SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

Meeting December 1st, 1933

President—W. J. HARRISON, M.B.

Simplified Method of Determining Percentage of Actual Hearing-power in Tuning-fork Tests

The opening paper read by Sir JAMES DUNDAS-GRANT is published in this issue of the *Journal of Laryngology and Otology*, Vol. XLIX, No. 4, pp. 233-239.

DISCUSSION.

MR. ALEXANDER TWEEDIE said that he had recently asked one of his friends who was engaged in the production of telephones to submit a critical report on the properties of electric aids. This report had been summarized in a "response curve" obtained from the best type of aids which his friend had inspected, and which he now showed (see Fig.).

This, it would be seen, corresponded fairly accurately with that already shown by Dr. Crowden, and his friend had stated that other types on the market gave precisely similar curves.

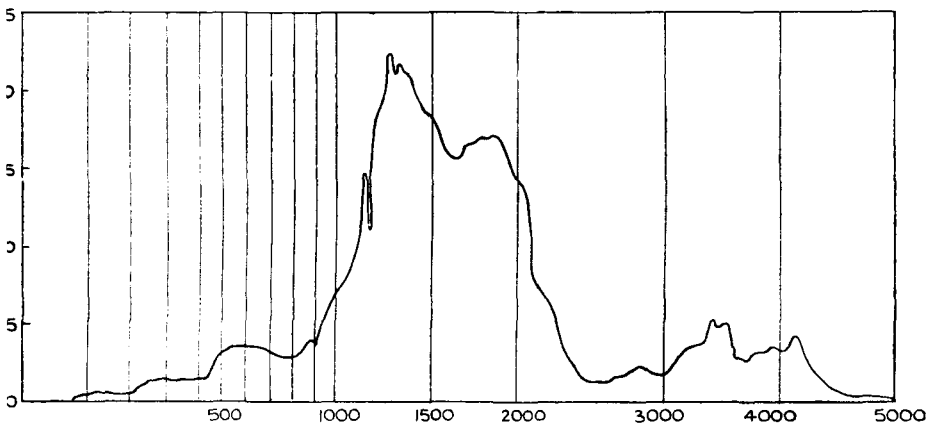
The main point to be noted was that the peak of accentuation of sound fell between 1,000 and 2,500 D.V. per second, that is to say, was higher than what was usually regarded as the "speech area" (D.V. 128 to 512) which was only very slightly affected indeed. It was, therefore, this accentuation outside the "speech area" which probably represented one, at least, of the disturbing factors in these electric aids. His informant had stated that the reason why electric aids did not offer the same help as the apparatus supplied in concert halls was that the microphone receivers employed there were of a different character.

Incidentally, his informant had also told him that the "aids" under inspection should be able to be manufactured wholesale at from, say, 28s. to 35s. each.

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

Anyone who was able to produce an electric aid which could definitely improve the range of hearing and that could be tolerated, would not only be welcomed with enthusiasm by the deaf, but also by all otologists, whilst at the same time no advertisement of any such "aid" would be necessary and the name of the inventor would become immortal.

At the Nottingham Institute for the Deaf, in connection with various annual fixtures, demonstrations of all available "aids" were held, the purpose of which was that the hard-of-hearing should have the opportunity of seeing all that was obtainable in that direction. In connection with these demonstrations, the



Input pressure approximately constant from 100-5,000 cycles/sec. to 18 dynes/sq. cm.

Institute issued the following pamphlet with the additional idea of preventing the deaf from spending their money without sufficient opportunity of having tested the value of various "aids" before purchase :—

AIDS TO HEARING.

GENERAL DESCRIPTION.

These are all divisible into one of the two groups :—

(A) Some form of "Collector", an example of which is the well-known Ear Trumpet. (As a general proposition the larger the "Collector" the more useful the aid.)

(B) "Electric Appliances" : —all based on the simple telephone, consisting of a microphone, telephone receiver and a small dry battery. (Amplifiers are sometimes associated with this type of apparatus, which is capable of producing a very great volume of sound, which may or may not be of assistance.)

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

ADVICE AS TO SELECTION.

