

## Original Research Article

# An increase in cases of complicated chronic otitis media: an indirect impact of COVID pandemic

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**Received:** 23 November 2021

**Revised:** 07 December 2021

**Accepted:** 08 December 2021

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### ABSTRACT

**Background:** Chronic otitis media is the most common disease dealt by an otologist, the cases of complication of which are remarkably low. The use of antibiotics and mastoidectomies have resulted in the fall of the fatal complications. COVID-19 pandemic called for restrictions which lead to medical care delay.

**Methods:** This study was conducted in the department of otolaryngology of GMC and associated hospitals, Jammu from June 2020 and May 2021. The data was retrospectively collected the data from March 2018 to June 2020. The study group included the patients diagnosed with Chronic suppurative otitis media (CSOM) on otoscopy and the patients with complications of CSOM were evaluated for the symptoms of complication, type of complication, bacteriology, treatment and hospital stay.

**Results:** The 38 (7.5%) patients among these were diagnosed with one or other complication, out of which 29 (76.3%) cases occurred during the COVID pandemic. The extra-cranial complications were more common and young to middle age group was more commonly involved.

**Conclusions:** COM is a common otological disease, the occurrence of which should not be taken lightly. Without timely and accurate treatment, the complications ensue which are difficult to treat and require expertise.

**Keywords:** Chronic otitis media, COVID-19, Extra-cranial complications, Intra-cranial complications

### INTRODUCTION

Hippocrates has written in his work Amorphisms “For extreme diseases, extreme methods of cure, as to restriction, are most suitable.” WHO declared COVID-19 a pandemic in December 2019 leading to temporary disruptions in routine and nonemergency medical care access. This unavoidable medical care delay increased the morbidity and mortality risk associated with treatable and preventable health conditions. CSOM is persistent inflammation of the middle ear or mastoid cavity characterised by recurrent or persistent ear discharge (otorrhoea) over 2 to 6 weeks. Synonyms of CSOM include chronic otitis media/COM, chronic mastoiditis, and chronic tympanomastoiditis.<sup>1-3</sup> The most common microorganisms that associated with CSOM are *Pseudomonas aeruginosa* and *Staphylococcus aureus*. *P*

*aeruginosa* is more commonly associated with bony necrosis and mucosal disease which causes complications in CSOM.<sup>4</sup> Complications of CSOM can be classified as extracranial (EC) or intracranial (IC). Extracranial complications include acute/ coalescent/ masked mastoiditis (Complications of mastoiditis: post auricular abscess, Bezold’s abscess, and temporal abscess, petrositis), labyrinthitis, facial nerve paralysis (FNP). Intracranial complications comprise meningitis, brain abscess (including extradural, epidural, subdural), lateral sinus thrombophlebitis (LST), and otitic hydrocephalus.<sup>5</sup> The routes of spread of EC and IC complications include thrombophlebitis of the venules of the adjoining cranial bones, bone erosion by pressure, bone necrosis by enzymatic actions, preformed pathways (congenital dehiscence, patent sutures, surgical defects, skull

fractures, oval and round window) and hematogenous spread.<sup>6,7</sup>

The prevalence of CSOM is 65 to 330 million people worldwide and 60% of these have clinically significant hearing impairment, on the other hand, the prevalence of COM in India is 7.8%.<sup>1</sup> Chronic suppurative otitis media (CSOM) is a common disease in developing countries that can lead to severe complications, if not treated timely, accurately and properly. With advent of antibiotics, incidence of CSOM-related complications has significantly decreased; nonetheless, this problem is still being faced by many otologists.<sup>6,8,9</sup> Frequency of CSOM complications was 20% in 1938, reduced to 2.5% in 1948 worldwide because of antibiotic usage and at this moment in time; it is estimated to about 0.7 to 3.2% worldwide.<sup>4</sup>

This study focuses on change in the incidence of complications, change in type of complication and bacteriology of CSOM before and during COVID-19.

