Dilemmas in Current Management of Complicated Chronic Otitis Media

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Abstract To evaluate the distribution of complications of chronic otitis media, dilemma of how soon to operate a seriously ill patient with CSOM and treatment outcomes. A retrospective study was done in a tertiary care centre. Clinical data from 2013 to 2015 was compiled, surgical management with outcome was analysed. A total of 425 patients with chronic otitis media were evaluated. Single/multiple complications were seen in 147 (34.5%) patients. Majority of the complications were seen in active squamosal type of chronic otitis media i.e. 137 (59.5%) cases out of the 147. Meningitis (3.3%) was the most common intracranial complication. Patients with intracranial complications were referred from other departments and did not primarily present to ENT, indicating a major fact that treatment was sort for the complication and not for chronic otitis media. Headache with or without ear discharge was the most common presenting complaint. Fever and pain were not prominent indicators of complications, posing a diagnostic dilemma as patients were already receiving antibiotics and analgesics before reaching tertiary care centre. The patients with severe intracranial complications were promptly taken up (within 3–5 days) for canal wall down mastoidectomy with intravenous broad spectrum antibiotic (vancomycin) and mannitol with high risk consent. However ill the patients were, especially children with very poor general conditions, there was dramatic recovery as soon as the mastoidectomy was done. There

were no deaths due to the complications of chronic otitis media in our 3 years study period. Delay in resorting to surgical management of chronic otitis media was the main reason for patients going into complications. Timely mastoidectomy in patients with poor general condition with high risk of mortality, the surgery actually had a major role in reducing the morbidity and mortality. Lack of awareness that chronic otitis media is a condition that can lead to life threatening complications resulted in procrastination of surgery. Chronic otitis media requires speedy surgical management i.e. as soon as patient is fit to tolerate anaesthesia: Tympanoplasty and Canal wall up or down Mastoidectomy to prevent complications from arising or to resolve the present complication.

Keywords Complication of CSOM · Mastoidectomy · Intracranial complications

Introduction

Chronic otitis media incidence has reduced as per WHO, but still Chronic suppurative otitis media (CSOM) accounts for 28 000 deaths and a disease burden of over 2 million DALYs worldwide [1]. Chronic otitis media and its complications continue to plague the developing countries, with high incidence in South East Asia and Africa. The advent of anti-microbial therapy was the main reason for the reduction of complications and mortality rates due to CSOM. However with anti microbial therapy the classical presentations of the complication are not often seen; e.g. the classic description of picket fence fever in lateral sinus thrombosis is rarely seen.

The middle ear and its air spaces has a small volume compared to the rest of the body, still it can give rise to

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multitude of problems. The middle ear space is separated from cranial fossa, sigmoid sinus and jugular bulb with thin plate of bone. The round window and oval window membrane and foot plate of stapes are doors to inner ear. Within the middle ear the facial nerve traverses in its commonly dehiscence bony canal. Complications occur when the normal defence barriers are overcome, permitting infection to spread to adjacent structures which can be life threatening [2]. Perforated tympanic membrane with persistently discharging middle ear jeopardises the inner ear and opens doors to the cranium.

As per the literature the complications of chronic otitis media can occur due to spread of infection via thrombophlebitis, bony erosion and direct extension through the pre-existing pathways [2]. Complication can occur in mucosal and squamous type of chronic otitis media; however the incidence of complications is known to be higher in ears with cholesteatoma due to its bone eroding properties [3].

With the availability of antibiotics and analgesics the patients often procrastinate surgery. The patients when presenting to tertiary care centres are many a times partially treated, hence masking the classical features of headache and fever. Therefore this study was undertaken to evaluate the difficulties and variety in presentation.

Methods

This is a retrospective study done in tertiary care centre from 2013 to 2015. All patients suffering from chronic otitis media were included in the study. A total of 425 patients were evaluated. Majority of the patients directly presented to the ENT department. However patients with intracranial complications were initially treated by medicine/paediatrics/neurosurgery department and on ENT evaluation were found to have chronic otitis media. These patients, who were referred from other departments for definitive management, were also included.

The complications of chronic otitis media with or without cholesteatoma were studied; patients with acute otitis media were not included. The clinical presentation at the time of admission, ENT evaluation including pure tone audiometry, radiological (CT/MRI) evaluation was done in suspected cases of complications. Patients were managed medically as well as surgically (mastoidectomy). The granulations/polyps were sent for histo-pathology in all cases. One was reported as tubercular, three were reported as squamous cell carcinoma. These patients were excluded from the study.

