

RESEARCH ARTICLE

ACUTE OTITIS MEDIA

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One hundred and twelve patients attending outdoor enrolled, as a case of acute otitis media were subject of study. Incidence was more in males. The main presenting symptoms were pain in ear and congetion of tympanic membrane. 34 patients agreed for diagnostic or therapeutic myringotomy. Fluid sample could be collected in 25 patients and on 26 occasions successfully, out of which ten were sterile, 12 samples showed single organism and two samples showed multiple organisms. The commonest offender was haemophilus influenzae which was sensitive to Azithromycin, Amoxycillin / Clavulanic acid combination and Betalactamase antibiotics.

Key Words : Acute otitis media

Acute otitis media is one of the most common problems encountered in clinical practice, though most of the patients being children first attended by paediatricians. Paradise et. al. has reported that children in each of the first two years received antibiotics in states. An average of 45-50 days and approximately 90% of cases were of acute otitis media¹. The incidence is higher upto the age of 6 years in children^{2,4}. The recurrent AOM is occurrence of three or more attacks, in a span of four to six months and requires a prolonged therapy.

In past, complication of Paediatric AOM was one of the significant causes of hospital admission in paediatric ward and accounted for upto 27%⁵. Even death rate was notable due to its complications.

It is necessary to establish as to whether it is viral or bacterial in nature. Viral AOM is usually a consequence of upper respiratory virus i.e. Rhinovirus⁶. Respiratory synciteal virus⁷ which presents as congestion and middle ear fluid accumulation. Fluid may persist even for months leading to deafness while bacterial infection present with sign and symptoms of acute inflammation, pain in ear, congestion and bulging of tympanic membrane with yellow or turbid fluid behind it, may be associated with malaise and/or mild pyrexia.

The diagnosis is confirmed by tympanometry which shows 'B' type curve and absent reflex. Myringotomy finally confirms it. Pneumatic otoscopy and acoustic reflexometry may be an important tool in the times to come.

INCIDENCE

The maximum incidence is reported between two to six years of age³. Various studies have shown at least an attack in 50-95% of cases^{2,3} and reported to occur more in males. The incidence is higher when children are left in creche or with ayas (maid servant) especially in small families and both partners working. During certain seasons incidence goes higher with more attacks of upper respiratory tract infection⁸ and after exposure to cold during flights and hill journeys.

ETIOLOGY

Otitis media is usually a result of migration of nasopharyngeal flora into the middle ear, through eustachian tube. The middle ear defence mechanism fails to clear it, either due to functional and/or anatomical defects of eustachian tube in association with bacterial and viral infection⁹. Hyperplasia of adenoid, due to allergy or infection, may lead to mechanical obstruction of eustachian tube¹⁰.

MATERIALS AND METHODS

During the year 1998, a total of 112 patients, attending outpatient department at Indian Institute of Ear Diseases, Railway Road, Muzaffarnagar were

diagnosed as cases of acute otitis media. 34 patients agreed for diagnostic or therapeutic myringotomy. Child was given promethazine syrup for sedation and 1 ml 2% xylocaine anaesthetic block was given, at incisura terminalis and anterior meatal wall. Ear canal was prepared first with povidone iodine solution followed by absolute alcohol which was sucked out after one minute. One ml. insulin syringe and 20 gauge spinal needle, was used for myringotomy. Fluid

dence was maximum in the second year of life. Table I (a&b) illustrates age and sex distribution.

26 samples were collected from 25 patients, out of which ten were sterile and 14 samples showed single organism and two samples showed multiple organism as illustrated in table II.