**METHODS**

This study was conducted in the department of otolaryngology of GMC and associated hospitals, Jammu from June 2020 and May 2021, after approval by institutional ethics committee. The data of CSOM patients was retrospectively collected from March 2018 to June 2020 and randomly selected the patients diagnosed with CSOM on otoscopy on Outpatient basis.

**Inclusion criteria**

Patients diagnosed with features of chronic otitis media and patients with or without complications were included in the study.

**Exclusion criteria**

Patients diagnosed with acute otitis media, otitis media with effusion, acute suppurative otitis media and patients not willing to take part in study were excluded.

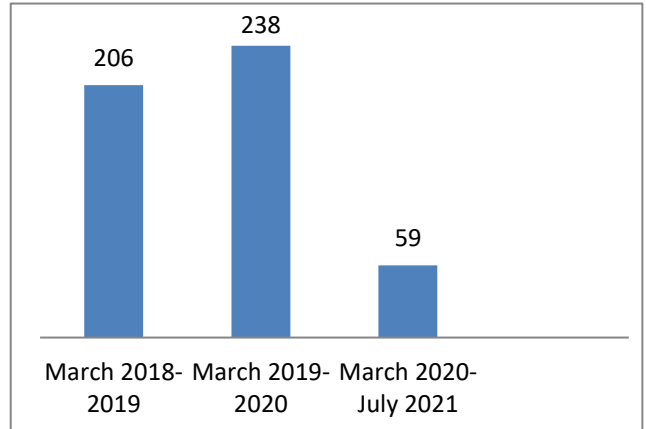
Patients were evaluated clinically, underwent routine investigations, Pure tone audiometry, bacteriology and radiological studies. Patients with complications of CSOM were classified as EC (mastoid abscess, petrositis, labyrinthitis, FNP and Bezold’s abscess) or IC (intracranial abscess, including extra-dural, epidural, subdural, perisigmoid sinus, and brain abscesses; lateral sinus thrombophlebitis; meningitis; and otitic hydrocephalus). The demographics, chronological distribution, symptoms on admission, bacteriology, pathological findings, duration of hospital stay and complications were assessed and analysed.

**Statistical analysis**

All the data was compiled on MS excel spreadsheet and categorical variables were evaluated using percentages.

**RESULTS**

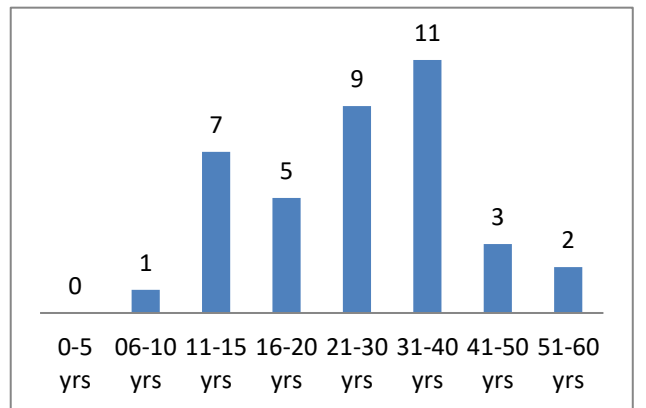
During the period from March 2018 to July 2021, 503 patients diagnosed with CSOM underwent a mastoidectomy (Figure 1). The 38 (7.5%) patients among these were diagnosed with one or other complication. Of the 503 patients that underwent an operation, 389 (77.3%) had cholesteatoma, and 114 (22.6) had granulation and/or polyp tissue. Of the 389 patients who had cholesteatoma, 29 (7.4%) had a complication. Of the 114 patients with granulation and/or polyp tissue, 9 patients (7.8%) had complications.