Collectors are more generally useful than " Electric " Aids, but are more conspicuous.

Electric Aids are sometimes successful.—Where amplifiers are added, they are too heavy to be portable. The batteries, of course, require renewal from time to time.

THREE " NOES ".

(1) No person can decide as to the value of any " Aid " except the patient.

(2) No " Aid " should ever be bought without the previous opportunity of two weeks' trial.

(3) No instrument maker should be trusted unless he will lend, on approval for two weeks, any " Aid " which the patient selects as possibly of use; with some reasonable arrangement for hire to cover wear and tear, risk of loss, etc.

The Secretary will be pleased to provide on request a list of instrument makers who will conform to the above methods of approval, trial and hire.

Dr. A. G. WELLS said it was only recently that regular audiometer work had been carried out among school children under the London County Council. Statistics would eventually be available on the subject, but could not be given yet.

There were points of interest which he had been able to note so far. One was that in the case of the bulk of the children who failed at tests 1 and 2, the fact of defective hearing had not been recorded on the medical record card which was issued at the child's routine medical examination. Therefore an ear defect which had been missed at the ordinary school clinic examination was revealed by the audiometer. A further important point was, that in those cases which had failed after the two tests and were examined clinically and treated, the failures were cut down greatly, in some groups of children by 50 per cent. These facts showed the great value and utility of this instrument.

Many children were outside the ordinary range of hearing altogether, even with the loudest intensity of the adaptor. But on that there had hitherto been no regular work done, with the exception of that undertaken by Dr. Crowden.

Mr. A. J. M. WRIGHT, referring to the work which he had done with the artificial drum, said he agreed, as a result of his observation, that in cases in which there was a considerable loss of tympanic membrane the apparatus acted in some way through its effect on the round window. But there were other cases in which the defect was relatively small, and then it would be found that the effect could be produced by closing the perforation by such a thing as a piece of moistened cigarette paper.

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

Royal Society of Medicine

Mr. E. A. PETERS said the subject of artificial drums was a complicated one and probably depended on more than pressure on the lesser window. An artificial drum consisting of a pledget of wool soaked in glycerine or water was more efficient if the membrana tympani was absent. He had tried a plug of dry wool and found this of no avail.

Possibly the soaked plug and a bubble of air reconstituted the drum cavity, or there was pressure on both windows.

Mr. TWEEDIE, referring to Dr. Hallpike's remarks on the action of the so-called "artificial drum", said he thought that this theory was really attributable to Bárány, who suggested that, normally, all sounds passed through the oval window and *viâ* the scala vestibuli, helicotrema, and scala tympani, out through the round window. This route was determined by the fact that, normally, mucus over the round window prevented vibrations travelling in the opposite direction.

In cases with a large defect of the tympanic membrane and a tolerant thus exposed middle ear, the application of some inert body, like liquid paraffin or mercury in the round window, would represent the normal drop of mucus which in those cases was lacking. The effect of this method in such cases was, of course, well known, and he (Mr. Tweedie) reminded members that on a previous occasion he had told them of a patient who had found out the method himself, and was in the habit of shaping a little piece of bacon fat, and inserting it into the ear in order to improve his hearing.

Sir JAMES DUNDAS-GRANT asked whether pressure on the round window improved the hearing if the stapes was ankylosed. He hoped Dr. Hallpike would be able to fix the stapes in the Wever-Bray experiment and observe and report the result. It was understood that if both fenestrae were hermetically closed, hearing was practically abolished.

He had systematically tried to place an artificial drum on the exposed stapes, and usually with success. In a case in which an old inflammation had subsided it was difficult to know whether the stapes was mobile; if it was not, he thought an artificial drum placed on it was not likely to have an effect. But when the round window was exposed and the stapes ankylosed, there was no reason why hearing should not be carried on through the round window without any artificial drum; he had had cases which demonstrated that this was so. He had tried placing an artificial drum on the round window, and in one case at least it had caused severe vertigo.

Humanity had cause to be thankful for the introduction of the audiometer, and nothing would take its place for testing large numbers at a time. Bone-conduction could not be altogether

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

eliminated, and could be carried through to the other ear when inequality of the two sides existed. It was not necessary for every otologist to buy one of these instruments for his private practice. He believed that tuning-fork tests would always hold their own.

