

## Research Article

# Clinical and operative study of otogenic intracranial complications

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### ABSTRACT

**Background:** Chronic otitis media is chronic inflammation of the mucoperiosteal lining of the middle ear cleft. The prevalence of chronic otitis media and its intracranial complications poses a major public health problem in developing countries like India. By this study; we authors have attempted to highlight the significance of various etiological factors in the occurrence of intracranial complications due to chronic otitis media.

**Methods:** The study was done prospectively in the department of otorhinolaryngology, J.A. group of hospitals, G. R. medical college, Gwalior during the period October 2007-2008. Thirty patients presenting to ear, nose and throat unit, diagnosed as having intracranial complications due to chronic otitis media were included in this study.

**Results:** Most intracranial complications cases were that of meningitis. One third of the cases had past surgical history like mastoid exploration and incision & drainage of post aural abscess, and one fourth of the cases had associated extracranial complications like post aural abscess, lower motor neuron palsy, labyrinthitis.

**Conclusion:** The present study and the reference studies, both reveal that the intracranial complications of chronic otitis media are still common till date, and their signs and symptoms are often subtle until late in the course of the disease. Hence, clinicians need to maintain high index of suspicion to avoid delay in diagnosis as morbidity and mortality rates are still high, even with the advent of modern antimicrobials and aggressive surgical intervention.

**Keywords:** Chronic, Otitis, Media, Intracranial, Complications

## INTRODUCTION

Chronic otitis media is chronic inflammation of the mucoperiosteal lining of the middle ear cleft. The prevalence of chronic otitis media and its intracranial complications poses a major public health problem in developing countries like India. Every otitis media carries with it the potential for intracranial extension which may threaten life because of the strategic location of middle ear cleft and adjoining mastoid air cells. These structures are separated by mere shell of bone from the large areas of the posterior and middle fossae dura.

The complications of otitis media occur if the normal defense barriers of the middle ear and the mastoid are

overcome. Normal defense barriers of middle ear are overwhelmed by cholesteatoma and osteitis which have the bone eroding property. Cholesteatoma is hallmark of the atticointral type of chronic otitis media. Chronic otitis media may present with various complications like meningitis, brain abscess, lateral sinus thrombosis, extradural abscess, subdural empyema, otitic hydrocephalus. Of these, meningitis is the most commonly encountered intracranial complication followed by brain abscess and lateral sinus thrombosis. The temporal lobe abscess is twice as common as cerebellar abscess.<sup>1</sup> Therefore, by this study; we authors have attempted to highlight the significance of various etiological factors in the occurrence of intracranial complications due to chronic otitis media.

Unquestionably, the most important single event in the history of otogenic intracranial complications was the introduction of antibiotics. With this, there was amazing tenfold decrease in the incidence of complications.<sup>2</sup> Most of the complications occurred with acute otitis media in pre-antibiotic era. In this era of antibiotics, intracranial complications occurred with chronic otitis media in conjunction with cholesteatoma. Despite the decrease in morbidity and mortality, with the advent of antibiotics and huge resolution CT scan, intracranial complications still do occur.<sup>3</sup> Late presentation of the patient, changing clinical spectrum, lack of education and awareness, non-availability of trained specialist, changing virulence and susceptibility of bacteria, poor compliance of individual patients are the factors responsible for these intracranial complications.<sup>4</sup> Early identification and treatment of chronic otitis media, and timely surgical intervention play an important role in the reduction of intracranial complications, hence the morbidity and mortality rate associated with them.

This study was carried out to assess the frequency of various intracranial complications of chronic otitis media, and their associated morbidity and mortality rate in our setting. Our observations and results were compared, analysed and discussed with various other studies like Samuel et al.<sup>5</sup> (1986), Rupa et al.<sup>6</sup> (1991), Kangsanark et al.<sup>7</sup> (1993), Osma et al.<sup>8</sup> (1999), Migarov et al.<sup>9</sup> (2005), Shambaul et al.<sup>10</sup> (1992).

