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Adenoids with Glue Ear: Incidence, Management and Outcome

By Delwar AHM

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Methods: It is a cohort retrospective study of 251 cases in the Department of Otolaryngology and Head-Neck Surgery, Cumilla Medical College, and Cumilla Medical Centre, Bangladesh, from 01 July 2016 to 31 June 2019.

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Conclusion: Suspected OME cases, though any benefit not found in medical management, some surgeon considering 12 weeks watchful waiting for surgery. Different surgical methods implicated based on severity of OME.

Keywords: glue ear or otitis media with effusion (OME), adenoids, pure tone audiometry (PTA), impedance audiometry, or tympanometry, otoscopy.

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I. Introduction

Adenoid is a lymphoid tissue in the posterior wall and roof of the nasopharynx just behind the nasal orifice or choana. From five months it increases rapidly, most enlargement is seen in 07 years, and after 15 years it regresses.[1] Enlarged adenoid block the nasopharyngeal opening of the Eustachian tube. As a result, accumulation of sterile or non-purulent mucous fluid within the middle ear cavity known as glue ear, OME, secretory otitis media, or serous otitis media. If it is persistent for more than three months is known as chronic OME.[2] Due to blockage of Eustachian tube, absorption of middle ear air causing negative intra-tympanic pressure as a consequence of retraction of tympanic membrane.[3] 80% of children, suffering one episode of OME before 03 years and 40% of them suffers more than three.[4] Acute otitis media due to viral attack may follow bacterial infection causes inflammation of adenoids following to an episode of OME.[5] The Eustachian tube lines by ciliated, pseudostratified columnar respiratory epithelium. The mucosa contains both goblet cells and mucous secreting glands.[6] Any infections due to viral or bacterial resulting in the production of mucous secretion effusion developing OME. Due to repeated infection, the flat cuboidal mucosa replaces by thicker pseudostratified mucous secreting epithelium with the development of cilia. The ciliary lining is less efficient at moving the secretion to the nasopharynx.[7] The latest research suggests that generic inheritance of susceptibility to OME, causing impaired metabolism of oxygen.[8] Composition of the effusion is a glycoprotein, immunoglobulin-A(IgA), lysozyme, interleukins, and other inflammatory cytokine develops rheological adhesiveness and poor transportation, the persistence of effusion needs surgical intervention.[9] Biofilm found in 92% middle ear mucosa undergoes ventilation tube and high grade found in adenoid mucosa.[10] The children with cleft palate have an incidence of OME was 20%.[11] Allergy has conflicted evidence with OME because symptoms of nasal obstruction are more prevalence in adenoid hyperplasia than allergic manifestation.[12] Family history of allergic rhinitis may have a link with OME.[13] Gastro-esophageal reflux is common in infants up to 04 months of age and pepsin first identified in middle ear effusion in 2002.[14] Seasonal variations is closely related to OME that patients of the winter season were more

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than around two times as in the summer.[15] It traditionally imposed that adenoidectomy relief the anatomical obstruction of the Eustachian tube is benefited for the children when the adenoid size is small, but the presence of OME has contributory another factor of adenoid.[16] Recurrent acute and chronic inflammation of adenoid and continuous bacterial loading change of mucosal epithelium into squamous metaplasia and fibrosis, reduced mucociliary clearance of effusion, the contributory factor of the OME.[17] Parental smoking is one of the risk factor of developing OME.[18] If the mother smoked, it is more significant to increase the risk of developing OME or persistence of the disease.[19] An international review of risk factors of OME was increasing number of siblings, smoking, not breastfeeding, low birth weight and poor socioeconomic condition.[20]

This study finds out the incidence, management, and outcome of the adenoids with glue ear and to facilitate the future research activity in the different impacts of glue ear on children's quality of life.

