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A STUDY OF HEARING IMPROVEMENT AFTER ADENOIDECTOMY VS. ADENOIDECTOMY WITH GROMMET INSERTION IN THE CASE OF OTITIS MEDIA WITH EFFUSION

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Abstract

Background: Otitis Media with Effusion (OME), also known as Secretory Otitis Media, has been identified as the commonest middle ear condition causing deafness in children in developed countries. Otitis media with effusion is one of the most common chronic otological conditions and the most common cause of conductive hearing loss in the pediatric population. Ventilation tube insertion with or without adenoidectomy is considered a standard surgical procedure.

Aims and Objectives: The hearing improvement after adenoidectomy vs. adenoidectomy with grommet insertion in the case of otitis media with effusion.

Materials and Methods This study was conducted in the Department of ENT in different private clinics in Balasore and Cuttack, Odisha. It consists of 60 patients, and their ages range from 2 to 12 years.

Result: In our study, the predominant age group was between 2–5 years (31.67%) and 8–11 years (31.67%). The mean age was 6.96. Higher incidence in male (71.67%) than female (28.33%) children. Preoperatively, 63% of ears had a dull tympanic membrane, and 37% of ears had an amber-colored tympanic membrane. All the patients had a B-type tympanogram curve. Postoperatively, at the end of 6 months of follow-up, patients who underwent adenoidectomy with grommet insertion had 94% normal tympanic membrane, 92% had a type A tymanogram curve, a mean PTA of 8.47 with a P value of <0.001, and 84% had an AB gap < 10 dB. While patients who underwent adenoidectomy alone had a 72% normal tympanic membrane, 64% had a type A tympanogram curve with a mean PTA of 15.40 dB with a P value of <0.001 and an AB gap of <10 dB in 60% of children. In Group A, 11 patients had persistant retracted tympanic membrane at the end of 6 months of followup, and hence these patients were taken up for myringotomy with grommet insertion, and they all improved symptomatically.

Conclusion: It is evident that secretory otitis media is a treatable cause of conductive hearing loss, and it is due to Eustachian tubal dysfunction secondary to adenoid hypertrophy and recurrent upper respiratory tract infection.

Keywords: Otitis Media with Effusion, Adenoidectomy, Grommet Insertion

Introduction

Otitis Media with Effusion (OME) is the accumulation of mucus within the middle ear and sometimes the mastoid air cell system. In children, OME may present most commonly with hearing loss but also delayed speech and language development, poor social behavior, and, in younger children, difficulties with balance. There is often a clearly defined history of preceding upper respiratory tract infection (typically viral etiology) and otalgia with an episode of acute otitis media. It is also called Glue Ear, Catarrhal Otitis Media, Non-Suppurative Otitis Media, and Serous Otitis Media. Approximately 80% of all children will have a single episode of OME, and 40% will have three or more episodes before the age of 3 years. In adults, it can lead to atelectatic and adhesive otitis media, which can sometimes lead to cholesteatoma formation.

It affects children's learning ability through temporary and recurrent hearing loss, permanent hearing impairment, and language disorders. Even slight hearing loss in the order of 10–15 dB may be sufficient to impair speech and language acquisition in infants and young children and may lead to generalized educational retardation. [1] Children with hearing loss of more than 30 dB are significantly retarded in their vocabulary level and are placed below their normal grade in school.' The prevalence of otitis media with effusion (commonly known as glue ear) has increased in the last 50 years due to the widespread and inadequate use of antibiotics for the treatment of acute otitis media. The hearing loss may be latent or overt, with the child rarely complaining of it. [2]

Two main theories of the cause of acute otitis media exist. The classic explanation proposes that eustachian tube dysfunction is the necessary precursor. The newer models describe the primary event as inflammation of the middle ear mucosa caused by a reaction to bacteria already present in the middle ear. Indeed, Bluestone and others have shown (using radiographic evidence) that reflux up the eustachian tube is demonstrable in children prone to otitis media. [3] Furthermore, Crapko et al. demonstrated the presence of pepsin in the middle ear space of 60% of children with otitis media with effusion [4], although this reflux certainly may also occur in otherwise healthy individuals.

