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Prevalence of middle ear pathologies in children with bilateral sensorineural hearing loss

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Summary

Objectives: In poor countries, hearing aids are too expensive for sensorineural hearing loss (SNHL) children's parents to offer for their children. These children may have middle ear problem, this will aggravate the level of hearing loss which may lead to delay in their ability to speak. This study is to highlight the prevalence of middle ear pathology in SNHL children.
Methods: Two hundred children with bilateral sensorineural hearing loss (SNHL) were selected in our study from the outpatient clinic of ENT department of Sohag University Hospital, Egypt. Children were classified into three categories according to their middle ear status. They were normal middle ear, middle ear with unhealthy tympanic membrane or otitis media with intact drum and chronic suppurative otitis media with perforation.
Results: Seventy percent of cases were normal, 25% had middle ear problem with intact tympanic membrane and 5% had chronic suppurative otitis media with perforation.
Conclusion: Thirty percent of SNHL children have middle ear pathology which aggravate the degree of hearing loss. Regular evaluation of SNHL children to treat those having middle ear pathology medically and/or surgically and this may help those having no ability to have hearing aids to learn language early.

1. Introduction

Delay in detection of significant hearing impairment will lead to loss of development of essential skill in speech, language and social interaction.

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Otitis media either suppurative or non-suppurative is common in children in the developing countries. If these problems affect children with mild to moderate sensorineural hearing loss (SNHL), it will eventually aggravate the present hearing loss.

Otitis media is one of the most common infectious diseases of childhood. The peak incidence of middle ear disease in children was noted to occur during the second 6 months of life with a second lesser peak noted between 4 and 5 years of age. Males were found to be at greater risk for otitis media than females and recurrent acute otitis media in a sibling was a strong predictor of recurrent otitis media in a study child [1]. So, risk features for recurrent otitis media in children are male gender, sibling history of recurrent otitis media, early occurrence of the infection, not being breast fed [2], being in group day care [3], and exposure to smoke in the household [4].

The etiologic correlates of SNHL, such as perinatal high risk factors, craniofacial anomalies and genetic disorders may place at least some children with SNHL at an increased risk for otitis media with effusion [1]. So, close audiological follow up is essential for effective treatment of children with SNHL.

The aim of this study is to know the prevalence of middle ear problems in children with bilateral SNHL in our locality.

2. Patients and methods

Two hundred children with bilateral sensorineural hearing loss (SNHL) were selected in our study from the outpatient clinic of ENT Department of Sohag University Hospital, Egypt.

Each child was subjected to:

1. History: prenatal, perinatal, neonatal, postnatal and family history for the detection of a possible aetiology for the SNHL.
2. Complete ENT examination.
3. Otologic investigations including: otoscopic examination, tympanometry and pure tone audiometry.

Children were classified into three categories according to their middle ear status:

1. Normal: no evidence of disease.
2. Otitis media with intact tympanic membrane.
3. Otitis media with perforated tympanic membrane.

They were classified into four groups according to the degree of hearing loss (Table 1) as follows:

Table 1 The degree of SNHL level

Degree	Frequency
A	43
B	158
C	126
D	73

1. A: mild hearing loss.
2. B: moderate hearing loss.
3. C: severe hearing loss.
4. D: profound hearing loss.

The classification criteria for degree of hearing loss were: borderline normal 16—25 dB HL; mild 26—45 dB HL; moderate 46—65 dB HL; severe 66—85 dB HL; profound = 86 dB HL.

In calculating the individual ear's hearing loss, we used the average of 500, 1000, 2000 Hz sensorineural hearing loss on both sides.

3. Results

The present study included 200 children: 113 boys (56.5%) and 87 girls (43.5%). Their age ranged from 4 to 12 years with mean of 8.6 years. Twenty-three percent of them at age of 7 years and 18% of 12 years (Fig. 1).

On otoscopic examination and after doing audiograms and tympanograms, 70% of cases were normal, 25% had otitis media with intact tympanic membrane and 5% had otitis media with perforation (Fig. 2). Table 1 shows the number of children in each hearing loss group. In the mild SNHL group, 18 ears had mild to moderate conductive gap, six of them due to effusion and two due to perforation. In the moderate SNHL group, 28 ears had mild to moderate conductive gap, nine of them due to effusion and two due to perforation. For cases of conductive hearing loss due to acute otitis media

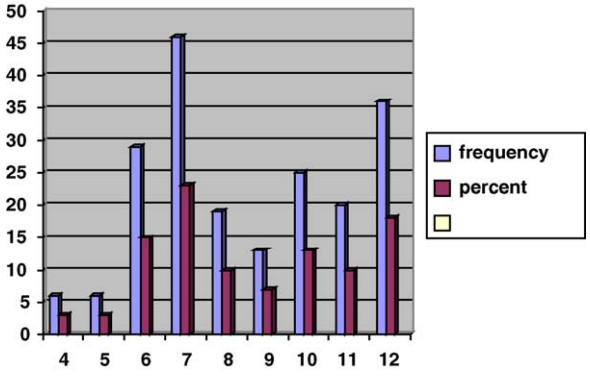

Fig. 1 Age distribution of the children.