II. Methods and Materials

It is a cohort retrospective study of 251 cases in the two different tertiary care institutions. During three years period, 7099 routine ENT operations performed in which adenoidectomy-tonsillectomy was 864, from that chronic adenoiditis and tonsillitis with glue ear was 251. I followed the QOL (quality of life) measurement concept which modified from the different study groups, the Rutter children behavior questionnaire for teachers, OM8-30, OMQ-14(otitis media questionnaire), including four main profile areas to assess and evaluate the children health status of the ear. Four main profile areas were A. Recurrent AOM, B. Reported hearing difficulties, C. Behaviour and parental QOL and, D. Speech and language. All patients clinically diagnosed as adenoids with glue ear and confirmed by history, examination, and investigations. It includes otoscopy; investigations were X-ray nasopharynx lateral view, Play Audiometry, PTA, Tympanometry, and blood tests were complete blood count and immunoglobulin study. The sensorineural hearing impairment cases excluded from the study. The following data collected about the patients: Age, sex, side, presenting features, otoscopic findings, pre and post-operative (up to 03 months) tympanometry and audiometric findings, radiological gradings of adenoids, treatment, and management. Statistical software SAS used to calculate the data.

III. Results

Incidence of adenoids with glue ear, out of total routine ENT operations was 3.54%, and adenoidectomy-tonsillectomy 29.05% (Chart-1). Of 251, the male was 102(40.64%), and female was 149(59.36%), 03-05 years were 83(33.07%), 06-10 years 107(42.63%), and 11-15 61(24.30%), mean age was 10.80 years whereas lowest one was 03 years, and highest 15(Figure-1). Among them, unilateral OME was 111(44.22%) in which left ear 41(36.94%). Right ear 70(63.06%), bilateral 140(55.78%)(Chart-2), presenting features showed nasal obstruction was 245(97.61%), mouth breathing 231(92.03%), hearing loss 229(91.24%), snoring 213(84.86%), frequent cold attack 199(79.28%), and infrequent earache 117(46.61%)(Figure-2), personal history revealed that villager was 107(42.63%), slum dwellers 105(41.83%), and urban 39(15.54%), smoker parent was 199(79.28%), and non-smoker 52(20.72%)(Figure-3). In otoscopic examination we used 0° Hopkin's laryngeal telescope in cooperative children and traditional otoscope for non-cooperative, exhibited lusterlessly and retracted tympanic membrane was 183(72.91%), color change 51(20.32%), and fluid level and air bubbles 17(6.77%)(Figure-4), radiographic report according to Cohen D et al. grade-2 was 144(57.37%), grade-3 82(32.67%), and grade-4 25(9.96%)(Figure-3), Play audiometry and PTA revealed mild hearing loss(30.49dB) was 181(72.11%), and moderate hearing loss(43.17dB) 70(27.89%). Pre-operative mean mild and moderate hearing loss was 36.83 dB and 43.17 dB, and post-operative (after 03 months) was 19.58 dB and 27.91 dB accordingly. Pre-operative mean hearing was 36.83dB, and post-operative 23.75dB, mean hearing gain 13.08dB (Table-1). Tympanometry showed, pre-operative Type-B was 107(42.63%), and Type-C 144(57.37%). Post-operative (after 03 months) normal Type-A was 231(92.03%), Type-B 07(2.79%), and Type-C 13(5.18%) (Table-2). Treatment provided as per the demand of the disease condition such as adenoidectomy-tonsillectomy for 144(57.37%), adenoidectomy-tonsillectomy with myringotomy, and softly suction of fluid 82(32.67%), and adenoidectomy-tonsillectomy with myringotomy, the suction of fluid and insertion of ventilation tube 25(9.96%)(Figure-4). I used Shepard and Shah's ventilation tube. Regarding follow-up the patient, they came after surgery every week for 03 weeks and after 03 months with audiometry and tympanometry report. Within 03 months, the ventilation tube spontaneously extruded.[21] Among Type-B 7, 4(57.14%) presented with typanosclerosis, and 3(42.86%) with tympanic membrane perforation (Figure-4). Amidst Type-C13, all suffered from allergic manifestation (Figure-4). I was counseling about the disease process with the parents and advised them for long term follow-up with symptomatic medical treatment.

