# **Original Research Article**

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# A study of status of contralateral ear in unilateral chronic otitis media in 500 patients

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#### **ABSTRACT**

**Background:** The aim of this study was to examine the contralateral ear clinically, audiologically and radiologically and compare the findings with squamous and mucosal type of chronic otitis media (COM).

**Methods:** A cross sectional study conducted in patients attending ENT Department, Government Medical College, Amritsar between December 2016 to November 2018. The study was conducted in 500 patients of either sex aged between 8 to 60 years with unilateral COM without perforation or history of ear discharge in the contralateral ear. Otoscopy, pure tone audiometry and X-ray mastoid or high-resolution computed tomography temporal bone were done on the patients. The results were recorded and analysed with SPSS software.

**Results:** 82% patients were found to have some abnormalities in the contralateral ear. On otoscopy abnormalities in contralateral ear includes retraction of tympanic membrane, thinning and tympanosclerotic patch, most common abnormality being retraction of tympanic membrane. Radiological analysis of contralateral mastoids showed 39% diploic and 22.8% sclerotic mastoids. Hearing status in the contralateral ear showed 45.6% patient with normal hearing, 48.6% with conductive hearing loss and 5.8% with mixed hearing loss. 40.4% contralateral ears had mild, 12% had moderate and 2% had severe hearing loss.

**Conclusions:** Contralateral ear pathologies were more in those who had squamosal type of COM than who had mucosal type in the diseased ear. The contralateral ear shows unmistakable predilection towards developing COM in the future.

Keywords: Chronic otitis media, Diseased ear, Contralateral ear, Squamosal type of COM, Mucosal type of COM

#### INTRODUCTION

Chronic otitis media (COM) implies a permanent abnormality of the pars tensa or flacida, most likely a result of earlier acute otitis media, negative middle ear pressure or otitis media with effusion. COM can be classified into active mucosal type, inactive mucosal type, active squamosal type, inactive squamosal type and healed otitis media. COM can be characterized histopathologically by middle ear pathology such as granulation tissue, cholesterol granulomas or cholesteatoma formation. The incidence of COM in India was found to be 7.8%.

According to the continuum theory which was the most commonly accepted theory for pathogenesis of COM, otitis media with effusion is recognized as the initial condition that, when resolved, may progress to chronic transformation. Otitis media seems to exist through a continuous series of epithelial and subepithelial events, and, after the initial triggering episode, a serous or purulent otitis media becomes serous-mucoid, then mucoid, and, in the absence of therapeutic resolution, chronicity may ensue. The main purpose of this study was derived from the fact that nasopharynx act as a common portal for drainage for both ears through left and right Eustachian tube, and hence factors responsible for

COM on one ear may also affect the other ear.<sup>3,4</sup> Examination of contralateral ear is very much helpful in evaluation of etiology and progression of the disease.

#### **METHODS**

This study was a cross sectional study conducted in patients attending Ram Lal Eye and ENT Hospital attached to Government Medical College, Amritsar.

The study was conducted in 500 patients of either sex aged between 8 to 60 years with unilateral COM without perforation or history of ear discharge in the contralateral ear. An approval from Institutional Ethics Committee, Government Medical College, Amritsar was obtained and an informed consent was taken from all the patients included in the study.

The main purpose of this study was to assess the status of contralateral ear in patients with unilateral COM. Contralateral ear is defined as the asymptomatic ear or the ear with no history of ear discharge or hearing impairment. All the patients were evaluated for the presence of changes in the contralateral ear according to complete history and clinical examination, otoscopic findings, pure tone audiometry, X-ray mastoid (lateral oblique view) and/or high-resolution computed tomography (HRCT) temporal bone wherever indicated. Contralateral ear was evaluated as normal or abnormal. The contralateral ear was labelled abnormal if any pathological findings were dectected as follows:

- In otoscopy abnormal findings include retraction, tympanosclerosis, atrophy of the tympanic membrane. The retractions were again graded according to Sade or Tos classification.
- In pure tone audiometry, type and degree of hearing loss (according to WHO classification) was assessed.
- In X-ray mastoid, HRCT temporal bone the degree of sclerosis of mastoid, status of ossicles, middle ear, dural plate, sinus plate were noted.