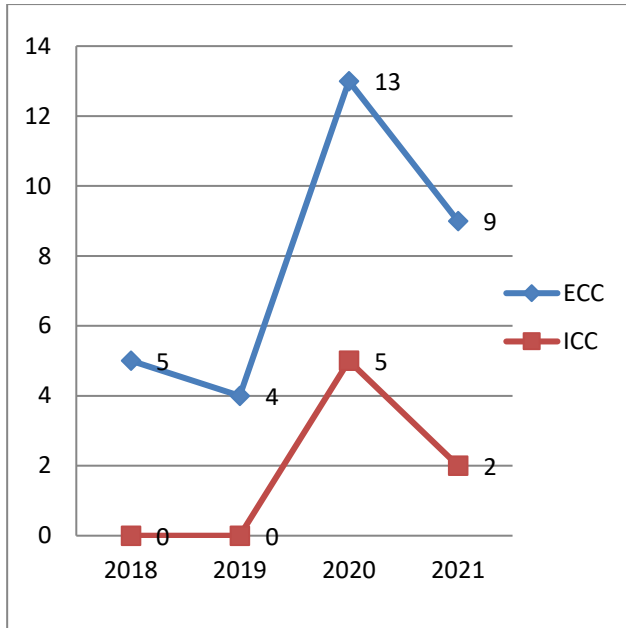
**Figure 1: Number of mastoidectomies performed in our department year wise.**

**Demographics**

The male to female ratio was 1.19. The patients with complications of CSOM ranged between 6 and 52 years of age. The 38 (7.5%) patients were diagnosed with one or other complication, out of which 29 (76.3%) cases occurred during the COVID pandemic. The age and chronological distribution of the complicated CSOM patients is shown in Figure 2 and 3 respectively. Figure 3 clearly depicts the surge in COM with complication during the years of COVID pandemic.



**Figure 2: Age wise distribution of COM with complications.**



**Figure 3: Increase in the number of both extra and intracranial complications of COM during COVID-19 pandemic.**

**Presenting symptoms**

All patients complained of otorrhoea and 42.1% patients had decreased hearing and 34.2% had fever as their chief symptoms. The distribution of symptoms is shown in Table 1.

**Table 1: Symptoms of complicated COM. Otorrhoea, decreased hearing and fever were most common.**

Symptoms	No. of patient	Percentage (%)
Otorrhoea	38	100
Headache	7	18.4
Decreased hearing	16	42.1
Meningeal sign	3	7
Fever	13	34.2
Vertigo	4	10.5
Postauricular swelling	11	28.9
Facial nerve paralyses	8	21

**EC and IC complications**

Either an EC or IC or combined EC and IC complication occurred in 38 patients. The most common EC complication in our series was mastoid abscess, followed by labyrinthitis (9%), FNP (8.4%). The most common IC complication was otitic meningitis (9%), brain abscess (6.5%) and the extradural abscess as shown in the Table 2.

**Table 2: Extra and intracranial complications.**

Complications	No. of patient	Percentage (%)
<b>Extracranial</b>		
Mastoid abscess	15	39.4
Labyrinthitis	8	21
FNP	8	21
Petrositis	0	0
<b>Intracranial</b>		
Lateral thrombophlebitis	0	0
Meningitis	4	10.5
Brain abscess	2	5.2
Extra-dural abscess	1	2.6
Otitic hydrocephalus	0	0
<b>Total</b>	<b>38</b>	

**Bacteriology**

The bacterial cultures were sent and were positive only in 17 (44.7%) of the patients. The most common bacterial organisms isolated were: *Staphylococcus aureus*, *Proteus mirabilis*, *Streptococcus pneumoniae*, and *Pseudomonas aeruginosa*.

**Pathology**

Squamous disease includes cholesteatoma in the middle ear, was more common intraoperative finding in both extra-cranial complications and intra-cranial complications.

Distribution of complications according to pathologies is depicted in Table 3.

