

## Original Research Article

# Status of contralateral ear in unilateral chronic otitis media

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### ABSTRACT

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

**Methods:** A prospective study of 15 months between April 2015 to July 2016 was conducted in the Otorhinolaryngology department, enrolling 80 patients with unilateral chronic otitis media. The contralateral ear was defined as the ear with no tympanic membrane perforation. Otoscopy, pure tone audiometry and X-ray mastoid or HRCT temporal bone were done on the patients. The results were recorded and analysed.

**Results:** Descriptive statistical analysis was done using SPSS software version 22 in Windows 7. It was seen that most of the Tympanic membranes were abnormal, with contralateral ear of squamous disease showing more abnormality. Retraction and thinning were the most common abnormalities. And 14.3% cases of pars tensa retractions in squamous cases were grade 4 retractions. Mastoids were mostly sclerosed or diploic, and soft tissue was present in the mastoid antrum in a few cases. Hearing loss was seen in contralateral ear of 47% of squamosal disease and in 30.5 % of mucosal disease.

**Conclusions:** The contralateral ear is now, what the diseased ear was yesterday. The contralateral ear shows unmistakable predilection towards developing chronic otitis media in the future.

**Keywords:** Chronic otitis media, Contralateral ear, Squamous disease, Mucous disease, Hearing loss

### INTRODUCTION

The diagnosis of chronic otitis media (COM) implies a permanent abnormality of the pars tensa or flaccida, most likely a result of earlier acute otitis media, negative middle ear pressure or otitis media with effusion. Hearing loss is due to perforation of the ear drum or disruption of the ossicles.<sup>1</sup> The global burden of illness from CSOM involves 65–330 million individuals with draining ears, 60% of whom (39–200 million) suffer from significant hearing impairment.<sup>1</sup> Prevalence in India was found to be around 7.8% amongst the highest internationally.<sup>2</sup> The contralateral ear (CLE) is defined as the asymptomatic ear in unilateral chronic otitis media. As previous studies have shown, COM is rarely an isolated disease. The factors responsible for COM in one ear may as well affect

the contralateral ear. It is to be remembered that both ears have a common portal of drainage i.e. the nasopharynx. According to the continuum theory unresolved otitis media with effusion later evolves in to chronic otitis media. Examination of the contralateral ear may provide us a guide to the etiology and evolution of the disease. The affected ear may well be the end point of the pathology in the contralateral ear. The so called "crystal ball effect" postulates the same.<sup>4,7</sup> Mastoid pneumatisation or lack thereof of the CLE could be a harbinger of COM in patients with unilateral cholesteatoma.<sup>8</sup> Hence this study was conducted to ascertain the risk of CLE developing COM. This was assessed by otoscopy, high resolution computed tomography of the temporal bone (HRCT), and pure tone audiometry of the CLE.

The objectives of the study were clinical and audiological examination of the contralateral ear in unilateral COM, imaging of the contralateral ear with Xray mastoid (Lateral oblique view) or HRCT temporal bone, if required and comparing the findings in contralateral ear with squamous and mucosal type of chronic otitis media.

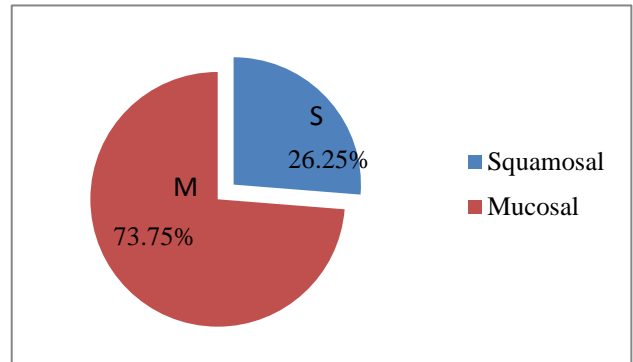
**METHODS**

Ethical clearance was obtained for conducting the study from Yenepoya University Ethics Committee. Eighty patients were enrolled in this prospective study from April 2015 to July 2016. Patients presenting with unilateral COM in the Department of Otorhinolaryngology, at Yenepoya Medical College, were enrolled in the study. The history and clinical findings were recorded. Otoscopy, pure tone audiometry (PTA) and bilateral X-ray mastoid (lateral oblique view) were done. HRCT Temporal bone was done where relevant. The CLE was defined as the ear with no perforation of tympanic membrane (TM). The pars tensa retraction was classified according to Sade' and pars flaccida retractions according to Tos.<sup>9,10</sup> The TM was also examined for evidence of tympanosclerosis and thinning. X-ray mastoid was done to find presence of mastoid bone sclerosis, HRCT temporal bone was performed with the aim of detecting presence of soft tissue in Middle ear cleft, ossicular continuity and mastoid pneumatization. PTA was done and degree of hearing loss was graded as mild, moderate and severe. Presence of sensorineural and mixed hearing loss was also accounted. Data was entered, and analysed using SPSS software version 20 and descriptive analysis done. In the 80 patients included in the study 21 suffered from unilateral squamous disease and 59 suffered from the mucosal variant of COM.