Dr. ALBERT A. GRAY said it was true that loss of hearing for low notes and a prolonged negative Rinne indicated obstruction in the sound-conducting apparatus, but they did not exclude affections of the nerve, as he (the speaker) had shown at the meeting of the Section in May, 1933, in cases of otosclerosis with negative Rinne. In these cases the cochlear nerve was definitely affected, but the pathological changes were limited for the most part to the medullary sheath and neurilemma, the axis cylinder remaining normal in appearance.

Dr. CROWDEN (in reply) said the instrument that he had demonstrated was very unlikely to go wrong, as the instrument now seen had been in use for four years, and the record could be played 100 times, only fresh needles being required. The pure-tone audiometer could not be used satisfactorily in an ordinary room; the room should be sound-proofed.

Mr. HALLPIKE (in reply) said that his reference to the Bezold triad meant that its absence did not necessarily mean the absence of a purely conducting deafness in the anatomical sense. Mr. Tweedie had pointed out that the carbon diaphragms of the type used by the late Mr. Wharry gave a response over the frequency range from 500~ to 200~, whereas speech frequencies were contained in the range below 500~. It was true that the energy of speech was mostly contained in the range below 500~, but it was generally agreed that the important range for the understanding of speech was that from 500 to 2,000, which in fact was the range dealt with by Mr. Wharry's carbon diaphragms.

Concerning the percentage method of expressing hearing losses for pure tones described by Sir James Dundas-Grant, grave difficulties arose, since the ear's behaviour varied so greatly with frequency. Thus from 1,000~ to 2,000~ the ear was very sensitive while the intensity here could be increased over fantastic ranges before the practical upper limit of hearing, the pain threshold, was reached. Thus huge percentage losses might occur and still leave large reserves of hearing.

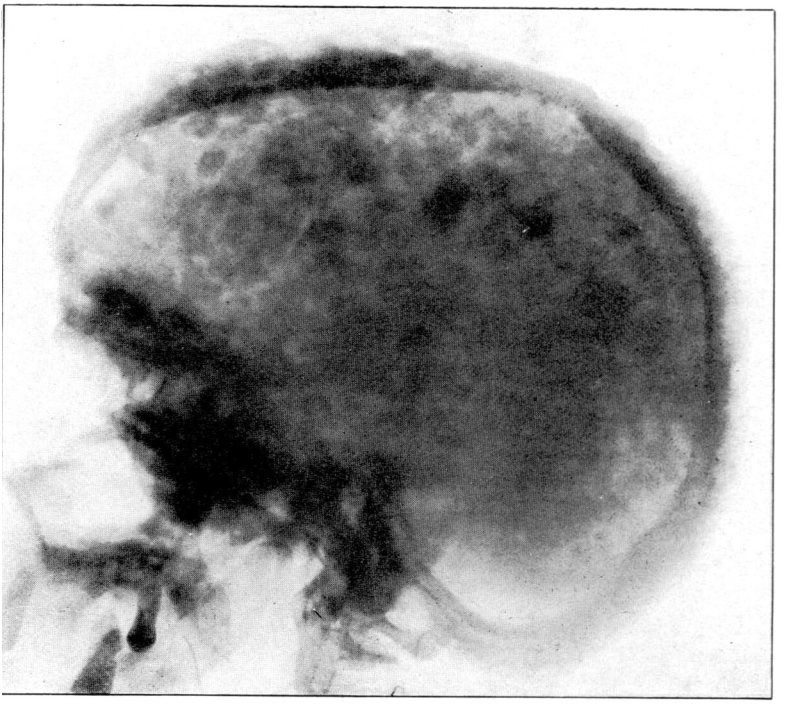
At the high and low ends of the scale the ear was much less sensitive and the range of hearing restricted, the pain threshold soon being reached. Hence comparatively slight percentage loss of hearing would here result in complete deafness.