Data was entered, and analysed using SPSS software version 20 and descriptive analysis done.

#### **RESULTS**

In our study majority of patients having COM in the affected ear (29%) was in the age group of 21 to 30 years. Least number of patients were in the age group of >50 years. The number of male patients was 287 (57.4%) and female patients were 213 (42.6%). Out of total 500 patients 254 (50.8%) patients were from rural and 246 (49.2%) were from urban background which showed that incidence of COM was slightly more in rural population.

The incidence of mucosal type of COM was 87% (435 patients) which was more than squamosal type of COM 13% (65 patients) (Figure 1).

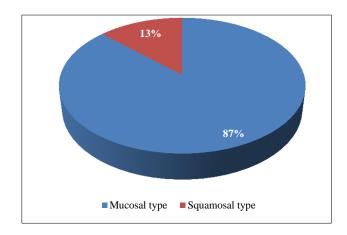


Figure 1: Incidence of type of COM.

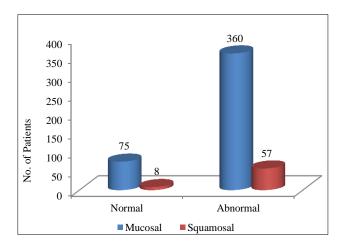


Figure 2: Status of contralateral ear.

In our study of 500 patients of unilateral COM, total 90 (18%) patients were found to have normal contralateral ears out of which 75 patients had mucosal type of COM and 8 patients had squamosal type of COM in the diseased ear. A total of 410 (82%) patients were found to have some abnormalities in the contralateral ear among this 410 patients, 360 contralateral ears had mucosal type COM and 57 contralateral ears had squamosal type COM in the diseased ear (Figure 2).

### Otoscopic findings

Otoscopic findings in the contralateral ears were assessed with respect to type of disease in affected ear in which 83 (16.60%) patients were found normal among these 75 patients had mucosal type of COM and 8 patients had squamosal COM in the affected ear. The most common pathology in otoscopy was grade 2 retraction of tympanic membrane which was present in 216 (43.20%) patients among which the affected ear had mucosal type COM and in 180 patients and 36 patients had squamosal type COM. Grade 3 retraction in contralateral ear was present in 65 patients of mucosal type of COM and 7 patients of squamosal type of COM. The incidence of grade 1 retraction in contralateral ear was 9.2% (40 patients) in case of mucosal type of COM and 7.69% (5 patients) in

squamosal type of COM among 45 (9%) patients. There was only one patient with grade 4 retraction of tympanic membrane in the contralateral ear which had squamosal type of COM in the affected ear. Thinned tympanic membrane in contralateral ear was present in 36 (7.2%)

patients among which 35 patients had mucosal type COM and 1 patient had squamosal type of COM in the affected ear. Tympanosclerotic patch in the contralateral ear was present in 40 patients of mucosal type and 7 patients of squamosal type of COM in the affected ear (Table 1).

Otoscopic findings in contralateral ear	Type of disease in affected ear				Tetal	
	Mucosal		Squamosal		Total	
	No. of patients	%	No. of patients	%	No. of patients	%
Normal	75	17.24	8	12.31	83	16.60
G1R	40	9.20	5	7.69	45	9.00
G2R	180	41.38	36	55.38	216	43.20
G3R	65	14.94	7	10.77	72	14.40
G4R	0	0.0	1	1.54	1	0.20
Thinned tympanic membrane	35	8.04	1	1.54	36	7.20
Tympano sclerotic patch	40	9.20	7	10.77	47	9.40
Total	435	100.00	65	100.00	500	100.00

