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A study on status of contralateral ear in unilateral chronic suppurative otitis media

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Abstract

Aims and Objectives

- Studying the anatomical and functional changes in contralateral ear with unilateral chronic suppurative otitis media.
- Comparing the findings in contralateral ear with squamous and mucosal type of chronic suppurative otitis media.

Materials and Methods: 100 patients in age group between 15 years and 50 years, with unilateral chronic ear discharge consulting department of ENT at Dr VRK Womens Medical College were evaluated from November 2018 to May 2020.

Clinical examination and audio logical evaluation were done for all patients. Procedure like Diagnostic nasal endoscopy, Otoendoscopy, Otomicroscopy and radiological evaluation were also included.

Results: Out of 100 patients most (90) of the patients were tubotympanic type and few (10) were atticofacial type of CSOM. Contralateral ear finding of TTD type of CSOM were retraction of tympanic membrane, tympanosclerosis and thin membrane. Contralateral ear finding of AAD type of CSOM were retraction of tympanic membrane, granulation tissue. Patient had conductive hearing loss in the contralateral ear. Radiologically also had a evidence of disease in the contralateral ear.

Conclusion: Patients with COM in one ear are more likely to develop some degree of disease in the contralateral ear. The results of this study showed that we should not consider COM as a disease limited to one ear because in many cases the occurrence of this disease can affect both ears. This issue should always be clarified in patients in order to achieve effective therapeutic planning. Consequently, the contralateral ear should always be evaluated comprehensively in patients with unilateral COM to efficiently diagnose any alterations and, provide timely therapeutic intervention.

Keywords: chronic suppurative otitis media, tubotympanic disease, atticofacial disease, tympanic membrane perforation, retraction of tympanic membrane

Introduction

The frequency of occurrence of chronic suppurative media is well known. Prevalence of CSOM in developing countries represents a wide range 4% to 33.3% [1]. Chronic suppurative otitis media [CSOM] is defined as a chronic infection of the mucosa lining the middle ear cleft. Middle ear cleft include the eustachian tube, hypotympanum, mesotympanum, epitympanum, aditus and mastoid air cell system. Chronic otitis media is divided into mucosal type of chronic otitis media and squamous type of chronic otitis media. There are various theories on pathogenesis of chronic otitis media. Otitis media seems to exist through a continuous series of epithelial and subepithelial events, and, after the initial triggering episode serous or purulent becomes serous-mucoid, then mucoid, and, in the absence of therapeutic resolution, chronicity may ensue. Chronic suppurative otitis media doesn't seem to be an isolated event that occurs in a particular patient. It seems rather be the product of a series of events constitutional of the individual. The precise and critical evaluation of both ears plays a fundamental role in the prognostic evaluation of the patient, because the ear with established CSOM can serve as a guide for the probable evaluation in the contralateral ear. Otoendoscopy is an upcoming day care procedure in the field of otology. It has several advantages over routine Otoscopy for e.g. better resolution, wider field of vision, Camera connectivity etc.

The disease often evolves in a continuum. Abnormalities that at first caused mild or minimal symptoms, such as simple retractions, can progress to severe changes, such as retraction pockets and destructive cholesteatoma.

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This continuum model explains the development of COM in a progressive manner. According to this theory, effusion, perforations, and cholesteatoma represent different pathological stages of the same disease. The evolution of this continuum can be seen in the contralateral ear (CLE). When tubal dysfunction is the trigger of COM, then there is a high probability of impairment of both ears, although in different intensity. Some studies point to a tendency of bilateral involvement of the middle ear by inflammatory pathologies [2].

Contralateral ear is defined as the asymptomatic ear. Contralateral ear [CLE] is evaluated as normal or abnormal. Abnormal ear is again classified according to their otoscopic findings. That may be normal, fluid in the middle ear, tympanosclerosis, retraction of pars tensa and pars flaccid, granulation, atelectasis and healed thin membrane.

Aim and Objectives

1. Studying the anatomical changes in contralateral ear with unilateral chronic suppurative otitis media.
2. Studying the functional changes in contralateral ear with unilateral chronic suppurative otitis media.
3. Comparing the findings in contralateral ear with squamous and mucosal type of chronic suppurative otitis media.

Materials and Methods

Source and collection of data:

All patients who had complaint of unilateral ear discharge for more than 3 months were taken up for study.