## METHODS

After being approved by the institutional ethical clearance committee, the study was done prospectively in the department of otorhinolaryngology, J.A. group of hospitals, G.R. medical college, Gwalior during the period October 2007-2008. Thirty patients presenting to ear, nose and throat unit, diagnosed as having intracranial complications due to chronic otitis media were included in this study. Detailed history was taken from each patient regarding persistent otorrhea, otalgia, deafness, tinnitus, vertigo, headache, nausea, vomiting, fever with rigors and lethargy. Clinical examination and investigation was carried out in each patient. CT scan was done in all the patients suspected of intracranial complications. All patients were administered with parental antibiotics and steroids to reduce oedema. Neurosurgical and ophthalmic opinion was also taken and followed up. Brain abscess and subdural abscess were dealt by neurosurgery department attached to this institution. Meningitis patients were treated conservatively, first with antibiotics, and later with lumbar puncture. In extradural abscess, mastoid surgery was done immediately. In lateral sinus thrombosis, mastoid exploration with removal of infected thrombosis was done under the coverage of antibiotics. Mastoid exploration was carried after stabilizing the general condition of the patient. Intraoperatively, care was taken to look for erosion of mastoid cortex/sinus plate/dural plate, presence of pus in antrum/extradural/subdural

space, in order to correlate the clinical findings and to assess the outcome. Type of bone eroding pathology (cholesteatoma, granulations) was also evaluated.

In order to evaluate statistically, Chi-square test was applied on intra cranial complications and age groups. Significance level was assessed with P value <0.05, and also with P value <0.10. Distribution of demographic data like age and gender amongst cases was also assessed. Intra-cranial complications and pathology, morbidity and mortality amongst cases was also statistically tabulated and analyzed.

## RESULTS

In the present study, Males (66.7%) outnumbered females (Table 1). Almost half intracranial complications cases were that of meningitis (Table 2). Chi-square test was moderately significant at P <0.10 between age groups and intracranial complications cases (Table 3). One third of the cases had past surgical history like mastoid exploration and incision & drainage of post aural abscess (Table 4). One fourth of the cases had associated extracranial complications like post aural abscess, lower motor neuron palsy, labyrinthitis (Table 5). One fourth of the cases also suffered from diseases like cerebellar ataxia, hemiparesis, epilepsy, hemianopia and profound deafness (Table 6).

**Table 1: Gender distribution amongst cases.**

Gender	n	%
Males	20	66.7
Females	10	33.3
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 2: Intra-cranial complications.**

Complications	n	%
Meningitis	13	43.4
Brain abscess	9	30
Extradural abscess (EDA)	4	13.3
Lateral sinus thrombosis (LST)	4	13.3
Subdural empyema	0	0
Otitic hydrocephalus	0	0
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 3: Chi-Square test: result significant at P <0.10.**

Age (years)	Meningitis (n)	LST (n)	EDA (n)	Brain abscess (n)	Total
0-10	3	0	2	0	5
11-20	8	3	2	2	15
21-30	2	1	0	5	8
31-40	0	0	0	2	2
<b>Total</b>	<b>13</b>	<b>4</b>	<b>4</b>	<b>9</b>	<b>30</b>

The Chi-square statistic is 16.5636. The P value is 0.056006

**Table 4: Past surgical record.**

History	n	%
Mastoid exploration	5	16.7
Incision & drainage of postural abscess	4	13.3
No past history	21	70
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 5: Associated extra-cranial complications.**

Extra-cranial complications	n	%
Post aural abscess	4	13.3
Lower motor neuron facial palsy	2	6.7
Labrynthitis	1	3.3
No associated extra-cranial complications	23	76.7
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 6: Morbidity of intra-cranial complications.**

Morbidity	n	%
Cerebellar ataxia	3	10
Hemiparesis	2	6.7
Epilepsy	1	3.3
Hemianopia	1	3.3
Profound deafness	1	3.3
No morbidity	22	73.3
<b>Total</b>	<b>30</b>	<b>100</b>

## DISCUSSION

In this era of antibiotics, frequency of intracranial complications has been low. But still, serious complications exist with significant morbidity and mortality. Meningitis is still the most common intracranial complication. In our study, meningitis accounted for 43.3%. Brain abscess is by far the most serious of intracranial complications, and therefore requires prompt diagnosis and treatment. Table 7 highlights on intra-cranial complications reported by various studies.