Academic skills, particularly in reading and other language-based subjects, may be affected when there is a high demand for attention to verbally presented information. [5] Several studies have shown that otitis media with effusion also occurs in children in developing countries, even though they are not brought for treatment. Most parents pay attention to suppurative problems of the ear. The conductive hearing loss associated with OME must have been missed by parents and teachers. [6] Neither the indication for surgical treatment nor the types and number of procedures used are uniform. Possible treatment includes myringotomy with or without insertion of a ventilation tube, either alone or with adenoidectomy, and occasionally tonsillectomy. However, the diagnosis of these patients at an early stage can be a difficult task, even for the clinician. [7] More difficult is choosing a surgical treatment, considering the complications associated with each of these procedures. This study hence attempts to shed light on the different modes of presentation, the various modalities of management, and the improvement in hearing after surgical management of otitis media with effusion.

Methods and Materials

This study was conducted in the Department of ENT in different private clinics in Balasore and Cuttack, Odisha. It consists of 60 patients, and their age ranges from 2 to 12 years.

INCLUSION CRITERIA:

Patients with adenoid hypertrophy (grades 3 or 4) with glue ear and a type B tympanogram were included in the study.

EXCLUSION CRITERIA:

Children of ages <2 years and >12 years, those with histories of ear discharge presently or in the past, and children with sensorineural hearing loss were excluded from the study. Patients who present to

our outpatient department with adenoid hypertrophy and otitis media with effusion, who fulfill the inclusion and exclusion criteria of the study, and who consented are selected for the study.
A detailed history was elicited from each patient, including a history of hearing loss, behavioral changes, poor school performance, altered sleep habits, and frequency of upper respiratory tract infection. A past history of ear discharge and any previous surgical interventions were elicited. Other co-existing medical and surgical illnesses were ruled out. All patients are examined with otoendoscopy and pneumatic otoscopy, and findings are recorded. Findings are recorded in three formats:

1. Normal tympanic membrane.
2. Semitransparent tympanic membrane with amber-colored fluid in the middle ear and air bubbles.
3. Dull, retracted, or bulging lustureless tympanic membrane. The patient was subjected to a diagnostic nasal endoscopy so as to document the grade of adenoid hypertrophy. Other clinical examinations and tests are performed. A complete examination of the throat is done. Tunning fork tests were performed.

All the children were subjected to a pure-tone audiogram and tympanometry to record and document the type and degree of hearing loss, along with the type of tympanogram curve. Radiological investigations were performed. X ray A neck soft tissue lateral view was taken for all children to document the adenoid hypertrophy and the airway compromise it causes. A total of 60 cases were divided randomly into two groups.
Group A and Group B.
Group A: Managed with adenoidectomy alone.
Group B: managed with adenoidectomy combined with myringotomy and grommet insertion.
Each group was followed up twice weekly, and their otoendoscopy, pure tone audiogram, and tympanometry findings were documented at the first, third, and sixth months. During their regular followup, symptomatic improvement and postoperative hearing improvement were recorded.

Observation and result
This study is a prospective analysis of the incidence, clinical profile, and treatment outcome of surgical management, conducted in the Department of ENT in Different private clinics in Balasore and Cuttack, Odisha.
The demographic profile shows the mean age most commonly affected was 7.1 for group A and 6.4 for group B. Out of the 60 cases studied, 71.67% (43 patients) were male and 28.33% (17 patients) were female. There was no significance to the gender or etiopathogenesis of the disease.
On pre-operative otoendoscopic evaluation, in Group A, 64% of patients had a dull tympanic membrane, and 36% had an amber-colored tympanic membrane. In Group B, 68% of patients had a dull tympanic membrane, and 32% had an amber-colored tympanic membrane.

On post-operative assessment,
Otoendoscopy after 6 months of follow-up
Group A: 58.33% (35 ears) had a normal tympanic membrane.
23.33% (14 ears) had a retracted tympanic membrane.
18.34% (11 ears) had a dull tympanic membrane.
Group B: 80% (48 ears) had a normal tympanic membrane.
20% (12 ears) had a dull tympanic membrane.
Tympanogram curve after 6 months of follow-up
Group A: 63.33% (38 ears) had a type A curve.
13.33 (8 ears) had a type B curve.
23.33% (14 ears) had a type C curve.
Group B: 86.67% (52 ears) had a type A curve.
13.33% (8 ears) had a type B curve.

Pure Tone Audiogram: Air-Bone Gap (AB Gap) after 6 months of follow-up
Group A: 60% (18 patients) had an AB Gap < 10 dB.
40% (112 patients) had an AB gap > 10 dB.
Group B: 80% (24 patients) had an AB Gap < 10 dB.
20% (66 patients) had an AB gap > 10 dB.