If the method of expressing hearing losses in percentages on the lines suggested by Sir James Dundas-Grant was adopted, the question would soon arise; how is it that at this frequency (1,000~) this patient's hearing-power is reduced to 0·001 per cent. and

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

PAGET'S DISEASE, CASE II—
W. M. MOLLISON



[face p. 273

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

yet he is able to hear a sound at this frequency of average conversational intensity quite well, while at 32~ his hearing-power is still some 90 per cent. and yet he is stone deaf to this frequency ?

If the facts and implications of Wegel's fundamental sensitivity curves of the ear were more generally known, the question of expressing hearing losses in anything but decibels or half intensity units need never arise.

Sir JAMES DUNDAS-GRANT, in further comment, said that he did not consider Mr. Hallpike's criticism applicable, as in the method described comparison was made with the hearing of a normal person, taken at 100 per cent. at all pitches. The conditions applying to the observed applied also to the observer, and the comparison, therefore, held good. The results given in percentages of hearing-power were intelligible to everybody and were obtained in accordance with physical and mathematical requirements.

CASES.

Two cases of Paget's Disease with High Degree of Deafness, greatly helped by "Bone-Conducting" Electrical "Aid".—W. M. MOLLISON.

CASE I.—W.H., aged 72, complained of deafness of two years' standing. The results of tuning-fork tests are similar to those obtained in cases of otosclerosis. The head is large and for the last five years the patient has had to have hats made specially for him.

X-ray examination of the skull shows changes typical of Paget's disease.

One of the electrical aids that transmit vibrations to the bone by means of a special button helps the patient to hear much better than any other.

CASE II.—(A more advanced case.) Elizabeth C., aged 68, has attended Guy's Hospital since 1916 on account of symptoms and signs of Paget's disease. In addition the head is greatly enlarged and the tibiae and femora are bowed. Deafness was first complained of in 1921. There has been suppuration in both ears occasionally. A skiagram of the skull shows changes typical of the disease.

The deafness is of high degree and similar in response to tests to that in the first case. With the "bone-conducting" electrical aid the patient can hear with comfort.

Tympanic Membranes which move with Respiration. T. B. JOBSON.

E.E., male, aged 23, was referred to the Guildford Hospital on account of tinnitus of four weeks' duration. No history of previous ear trouble.

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press

The right tympanic membrane is thin. It shows a striking in-and-out movement corresponding to inspiration and expiration. The left membrane moves a little with respiration but the excursion is much less than on the right. Both Eustachian tubes are patent.

DISCUSSION.

Mr. E. A. PETERS said he had seen what appeared to be a similar case to this. Nasal obstruction was noticeable in the present case, and there was definite movement of the membrane, even on light respirations. The drum was atrophic, the result of catarrh and patent Eustachian tubes.

ROYAL SOCIETY OF MEDICINE—SECTION OF LARYNGOLOGY

Meeting November 3rd, 1933

President—MUSGRAVE WOODMAN, M.S.

CASES

Cancer of the Larynx treated by Surgery and Radium.—WALTER HOWARTH.

Male, aged 35, came to St. Thomas's Hospital three and a half years ago complaining of hoarseness of several months' duration. The left vocal cord was found to be occupied by a growth which extended forwards across the anterior commissure and backwards on to the anterior face of the arytenoid. Biopsy proved it to be a squamous-celled carcinoma.

The correct surgical treatment would undoubtedly have been a complete laryngectomy, but I hesitated to do this in the first instance in the case of so young a subject. The growth was exposed by laryngo-fissure and the anterior third of the right cord, along with the whole of the left cord and surrounding parts, was removed in the usual way. It was not possible to remove the portion of growth which was extending on to the arytenoid, so a palisade of eight radium needles (1 milligramme, with platinum filter), was placed round this. The larynx was packed and left open. The needles were removed on the eighth day and the larynx was closed. Recovery was uninterrupted.

The patient has been wearing a tracheotomy tube for nearly three years, mainly as a precautionary measure, but has now given it up. It has not been thought advisable to close the tracheotomy opening completely. The patient has a useful voice but the glottic chink is, naturally, rather small.

https://doi.org/10.1017/S0022215100040123 Published online by Cambridge University Press