DISCUSSION

With low morbidity and mortality, the ear infection is usually neglected in developing countries, either not treated or inadequately treated, leading

TABLE I(a)
AGE & SEX DISTRIBUTION

Age group	Total no.	Males	Females	%
0-1 yrs	11	6	5	9.82
1-2 yrs	38	20	18	33.92
2-3 yrs	34	19	15	16.96
3-5 yrs	17	10	7	15.17
5-8 yrs	7	3	4	6.25
8-12 yrs	5	3	2	4.46
	112	61	51	100.00

TABLE I(b)
AGE & SEX DISTRIBUTION - PATIENTS UNDERGOING MYRINGOTOMY

Age group	Total no.	Males	Females	%
0-1 yrs	1	1	-	2.94
1-2 yrs	8	5	3	23.52
2-3 yrs	12	5	7	35.29
3-5 yrs	8	5	3	23.52
5-8 yrs	3	2	1	8.82
8-12 yrs	2	2	-	5.88
	34	20	4	100.00

sample could be collected in 25 patients and on 26 occasions successfully. Six children could not be tackled without general anaesthesia hence, dropped from the study and in three cases, no fluid came out on aspiration.

The fluid was sent for gram staining and culture and sensitivity test which was cultured on blood and chocolate agar. Pneumococci was confirmed by positive slide agglutination test, while diagnosis of haemophilus influenzae was based on chocolate agar and gram staining. Moraxella catarrhalis was identified on the basis of gram staining and positive oxidase reaction.

RESULTS

A total of 112 patients enrolled in OPD as a case of AOM were divided in two groups. Group A- Management with medical treatment and B-Medical management with myringotomy. In 34 patients, attendents gave consent for myringotomy, out of which fluid could be aspirated in 25 children and on 26 occasions. In 3 cases fluid could not be aspirated.

Sixty one were males out of 112, while out of 34 going for myringotomy 20 were male. The inci-

TABLE II

SIGN & SYMPTOMS		No.	%
1.	Pain in ear	104	92.85
2.	Tympanic Membrane		
	A. Congestion	112	100.00
	B. Bulging	95	84.82
	C. Appearance of fluid behind it	86	76.78
3.	Fever	33	29.46
4.	Associated Respiratory tract infection	96	85.71
5.	Hearing impairment	22	19.64
6.	Heaviness in ear	9	8.03
7.	Recurrent history of pain in ear	18	16.07

to chronic suppurative otitis media or adhesive otitis media resulting to deafness. Hence, early diagnosis and management of acute otitis media is, of utmost importance. Viral pathology should be kept in mind and all the more in patients with sterile cultures. Viral otitis media is usually caused by respiratory syncytial virus, Rhinovirus, influenza, para influenza

TABLE III

Occurrence of Bacteria : A.O.M.		
	No.	%
Haemophilus Influenzae	6	42.85
Streptococcus Pneumoniae	5	35.71
Moraxella Catarrhalis	3	21.42
Streptococcus Pyogenus	1	7.14
Pseudomonas	1	7.14

and adeno virus⁵. The virus has been isolated in substantial number of cases from aspirates of middle ear and nasopharynx⁶.

In our series only 14 out of 26 samples were cultured positive, rest might be of viral origin or might be false negative as all of the children were already on antibiotics. In our series Haemophilus influenzae was observed in 42.8% of cases while Leibovitz has reported an incidence of 37% which is slightly low¹¹ while Ruushancen has observed a further low incidence of 25%. He observed an in-

idence of 35% of streptococcus Pneumoniae⁵ which coincides with our 35% result, while Leibovitz obtained an incidence of 43% in treated group and 27% in non treated group. The incidence of moraxella catarrhalsis was much higher in our study i.e. 21.4% as compared to others^{11,12}. Harrisin et al has reported that the S.aureus and streptococcus pyogens are frequently observed in post antibiotic acute otitis media¹³, while we could observe Pseudomonas & streptococcus pyogens each in one instance only. Though we took the aspirate directly from middle ear, culture was repeated, for check confirmation in pseudomonas case¹⁴.

The bacteriology has not changed much for the last three decades and appears to be same globally. Though, resistant strains have developed so the new antibiotics have been invented. Now most of the strains of haemophilus and moraxella, recovered from middle ear are beta lactamase positive¹⁵. Pneumococci have developed strains having penicillin binding protein of altered size and affinity to the penicillin¹⁶. The more altered penicillin binding proteins are, the more resistance on organism has to penicillin and other beta lactamase antibiotics. The pneumococci, one of the most common offenders has come out with emergence of antibiotics resistant strain and incidence is quite high 17-40%^{17,18,19}.