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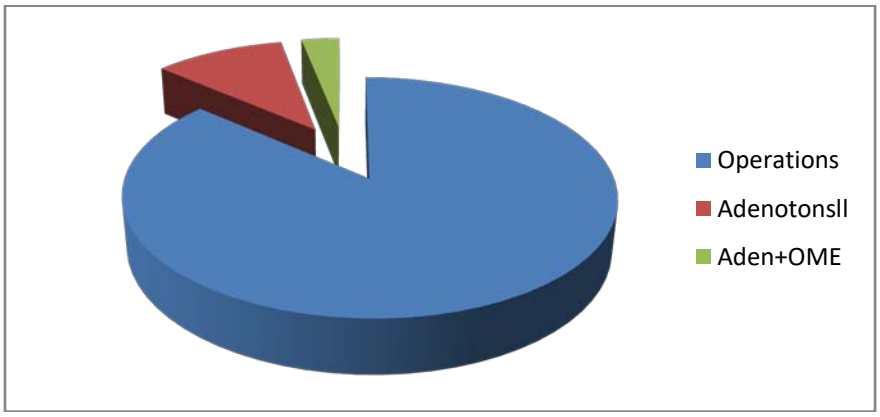


Chart-1: Incidence.n-7099 [Total operation-7099; Aden+OME-251(3.54%): Adenotonsllectomy-864: Aden+OME-251(29.05%)]

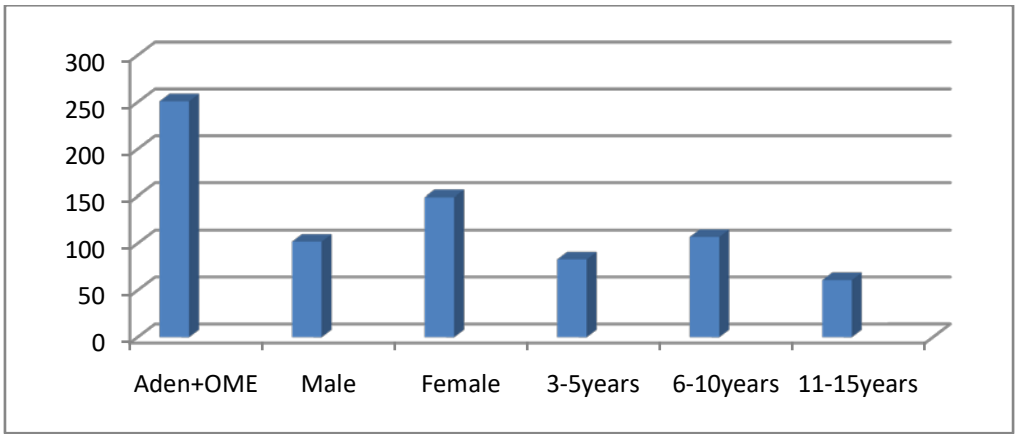


Figure-1: Gender & Age.n-251[Aden+OME-251; Male-102(40.64%): Female-149(59.36%): 3-5years-83(33.07%): 6-10years-107(42.63%): 11-15years-61(24.30%)]