**RESULTS**

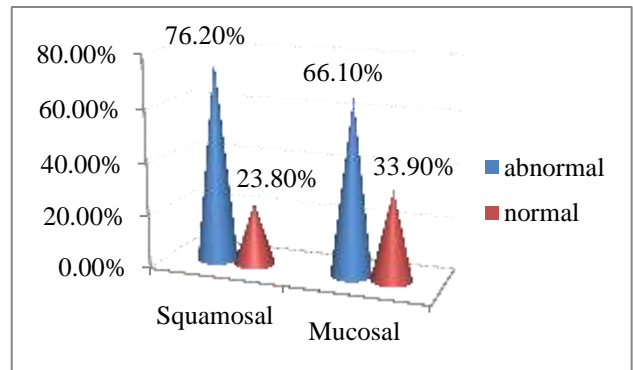
Out of 80 cases 26.25% were squamous diseases and 73.75 % were mucosal diseases as presented in Figure 1.

51.29 % of the subjects were male and 48.75% were female.

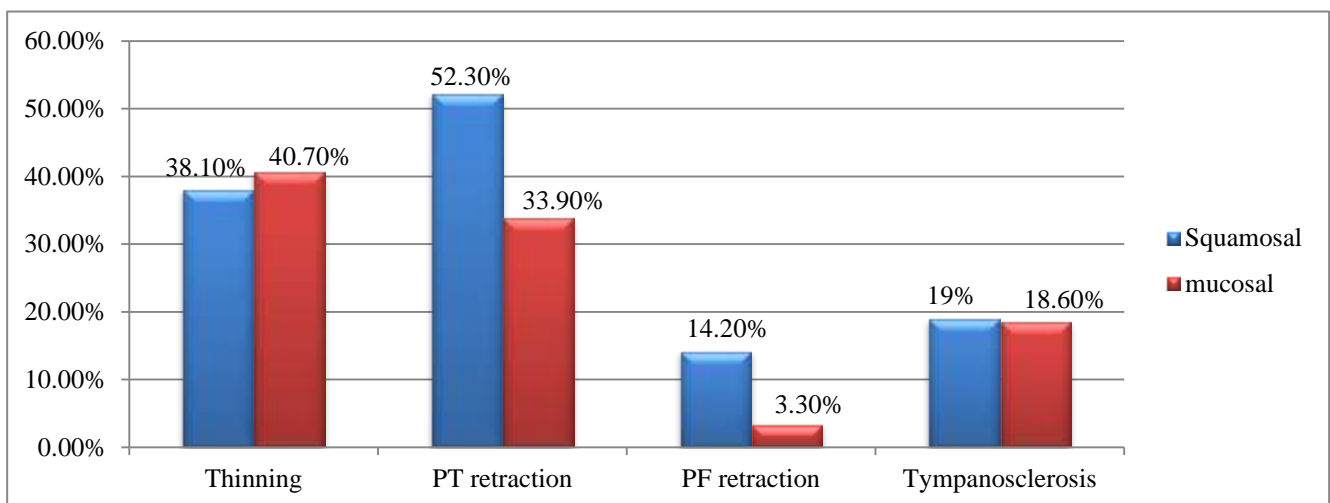


**Figure 1: Types of COM.**

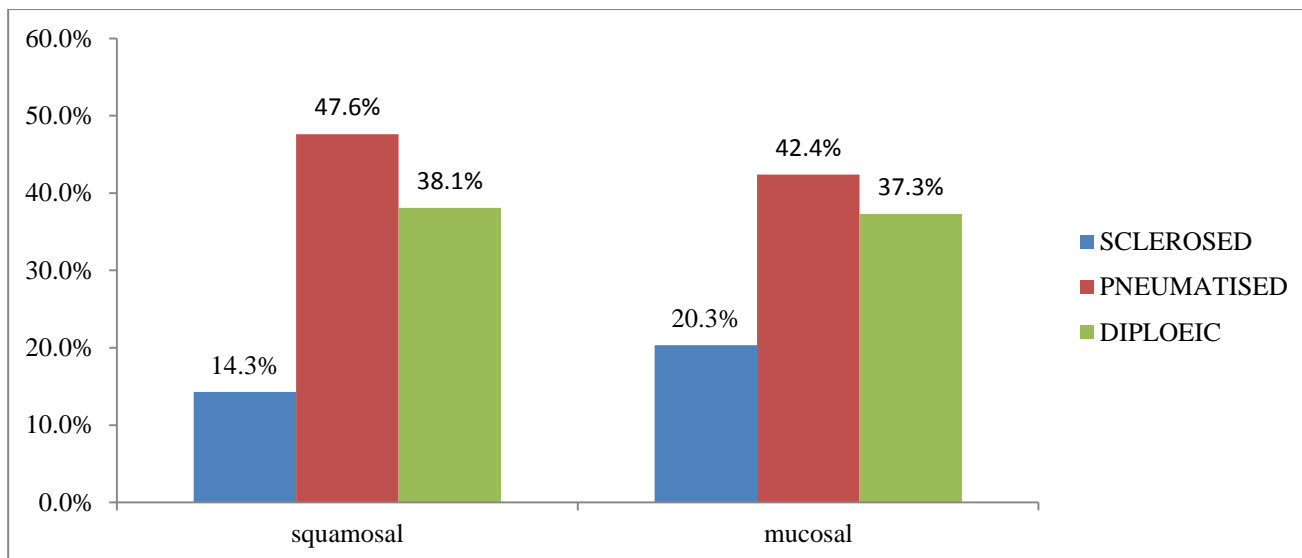
The TM was abnormal in 68.8% of all CLEs as in Figure 2. Presence of tympanosclerosis, thinning, retraction of pars tensa and pars flaccida were assessed. In 21 cases of squamous disease 76.2% had abnormalities, the most common being pars tensa retraction (52.3%), followed by thinning of TM (38.1%), tympanosclerosis (19%), and pars flaccida retraction (14.2%).



**Figure 2: Percentage of abnormal TMs in the CLEs.**



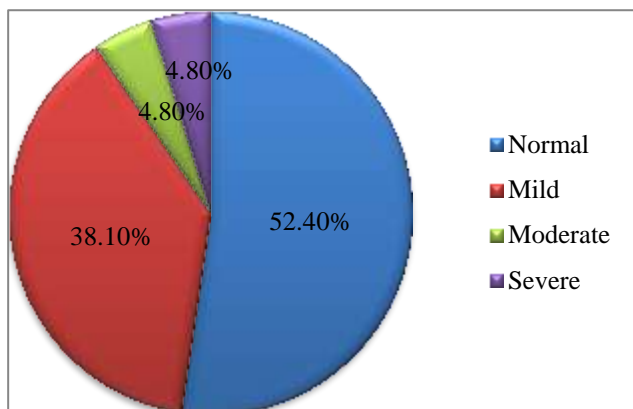
