SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY.

November 7, 1925.

President—Mr G. J. Jenkins, F.R.C.S.

The Otolith Reactions—Mr Alex. R. Tweedie, F.R.C.S.—After a brief reference and tribute to the experimental work of Professor R. Magnus and Dr de Kleijn, to the theories of Professor Quix, and the clinical application and significance of the otolith reactions, Mr Tweedie showed some cases which he submitted were illustrative of these phenomena.

Case I. was that of a girl, aged 6, on whom complete left labyrinthectomy had been performed by Mr Sydney Scott some months ago. There was no spontaneous nystagmus and no spontaneous error either in the vertical or horizontal "pointing" test, with the head erect; no nystagmus or error in pointing could be induced with alteration of the position of the head, *except* when the head was inclined to the left shoulder. There was then a constant deviation outward of the left arm of about 3 in. in testing the vertical "pointing." It was suggested that in these circumstances there was some vascular stimulation of the stump of the vestibular nerve.

Mr Sydney Scott said he had operated on the patient's left mastoid because of chronic middle-ear disease and recurrent attacks of pain and pyrexia. A fistula of the lateral semicircular canal was found at the operation, and the labyrinth did not react to strong caloric stimuli while under light general anæsthesia. The labyrinth was opened above and below the facial nerve and its contents removed. There was no disturbance of co-ordination before or afterwards, showing there had been destruction of the membranous labyrinth by disease, months, if not years, previously, though the history of giddiness was unobtainable.

Mr Tweedie's demonstration plainly showed lateral deviation while pointing with the left hand only, when the head was laterally flexed with the defunct labyrinth downwards, but no error was observable with the right upper extremity in any position, nor with the left upper extremity unless the head was laterally flexed to the left.

Case II.—An infant with some form of intracranial lesion (kindly sent from the Hospital for Sick Children) was also shown in the hope of demonstrating the neck and otolith reactions. Unfortunately, the infant was usually querulous, but in its quiet semicomatose phases, when lying on the back if the arms were raised, and the head inclined to the right or the left, the right and left arm respectively became

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more extended. These reactions might be due to either the neck or otolith reflexes or both combined; the only way to differentiate the latter would be to fix the child with the head and body bandaged to some rigid support, and then test if these reactions still persisted; this child, however, was insufficiently comatose for any such investigation. (See *Journal of Laryngology and Otology*, 1923, vol. xxxviii., p. 654.)

CASE III. was that of a young man on whom a partial left labyrinthectomy had been recently performed by Mr Capps. The case was similar to number I. and showed the same error in the vertical "pointing" in the same circumstances.

Mr SYDNEY SCOTT said this man had had facial paralysis for more than seven years. An operation was carried out on his left ear before the war. He happened to come to St Bartholomew's Hospital during this week, when Mr Tweedie was there, and he (the speaker) asked Mr Tweedie whether he could prove that the labyrinth had been destroyed or not. The otolithic reactions which the latter demonstrated were the same as those in the first case. The left labyrinth did not react to labyrinthine stimulation by caloric tests.

CASE IV. was a young adult woman, on whom a left labyrinthectomy had been performed twelve months ago by Mr Watkyn-Thomas. There was no spontaneous nystagmus or spontaneous error either in the vertical or horizontal "pointing" with the head erect; nor could these movements be induced with any alteration in the position of the head; except that when lying in the dorsal position, or when sitting with the head retracted, a nystagmus to the left was induced. It was suggested that this reaction was due to some disturbance of the utricle.

Mr TWEEDIE, in apologising for the absence of detailed notes of these cases, asked for indulgence as he had only rather hurriedly collected them yesterday, while the infant he had seen for the first time that morning.

He appealed to the members of the Section to test their cases in some such way as he had endeavoured to demonstrate, and to bring forward their results, so that by means of a collective review it might be possible to determine the true clinical value and significance of these reactions. He urged that examinations of all such cases should proceed in the ordinary way with a preliminary investigation of the nose, pharynx, naso-pharynx, Eustachian tubes and the tympanic membranes, along with a functional examination of the auditory nerves, so that, as far as possible, we should be in possession of these data in each case before commencing examination of the vestibular system.

As to the latter, Mr Tweedie reminded the members that, as the vestibular apparatus was divisible anatomically into semicircular canal and otolith portions, so it should probably be regarded physiologically, as representing kinetic and static control respectively. In both these portions, it was apparently possible to induce similar reactions such as nystagmus and "by-pointing."

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It was important, therefore, that we should first ascertain the condition of the better known kinetic portion, by obtaining a record of the reactions to the rotation, caloric and galvanic tests: (if indeed the latter did really represent the effect on the semicircular canals, and not the otolith apparatus, as might possibly prove to be the case).