Prospective study of 100 patient, who had unilateral chronic ear discharge attending to the Department of Otorhinolaryngology OPD of the Dr. VRK Women’s Medical College were included. The study was conducted for a period from November 2018 to May 2020. Ethical committee clearance taken and also Patient Consent was taken for the study.

After history taking and clinical examination of Ear, Nose and Throat, the following investigations/procedure were done and recorded.

- Diagnostic Nasal Endoscopy.
- Otoendoscopy (pic:2)

- Otomicroscopy (pic:3)
- Audio logical evaluation: Pure tone audiometry (pic: 5), Impedance audiometry (pic: 6).
- Bilateral X-ray mastoid: Schuller’s view (pic: 14).
- HRCT temporal bone done if needed (pic: 15).

Reason for undertaking study: Chronic otitis media does not seem an isolated event that occurs in a particular patient ear. It seems rather, be the product of a series of events „constitutional „of the individual. The precise and critical evaluation of both ears plays a fundamental role in the prognostic evaluation of the patient because the ear with established chronic otitis media can serve as a guide for the probable evaluation in the contralateral ear.

Inclusion criteria

All unilateral CSOM patient between 15 to 50 yrs.

Exclusion criteria

- Traumatic CSOM.
- Bilateral CSOM.
- Previous history of ear surgery.

Results

Age distribution:

Out of 200 patient, 32 patient were in between 15-20years (16%), 84 patient were in between 21-30 years(42%), 44 patient were in between 31-40 years(22%) and 40 patient were in between 41-50 years (20%).

Table 1: Age and Sex wise distribution

Age group	Male	female	total
15-20 yrs	14	18	32
21-30 yrs	38	46	84
31-40 yrs	18	26	44
41-50 yrs	12	28	40
total	82	118	200

Sex ratio

Among them male patient were 82 (41%) and female patient were 118 (59%)

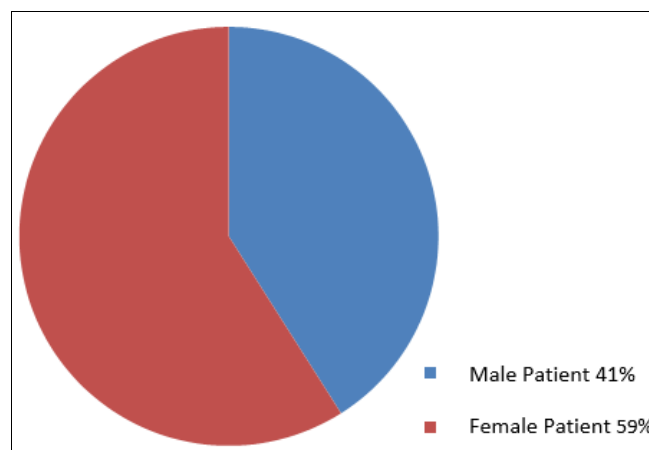


Fig 1: Pie diagram showing gender wise distribution

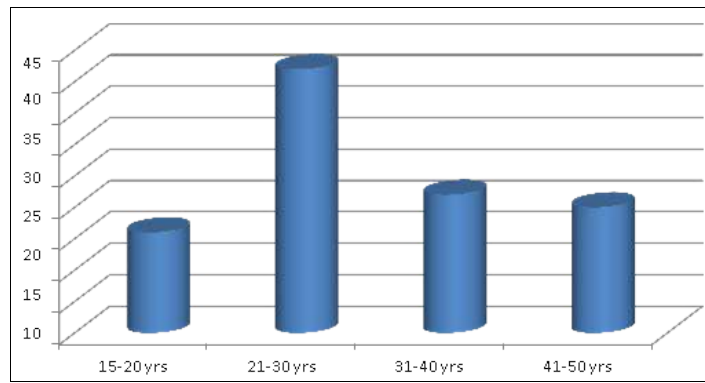


Fig 2: Age and Sex wise distribution

Symptoms in which patient presented: 82% patient had ear discharge complaints, with 12% of patient had decreased hearing and 6% had ringing sensation in the ear.

Table 2: Symptoms in which patient presented

Symptoms	No of patients	Percentage
Only ear discharge	164	82%
Ear discharge with decreased hearing	24	12%
Ear discharge with tinnitus	12	6%

Table 3: Duration of ear discharge

Duration of ear discharge	No of patients	Percentage
Since childhood	68 patients	34%
5 years	40 patients	20%
2 years	56 patients	28%
1 year	36 patients	18%

Side of ear involvement: 100 patient on the right ear (50%) and 100 patient on the left ear (50%) were symptomatic.

