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A STUDY OF VISUAL DEFECTS IN HEARING IMPAIRED CHILDREN

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Abstract
Findings from the visual screening of a group of 40 hearing-impaired children are presented. The incidence of visual defects is found to be higher than in the normal school age population. The reliance on vision for speech interpretation is emphasised and modifications of testing methods are described.

Key words
Deafness, visual screening, speech reading.

This paper was written while the author was a third year student in Orthoptics at Cumberland College of Health Sciences, Lidcombe, N.S.W.

The aim of this paper is to call attention to the importance of good binocular vision for the integration of deaf children into a hearing society, and to discuss the methods and findings of visual screening carried out on two groups of these children.

Similar studies[1,2] have stressed the need for deaf children to be regularly assessed for visual disorders.

Deafness, like blindness, is in many cases not absolute. The vast majority of children have some usable hearing, although it may be very defective. The lowest sound level that can be heard by an individual is assessment of deafness. The softest sound a normal ear can appreciate has a level of zero decibels (I.S.O. standard). The mildly deaf can appreciate sound at 20-40 decibels, the moderately deaf at 60-80, and the profoundly deaf can hear sound only at the 80 decibel level or higher. A hearing aid amplifies sound, but does not restore normal hearing to its user.

For many people the image of a deaf person is of somebody who speaks with his hands. Current educational management of a young deaf child discourages the use of any sign language. He is encouraged to communicate by speechreading and the use of hearing aids, so that in time he may take his place among hearing companions.

Mrs Alexander Graham Bell in 1894 described speechreading as "essentially an intellectual exercise; the remedial part performed by the eye . . .". Speechreading is a combination of watching and reading the speaker's lips as well as listening for the amplified sounds which may be picked up though the hearing aids, the aim being to understand the spoken word and conversation.

The ability to speechread well probably depends on several factors, including

1. good visual acuity
2. good accommodation which can be maintained over long periods,
3. above average visual perception,
4. full visual fields, which enable the speechreader to gain in information from the face and setting whilst still focussing on the mouth of the speaker, and
5. good visual memory.

Programmes to teach oral communication to deaf children follow a pattern of auditory training, cognition, speech training, all of which are combined in a single lesson. Several such lessons are given every day. The main stimulus is provided by visual input, combined with tactile stimulation and residual hearing.

Some deaf children are multi-handicapped. This is especially likely when the cause of deafness was

rubella, which causes eye defects as well as hearing defects. It is for this reason that deaf children are now being screened more widely for eye problems. Early detection and treatment of ocular defects allows the child the advantage of the best possible sight.

The 40 deaf children with whom this paper is concerned were from the Shepherd Centre for Deaf Children, Sydney University, and from the Opportunity Deaf Class at Granville primary school, the latter group attending as part of the school screening system.

The children ranged in ages from five months to fourteen years. The degree of deafness ranged from a mild loss to profoundly deaf. As many as possible were given a full orthoptic assessment.

Generally speaking, it is just as easy or difficult to test a deaf child as a hearing child. It is important to talk just as much, if not more, to a deaf child than to a hearing child, repeating whole phrases, not just words. State first what you want him to do, and then show him. To show first, or while you are talking, will only attract the child's attention away from your face so that he misses what you are saying.

Visual acuity was usually tested first. If performed well it gave confidence to both the child and the orthoptist. As part of their schooling, from as young as eighteen months to two years, the children match animals, progressing to letters and words, and therefore the Sheridan Gardiner test was readily understood. It is often best to start close to the child where he can gain information from your lips and face, encouraging him when he perform correctly, and then to move back to the appropriate distance. It is better not to point to the letter or picture, but to encircle it with your finger as this reinforces the method taught at school.

6 of the children were found to have defective vision.

2 had strabismic amblyopia

2 had refractive or anisometropic amblyopia

1 showed signs of retinopathy, and

1 case was of unknown cause.

Ocular motility was assessed by cover test, ocular movements, and convergence. Most of the children willingly looked at an accommodative target long enough for an accurate cover test to be performed.

5 children would not allow either eye to be covered; by cornela reflections their eyes appeared straight. Of the remaining 35

13 were orthophoric

7 were esophoric

3 had constant convergent squint

8 were exophoric

3 had intermittent divergent squint, and

1 had a constant hypertropia

Ocular movements were performed using a visual stimulus; surprisingly, squeaky toys proved successful as some children were able to hear them. Older children performed well when asked to follow a light.

4 children were unassessable,

29 had no apparent muscle anomaly

5 showed underaction of a superior oblique muscle

1 had Brown's syndrome, and

1 had a lateral rectus palsy

Convergence was assessed using a fixtion target, not the R.A.F. rule.

4 children were not tested for various reasons.

30 had full convergence,

6 had a near point further than 5 cm.

Binocular single vision was tested using the Titmus and in some cases the TNO stereo acuity test. These proved to be much more easily done than one would have expected. The children readily pointed to the correct item with little or no encouragement. Good stereoacuity was demonstrated in most of the children tested. The Ishihara colour vision test gave no trouble with the older children, who traced the numbers wihtout prompting. No case of defective colour vision was found.

In this survey the testing of visual fields was not attempted, possibly because of difficulties due to age and deafness, but I feel that this is an area which should be investigated, as these children rely heavily on peripheral vision to gain information about the conversation and surroundings whilst speechreading.

Many of the children, especially of those from Granville school, had not been refracted. Of the 5 patients with known refractive errors, 4 were myopic, and 1 hypermetropic, 3 of the group having anisometropia. These five constituted 12.5% of the total. Previous studies[1,2] of the refractive errors in deaf children found approximately 38% requiring a hypermetropic correction while about 9% were myopic. Using the basic procedures of our survey, hypermetropia would not be detected.

It was noted from the medical records that for twenty two children the cause of deafness was unknown. Ten cases were due to rubella. Five of these ten children had retinopathy, consisting

of retinal pigmentation and paramacular pigmentary stippling. The pigmentary disturbances did not appear to interfere with visual acuity.

It should be remembered that deaf children with severe eye pathology and blindness would be in schools or institutions for the severely and multi-handicapped. The children whose assessment has been described in this paper have the major handicap of deafness, and are being screened for associated eye defects.

CONCLUSIONS

Forty deaf children were screened for visual disorders. Apart from the incidence of refractive errors, the findings agree well with previous studies. Six of the children were found to have ocular defects.

Several facts became apparent during this study.

1. All deaf children, where possible, should be screened for eye defects. This study confirms that of others, that there is a higher incidence of eye problems in these children than among normal hearing children of their age.
2. Visual input is the prime stimulus that these children rely on to gain information from speech and their environment. Treatment of any visual disorder, especially refractive error and amblyopia is of the utmost importance. In addition, it must be remembered that the children already have a severe handicap which is receiving intense treatment; our treatment should be carefully adapted so as to assist, and never to hinder, their progress.
3. Testing procedure may be modified within reasonable limits, but these children are generally not lacking in intelligence. One explains testing procedure to them as one would to any child of the same age.

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