**Table 7: Intra-cranial complications reported by various studies.**

Author	Year	Meningitis (%)	Brain abscess (%)	EDA (%)	LST (%)
Samuel et al.	1986	77	17.5	16	17.4
Rupa & Roman	1991	26.7	57.4	12.7	8.5
Kangsanarak et al.	1993	51	42	22	19
Osma et al.	1999	71.9	17.5	7	1.7
Migarov et al.	2005	46.4	21.4	17.9	7.9
Our study	2008	43.3	30	16.7	10

The most important factor in making an early diagnosis is careful history taking, physical examination, and a high

index of suspicion for impending complications. Patients with discharging ear warrant urgent attention if they develop one or more of the symptoms like persistent headache, vomiting, irritability, otalgia & dizziness. The most common pathology found on otoscopic examination was granulations (70%), followed by cholesteatoma (50%). Clinically, marginal perforation was found in majority of our cases (36.7%). Kangsanark et al. (1993) reported 20%. In our study, 16.6% of patients had history of previous mastoid exploration. Recurrent infection can be attributed to improper drainage and aeration of cavity, or incomplete clearance of the disease, or activation of relatively dormant infection. Cholesteatoma was the most common (66.7%) pathology seen at surgery in our study, followed by granulations (50%).

The most common bony barrier eroded in our study was sinus plate (62%), followed by dural plate. In meningitis patients, on mastoid exploration, sinus & dural plates were eroded in 30.8% and 46.2%. In the rest cases, spread by osteothrombophlebitis as a result of acute exacerbation was a probability. In our study, extradural abscess was an incidental finding in 10% cases. Our findings were similar to Syms et al.1999. Mastoid cortex was eroded in 16.7% cases. Facial nerve was found to be exposed in 8.33% of cases. Lateral semicircular canal involvement was noticed in 4.7% cases. Of the ossicles, incus was found to be necrosed in 72.1 % cases. Similar findings were reported by Kangsanark et al. (1993).

**Table 8: Mortality rate comparison with various studies.**

Author	Year	Mortality from meningitis (%)	Mortality from brain abscess (%)
Samuel et al.	1986	8	3.8
Kangsanarak et al.	1993	36	50
Osma et al.	1999	29.3	20
Migarov et al.	2005	0	0
Our study	2008	15.6	11.1

Morbidity reported in our study was 26.7%, amongst which, cerebellar ataxia was noticed in 10% patients. Hemiparesis was found in 6.7% patients. Kangsanark et al. (1993) reported similar morbidity rate. However, Osma et al. (1999) reported lower morbidity rate (12%). Table 8 highlights on mortality rates reported by various other studies. Kangsanark et al. (1998) and Osma et al. (1999) reported higher mortality rates. This could be attributed to less advanced medical and surgical facilities during those days. Migarov et al. (2005) reported 0% mortality rate. Early diagnosis and immediate intervention could be major factors responsible for this splendid report by Migarov et al. (2005). However, in our study, mortality rate was moderately high. Mortality rate was found to be 10% in our study. This could be attributed to factors like late presentation of the patients leading to delay in diagnosis, poor compliance of these

poor patients hailing from rural areas and absence of proper medical and surgical facilities at primary health level. In our study, mortality from meningitis was reported to be 15.6%, and from brain abscess, 11.1%.

Chi-square test was moderately significant at  $p < 0.10$  between age groups and intracranial complications cases, which meant, age was relevant in the occurrence of intracranial complications.

## CONCLUSION

The present study and the reference studies, both reveal that the intracranial complications of chronic otitis media are still common till date. Their signs and symptoms are often subtle until late in the course of the disease. Morbidity and mortality rates are still high, even with the advent of modern antimicrobials and aggressive surgical intervention. Early diagnosis and treatment is the remedy. Hence, clinicians need to be aware of this possibility and maintain high index of suspicion to avoid delay in diagnosis.

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