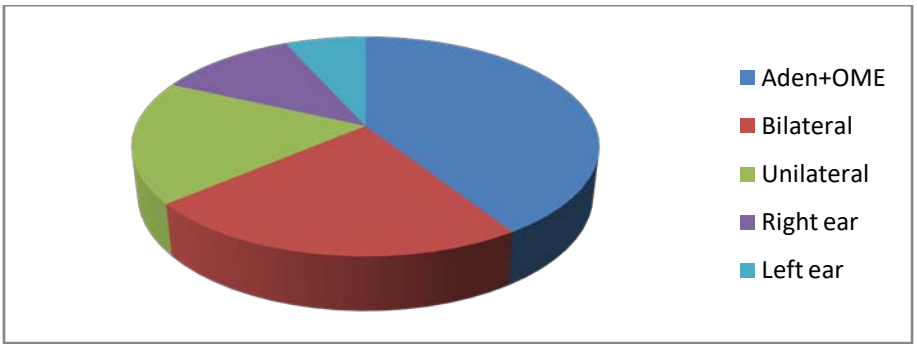


Chart-2: Laterlity.n-251 [Aden+OME-251; Bilateral-140(55.78%): Unilateral-111(44.22%):{n-111;Right ear-70(63.06%): Left ear-41(36.94%)}]

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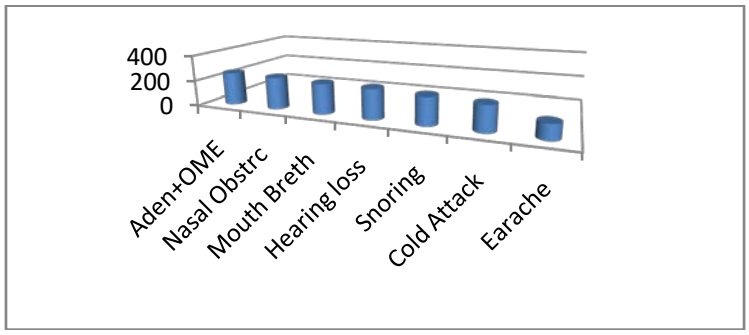


Figure-2: Presenting features. n-251[Aden+OME-251; Nasal Obstruc.-245(97.61%): Mouth breath.-231(92.03%):Hearing loss-229(91.24%):Snoring-213(84.86%):Cold attack-119(79.28%):Earache-117(46.61%)]

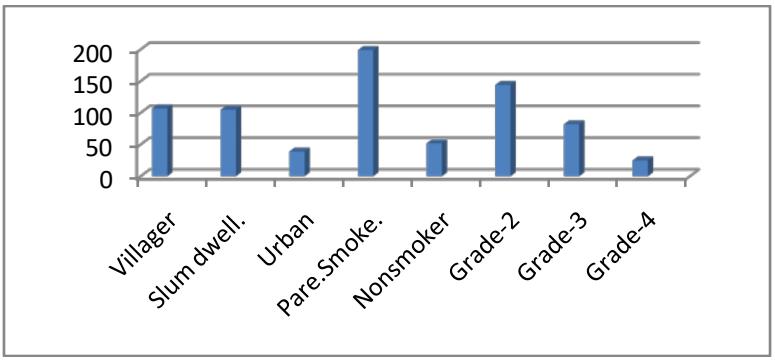


Figure-3: Personal history and radiological finding [n-251; Villager-107(42.63%): Slum dwellers-105(41.83%):Urban-39(15.54%):Parental smoker-199(79.28%):Nonsmoker-52(20.72%):Grade 2-144(57.37%):Grade 3-82(32.67%):Grade 4-25(9.96%)]