With all these data before us and recognised, it would then be possible to refer a nystagmus or an error in "pointing," which might be induced by the positional tests, to the static effect on the otolithic apparatus. It was always necessary to bear in mind, in addition, the phenomena of the neck reflexes — easily demonstrated in a rabbit — as potential complications to any positional test, during which the normal relationship of the head to the trunk was disturbed.

Mr Tweedie suggested that the reports on these cases should be grouped as follows:—

Group I.—Cases of unilateral acute otitis media; in which a record should be made of the reactions obtained, prior to operation or spontaneous recovery, and after the same.

Group II.—Cases of unilateral labyrinthectomy; unilateral lesions after "fracture of the base," and also in this connection, cases of unilateral microtia in infants under three months, where malformation presumably also included absence of development of the "inner" ear: (as already referred to by Mr Cleminson last year).

Group III. — Cases of adults complaining of dizziness, associated principally with arterio-sclerosis, altered blood pressure and other general senile changes in men, and the climacteric in women.

Group IV.—Toxic cases due to excess of, for instance, alcohol and tobacco.

Group V.—"Decerebrate" cases in suitable conditions of coma, such as sometimes occurs in connection with intracranial tumours, certain stages of meningitis, hydrocephalus and apoplexy, which should afford an opportunity during some phase of their development for testing the neck reflexes.

As a provisional routine, he was adopting the following method as a ready way of testing these reactions:—

"With the patient sitting in the chair and the head erect, the presence or absence of nystagmus is first observed and then the vertical and horizontal 'pointing' reaction noted. The patient's head is then laid to the right shoulder, and after some 30 seconds, an examination is again made as regards the nystagmus, and then the vertical 'pointing' again tested while the head is still in this position. The head is then laid on the left shoulder, and a similar examination repeated. Finally, the head is laid backwards, and after 30 seconds (which must be always observed as the latent period for reaction in these tests) the effect on the eyes is again examined for nystagmus, and, with the head in this position, the effect on the horizontal 'pointing' noted. If, then, any nystagmus or error in 'pointing' were induced, the patient could be tested again, lying on the couch in various positions, while the head and body were maintained in their normal relationship, and thus the potential factor of a neck reflex eliminated or determined."

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This method was offered as a provisional working routine in order to comply with the teachings of Professor Magnus and Dr de Kleijn, based on their experimental work on animals and suggestions for testing their reactions clinically.

The PRESIDENT expressed the gratitude of the Section to Mr Tweedie for this demonstration and for having brought the matter forward so lucidly. They had been in touch with the works of Magnus and de Kleijn, and some of them had seen Quix demonstrate his cases. It was necessary to be careful not to argue too much from experiments on lower animals. De Kleijn held that he had had two cases of pure otolithic disturbance; such cases must be rare. Very likely the otolithic organs were affected sometimes when there was extensive disease of the labyrinth. The clinical phenomena due to affections of the otolithic organs were bound to be obscure, when other parts of the labyrinth were affected. The past-pointing which Mr Tweedie had demonstrated might possibly not be the compensatory past-pointing found in disturbances of the semicircular canals. Could it be due to a true muscle reflex?

He (the President) had had eight cases in which nystagmus could be produced by altering the position of the head so as to bring the otoliths into play. In most of these cases there was some affection of the semicircular canals, and he had hesitated to bring them forward as cases of true otolithic disturbance. A lady, 35 years of age, when tossing up a child, and holding her head on one side, fell to the ground. She sat up and was immediately comfortable. On going to bed and lying on the right side, she experienced the same sensation, which was repeated. He found nothing wrong with her labyrinth, except that she had slight giddiness at times and there was slight loss of bone conduction on the right side. He could always induce nystagmus, however, when the head was put on the right side, and that was the nearest to a pure otolithic disturbance he had ever encountered.

Mr A. CHEATLE said it was obvious that much spade-work yet required to be done on the subject. He suggested that Mr Tweedie should have diagrammatic models made of the otoliths, to be worn on the top of the head, in the same way as the King's College Hospital labyrinth models were worn, so that they could be used for purposes of clinical teaching. At Cambridge, de Kleijn had insisted that, in testing for the otolith reaction, the patient should be laid prone on the table, the head and body being moved as one.

Sir JAMES DUNDAS-GRANT said the President had touched upon a point which had occurred to him, but which seemed to have been overlooked, namely, as to whether the action of the otolith when it pressed on the macula acted as a damper or a stimulus: it was well worthy of consideration. Too much attention should not be concentrated on the otoliths, lest cerebellar troubles should be overlooked. He (the speaker) had formulated a scheme of mnemonics for teaching purposes in regard to the otoliths, maculæ, and cristæ.

