders may also be presented in contralateral ear. The results of this study and previous research exhibit that we should not think about COM as a sickness restricted to one ear due to the fact in many instances the occurrence of this disease can affect both ears. This problem

constantly is clarified in sufferers in order to accomplish positive therapeutic planning. Therefore; we recommended that the contralateral ear should usually be evaluated completely in patients with COM to efficaciously diagnose any amelioration and, if needed, grant well timed therapeutic intervention.

## Conflict of interest

Nothing to declare

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