**Table 3: Pathology associated with the complication.**

Complications	Mucosal disease	Squamous disease
<b>Extracranial</b>		
Mastoid abscess	4	11
Labyrinthine fistula	1	7
Facial nerve paralysis	3	5
<b>Intracranial</b>		
Lateral thrombophlebitis	0	0
Sigmoid sinus abscess	0	0
Meningitis	1	3
Brain abscess	0	1
Extradural abscess	0	2
Otitic hydrocephalus	0	0
<b>Total</b>	<b>9 (23.6%)</b>	<b>29 (76.3%)</b>

**Treatment**

Mastoid abscess was treated with IV antibiotics followed by a mastoid surgery. Labyrinthitis patients required IV antibiotics, labyrinthine sedatives, absolute bed rest and then tympano-mastoidectomy. The cholesteatoma was removed from fistula site and the fistula was sealed with

graft and fat (Figure 4). Patients with Facial nerve paresis were started on steroids followed by mastoidectomy and facial nerve decompression. Meningitis was treated first with multiple dose intravenous antibiotics given before ear surgery until meningitis was settled (48-72 h) which was followed by mastoidectomy. Patients with extradural or brain abscess underwent drainage of the abscess following the neurosurgery consultation. Simple mastoidectomy in presence of reversible pathological changes such as mild to moderate middle ear mucosa swelling and modified radical mastoidectomy in the presence of irreversible pathological changes such as cholesteatoma, granulation and polyp was done.



**Figure 4: Fascia graft and fat covering the fistula.**

### Hospital stays

The duration of hospitalization ranged from 5 to 12 days (mean 11.3 days), with 89% of the patients being discharged during the first 7 post-operative days

### DISCUSSION

Our study showed that the most common age groups with complications were young and middle-aged. According to the studies by Osma et al, Dubey et al, Kangsanarak et al, Abada et al, Mustafa et al and Sharma et al these complications are more frequent in young and middle-aged adults.<sup>2,6,9-13</sup> The complications of CSOM in our study were predominantly in males which is in accordance with other studies as well.<sup>2,6,7,9,12-14</sup> The most frequent symptoms of our patients were otorrhoea, hearing loss, and fever which were similar to other reports.<sup>2,6,7,9,12,13</sup>

Our study included the time period of COVID pandemic and hence the rate of complicated cases (7.5%) in our series is slightly more than previously reported data. Kangsanarak et al reviewed 17,000 patients with suppurative otitis media and calculated the prevalence of complications as 0.69%.<sup>9</sup> In another series of 24,321 otitis media patients, Mustafa et al found that among 1,803 patients with chronic otitis media with cholesteatoma, 91 patients (5%) had complications.<sup>12</sup> Osma et al reviewed 2,890 chronic otitis media patients and found 93 patients (3.22%) with complications.<sup>2</sup>

Yorgancilar et al calculated the prevalence of CSOM complications as 2.6%.<sup>7</sup>

With respect to pathology of COM, 76% of the complications occurred in cholesteatomatous ears and 23% complications occurred in mucosal ear diseases. This is in accordance with studies by Kangsanarak et al and Abada et al who reported 80% and 70% of patients with complications had associated cholesteatoma.<sup>9,11</sup> Osma et al reported that 78.5% of patients had a cholesteatoma in a study by, while 21.5% had granulations. Yorgancilar et al 18.4% patients with cholesteatoma had a complication and in 6.8% of patients with granulation and/or polyp tissue complications were identified.<sup>2,7</sup> Only one study by Baljosević et al reported cholesteatoma in 37%, polypoidal tissue in 47% and granulation tissue in 47% of complicated CSOM cases.<sup>14</sup>

The mastoid abscess was the most common EC complication (39.47%) in our study. In most of the studies, mastoid abscess was the frequent EC complication, 27.8% by Yorgancilar et al 21% by Abada et al and Baljosević et al and 20% by Sharma et al.<sup>7,11,14,15</sup> Subperiosteal abscess which is a complication of acute mastoiditis was reported to be the most common EC complication in a study by Kangsanarak et al and Sharma et al reported subperiosteal abscess as second commonest EC complications with an incidence of 40%.<sup>9,13</sup> Mastoiditis was found most commonly in young age group in our series and is similar to the studies done previously. Dubey et al have explained commonization of the development of mastoid abscess and post-aural fistula and rarity of the intracranial complications in younger patients. The subperiosteal abscess with or without fistula, reduces the pus accumulation in middle ear, leading to reduction of pressure of pus within the middle ear cleft, which in turn reduces the spread of infection intracranially. Also, the mastoid antrum is shallow in young age group and reaches adult size by the age of 16 years.<sup>6</sup>