Types of CSOM: 180 patient were diagnosed to have tubotympanic disease (90%), 20 were atticoantral disease (10%)

Clinical findings (perforation): On examination in the symptomatic ear perforation were seen in the pars tensa and

pars flaccid. In pars tensa 10 were total perforation (5%), 64 were subtotal perforation (32%), 22 were large perforation (11%), 48 were medium size perforation (24%), 36 were small perforation (18%) and 20 were attic perforation (10%)

Contralateral ear findings

When on Otoendoscopy and Otomicroscopy were used to know the ear finding, the following finding were noted.

Table 4: Contralateral ear findings

Contralateral ear Findings	Grades	Number	Percentage
Normal tympanic membrane	-	64	32%
Abnormal tympanic membrane		136	68%
Abnormalities are			
Retraction of pars tensa	Grade I	72	52.9%
	Grade II	42	30.8%
	Grade III	0	0%
	Grade IV	2	1.4%
Retraction of pars flaccid	Grade I	18	13.2%
	Grade II	2	1.4%
	Grade III	0	0%
	Grade IV	0	0%
Tympanosclerosis patch	-	50	36.7%
Thin healed membrane	-	16	11.7%
Granulation tissue	-	4	2.9%

Diagnostic nasal endoscopic findings

On diagnostic nasal endoscopy majority that is 168 (84%) patient had deviated nasal septum with spur. Out of which

148 patients were asymptomatic and only 20 patient were symptomatic. Nasal surgery was considered first for these symptomatic cases.

Table 5: Diagnostic nasal endoscopic findings

Diseased ear	Deviation of septum to right		Deviation of septum to left	
	Asymptomatic	Symptomatic	Asymptomatic	Symptomatic
Right ear	34	6	36	4
Left ear	36	6	42	4

Type of Hearing Loss

All of them had conductive hearing loss. Pure tone average hearing loss were compared with contralateral ear and diseased ear as follows.

Table 6: Type of Hearing Loss

Hearing loss in decibel	Contralateral ear	Diseased ear
<25 DB	178	04
26-40 db	24	106
41-55 db	-	50
56-70 db	-	30
71-91 db	-	10
>91db	-	-

Table 7: Impedance Audiometry findings

Impedance audiometry	Contralateral ear	Diseased ear
A type	64	0
B type	16	164
C type	136	36

Table 8: Mastoid X-ray findings

X-ray mastoid	Pneumatized	Sclerosed	Diploic
Diseased ear(100)	0	130	70
Contralateral ear(100)	90	60	50

X-ray mastoid showed sclerosed, pneumatized and diploic changes.

Table 9: HRCT finding of Atticoantral type- CSOM

HRCT Findings	Contralateral ear in atticoantral disease.
Soft tissue in tympanic cavity	4
Soft tissue in mastoid cavity	0
Ossicular chain defect	6
Scutum erosion	2
Poor mastoid pneumatization	12
Normal	4

Discussion

Limited data are currently available in the literature relating to the contralateral ear in patients with COM. Previous studies have predominantly focused on the condition of the contralateral ear via Otoscopy, but in our study we use PTA, tympanometry, Otomicroscopy, diagnostic nasal endoscopy and radiography in addition to Otoscopy for the evaluation of the contralateral ear in COM.

Age distribution

In this study the average age was 25.02 years (15-50 years). In a study performed by Scheibe B *et al* [3], the average age was 26.3 years, the study conducted by Akeem AL mean age years was 35.4±4 (16-75yrs) [4]. The age ranged from 7 to 57 years in study conducted by Abou-Elhamd *et al.* [5] the study conducted by Damghani MA, *et al* mean age year was 23.03±12.9(15-63yrs) [6].

Sex ratio

In 200 patients, 82 were male and 118 were female. In study conducted by Akeem AL [4] out of 64 patients 44 were male and 40 were female. In study by Md Aliout of 100 patient 47% male and 53% female [6], but in Adhikari P study out of 750 patients 64.4% were male and 35.6% were female [7].

They were 31 males and 15 females in study by Abou-Elhamd *et al.* [5].

