

HEARING IN THE REMAINING EAR IN CASES OF UNILATERAL TOTAL DEAFNESS

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The first question asked by patients with unilateral total deafness naturally concerns his or her, sound ear. The patients or their family want the physician's assurance that the functioning ear will work efficiently and will not suffer premature degeneration owing to the fact that it will be burdened, as they believe, with "double work". The necessity of answering this very vital question inclined us to analyse our cases of unilateral total deafness from this point of view. Our problem was to determine whether the hearing ear would maintain its present state, or whether it would deteriorate. It is well known that in these cases several different factors can exert an influence on the hearing ear. In this paper we will confine ourselves to only one of those factors namely the probable etiology of total unilateral deafness.

In the available otological literature we have found very little information concerning this particular problem. It is probable therefore that unilateral total deafness is not a common type of hearing defect. The authors dealing with the subject of unilateral deafness confine themselves exclusively to cases in which the other ear is quite normal, as e.g. Everberg, who has had the most numerous cases or Lieberman, who is interested in cases of unilateral hearing impairment. The above-mentioned authors do not discuss cases where there is impaired function of the remaining ear, as such cases have no bearing on the premises of their investigations.

During the past 4 years we have observed 93 cases of unilateral total deafness of different etiology. In all the patients we carried out, as routine examinations, the usual audiological tests, including the examination of directional hearing, vestibular tests (the majority of them with the aid of electronystagmography), neurological and ophthalmological examinations and radiograms of the skull and of the temporal bones. Every half year a control examination was made to ascertain the state of the functioning ear. And it is the data thus collected that we shall now discuss.

Our cases are grouped according to the supposed etiology of unilateral total deafness.

Among 93 patients we diagnosed:

1. in 23 a sudden deafness probably of vascular origin,
2. in 17 a sudden deafness probably of infectious origin,
3. in 22 the deafness was revealed accidentally (in mostly congenital deafness),

4. in 17 deafness was caused by some head injury,
5. in 10 the deafness arose from certain diseases of the central nervous system (such as tumours of the ponto-cerebellar angle, disseminated sclerosis, etc.),
6. in 4 the deafness was caused by inflammation of the middle ear.

We considered it advisable to confine the present discussion to the cases mentioned in the first 3 groups, comprising altogether 62 patients, i.e. 2/3 of the total number. We decided not to speak about the remaining cases, since in group 4 and 5 the complexity of different factors acting on the hearing organ would compel us to go into too much detail, and in the case of group 6 the small number of cases (only four) would make a correct analysis impossible.

In the first group in which there was sudden deafness of probably vascular origin among 23 persons, 7 revealed normal hearing in the other ear, 16 showed an auditory impairment greater than the average physiological impairment found in various age groups. The impairment was of the perceptive type. Among the 16 persons with impaired hearing in the other ear the control examination revealed in 8 a progressive character of the disease (the patients concerned were all in their forties or fifties). We didn't observe such a progression in the older patients. It should be mentioned that two persons with progressive impairment of the hearing ear were also blind due to congenital cataract with the resulting atrophy of the optic nerve.

In the second group, where there was sudden unilateral deafness of probably infectious origin, among 17 persons 14 showed normal hearing in the other ear. In 3 persons the hearing of the other ear was impaired. In only one patient did we find a progressive lowering of the hearing acuity.

In the third group unilateral deafness was noticed accidentally. Among the 22 persons of this group 14 revealed normal hearing in the other ear and 8 had their hearing impaired. In 2 of them the auditory impairment was of the conductive type, in 6 of the perceptive type. No person in this group showed a tendency to progressive deterioration of the hearing in the second ear.

In all patients with unilateral total deafness the directional hearing was handicapped but only some of them were already aware of this handicap. In 2 persons where deafness (probably of congenital etiology) had been revealed accidentally, their directional hearing was only slightly impaired. In the remaining cases the impairment was very marked. In patients with unilateral total deafness we could not observe the development with time of any compensation in directional hearing.

Discussion

It is interesting to consider the problem of aural interdependence in cases of unilateral total deafness. Mayoux and Martin maintain that aural interdependence occurs mainly in cases of unilateral hearing impairment of the conductive type. It is found also in labyrinthine deafness, but it is never observed in cases of nerve deafness, probably on account of the interruption

of the reflex arch, one section of which we may assume consists of efferent nerve fibres as described by Fernandez, M. Portmann and Rasmussen.

If we eliminate all the other factors which could be responsible for the changes in the functioning ear, we may suppose that progressive impairment of hearing in the other ear is due to the occurrence of pathological changes in the cochlea of the deaf ear. Such a supposition is further supported, we believe, by the tendency to progressive impairment of the hearing ear in cases of sudden unilateral deafness of probably vascular origin. On the other hand we have not observed such a tendency in cases of unilateral total deafness of infectious origin, where the deafness followed probably upon meningo-neuritis, or in cases of accidentally revealed monaural deafness, probably mostly of a congenital character. So we believe that the prognosis of hearing in the second ear in cases of unilateral total deafness of vascular origin calls for special caution. On the other hand the outlook is rather favourable in cases of infectious and congenital deafness.