**Figure 3: Changes seen in the tympanic membrane of the CLEs.**



**Figure 4: Pneumatisation of mastoid.**

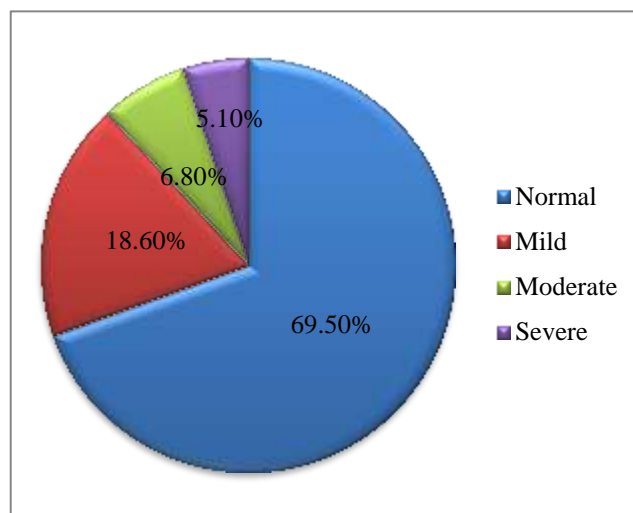
Grade 1 pars tensa retraction was the most common (28.6%). Notably 14.3% cases of pars tensa retraction in squamous cases were grade 4 retraction or adhesive otitis media. Two squamosal cases had grade 1 pars flaccida retraction and one had grade 2 pars flaccida retraction. 66.1% of the 59 mucosal cases had an abnormal TM. The most common of these were thinning of the TM (40.7%), followed by pars tensa retraction (33.9%), tympanosclerosis (18.6%) and pars flaccida retraction (3.3%) Figure 3. In 20 cases of pars tensa retraction, 18 had grade 1 retraction, one had grade 2 and only one case of grade 4 retraction was present.