Labyrinthitis was the second most common EC complication in our study. This is congruent with previous studies by Osma et al, Yorgancilar et al and Sharma et al who reported labyrinthitis in 12.8%, 9%, 17.7% cases respectively.<sup>2,7,13</sup> Kangsanarak et al reported labyrinthitis as third most common EC complication (34%).<sup>9</sup> Wu et al reported Labyrinthitis as the most common extracranial complication and was found in 40% of cases. The labyrinthine fistula was present in 35.1% of cases and most commonly affected the lateral semi-circular, then, superior and posterior semi-circular canals followed by vestibule and the promontorium tympani.<sup>15</sup>

FNP was seen in 21% of complicated CSOM patients in our study. According to previous studies, the frequency of FNP in CSOM ranges from 0.16 to 14.3%.<sup>16-19</sup> As opposed to our reports, Osma et al reported the incidence of FNP as 12.8% and Yorgancilar et al reported it as 8.2%.<sup>2,7</sup> Kangsanarak et al reported facial paralysis, as the



most common EC complications with an incidence of 58%.<sup>9</sup> Also, FNP was more in cholesteatomatous group in our study. This was similar to studies like by Altuntas et al who reported that 70% of FNP patients with CSOM have cholesteatoma.<sup>18</sup> However, one study by Yorgancilar et al estimates granulations to be more common (61%) than cholesteatomas in FNP cases.<sup>7</sup> FNP is possibly a result of the inflammatory response within the fallopian canal leading to the infection. Savic et al have theorised that FNP in otitis media develops when spread of the infection along the nerve tissue occurs, leading to inflammation of the facial nerve and not due to the compression atrophy.<sup>17</sup>

Meningitis was the most frequent IC complication in our patients which is similar to the studies done by Osma et al, Yorgancilar et al and Baljosevi et al who reported the incidence as 71.9%, 9% and 21% respectively.<sup>2,7,14</sup> It has been reported as the second most common IC complication by Sharma et al.<sup>13</sup>

Brain abscess and extra-dural abscess was found in 5.2% and 2.6% of cases respectively in our study. The previous studies have reported brain abscess in 6.5% and 5% by Yorgancilar et al and Baljosevi et al respectively.<sup>7,14</sup> Brain abscess (temporal lobe, cerebellum) was the most IC common complication in studies by Kangsanarak et al, Sharma et al, Wu et al and Rupa et al.<sup>9,13,15,20</sup> It was reported as the second most common ICC by Osma et al having 17.5% of cases.<sup>2</sup> Extradural abscess was reported in 4.5% cases by Yorgancilar et al and 4.4% by Sharma et al.<sup>7,13</sup> The common site of brain abscess has been reported as temporal lobe in previous studies, however, Kulali et al has reported perisinus abscess as most common IC abscess.<sup>21</sup>

LST, sigmoid abscess, Bezold's abscess, Luc's abscess, otitic hydrocephalous were not found in any patient of our series. According to many previous studies, it is generally considered the third or fourth most common IC complication.<sup>7,8,12,13</sup> However, Yorgancilar et al and Mustafa et al reported LST as their most common IC complication.<sup>7,12</sup> As compared to their study, Osma et al who has reported only one (1.8%) patient with LST among 93 patients with complications of CSOM.<sup>2</sup>

### **Limitations**

The study population and study period are less as compared to the studies previously done. Also, our study is not multi-centric, which therefore, focuses only on the regional status of CSOM.

### **CONCLUSION**

This is a first study comparing CSOM complications pre-COVID and during COVID. We observed an increase in the incidence of complicated CSOM during the COVID pandemic. The reason can be theoretically attributed to delay in the seeking medical attention or immune-

suppression due to COVID 19, nonetheless, it is emphasizing the importance of timely treatment of CSOM, squamous or mucosal.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Deva FAL. An increase in cases of complicated chronic otitis media: an indirect impact of COVID pandemic. *Int J Otorhinolaryngol Head Neck Surg* 2022;8:5-10