#### Radiological status

Radiological status of the contralateral mastoids were assessed with respect to type of disease in the affected ear using X-ray both mastoids lateral oblique view and/or HRCT bilateral temporal bones in selected cases and it was found that in 180 (41.38%) patients of mucosal type of COM and 11 (16.92%) patients of squamosal type of COM the contralateral mastoid was pneumatised. In 195 (39%) patients of contralateral mastoids were diploic among which 180 (41.38%) patients had mucosal type and 15 (23.08%) patients had squamosal type COM. In contralateral ear sclerosed mastoid was found in 114 patients out of which 75 (17.24%) patients had mucosal and 39 (60.00%) patients had squamosal type of COM (Figure 3).

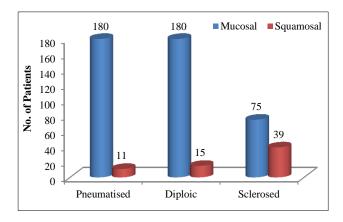


Figure 3: Findings in contralateral mastoid.

## Hearing status

Hearing status in the contralateral ear was analysed and it was found that normal hearing was present among 215

patients of mucosal type of COM and 13 patients of squamosal type of COM. 243 (48.60%) patients had conductive hearing loss in contralateral ear among which 195 patients had mucosal type of COM and 48 patients had squamosal type of COM in the affected ear. Total 29 (5.80%) patients had contralateral ear with mixed hearing loss among which 25 patients had mucosal type of COM and 4 patients had squamosal type of COM. Mild hearing loss in the contralateral ear was present in 202 (40.40%) patients out of which 167 patients had mucosal type of COM and 35 patients had squamosal type of COM in the affected ear. In 47 patients of mucosal type of COM and 13 patients of squamosal type of COM there was moderate hearing loss in the contralateral ear. Severe hearing loss in contralateral ear was found in 6 patients with mucosal type COM and 4 patients with squamosal type of COM in the affected ear. No patient had profound hearing loss in our study (Table 2) (Figure 4).

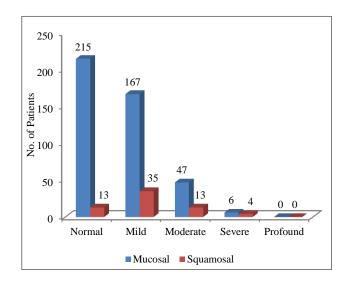


Figure 4: Hearing status of contralateral ear.

Table 2. He	aring status	assessment in	contralate	ral ear
Table 4: ne	arme status	assessment in	l Contralate	lai eai.

Hearing status in contralateral	Type of disease in the affe Mucosal type		ected ear Squamosal type		Total	
ear	No. of patients	%	No. of patients	%	No. of patients	%
Normal	215	49.42	13	20.00	228	45.60
Conductive hearing loss	195	44.83	48	73.85	243	48.60
Mixed hearing loss (mix)	25	5.75	4	6.15	29	5.80
Sensorineural hearing loss	-	-	-	-	-	-
Total	435	100.00	65	100.00	500	100.00

#### **DISCUSSION**

As the main cause of COM is malfunction of Eustachian tube, it is probable that a patient with COM will have a disorder in the contralateral ear (CLE).<sup>5</sup> Majority of patients of COM in our study belong to 3<sup>rd</sup> decade which is in accordance with a study by Chandrashekharayya et al in which maximum number of patients were from 3<sup>rd</sup> and 4<sup>th</sup> decade.<sup>6</sup> Slight male predominance (57.4%) was noted as was in a study by Chavan et al which also showed slight male dominance 1.1:1.<sup>7</sup> Incidence of COM was slightly more in rural population (50.8%) as compared to Urban population (49.2%). A study by Chandrashekharayya et al also found that majority of the patients of COM (77.6%) were from rural and low socioeconomic status.<sup>6</sup>