Results

Chronic otitis media was seen in 425 patients, all were surgically treated, the age distribution was studied (Table 1). The presenting complaints were primarily hearing loss and ear discharge (Table 2). Mucosal disease was found in 195 out of 425 patients. Complications in patients with mucosal type of chronic otitis media were seen in 10 of the 195 patients (5%), namely mastoiditis (7), meningitis (2) and facial palsy (1). In active squamous disease, complication was seen in 137 of 230 cases of unsafe CSOM i.e. 60%. There were 147 of 425 patients who presented with single/multiple complications. The overall incidence of complications in a patient of chronic otitis media was 34.5% in our study, the rate being higher in squamous type of disease. The male to female ratio (Table 1) of cases of chronic otitis media was 1.2:1, no specific reason was found for the same probably male population sort treatment more than female. Majority of the patients with complications were young males below the age of 25 (Table 3). The commonest intracranial complication was meningitis. Sub periosteal abscess was the commonest intratemporal complication (Table 4).

Subperiosteal Abscess/Postauricular Fistula

In 72 patients with mastoid abscess (postauricular, bezolds, zygomatic and lucas) the pus was drained and abscess cavity was packed with medicated (Povidon iodine) tape, the length of which was reduced daily and the patients were taken up for surgery later within 2–7 days depending upon the general condition. In two patients there was extensive spread of pus along muscle plane; one 7 years female was admitted with meningitis with postauricular abscess which had extended along the latissimus dorsi requiring incision and drainage with 40–50 cc pus drained from multiple sites including postauricular region, anterior neck along the sternocleidomastoid muscle and interscapular region. Another 14 years male presented with postauricular swelling extending to the occipital region and crossing midline to opposite side of the scalp. Immediate incision and drainage followed by mastoidectomy was sufficient and effective. In patients with postauricular fistula the tract was excised during mastoidectomy. However there was higher incidence of postoperative wound dehiscence in these patients requiring secondary suturing.

Pus was collected and sent for bacteriological studies, which revealed staphylococcus sp, pseudomonas, proteus, streptococcus sp in different patients. Patients were started on ceftriaxone and amikacin and later changed as per the culture report.

Table 1 Age distribution of patients with chronic otitis media

Age	Male	Female
1–25	145	125
26–50	70	55
51–75	18	12
Above 75	0	0

Table 2 Complaints

Presenting complaint	Number of patients
Headache	103
Fever	40
Ear discharge	325
Pain	270
Swelling	72
Altered sensorium	4
Facial asymmetry	8
Post auricular fistula	20
Hearing loss	400
Mass in the ear canal	40

Table 3 Age distribution of patients with complication of com

Age	Number of patients
Below 10	36
10–20	61
20–30	30
Above 30	20

Facial Palsy

In our study there were 10 patients of facial palsy which ranged from grade 1 to grade 4 at the time of presentation. Canal wall down mastoidectomy was performed in 9 of 10 cases with facial palsy. Decompression in 5 of the 9 patients as the canal was partly eroded (Table 5). Cholesteatoma with granulations was found eroding the vertical/tympanic segment of the fallopian canal. In 3 of 9 cases the nerve was found completely exposed by the disease process it-self not requiring decompression; in these patients there was only grade one palsy at the time of examination which had gone unnoticed by the patient. In cases with palsy more than grade three, where the canal was partially eroded, decompression was done. The facial nerve was covered by gel foam soaked in hydrocortisone. One patient of the 9 cases operated, with grade two facial paresis recovered with canal wall down mastoidectomy without requiring facial nerve decompression as the fallopian canal was not found to be eroded in any part. Recovery was complete in those who had grade three palsy.

Table 4 Complications of chronic otitis media (147)

Complication	No of patients	Percentage
Intracranial		
Meningitis	14	9.5%
Lateral sinus thrombosis	5	3.4%
Temporal lobe abscess	6	4%
Cerebellar abscess	3	2%
Extradural abscess	5	3.4%
Subdural abscess	1	0.6%
Otitic hydrocephalous	0	
Intratemporal		
Mastoiditis	34	23%
Postauricular abscess/fistula	52	35.3%
Bezolds abscess	18	18%
Zygomatic abscess	2	1.3%
Facial palsy	10	6.8%
Sensorineural hearing loss	5	3.4%
Labyrinthitis	2	1.3%

Table 5 Intra-operative findings

Complication	Percentage
Cholesteatoma	200
Granulation/polyp	150
Ossicular erosion	240
Meningoencephalic herniation	5
Eroded sinus plate	30
Labyrinthine fistula	5
Exposed facial nerve	5

Grade four recovered to grade two at 6 months follow up. One patient with grade 2 palsy with mucosal type of disease was treated conservatively with antiviral and steroids with full recovery.

