Studies Concerning the Problem of Ear Diseases in Cleft Palate Children



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A correlation between cleft palate and loss of hearing has been known to exist since the last century (1, 3). Later, the frequent occurrence of hearing disturbances in cleft palate patients could be proved by statistics. The figures recorded range between 40 and 90%. Thus, it is all the more surprising that both the question of the age of onset of this complaint and its pathogenesis and the possibilities of diagnosing and treating it have remained unsettled to a large extent.

Subsequent to the latest publications both by Stool and Randall (20) and by Sholehvar and associates (18), these problems became of vital interest again. Therefore, at the suggestion of these authors, we conducted clinical, microscopical and audiometrical examinations of our patients. Following, the results obtained are discussed in detail.

Materials and Methods

Forty subjects were used; both ears of each patient were examined. Because of the various types of hearing tests, we decided to divide the patients into two groups. Group I includes infants under the age of two with unilateral and bilateral clefts of whom measurements of impedance were taken. Group II consists of children over two years of age; they were tested by puretone audiometry. An otologic evaluation of both groups was made prior to reconstructive surgery of the cleft palate.

The most important part of the physical examinations were the observations of both the ear drums and the middle ear with a Zeiss binocular otoscope at magnifications of $6\times$, $10\times$, and $16\times$. As in the case of the surgical closure of the clefts, controls were also made in general anesthesia. In the expectation of fluid being present in the middle ear, a pinhole was first made into the eardrum. If fluid appeared, a

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FIGURE 1. Illustration of use of a polyethylene tube as a prosthetic eustachian tube.

myringotomy was performed by using small handmade polyethylene tubes (type A 2 of Braun-Melsungen) for withdrawal of the fluid from the cavity. A tube in situ is shown in Figure 1.

The content of fluid of 18 middle ears in total with pathological findings could be examined bacteriologically.

Results

According to the case history of these children (made available by their parents) only 2 out of 40 had been treated by an otologist before. Both the auricles and the outer auditory canals of these two patients showed defects. Table 1 presents findings from the bilateral microscopical examinations of the tympanic membranes and middle ears of 40 cleft palate children. Only 6 children of Group II were pathologically

group 1 (under 2 years)							group 2 (2–6 years)					
cases	М	F	ears exam.	pathol. drums	middle- ear pathol.	type of clefts	cases	М	F	ears exam.	pathol. drums	middle- ear pathol.
3	2	1	6	6	6	total clefts bilat- eral	3	2	1	6	3	4
12	10	2	24	13	24	total clefts unilat- eral	7	1	6	14	9	11
5						right	2					
7						left	5					
						clefts of hard and	6	5	1	12	4	7
						clefts of soft pal-	3	1	2	6	4	5
3	i.	3	6	6	6	ate atypical cases	3		3	6	2	2
18	12	6	36	25	36	total	22	9	13	44	22	29
45	67	34	100	69.4	100	percentage	55	41	59	100	50	65.9

TABLE 1. Findings from the bilateral microscopical examinations for 40 children.



PATH. FINDINGS BY 80 MICROSCOP. EXAMINAL OF EARDRUMS

sound. 91% of the remaining patients were involved with a bilateral middle ear complaint, irrespective of the type of clefts, including all of the youngest patients without any exception. However, pathological findings could only be obtained from 29 out of 44 ears examined of Group II. As in this case, appreciable differences between the two groups with respect to the suspect phenomena at the eardrums and pathological disturbances at the middle ears were noticed. A discrepancy in the findings becomes particularly apparent in Group I, for only a transtympanic exploratory puncture in more than 30% of the cases could give evidence of fluid being present in the middle ear cavity. In contrast to it, in older children any pathological changes at the ear drums could more easily be ascertained.

Figure 2 shows the distribution of the most striking symptoms of the tympanic membranes. These observations were made with an operative microscope. An otological routine examination is, particularly in infants, less successful.

On Figure 3 the different contents of the middle ear cavities are classi-



INCIDENCE OF MIDDLE EAR PATHOLOGY IN 80 EARS

FIGURE 3. Distribution of types of middle ear pathologies.

FIGURE 2. Distribution of symptoms of ear disease.

fied according to their viscosity and frequency. It was surprising that in 43.7% of the cases gelatinous fluid was found, mainly in infants of Group I.

Cultures taken from 18 middle ears revealed in none of the cases pathogenic bacteria. Thus, we decided to refrain from a routine antibiotic treatment.

Due to difficulties in coordinating location and time, we were unfortunately not able to conduct hearing tests in all of the children. Through exact measurements of the impedance in 11 out of 13 patients of Group I, either mild or fairly severe hearing losses of the conductive type could be detected. Only one child revealed a perceptive loss of hearing. Puretone audiometry showed in 9 of the 15 tested patients of Group II difficulty of hearing of the conductive type between 20 and 60 dB.

Discussion

In spite of the fact that loss of hearing has often been described in connection with cleft palates (4, 5, 8-11, 13, 16, 19, 21) there are actually no data available on the age of onset of these complaints, their pathogenesis, diagnosis and therapy.