The appearance of sudden unilateral total deafness in 2 blind patients confirms our belief that there is a close connection between these two highly differentiated organs of sense. This fact has been referred to in a previous paper of ours dealing with retinitis pigmentosa and has been discussed recently by Guerrier and Dejean.

It is also our opinion, based on the results of our investigations that in cases of unilateral total deafness the functioning ear is not able to compensate the impairment of directional hearing. The results of our investigations support the observations of Viehweg and Campbell but are contrary to the opinion of Christian and Röser, who believe that this kind of compensation develops gradually with the duration of deafness. Unlike the high degree of sight compensation in monocular persons (Merz), monaural patients develop no compensation in directional hearing. It is our opinion that this fact should be taken into consideration in the selection of candidates for different professions, in the certification of invalidity and in medico-legal certificates.

We have discussed only some aspects of hearing in cases of unilateral total deafness. We believe that this problem merits further investigations.

L'AUDITION DE L'AUTRE OREILLE EN CAS DE SURDITÉ TOTALE UNILATERALE

Les auteurs ont en observation 93 malades présentant une surdité totale unilatérale de causes diverses. Dans le rapport ci-contre les auteurs s'occupent du problème de la fonction de l'oreille controlatérale chez 62 malades. Dans un groupe de 23 patients la surdité unilatérale brusque était probablement d'origine vasculaire, chez 17 — infectieuse, chez 22 (probablement congénitale) elle a été remarquée accidentellement au cours de l'enfance. Chez les premiers, des examens effectués tous les six mois ont révélé une tendance à l'aggravation progressive de l'ouïe de l'oreille controlatérale dans 8 cas, chez les seconds cette tendance ne s'est révélée que dans un cas et dans le dernier groupe on ne l'a trouvée chez personne.

On a observé chez ces 62 malades un trouble de l'audition directionnelle,

la plupart du temps à un degré assez élevé et sans tendance à la compensation lors de la durée de la surdité unilatérale.

Les auteurs discutent le problème de l'interdépendance auriculaire dans la surdité totale unilatérale. Il semble que dans les cas de surdité d'origine vasculaire (brusque) le pronostic en ce qui concerne l'ouïe de l'oreille opposée, est moins favorable que dans les surdités postinfectieuses et congénitales.

Contrairement aux grands possibilités de compensation de la vision chez les borgnes, parmi les malades qui ne disposent que d'une seule oreille les auteurs n'ont pas trouvé de possibilités pareilles en ce qui concerne l'audition spatiale. Selon les auteurs il faudrait tenir compte de ce fait dans les Centres d'Orientation Professionnelle et dans l'expertise en médecine légale.

REFERENCES

- Bochenek, Z., Mitkiewicz, W.:** Otolaryngologia. Polska, 1958, 12, 457.
Christian, W., Röser, D.: Ztschr. f. Lar. Rhin. Otol. 1957, 36, 431.
Everberg G.: Acta Oto-lar. 1960, 52, 253.
Guerrier, Y., Dejean, Y.: Journal Français O-R-L. 1962, 11, 209.
Lieberman, A. T.: Laryngoscope. 1957, 67, 1237.
Mayoux, R., Martin, H.: Infection tubo-tympanique et surdités labyrinthiques 1954, Masson, Paris.
Merz, M.: Bezpiecz. Hig. Pracy. 1951, 5, 48.
Mitkiewicz, W.: Metodyka Badan Sluchu w Calkowitych Gluchotach Jednostronnych. Thesis, 1960. Medic. Acad. Warsaw.
Viehweg, R., Campbell, A. R.: Ann. Otol. Rhinol. Lar. 1960, 69, 622.

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DISCUSSION:

Ewertsen:

We would like to know from where you get your material as you not very often meet people with unilateral hearing losses in a hearing center because they will hear with the other good ear. We should like to know from which age you have them and how you analyze their localization ability? Are they able to localize in rooms and not in the free open space?

Bochenek:

The progression of hearing loss in the remaining ear did not depend in our cases on the age of the patients in each of three etiological groups discussed. The patients diagnosed as unilaterally deaf were sent on our request by many colleagues from Warsaw for the detailed examination. Hence the relatively high incidence of those rather uncommon cases of deafness.

The directional hearing was examined in that way that the patient sitting with the eyes closed pointed with the arm the direction from which the voice of the examiner came to his or her ear. This simple method, which I can not describe in detail now, was, as we believe, sufficiently reliable for clinical evaluation of disturbances in directional hearing in the discussed cases.