Labyrinthine Fistula

Labyrinthine fistula was seen in 5 patients' intra operatively (Table 5). The fistula was suspected on CT, intra-operative site identified- Canal wall down mastoidectomy was completed, then matrix was removed in the end and the defect covered with fascia. The defect was not larger than 2 mm in any of the cases. Sensorineural hearing loss was seen in all cases of fistula preoperatively on pure tone audiometry hence the patients were counselled preoperatively regarding the prognosis.

Lateral Sinus Thrombosis

The sigmoid sinus was thrombosed on CT scan in 5 patients. Anaemia with headache was the predominant finding in patients who developed sigmoid sinus thrombosis. The peri-sinus abscess was drained, however the sigmoid sinus was not opened and patients recovered well. Low molecular heparin was given in 2 out of 5 patients in whom surgery was awaited as there was thickening of internal jugular vein with progressive anaemia.

Meningitis

On clinical grounds 14 patients were diagnosed to have meningitis and confirmed with CSF examination. Majority (10) were referred from other departments. It was the most common intracranial complication. Patients were managed conservatively with broad spectrum intravenous antibiotics, steroids, antiepileptics and mannitol. As soon as general condition improved and patient was fit for anaesthesia mastoid exploration was done. In none of the patients with meningitis bony defect was found, indicating that the probable mode of spread was haematogenous.

Multiple complications were seen in young patients below 15, both intratemporal and intracranial. However timely canal wall down mastoidectomy, resulted in rapid recovery.

Discussion

There were 425 patients admitted with chronic otitis media. Chronic otitis media was seen across all age groups; however the complications were mainly clustered in the young population. 147 patients were admitted with complications of chronic otitis media. There was male predominance with a ratio of 1.2:1. Majority (65.9%) of the patients who developed complications were below 20 years. Similar results were seen in a study by Bijjan Basak et al. in his study “Demographic profile of CSOM in a rural tertiary care hospital” which included 1717 patients, he reported- Maximum patients fall within the age group between 11 and 30 years and among them the most common age group of presentation was 2nd decade—671 patients (39.08%) [4]. In a study by Modak V B et al. of 106 cases of intracranial complications 87% were below 20 years [5]. The reason for complications developing in young patients could be a delayed diagnosis due to poor communication by the child or the nature of disease—erodes the soft bone. Another reason could be that these children have a primary problem of ventilation in the

middle ear and the disease is of squamosal type at the onset itself. Nevertheless children with ear discharge need to be evaluated cautiously since there is a problem in cleaning the discharge; often the cholesteatoma goes unnoticed for many years. On detailed history and careful clinical evaluation after cleaning the ear discharge if cholesteatoma is found, whatever the age mastoidectomy to be done at the earliest.

The complications of cholesteatoma can be life threatening, in the past many lives have been lost. In today's time with improving health care facilities the incidence of complications and mortality rate has come down dramatically but it continues to be a major cause for morbidity. However the complications still occur in developing countries like India where the access to surgical facilities is limited. The presentations are variable as the patients often take partial treatment in the hope that chronic otitis media will resolve with medication alone. Often there is ignorance/lack of awareness or rather procrastination of surgery. Chronic suppurative otitis media does not hinder the person's daily performance of his duties. In chronic otitis media with cholesteatoma the symptoms are often minimal to start with, scanty discharge with pain which reduces with analgesics. The average duration of onset of disease and patient resorting to surgery was 7 years. Very often when the patient presents with severe complications it becomes difficult to decide whether to operate or wait till the general condition improves. In our study we found the patients improves faster after surgery than waiting for the sepsis to come under control.

Complications of chronic otitis media were seen in 147 patients. Intracranial complications were seen in 23.1% where as 82.9% experienced intratemporal complications. Meningitis (9.5%) was the commonest intracranial complication followed by temporal lobe abscess (4%). Postauricular abscess was the commonest intratemporal complication in 35% followed by mastoiditis.

Dubey SP et al. has reported 70 cases, 47 (67%) had a single complication, of which eight (11%) had intracranial and 39 (56%) had extra cranial complications. Twenty-three (33%) had two or more complications [6].

In another study by Pawar S R et al. “A clinical study on complications of chronic suppurative otitis media and level of awareness in patients admitted at tertiary care hospital in central India” found Intratemporal complications was seen in 46 (88.46%) of the patients while only 6 (11.53%) belongs to intracranial complications [7].

These are recent studies from central India confirming the fact that complications of otitis media are a persistent problem. In all cases with complaints of recent onset of headache, fundus examination was advised to diagnose early papilledema. Timely CSF examination with intravenous antibiotics which penetrate blood brain barrier was

the primary medical managements along with mannitol and anti-epileptics. This was followed by surgery to eradicate the disease process. Surgery should not be delayed due to the poor general condition, as the general condition improves only after surgery. The delay in surgery in view of the poor general condition proves detrimental to the well being of the patient. All patients were taken under general anaesthesia, with good postoperative recovery.