Table no.1: Age-wise distribution of the study participants

Age	**Group A**	**%**	**Group B**	**%**	**Total**	**%**
2	0	0	2	6.67	2	3.33
> 2–5	10	33.33	9	30	19	31.67
> 5–8	8	26.67	11	36.67	19	31.67
> 8–12	12	40	8	26.67	20	33.33
Total	30	100	30	100	60	100

Table no.2: Gender distribution of study participants

Gender	Group A	%	Group B	%	Total	%
Male	**19**	**63.33**	**20**	**67.67**	**43**	**71.67**
Female	**11**	**36.67**	**10**	**33.33**	**17**	**28.33**
Total	**30**	**100**	**30**	**100**	**60**	**100**

Table no.3: Post-operative otoendoscopic findings, Group A

OTOENDOSCOPY		**Followups (Months)**		
		1st	**3rd**	**6th**
	Normal	6	8	12
DULL	Retracted	5	4	3
	Dull	0	3	0
	Normal	6	11	8
AMBER	Retracted	5	6	5
	Dull	4	4	4

Table no.4: Post-operative otoendoscopic findings, Group B

OTOENDOSCOPY		**Followups**
		6th Month
	Normal	26
DULL	Retracted	8
	Dull	0
	Normal	14
AMBER	Retracted	2
	Dull	0

Table no.5: Comparison of postoperative otoendoscopy findings for groups A and B

Otoendoscopy	GROUP A	%	GROUP B	%
Normal	35	58.33	48	80
Retracted	14	23.33	0	0
Dull	11	18.33	12	20
Total	60	100		100

Table no.6: Tympanograms of the Study Groups

Tympanograms		Followups (Months)					
		1st		3rd		6th	
		N	%	N	%	N	%
Group A	A	25	41.67	35	58.33	38	63.33
	B	10	16.67	9	15	8	13.33
	C	25	41.66	16	26.67	14	23.33
Group B	A					52	86.67
	B					8	13.33
	C					0	00

Table No. 7: Mean pure tone audiogram

Group		Mean	SD	STD Error	95% CI for Mean		Minimum	Maximum	Significance
					Lower Bound	Upper Bound			
A	PRE OP	26.22	3.56	0.50	25.20	27.23	18.0	33.50	
	Ist Follow-up	22.19	3.59	0.21	21.17	23.21	16.00	30.00	<0.001
	3rd Follow-up	18.32	3.35	0.47	17.36	19.27	14.0	26.0	
	6th Follow-up	15.40	3.39	0.48	14.43	16.36	10.00	26.00	
B	PRE OP	29.20	3.46	0.49	28.22	30.18	21.0	36.0	
	6th Follow-up	8.47	5.36	0.76	6.94	9.99	2.80	23.60	<0.001

Table no.8: Air-bone gap of the study groups

PTA-AAB GAP	Group A	%	Group B	%	Total	%
< 10db	18	60	24	80	42	70
>10db	12	40	6	20	18	30
Total	30	100	30	100	60	100

DISCUSSION

Age is one of the most important risk factors for OME. Zielhuis et al. concluded that there are two peaks, one around 2 years and the other around 5 years. While OME generally decreases after the age of five, it continues to be seen in a significant proportion of school-age children [8]. In our study, there is a bimodal age distribution, and the mean age group is 6.46. In our study, we found no significant association between genders in the prevalence of OME. Our results are similar to those of the studies done by Kiris et al. [9] and Engel et al. [10]. According to Tos et al., gender differences in otitis media with effusion represent mainly the influence of cultural factors [11]. In our study, there is a higher prevalence in male children (71.67%) compared with female children (28.33%).

Khurshid Anwar et al. [12] and Saeed Khan et al., in their study, reported that a type B tympanogram with a flat curve was obtained in 71.4% of the ears. The diagnostic value of tympanometry was: sensitivity 85.85%, specificity 72.22%, positive predictive value 94.44%, negative predictive value 48.14%, and accuracy of 83.76%.

Tian et al. and Liu Y et al., in their study, reported that adenoidectomy was superior to non-surgical treatment in reducing the incidence of acute otitis media and removing the middle ear effusion [13]. Adenoidectomy combined with a tympanostomy tube was superior to tympanostomy tube alone in the removal of the middle ear effusion and improvement of hearing level. The results of our study are also similar to this one. The mean PTA after 6 months of surgery in adenoidectomy alone was 18.3 dB, and in adenoidectomy combined with myringotomy and grommet insertion, it was 8.47 dB. AB-Gap after 6 months of follow-up in adenoidectomy alone was <10 dB in 60% of children, whereas it was 80% in adenoidectomy with grommet insertion.