Symptoms in which patient presented

The main presenting symptoms was ear discharge 82% and then with 12% decreased hearing, few had 6% tinnitus. The main cause of the disease was AOM. In study by Damghani MA *et al*, the chief complaint of patients was hearing impairment and purulent drainage of the ear, that is the chief complaint in 56% of patients was otorrhea, followed by hearing impairment (37%), whereas in other studies these factors were disregarded.⁶

Most of cases (56.5%) presented with aural discharge and 17% presented with diminution of hearing [5].

Duration of ear discharge

In the study duration of discharge ranged since childhood to 1 year. But study in Damghani MA *et al* the average duration of disease was 11.87±10.9 years (range, 1– 15) [6], compared with 6.5 years as reported in an earlier study.

Type of CSOM

The mucosal type of CSOM was 90% and the squamous type was 10%. In study conducted by Damghani MA *et al* [6] of 100 patients chronic suppurative otitis media 33 were squamous type, and 67 were mucosal type. 36.0% were squamous type in the Prakash Adhikari study [7].

Clinical findings (perforation)

On examination in the symptomatic ear, tympanic membrane perforation were seen in the pars tensa and pars flaccid. In pars tensa 10 were total perforation (5%), 64 were subtotal perforation (32%), 22 were large perforation (11%), 48 were medium size perforation (24%), 36 were small perforation (18%) and 20 were attic perforation (10%). In study conducted by Akeem AL *et al.* [4], 77 perforated ear drums were studied and 15 (24.2%) had bilateral TM perforations, 21 (33.9%) right unilateral and 26 (41.9%) left unilateral.

Contralateral ear findings

In this study, the incidence of problems in the opposite ear based on Otoscopy, PTA, tympanometry and radiographic techniques was 68% which were near to 60% of other study.⁷⁶ In study conducted Damghani MA [6] Otoscopy showed 54% of patients had a problem in the contralateral ear. It was noted that like our study some patients had overlapping symptoms. The most common symptoms were perforation of the ear drum (59.2%) and plaque sclerosis (44.4%).

Furthermore, according to the results of Otoscopy, 68 patient had retraction of tympanic membrane in that pars tensa grade I- 36, Grade II- 21, Grade III -0, Grade IV- 1 and

these feature was more in tubotympanic CSOM. The attic retraction Grade I -9 and Grade II-1 was found in 10 pt who had attico-antral CSOM. In other studies ear- drum perforation and the existence of plaque sclerosis in the ear drum were the principal problems.

In this study tympanosclerosis patch was seen in CLE in about 50 patient. According to our study, incidence of tympanosclerosis was found to be almost same in males (26)

and females (28). This was comparable to the study by Kamaljit Kaur *et al* and Indranil Pal where male: female ratio was 1.23:1 and 1:8. Kinney (1978) and Asiri *et al* (1999) also did not report any predominance of tympanosclerosis in a particular sex^[8].

In our study the maximum incidence was found in the age group of 21-30 years. According to Indranil Pal (2005), maximum incidence was in 21-40 years age group^[8].