Mahato R et al. reported meningitis in most of the cases (30%) followed by brain abscess (20%). Other findings are subdural abscess (15%), extradural abscess (10), perisinus abscess (10%), pus in lateral sinus (10%), and clot in lateral sinus (5%). Perisinus abscesses, lateral sinus abscess, clots in lateral were removed until free flow of blood was achieved [8]. In our study the perisinus abscess was drained and all granulations removed, however the sigmoid sinus was not opened. There was no postoperative complication and the patients recovered uneventfully. Simultaneously the neurosurgeon drained the brain abscess where ever it was required. Since the source is the ear, once that is removed the smaller abscess resolved with intravenous antibiotics not requiring open drainage.

B Vishwanath in his study from 2008 to 2013 has reported there was more incidence of cerebellar abscess in patients below 20 years. Higher incidence of temporal lobe abscesses in low socio economic group, whereas mastoiditis was seen in higher socio economic group [9]. In our study majority of the patients belonged to the low socio economic group hence the comparison with higher socio economic group could not be done. Majority of the complications are seen in lower socio economic group indicating a role of nutrition of the individual, hence the development of the disease is linked to deficiency which needs to be further evaluated.

The communication of the middle ear space to the mastoid cavity results in some degree of mastoid inflammation. We had seven patients who developed acute mastoiditis in chronic otitis media, two presented with meningitis. These patients were initially managed conservatively with antibiotic, steroids and mannitol. In two patients there was persistent discharge for more than 2 weeks following symptoms of mastoiditis they were taken up for canal wall up mastoidectomy, in the others tympanoplasty was done.

Postauricular sub periosteal abscess was seen in 52 patients, pinna was displaced anteriorly and inferiorly, the postauricular crease was obliterated, skin over the mastoid was fluctuant and erythematous. Postauricular incision and drainage was done with intravenous antibiotics. Canal wall up/down mastoidectomy was followed within a week. Mastoid cortex was found eroded in majority of the patients with the tract lined by granulations. There was

higher incidence of wound dehiscence in these patients due to friable tissue, which required secondary closure.

Sampath et al. has reported, in cases with only hearing ear, with a fistula larger than 2 mm, an open technique is indicated. If the fistula is adherent to the membranous labyrinth or the fistula is larger than 1 mm, it is trimmed less than 1 mm larger than the margin of the fistula to interrupt its possible nutrient pathways and left in place and then the second stage is performed [10]. In our study the defects were small and were dealt in a single sitting. The defect was covered with fascia with no significant sensorineural losses postoperatively.

The delay in surgery and dependence on medical treatment often results in complications such as meningitis or temporal lobe abscess. These patients are often juggled from neurophysician to neurosurgeon, missing out the source of infection in the ear. Only on detailed history and examination the source is revealed. Patients with small intracerebral abscess were managed conservatively. In two patients a neurosurgical intervention was planned, it was accompanied with canal wall down mastoidectomy. Extradural abscess/perisinus abscess were drained through the mastoid and the defect repaired with fascia. These patients had a dramatic recovery postoperatively.

Singh et al. reported: The mortality was directly related to the patients' consciousness level on admission and not to the type of ear pathology. It can therefore be concluded that radical mastoidectomy is unwarranted in the non-cholesteatomatous ear, even with an otogenic intracranial complication [11].

In our experience radical mastoidectomy was done only in cases where there was cholesteatoma in inaccessible places in middle ear. Majority of times modified radical or bondies mastoidectomy was done to preserve any residual hearing. Timely surgery is what is important, canal wall down procedures with well saucerised cavity and ossicular reconstruction give fairly good results. In extensive disease with complications canal wall reconstruction is not recommended. The population from rural sector often visit the city for surgery and never turn up for follow up visits, hence modified radical mastoidectomy still stands good in India.

Conclusion

Complicated Chronic otitis media is still a big challenge in developing countries like India. Early and timely surgery even in the seriously ill patients is the key in the management of complications. Lack of availability of surgical facilities in small cities and easy availability of antibiotics delays the definitive treatment resulting in complications. Majority of patients are young, a proactive approach in

managing these children will go a long way in reducing the morbidity and mortality rate due to otitis media. However it cannot be over emphasised that all patients with infective intracranial pathology should be evaluated by an ENT surgeon to rule out primary focus of infection in ear or para nasal sinuses. Over use of antibiotics actually a double edged sword which masks symptoms and gives a false sense of relief. The definitive management of chronic otitis media is surgery- mastoidectomy with or without tympanoplasty, this alone will reduce the number of complications.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical clearance As it was a retrospective study where records were examined, ethical clearance was not required.

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