A randomized control trial of surgery for the glue ear conducted by N.A. Black et al. and C.F. B. Sanderson et al. reported that myringotomy with grommet insertion produced a significant improvement in hearing that lasted for six to twelve months. [14] Adenoidectomy resulted in only a modest improvement in hearing, though there was some evidence to suggest this was more lasting than that obtained from the insertion of a grommet.

CONCLUSION

From our study, it is evident that secretory otitis media is a treatable cause of conductive hearing loss, and it is due to Eustachian tubal dysfunction secondary to adenoid hypertrophy and recurrent upper respiratory tract infection. Though there are many treatment options available, surgical management in the form of adenoidectomy or myringotomy with grommet insertion has a better outcome in terms of hearing improvement and disease relapse and recurrence. Combined treatment options have even better outcomes. If the principle objective of the surgery for the glue ear is to restore hearing at the earliest, then my study shows myringotomy with grommet insertion is the treatment of choice. The addition of adenoidectomy will increase the likelihood of restoration of normal function of the middle ear and prevent recurrent episodes. Hence, considering the age group (school going) of the children included in my study, I would like to conclude my study stating that adenoidectomy combined with grommet insertion has better hearing improvement at the earliest and has the least rate of recurrence of the disease in patients with adenoid hypertrophy with otitis media with effusion.

REFERANCE

1. Shaheen MM, Raguib A, Shaikh MA. Chronic suppurative otitis media and secretory otitis media and its association with socio-econonic factors among rural primary school children of Bangladesh. Indian J Otolaryngol Head Neck Surg. 2012;64:36- 41
2. Sigdel B, Nepali R. Pattern of ear diseases among pediatric ENT patients: An experience from the tertiary care centre,Pokhara, Nepal. Journal Nepal Paediatric Society 2012; 32:142-5.
3. Bluestone CD, Beery QC, Andrus WS. Mechanics of the eustachian tube as it influences susceptibility to and persistence of middle ear effusions in children. Ann Otol Rhinol Laryngol. 1974; 83(Suppl 11):27-34.
4. Crapko M, Kerschner JE, Syring M, Johnston N. Role of extra-esophageal reflux in chronic otitis media with effusion. Laryngoscope 2007; 20:74-78
5. Parma S, Gohil CS, Patel V, Patel A. Comparative Study Of Secretory Otitis Media And Chronic Suppurative Otitis Media in School Going Children Aged Between 5 To 12 Years In Local Municipal School. Int J Med Surg Emerg. 2013; 1(3):53-5.
6. Roberts JE, Burchinal MR, Zersel SA. Otitis Media in Early childhood in relation to children's school age language and academic skills. Pediatrics 2002; 110:696-706 .
7. Chang CW, Yang YW, Fu CY, Shiao AS. Differences between children and adults with otitis media with effusion treated with CO2 laser myringotomy. J Chin Med Assoc. 2012; 75:29–35.

8. Zielhuis GA, Rach GH, Van den Basch A, Van den Broek P.The prevalence of otitis media with effusion : a critical review of the Literature. Clinical Otolaryngology. 1990; 15:283-8.
9. Prevalence and risk factors of otitis media with effusion in school children in Eastern Anatolia. Kırıs M**1 ,** Muderris T**,** Kara T**,** Bercin S**,** Cankaya H**,** Sevil E**.** Int J Pediatr Otorhinolaryngol. 2012 Jul;76(7):1030-5.
10. Engel J, Anteunis L, Volovics A, Hendriks J, Marres E. Risk factors of otitis media with effusion during infancy. International Journal of Paediatric Otolaryngology.1999b; 48: 239-49.
11. Tos M, Holm-Jensen S, Sorensen CH, Mogensen C.Spontaneous course and frequency of secretory otitis in 4-year-old children. Archives of Otolaryngology.1982; 108: 4-10.
12. Otitis media with effusion: Accuracy of tympanometry in detecting fluid in the middle ears of children at myringotomies Khurshid Anwar, 2016 Mar-Apr; 32(2): 466–470.
13. A systematic review of adenoidectomy in the treatment of otitis media with effusion in children; Tian X, Liu Y, Wang M, Liu H; 2014 Apr;29(8):723-5.
14. A randomized control trial of surgery for glue ear N A Black, C F B Sanderson, A P Freeland, M P Vessey ; Br Med J 1990;300:1551-6.