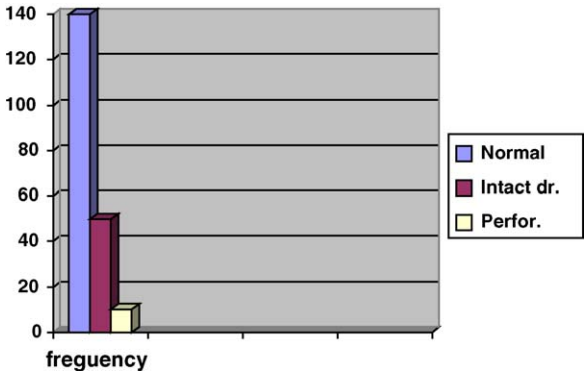

Fig. 2 Middle ear problems.

and cases of effusion, we gave them, augmentin suspension 312 mg: amoxycillin and clavulanic acid 5 ml TID and mucolytic (bisolvon syrup: bromhexine hydrochloride 5 ml BID) for 10 days. Most of these cases, felt better in hearing after medical treatment due to improvement in the conductive gap. For 10 cases of persistent effusion after medical treatment, they had myringotomy with grommet's tube application. They also had better hearing after myringotomy. The possible aetiologies of SNHL of these children are presented in Table 2. Thirty-six percent of cases are of unknown cause, 21.5% had positive family history and 19% were due to meningitis.

4. Discussion

In our study, 30% of children having SNHL had middle ear trouble. It goes with the percentage reported by Brookhouser et al. in 1993 [1] (36.4% out of 437 children). Ruben and Math in 1978 reported the same percentage 30% [5]. Stool et al. found that 29% of their study had middle ear problems at some time during the year [6]. Of these, 8% had middle ear effusion and/or otorrhoea. Twenty-one percent had high negative pressure, 26% had residual middle ear disease and 1% had inactive disease. Brooks reported in 1974 a lower percentage 20% [7]. A higher percentage of 57% was reported by Das in 1990 [8].

Table 2 The aetiology of SNHL

Aetiology	Frequency	Percent
Unknown	72	36%
Positive family history	43	22%
Meningitis	38	19%
Measles	18	9%
Mumps	4	2%
Ototoxicity	8	4%
Trauma	5	2.50%
Prolonged labour	4	2%
Pre-term labour	4	2%
Jaundice	4	2%

Most of our cases were at age of 6 and 7 years, this was due to the delay of parents in our locality to seek ENT specialist to evaluate their children hearing level and this is because the nearest audiological unit is far away for most of them and our unit services four districts and one of them is 400 km to the south, beside the low social standards for most of them, this is also the age of application to primary schools. These who were older, were referred from schools for the deaf for re-evaluation of their hearing level or for ENT problem.

This is not the only problem but what makes the matter worse, the ability of most of them to have hearing aids, it is too expensive for them to have one because it costs at least $300, beside the refusal of children and the unacceptance of their parents for hearing aids. The aid acts as a source of ridicule for some of them.

This is why we try to manage any middle ear pathology medically or surgically to help those who have a mild or moderate degree of SNHL. It is well known that hearing aids (HA) can provide excellent compensation for a purely conductive hearing loss and they can be an effective alternative to surgery with high acceptance and compliance rates [9]. And in their excellent paper, Flanagan et al. in 1996 concluded that the most defined use of a hearing aid must be in managing otitis media with effusion in those children with significant recurring hearing loss despite previous surgery [9].

The possible aetiologies of SNHL in this study were 36% of unknown aetiology, 21.5% had family history, 19% due to meningitis and 9% due to measles. Das in 1988 reported that the aetiology of SNHL was 37% of unknown aetiology, 24% due to genetic abnormality, 15% due to adverse perinatal factor and 6% postmeningitic [10].

The high prevalence of middle ear problems in children with SNHL confirms the importance of regular otologic, tympanometric and audiometric screening as follow up tools in the educational settings serving hearing impaired children. As hearing impaired children may be unable to convey to parents and other care givers their otologic symptoms, auditory threshold measures should be obtained regularly to discover any possible accompanying hearing loss.

5. Conclusion

Accurate determination of the degree and audiologic configuration of SNHL may be seriously hindered by a coexisting middle ear problem. The

presence of conductive hearing loss will increase the degree of hearing impairment in the affected ear. So, it is important to evaluate children with SNHL periodically to discover any middle ear problem early and to correct the conductive component either medically and/or surgically.

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