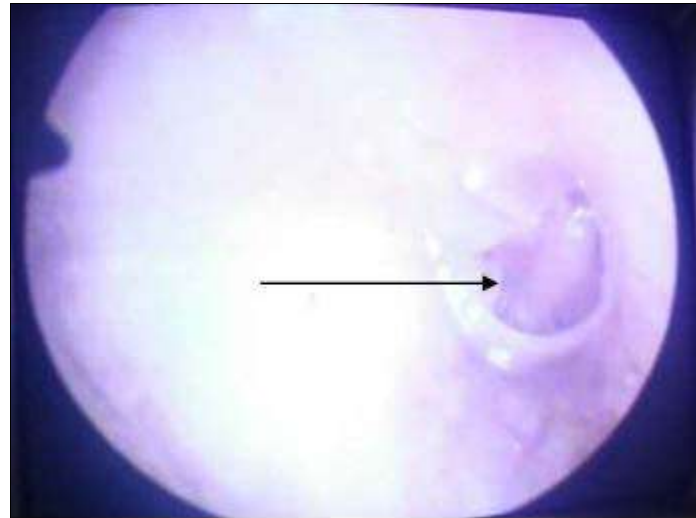


Fig 3: Tympanic membrane perforation

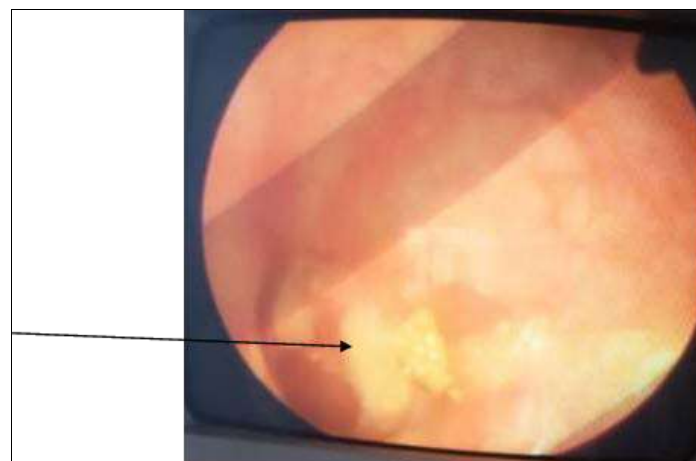


Fig 4: Tympanosclerosis patch



Fig 5: Adhesive otitis media

Diagnostic nasal endoscopic findings

All patient undergone diagnostic nasal endoscopy in which most of them had deviated nasal septum where was asymptomatic. In this only 20 patient had deviation of nasal septum with spur which were symptomatic.

In other study conducted by Buztus *et al.*^[9] 40 patients (73%) had septal deviation / turbidostat deformity which was the most common anatomical variant Using paranasal CT procedures, Gocmen *et al*, reported septal deviations in 52% of 52 patients with adhesive otitis, and 17% of 60 control subjects.

Out of 100 patient of CSOM a study by Damghani MA *et al*, on nasal examination, 40(40%) cases had a normal finding. Unilateral obstruction alone was observed in 33(33%) cases while bilateral obstruction was observed in 1(1%) case.

Type of Hearing Loss

Maximum hearing loss was seen where tympanosclerotic patch was found in the posterosuperior quadrant of tympanic membrane. In our study maximum patients had tympanosclerotic patches in anteroinferior quadrant. But in a study by Indranil Pal, majority of patients, 26% of patients had tympanosclerotic patch in posterosuperior quadrant [5]. According our study, anterosuperior tympanosclerosis was found to have minimal hearing loss. Hearing loss was found in 64% of cases according to our study which was comparable to study by Indranil where 60% had conductive hearing loss [8].

In this study, PTA analysis showed that 90% of pt with CLE had near normal hearing and 10% patient had moderate hearing loss which was conducting hearing loss, but, no sensory hearing loss. But study conducted in Iran 48% of patients had hearing impairment in the contralateral ear, which was conductive in 85% of cases, sensorineural in 12.5% and a mixed hearing impairment in 1.2%.

The results of PTA indicated 48% hearing impairment in the contralateral ear. In other study the results of PTA indicated 48% hearing impairment in the contralateral ear, with 73.2% of patients experiencing conductive hearing loss across all frequencies.

In our study right side ear were equal to left but in other study Fifty-three percent of patients had COM in the left ear, with the causative factor in 47.5% of patients being AOM.

Impedance Audiometry findings

By means of tympanometry, 68% were diagnosed to have problem in CLE in whom type A was 32%, type B was 8% and type C was 68%. In other study by Damghani MA, 38% of patients were diagnosed with a problem in the contralateral ear, out of which 89.5% was type B and 10.5% was type C⁶ and in other study 36 was B type and 4 was C type¹⁰

HRCT findings of atticoantral type-CSOM

In this study, HRCT temporal bone showed soft tissue in tympanic cavity [4], ossicular chain defect [6], scutum erosion [2] poor pneumatization [12] in 20 cases of attico-antral diseases.

Conclusion

Patients with COM in one ear are more likely to develop some degree of disease in the contralateral ear. The results of this study and previous studies show that we should not consider COM as a disease limited to one ear because in many cases the occurrence of this disease can affect both ears. This issue should always be clarified in patients in order to achieve effective therapeutic planning. Consequently, the contralateral ear should always be evaluated comprehensively in patients with unilateral COM to efficiently diagnose any alterations and, if necessary, provide timely therapeutic intervention.

The mucous type of chronic otitis media has a chances forming various grades of tympanic membrane retraction, tympanosclerosis, thin healed membrane in the contralateral ear. The squamous type of chronic otitis media also has a

greater chance of contralateral ear involvement like, retraction granulation etc.

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Conflict of Interest

None

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Nil

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