The incidence of mucosal type of COM was 87% (435 patients) which was more than squamosal type of COM 13% (65 patients), similar to a study by Kutty et al in which 73.75% had mucosal and 26.25% had squamosal disease. Adhikari et al found that 64% patients had mucosal type of COM and 36% had squamosal type of COM in the diseased ear. 9

In our study of 500 patients of unilateral COM, 75 patients (17.24%) of mucosal type of COM and 8 patients (12.31%) of squamosal type of COM in the diseased ear had normal contralateral ears. A total of 410 patients (82%) were found to have some abnormalities in the contralateral ear among these 410 patients 360 contralateral ears (82.76%) had mucosal type COM and 57 (87.69%) contralateral ears had squamosal type COM in the diseased ear. This result of our study closely matches with a study by Kutty et al according to which 66.10% of patients had abnormal contralateral ears and 33.90% patients had normal contralateral ears in those who had mucosal type COM. In cases of squamosal COM, 76.20% of patients had abnormal contralateral ears and 23.80% of patients had normal contralateral ears.

#### Otoscopic findings

Otoscopic findings in the contralateral ears were assessed with respect to type of disease in affected ear and it was found that 75 patients (17.24%) of mucosal type of COM and 8 patients (12.30%) of squamosal type of COM in the

affected ear had normal contralateral ears. In total 83 patients (16.60%) had normal contralateral ears.

According to our study grade 2 retraction was the most common otoscopic finding in the contralateral ear. 180 patients (41.38%) of mucosal type COM and 36 patients (55.38%) of squamosal type COM had grade 2 retraction in the contralateral ear. The total incidence of grade 2 retraction in the contralateral ear was found to be 43.20% (216 patients). 40 patients (9.20%) of mucosal type COM and 5 patients (7.69%) of squamosal type COM in the affected ear had grade 1 retraction The total incidence of grade 1 retraction in the contralateral ear was found to be 9% (45 patients). 65 patients (14.94%) of mucosal type COM and 7 patients (10.77%) of squamosal type COM in the affected ear had grade 3 retraction in the contralateral ear. In total grade 3 retraction in the contralateral ear was seen in 72 patients (14.4%). One patient (0.2%) had grade 4 retraction in the contralateral ear. According to a study by Adhikari et al the most common findings in contralateral ear in both mucosal and squamosal type of COM patients was retraction of the tympanic membrane.<sup>9</sup>

35 patients (8.04%) of mucosal type of COM and one patient (1.54%) of squamosal type COM had thinned tympanic membrane in the contralateral ear. Thinned tympanic membrane in the contralateral ear was found to be more in those who had mucosal type COM in the diseased ear than compared to those who had squamosal type COM in the diseased ear which is in consistent with a study by Kutty et al in which otoscopy in the contralateral ear revealed thinned tympanic membrane in 40.70% patients who had mucosal type of COM and 38.10% patients who had squamosal type of COM in the affected ear.<sup>8</sup>

40 patients (9.20%) of mucosal type COM and 7 patients (10.77%) of squamosal type COM in the affected ear had tympanosclerotic patch in the contralateral ear. Overall Incidence of tympanosclerotic patch in the contralateral ear in our study was 9.4%. Study by Kutty et al otoscopy in the contralateral ear revealed tympanosclerotic patch in 18.60% patients who had mucosal type of COM and 19% patients who had squamosal type of COM in the affected ear. This indicates that the incidence of tympanosclerotic patch in the contralateral ear was found to be slightly more in those who had squamosal type of COM in the

affected ear than those who had mucosal type COM in the affected ear.