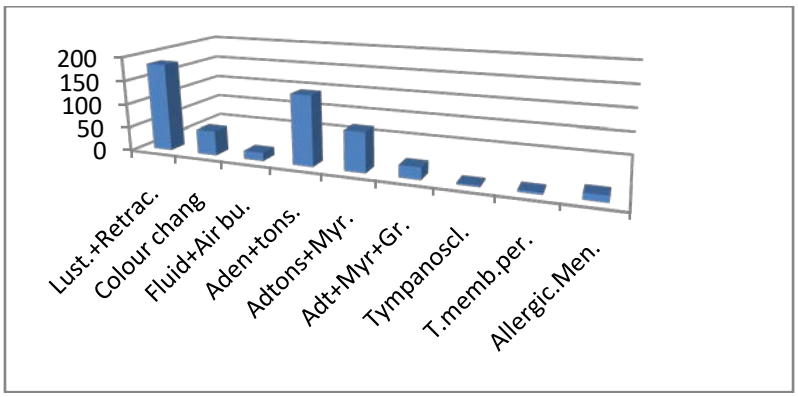


Figure-4: Otoscopic Finding+Surgery+Complications. [n-251; lust.+Retrac.-183(72.91%):Colour-51(20.32%): Fluid+air-17(6.77%): Adenotons.-144(57.37%): Adtons.+Myrin.-82(32.67%): Adt.+Myr.+Grom.-25(9.96%): {n-7(Type-B): Tymscl.-4(57.14%): Perfo.-3(42.86%)}: {n-13(Type-C):Allergic Menif.-13(100%)}]

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Table-1: Play audiometry and PTA finding: pre-operative and Post-operative and Mean Hearing Gain-13.08dB.

Serial No.	Play audiometry and PTA, Types of Hearing loss.	Number of Patient(pre-operative)	Percent--age	Mean hearing(pre-operative)	Mean hearing(post-operative)	No. of patient(post-operative)	Percentage (post-operative)
1.	Normal hearing (0-25dB)				19.58dB	231	92.03%
2.	Mild hearing (26-40dB)	181	72.11%	30.49dB	27.91dB	20	7.97%
3.	Moderate (41-55dB)	70	27.89%	43.17%			
4.	Moderately severe (56-70dB)						
5.	Severe (71-90dB)						
6.	Profound (91-120dB)						
Total		251	100%	Mean hearing-36.83dB	Mean hearing-23.75dB	251	100%

Table-2: Audiometric Finding: Pre-operative and Post-operative

Serial No.	Types of Tympanogram	Pre-Operative: Number of Patient	Percentage	Post-operative: Number of Patient	Percentage
1.	Type-A (Normal Tympanogram)	00		231	92.03%
2.	Type-As(Reduced compliance at ambient Pressure) e.g. Otosclerosis.	00			
3.	Type-Ad (Increased Compliance at ambient Pressure) e.g. Ossicular Disruption.	00			
4,	Type-B(Flat or dome-shaped.) Fluid in Middle Ear.	107	42.63%	07	2.79%
5.	Type-c(Maximum compliance at pressure -200 mm H_2O.) Early stage of OME	144	57.37%	13	5.18%
		251	100%	251	100%

IV. Discussion

Historically, the adenoid associate with upper airway obstruction, as a focus of recurrent infection of the upper and lower respiratory tract, rhinitis, rhino-sinusitis, otitis media, and persistence of OME. The incidence of adenoid with OME in our study was 3.54% in routine operative patients and 29.05% in the adenoidectomy-tonsillectomy patients. Mwaniki KA showed his dissertation in the Medicine department of Nairobi University, Kenya, 67.3% of children with adenoids suffering from OME. In contrast, Nwosu C et al. study displayed incidence of OME was 55.9% in adenoids patient.[22, 23]

Considering gender epidemiology, female 149(59.36%) was more than male 102(40.64%), against Ajayan PV et al. series where the male was 63% and female 37%, Paradise JL reported that there was no any gender prelidection.[24, 25] In Bangladesh perspective female children engaged in household work like cleaning and washing from early childhood causes a frequent attack of cold.

Regarding age, 06-10 years of age was more sufferer 107(42.63%), second-most was 03-05 years 83(33.07%), held up by Dawes JDK and Fujioka M et al. study.[26, 27] Dawes showed majority was in the age of 05-10years whereas Fujioka revealed 04-08 years.