Skolnik (19) employing conventional methods of ear examinations on cleft palate children under one year of age, detected in only 6% of the cases pathological findings, observing an increase up to 69% until school age. Stool and Randall (20) and Sholehvar and associates (18) were able to furnish proof of middle ear complaints in more than 90% of the infants prior to the surgical cleft repair. The results obtained could be confirmed by our own examinations. The varying numerical data can be accounted for by the different methods of diagnosing ear complaints.

It is difficult to make an assessment of an infant's organ of hearing: thus, an otologic routine examination will not clearly reveal any pathological changes. A case history is a completely unreliable source as could be proved by the striking discrepancies between the information given by the parents and our own objective findings.

As it is known, also, hearing tests conducted during infancy are rather complicated. Consequently, an early recognition of any disturbances in early childhood mainly depends upon an improved diagnosis, which, however, without the aid of a microscope and general anesthesia appears to be an impossibility. In contrast to the data given by Skolnik (19), we were able to detect and differentiate pathological findings at the ear drums (Figure 2) in 69.4% of the infants in Group I by applying the aforementioned method.

Another resource for recognizing ear complaints in early childhood is the measurement of impedance. The results obtained, by using this method, are more exact and objective than those obtained by audiometry. It furthermore allows conclusions to be drawn from the tubal functions. However, only myringotomy will give assurance of the presence of pathological conditions in the middle ear cavity, by which the existence of fluid in the tympanic ear of cleft palate children under two years of age could be detected; in Group II only 65.9% of the children examined showed middle ear complaints. Consequently, there seems to exist the possibility of a spontaneous healing of the otitis media.

Following is a summary of the previously discussed data. a) The otitis media in cleft palate children occurs much more frequently than has generally been assumed. b) An early and exact recognition of any pathological changes is rendered possible by using an operating microscope taking exact measurements of the hearing acuity. c) An otitis media in cleft palate children begins during the first few months of life, long before the surgical closure of the cleft has been performed.

As a result of our observations we can say that the statements established by House (7), namely that a cleft palate repair followed by scar formation will lead to disorders of the tubal function, and is thus responsible for the frequent occurrence of middle ear complaints, do not hold true. Moreover, the development of defective hearing cannot be avoided by an early cleft palate repair. This point of view has been confirmed by postoperative evaluations made by Holmes and Reed (6), Lorenz (8, 9), and Skolnik (19).

Besides, many unknown factors, the tubal dysfunction in combination with pathological conditions in the nasopharynx, may play a particularly significant role in the pathogenesis of the otitis media in cleft palate children. It is a surprising fact that many authors share their view on this assumption: Sataloff and Frazer (16), Schwarz (17), Halfond and Ballenger (4, 5), Pfisterer (14), Skolnik (19), Lorenz (8, 9), and Wittenborg (21).

As these dysfunctions cannot be eliminated by surgery, a causal therapy of the otitis media seems to be impossible. Therefore, any effort in treating this disease must be concentrated both on the prophylaxis and the symptomatology. Thus, it is recommended that any child with a cleft palate undergo an otological examination as early as possible.

According to Armstrong (2), the use of plastic tubes in the therapy of the otitis media is both effective and practicable. The insertion of small polyethylene tubes into the middle ear by a conventional myringotomy allows a permanent perforation for months, which after the removal of the tube will automatically close again. An excessive amount of fluid contained in the middle ear cavity can easily be withdrawn. Subsequently, the prescribed medicaments can just as easily be instilled. It is furthermore highly important that at the same time, while the eustachian tube is functioning insufficiently, a passage for ventilation of the middle ear cavity is prepared. This ventilation plays a significant role in restoring the mucosa of the middle ear to normal, which is fundamental for a normal development of the pneumatization of the temporal bone. The short duration and the simplicity of the surgical

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intervention bears no comparison with the excellent therapeutic effect, which presumably will help avoid a later loss of hearing, as proved by follow-up examinations of the treated children (12).

Good hearing is essential to normal speech. For this reason, best anatomical and functional results of surgical repair of cleft palates will after all remain unsatisfactory, if loss of hearing complicates the normal development of speech. Therefore, continuous otologic care of cleft palate children is indispensable.

Therefore, it is our intention to continue with further examinations and to extend them to a comparable group of children without clefts. It would be of great value to the children if by our contribution we would be able to advance an early recognition and treatment of the otitis media in cleft palate children in other cleft palate centers as well.

Summary

Loss of hearing and its negative influence on the development of speech has been known for a long time. In spite of this fact, such phenomena could hardly be controlled, as difficulties in making a diagnosis would not allow an early treatment of the otitis media. Up until the last three years, middle ear complaints seemed to be a rarity. According to previous descriptions made by other authors (15, 18, 20), we were able to prove with an operating microscope, and by conducting exact hearing tests in 82% of the children examined, the existence of the otitis media prior to the surgical repair of the clefts. In such cases, a polyethylene tube was inserted into the tympanic cavity. An early healing of the otitis media during infancy is the only effective prophylaxis for a later loss of hearing. First controls showed good results, and in many cases already a significant improvement of the hearing acuity.

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