In our series Azithromycin, Amoxicillin / Clavulanic acid combination were found to be the most appropriate antibiotics though, in empirical group, patients responded with roxythromycin also. In each decade resistant strain of bacteria have developed and so have the industry and academia invented newer antibiotics. Hence we have got eight new cephalosporins, three in second generation and five in the third generation and two new macrolides and their access to middle ear compartment is very good.

While deciding for an antibiotic firstly we must be sure that AOM is bacterial in nature, then what drug and how long should it be given. The drug must be effective in killing bacteria without harming the patient. Overall the antibiotics have tended to be a safe group of drug. There is very little to choose in terms of safety except diarrhoea or vomiting especially, in children due to poor palatability which determines compliance and at times it may be difficult to give a dose to a child. The drugs, which may require dosing more than twice, may not be convenient to give and should have complete oral bioavailability. Lastly the drug should undergo neither metabolic clearance nor accumulation despite either hepatic or renal function impairment.²⁰ Higher molecular weight antibiotics shows significant biliary

excretion eg. ceftriaxone, azithromycin, though most of the drugs are eliminated via the kidney but higher molecular weight antibiotics can compensate via biliary secretion in cases of renal impairment and dose regulation is not required. The drug shows either concentration dependent or time dependent killing²¹. The beta lactamase antibiotics are time dependent; macrolide / Azilide work on concentration of drugs and it appears that with Azilide a single large dose might be preferable to divided daily dose and of course with lengthy half life.

No single antibiotic can be said to be the best and has to be selected on the basis of palatability, dosing schedule, duration of treatment and of course efficacy and if possible cost consideration also. High doses of amoxicillin may be given priority to begin the treatment. Azithromycin, amoxicillin / clavulanic acid combination, clarithromycin or roxithromycin may be considered. Practically all antibiotic syrups can be given with food without considering at their efficacy.

In an era of increasing resistance to antibiotics and usual consumption of pesticides with vegetables and fruits one must try to avoid use of antibiotics specially in AOM of viral origin; during that period indigenous herbal medicines may be tried^{22,23}. The children with incidence of recurrent acute otitis media have been benefitted with correction of diet esp. adequate amount of protein particularly first class protein.

Vaccines against streptococcus pneumonia and certain viruses which are considered to be associated with AOM may be given a consideration^{24,25}. Surgery in the form of myringotomy and ventilation tubes. or adenoidectomy and tonsillectomy may be required to have lasting results²⁶. Supportive therapy in the form of analgesics²⁷, antihistamanics and decongestant nasal drops²⁸ should be considered. Prolonged therapy in recurrent acute otitis media has shown successful results.

CONCLUSION

The common pathogens i.e. streptococcus Pneumoniae, Haemophilus influenzae and moraxella catarrhalsis are still predominant offenders¹⁵ and resistant strains have developed. Beta lactam antibiotics and azilides are the drugs of choice. Parents, especially having small family and both partners working, must be educated. Guidelines should be given to nursery schools and creche for prevention and early management.

Bottle feeding and breast feeding in lying down position, smoking in house should be discouraged. Balance diet should be given a consideration in cases

Blood Urea in mg%	Total No. of Cases	Normal Hearing		Impaired Hearing		Type of Hearing Loss
		No. of Cases	%	No. of Cases	%	
41-80	3	2	66.67	1	33.33	SNHL
81-120	10	6	60.00	4	40.00	SNHL
121-160	16	11	68.75	5	31.25	SNHL
161-200	14	11	78.60	3	21.40	SNHL
>200	7	6	85.70	1	14.30	SNHL

Serum Creati- nine in mg%	Total No. of Cases	Normal Hearing		Impaired Hearing		Type of Hearing Loss
		No. of Cases	%	No. of Cases	%	
<0.05	-	-	-	-	-	-
0.5-0.9	20	15	75	5	25	SNHL
1.0-1.5	20	12	60	8	40	SNHL
1.6-2.0	10	9	90	1	10	SNHL

pressure with the severity of impaired hearing (Table Nos 2,3,4,5,6).