Mastoid pneumatisation was assessed by X-ray in 55 cases and by HRCT temporal bone in 25 cases. 14.3% of CLE mastoids were sclerosed in squamosal disease. 20.3% of mastoids were sclerosed in mucosal disease. The pneumatisation pattern is as shown in Figure 4. Soft tissue was found in the mastoid antrum of CLEs in squamosal (13.3%) and mucosal (6.3%) cases. Soft tissue was not seen anywhere else in middle ear cleft. ossicular continuity was present in all cases.



**Figure 5: Hearing loss in CLE of squamosal patients.**

Pure tone audiometry was done and mild hearing loss was seen in 38.1% of CLEs in squamosal diseases and 18.6% of the CLEs in mucosal diseases as shown in Figure 5. Sensorineural hearing loss was seen in two cases of mucosal CLEs.



**Figure 6: Hearing loss in CLE of mucosal patients.**

**DISCUSSION**

Studying the CLE helps us in understanding the evolution of COM both in terms of speed and direction. In other words the CLE is today what the diseased ear was yesterday. The present study sought to describe the CLE in terms of otoscopic, radiological as well as audiological changes. In 1996, Vartiainen et al described a series of 493 CLEs in patients undergoing otological surgery for COM (with and without cholesteatoma). They found 63% of the CLEs had some degree of abnormality (defined as severe retraction, perforation, or cholesteatoma), and again, TM retraction was the most frequent finding. This

correlates with our study wherein PT retraction was the most common abnormality in CLE of squamosal ears (52.3%), whereas thinning was the most common abnormality in CLEs of mucosal diseases (40.7%), followed by pars tensa retraction. Furthermore Sady et al postulated that TM retractions were more severe in CLE of ears with squamosal disease.<sup>4</sup> In our study 14.3% cases of pars tensa retraction in squamous cases were grade 4 retraction or adhesive otitis media, whereas only one out of 59 mucosal cases had grade 4 retraction. 3 out of 21 squamosal cases had pars flaccida retraction whereas only 2 out of 59 mucosal cases had the same. Deguine found that the tympanic membrane in the contralateral ears of unilateral cholesteatoma patients was normal in only one-third of cases.<sup>11</sup> Ho Chung et al published a study wherein they found grade 1 Pars tensa retraction as the most common tympanic membrane abnormality. Also radiologically the mastoid pneumatization in the CLE of squamosal patients was reduced compared to controls.<sup>12</sup> In our study, 25 patients underwent HRCT temporal bone and 55 underwent X-ray temporal bone. The mastoid was sclerosed in 14.38% of cases and diploic in 38% cases. In mucosal ears, 20% sclerosed and 37.3% diploic mastoids were seen. Soft tissue was seen only in the mastoid antrum. The limitation of radiological evaluation in this case was that a very limited number of squamosal cases were taken, as compared to the less severe mucosal cases. Thus our finding is unlike that of Da Silva et al, wherein primarily the patients were those who had severe COM and HRCT was an absolute indication. Da Silva et al found a high number of abnormalities including prevalence of opacification or mucosal thickening in the tympanic cavity of approximately 20%. Also signs of some form of complication, such as cortical erosion of the mastoid, tegmen erosion, or fistula of the lateral semicircular canal were seen in their patients.<sup>13</sup> According to Ho Chang et al, CLE was found to be significantly different from control ears in terms of pneumatization of mastoid antrum (evaluated by calculating pneumatized areas and aeration ratios), development of the anterior epitympanic space, and eustachian tube patency.

In the study by Ho chung et al, 60 % of contralateral ears had normal hearing levels, with others having an air bone gap only up to 44 db.<sup>12</sup> A study by Damghani and Barazin published in 2013, showed 85% conductive hearing impairment, 12.5% sensorineural hearing impairment; 1.2% mixed and a total of 73.2% of patients with conductive hearing loss had a problem across all frequencies. Also tympanometry showed 38% of CLEs had an abnormal result.<sup>14</sup> A study of CLE in unilateral acquired cholesteatoma showed that 30% of contralateral ears presented moderate to severe HL level with more than 25 dB hearing loss.<sup>13</sup> In the present study, hearing loss was seen in contralateral ear of 47% of squamosal disease and in 30.5% of mucosal diseases. SNHL was seen in two cases of mucosal CLEs. A limitation of this study is the absence of tympanometry in patients.

## CONCLUSION

The present study and the ones preceding it have proven beyond doubt the presence of abnormalities in the CLE of squamosal and mucosal disease, more so in cases of squamosal disease. Scheibe Ana Bárbara et al refers to this phenomenon as the "Orloff effect @ " referring to the television advertisement of a beverage, whose slogan was "I am you tomorrow". Since prevention is better than cure, it is the recommendation of the authors that steps be taken to evaluate both ears as an intrinsic unit as well as find predisposing factors in the common portal and resolve it.

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