#### Radiological status

Radiological status of the contralateral mastoids were assessed with respect to type of disease in the affected ear using X-ray both mastoids lateral oblique view and/or HRCT bilateral temporal bones in selected cases. The findings were analysed in which 180 (41.38%) patients of mucosal type of COM and 11 patients (16.92%) of squamosal type of COM in the affected ear had pneumatised contralateral mastoid. In total 191 (38.20%) patients had pneumatised contralateral mastoid. 180 patients (41.38%) of mucosal type of COM and 15 patients (23.08%) of squamosal type COM in the affected ear had diploic contralateral mastoid. Overall 195 patients (40%) had diploic mastoid on the contralateral side. Out of 114 (22.80%) patients of sclerosed mastoid 75 patients (17.24%) of mucosal type of COM and 39 patients (60.00%) of squamosal type of COM in the affected ear had sclerosed contralateral mastoid. In total 114 (22.80%) patients had sclerosed contralateral mastoids. In our study the incidence of mastoid sclerosis was found to be more in those who had squamosal type of COM in the affected ear than those who had mucosal type of COM this was similar to study by Kutty et al according to which 42.4% of contralateral mastoids were pneumatised, 37.3% were diploic and 20.3% were sclerotic in those patients who had mucosal type of COM in the affected ear. In contralateral mastoids of those who had squamosal type COM, 47.6% were pneumatised, 14.3% were diploic and 38.1% were sclerotic.8

#### Hearing status

Hearing status (type and degree of hearing loss) of the contralateral ear was assessed using PTA. According to a study by Acuin et al about 60% of COM patients had hearing loss.<sup>10</sup> In our study 215 patients (49.42%) of mucosal type of COM and 13 patients (20%) of squamosal type of COM in the affected ear had normal hearing. In total 228 patients (45.60%) had normal hearing in the contralateral ear.195 patients (44.83%) of mucosal type of COM and 48 patients (73.85%) of squamosal type of COM in the affected ear had conductive hearing loss in the contralateral ear. 25 patients (5.75%) of mucosal type of COM and 4 patients (6.15%) of squamosal type of COM in the affected ear had mixed hearing loss in the contralateral ear. In total mixed hearing loss was found in 29 patients (5.80%). According to a study conducted by Damghan et al entitled alterations in the contralateral ear in COM, PTA showed a 48% incidence of contralateral ear problems (85% conductive hearing impairment; 12.5% sensorineural hearing impairment; 1.2% mixed hearing impairment).11

In terms of assessment of degree of hearing loss in 500 patients total 228 patients (45.60%) had normal hearing

contralateral ear. 215 patients (49.42%) of mucosal type of COM and 13 patients (20%) of squamosal type of COM in the affected ear had normal hearing. In total 228 patients (45.60%) had normal hearing in the contralateral ear. 167 patients (38.39%) of mucosal type COM and 35 patients (53.85) of squamosal type of COM in the affected ear had mild hearing loss in the contralateral ear. 47 patients (10.80%) of mucosal type of COM and 13 patients (20%) of squamosal type of COM in the diseased ear had moderate hearing loss in the contralateral ear. overall moderate hearing loss in the contralateral ear was found in 60 patients (12%). 6 patients (1.38%) of mucosal type COM and 4 patients (6.15%) of squamosal type of COM had severe hearing loss in the contralateral ear

No patient had profound hearing loss in our study. According to a study by Kutty et al regarding status of contralateral ear in unilateral COM, in those who had mucosal type COM in the affected ear 69.50% had normal hearing, 18.60% had mild hearing loss, 6.80% had moderate hearing loss, 5.10% had severe hearing loss in the contralateral ears. In those who had squamosal type COM in the affected ear, 52.40% had normal hearing, 38.10% had mild hearing loss, 4.80% had moderate hearing loss and 4.80% had severe hearing loss in contralateral ears. 8

#### **CONCLUSION**

COM is almost always a bilateral disease due to eustachian tube dysfunction. Most of the contralateral ears showed some pathology or other. Pathologies found in contralateral ears in otoscopy, the incidence of mastoid sclerosis and the degree of hearing loss in the contralateral ears was found to be more in patients with squamosal disease than the patients with mucosal disease in the diseased ear. We can conclude that according to our study, those who had squamosal type COM had more abnormal contralateral ears than those who had mucosal type COM.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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