DISCUSSION

Maximum number of patients with CRF were in the age group 31-40 years (50%) and majority of patients having sensorineural deafness were also in the age group 31-40 years. However, Alport¹ found incidence of Alport's syndrome in childhood (II decade) which was also seen in our series. Males outnumbered females by ratio of 1.17:1. There were more females (16%) than males (12%) who developed sensorineural deafness after going into renal failure. Agrawal et al.⁴ found high incidence in males, but this study showed that females were more

susceptible to develop Cochlear involvement after going into renal failure. 14 cases (28%) had developed sensorineural deafness after renal failure had set in. Out of these, 5 cases (10%) complained of tinnitus and 2 cases (4%) had transient episode of vertigo. Beaney⁵ observed deafness in 0.30%, vertigo in (19.5%) 5 patients. Thus the disagreement of deafness with our series is probably due to earlier presentation of the patient for treatment in Beaney's series.

Patients with sensorineural deafness in CRF were having high frequency hearing loss, in the frequency range of 2000-6000 cps with a peak at 2000 cps and hearing loss in the range of 25-40 dB. Johnson and Mathog⁶ found a notch at 6 KHz in audiogram. This possibly was characteristic of the renal failure. The Audiological findings of

Serum Potassium in mEq/L	Total No. of Cases	Normal Hearing		Impaired Hearing		Type of Hearing Loss
		No. of Cases	%	No. of Cases	%	
3.5-4.0	4	4	100	-	-	-
4.1-4.5	13	10	76.9	3	23.1	SNHL
4.6-5.0	17	12	70.6	5	29.4	SNHL
5.1-5.5	10	4	40.0	6	60.0	SNHL
5.6-6.0	6	6	100.0	-	-	SNHL

Serum Calcium in mg%	Total No. of Cases	Normal Hearing		Impaired Hearing		Type of Hearing Loss
		No. of Cases	%	No. of Cases	%	
8.5-8.9	4	4	100.0	-	-	-
9.0-9.4	13	10	76.9	3	23.1	SNHL
9.5-9.9	17	12	70.6	5	29.1	SNHL
10.0-10.5	10	4	40.0	6	60.0	SNHL
10.6-11.0	6	6	100.0	-	-	-

TABLE VI						
CORRELATION BETWEEN BLOOD PRESSURE AND DEAFNESS IN CRF						
Diastolic Blood Pressure (mmhg)	Total No. of Cases	Normal Hearing No. of Cases		Impaired Hearing No. of Cases		Type of Hearing Loss
<90	24	19	79.20	5	20.80	SNHL
90-100	12	8	66.67	4	33.33	SNHL
101-110	8	6	75.00	2	25.0	SNHL
111-120	6	3	50.0	3	50.0	SNHL

Alport's syndrome are characterised by a progressive, bilateral and symmetrical sensorineural hearing loss. In sensorineural hearing loss, short increment sensitivity index (SISI) test showed score above 20% and tone decay test was found to be absent or below 20 dB in all the cases thus confirming an end organ lesion. Yassin et al³ also had similar findings. A direct relationship could be established between increasing deafness and hyponatraemia. Changes in the level of blood urea, creatinines, potassium and calcium had no effect on Cochlear function. This is in agreement with Yassin et al³. The involvement of Cochlea in Hyponatremia has been explained by one of the following :

1. Disturbance of water and salt metabolism

2. Volume and/or pressure changes in the endolymph and perilymph system.
3. Hormonal changes that may alter the conductivity of receptor organs in the internal ear.

10 cases of CRF underwent dialysis after which the blood electrolytes returned to normal but 3 cases who had sensorineural hearing loss before dialysis had no change in their hearing after dialysis. Thus the inner ear changes produced in renal failure are irreversible. Yassin et al³ found improvement of hearing loss with initial improvement in hyponatraemia. 80% of cases of acute renal failure were improved whereas in chronic form, only 52.4% improved by treatment.

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