About laterality, bilateral (140) was more than unilateral (111) in which right ear (70) more than left (41), persistence with the report of Silva PA et al. series and memorize that bilateral hearing impairment produce

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more suffering than unilateral and let give them more attention about treatment.[28]

The traditional presenting symptoms of adenoids with glue ear were nasal obstruction 97.61%, mouth breathing 92.03%, hearing loss 91.24%, snoring 213(84.86%), frequent cold attack 79.28%, and infrequent earache 46.61% consistent with Tos M et al. study who described hearing loss and nasal obstruction was above 90%, and other symptoms were above 70%.[29]

Personal history revealed the villager was 42.63%, slum dwellers 41.85%, those were poor, working-class group and urban 15.54% was lower middle-class group supported by Ajayan PV et al. series reported a majority of the patient was poor class.[24] Parental smoker exhibited 79.28% in our research, one of the risk factor for the persistence of glue ear consistent with Alpert H et al. report.[18]

The otoscopic finding was the most important examination procedure to a diagnosis the glue ear. Our current study showed lusterlessly and retracted tympanic membrane was 72.91%, the color changed to amber or yellow to bluish 20.32%, and fluid level and air bubble 6.77% held up by Satish HS et al. series reported 64% retracted tympanic membrane, 16% air bubble but color change 94% wasn't in our favor.[30]

The radiological investigation, X-ray nasopharynx lateral view in open mouth replicated the size of the adenoids described by Cohen D et al. study in which our series, grade-2, was 57.37%, grade-3 32.67%, and grade-4 9.9% supported by Wormald PJ et al. work.[31, 32]

Play audiometry and PTA exhibited the most prime findings of the outcome about the treatment. The pre-operative report in our study, the mild hearing loss of children was 181(72.11%), and moderate 70(27.89%), pre-operative mean hearing thresholds were 36.83dB, persistence with Aman SJ et al. series, they reported 41.56dB whereas Fria TJ displayed 27.5dB.[33, 34] Post-operative, after three months mean hearing was 23.75dB, mean hearing gain 13.08dB held up by Takahashi H et al. research, reported 14.25dB, Aman SJ et al. displayed 16.95dB near our report.[35, 33]

Pre-operative impedance audiometry showed Type-B was 107(42.63%), and Type-C 144(57.37%) near to Orji FT et al. work, reported Type-B was 35% and Type-C 60%.[36] Other studies were against our series, Abd Alhady R et al. displayed Type-B was 84.38%, and Type-C 15.62%, and Aman JS et al. exhibited Type-B was 62.5%, and Type-c 30%.[37, 33] Post-operative after three months, our study presented Type-A(Normal) was 231(92.03%), Type-B 07(2.79%), and Type-c 13(5.18%) which wasn't in our favor, Aman JS et al. study reported Type-A was 70%-, and Type-C, 17.5% whereas Maw AR showed Type-A was 62%.[33, 38]

Regarding treatment, as the patient was children, the parents had over-pessimistic about the disease and are over-optimistic about the result of surgery. They avail of the medical treatment for a prolonged period. After the failure of medical treatment, the parents agreed to take surgical management. In our study, adenoidectomy-tonsillectomy did 144(57.37%) consistence with Sandooja D et al. reported sufficient improvement of OME.[39] Adenoidectomy-tonsillectomy plus myringotomy with soft suction of effusion fluid performed 82(32.67%) held up by Mendel EM et al. series.[40] Adenoidectomy-tonsillectomy plus myringotomy with suction of fluid plus ventilation tube insertion in 25(9.96%) kept up by Gates GA et al. and recommended some cases need triple modalities of surgery.[41]

Post-operative complications like tympanosclerosis, tympanic membrane perforation, and allergic disarrayed children treated accordingly and suggested to maintain long term follow-up.

V. Conclusion

Adenoid with glue ear is a common disease in children. Early detection through a screening process and take the appropriate treatment lowering the catastrophe of the disease process. To maintain the quality of life, normal hearing is essential. Responsible and literate parents, school teacher, are another major factor in takeing care about the disease process, and help to accept the surgical treatment accordingly. Appropriate treatment maintains the children's normal hearing, behavior, speech, language, and intellectual development.

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Conflict of interest: None declared.

Ethical approval: The study was approved by Institutional Ethics Committee.

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