There was one particular point on which all observers were agreed: that the patient with supposed otolith disturbance derived the greatest relief when lying on the affected side. One did not know whether the

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diseased side was hyperæsthetic or paralysed, but when the patient lay on the diseased side, the sagitta was dropping away from the macula. It was delightful to be inspired by Mr Tweedie's enthusiasm, and he (the speaker) hoped that cases would be brought forward so that our knowledge on the subject might be increased.

Mr SYDNEY SCOTT said that the President and Mr Tweedie made it clear that we had two distinct sets of events, referable (1) to the semicircular canals; (2) to the otolithic mechanism. During the stage of hyperstimulation by the caloric test, there were normal past-pointing errors, presumably originating in the semicircular canals. But the President mentioned one case in which the past-pointing error was obtainable during static stimulation, when there was no disease of the semicircular canals, and he (the speaker) had also seen parallel cases in which the so-called otolithic reflex past-pointing error was obtainable in persons with normal labyrinths. Recently he saw a patient who had a plug of cerumen pressing on the drum, and nothing else abnormal, and his past-pointing reaction disappeared when the plug of wax was removed from the drumhead. Why some persons only showed such reactions when the conditions appeared to be alike he did not know.

Past-pointing was also obtained from a static stimulus as well as from caloric stimulation, when one Eustachian tube was obstructed in certain individuals. Presumably, the stapes was then pressed inwards on one side only, compressing the labyrinthine fluid. Sudden relief of the extra pressure would cause the past-pointing forced movements in one direction; and if the pressure was suddenly reapplied, the forced movements were reversed. Hence the same labyrinth would give past-pointing to one side or to the other, according to whether the pressure was raised or lowered in comparison with the pressure on the other side.

It would seem that the otolithic reactions were set up by changes of difference in pressure between the two sides, so that both traction and pressure on the cilia of the saccule could take place. He believed that the change of pressure was of great practical significance in discussing the hypothesis whether traction or pressure was the chief factor. He was prepared to believe that both played a part.

Mr TWEEDIE (in reply) said he described the direction of the nystagmus by the direction of the quick movement—as he thought was the plan universally adopted—but he agreed that the slow component was the real labyrinthine reaction.

As regards a "damping" action, he would remind members that Magnus and de Kleijn distinctly described these reactions in reference to their "maximal" and "minimal" positions; they considered that there was always a *constant* stimulus normally, which was modified by position, and in that sense he presumed one might speak of a position in which a "damping" action took place. He believed that the "otolith" phenomena were usually referable to some local lesion combined with a general pathological factor.

He thanked Mr Cheatle for his suggestion as to another diagrammatic model to fix to the patient's head, and would try to adopt it. He quite agreed on the importance of recognising and eliminating the potential factor of neck reflexes. As regards Sir James Dundas-Grant's remarks, he thought

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that the side on which a patient preferred to lie after an operation on the labyrinth, depended upon whether the operated side was hyper- or hypo-sensitive.

Recovery of Facial Nerve after Seven Years—WILLIAM IBBOTSON, F.R.C.S. Ed.—A. B., aged 42, had chronic left tympanic suppuration, and was first seen in 1918. He was then found to have complete left facial paralysis. Radical mastoid operation was performed, with no improvement in the facial paralysis.

October 1925; for several months past the facial movements have been gradually improving and are now almost completely restored. No further operation has been performed.

Mr SOMERVILLE HASTINGS said that, in 1913, he did a labyrinthectomy on a patient, and three weeks later a complete facial paralysis supervened. For three years the case was treated with faradism, and many reports were made in that time that the reaction of degeneration had occurred. He turned down a piece of the masseter, as the patient was uncomfortable, especially when eating. Following this procedure, there was some improvement. After four more years, or seven years after the original operation, she began to improve, and he showed the patient to the students as a successful case in which the turning down of the masseter had helped the condition of the face. One observant student, however, pointed out that it was not the masseter which was doing the work, but the facial muscles, which were now recovering; and that was true. The face had since completely recovered.

The PRESIDENT said he had seen a case of facial paralysis recover after fourteen months.

Meatal Swelling for Diagnosis—Mr CHARLES J. HEATH, F.R.C.S.—A woman had right aural discharge for nine years. Conservative mastoid operation was performed in 1909. After that she remained well, with excellent hearing till the spring of 1925. A painless swelling then ruptured spontaneously several times, healed firmly, and increased. When seen, a blue swelling pressed against the anterior wall of the bony meatus. It did not pulsate. When punctured, mucus and blood escaped, and continued to do so. The drumhead appears intact and the hearing is good.

The PRESIDENT said most members had occasionally seen conditions somewhat like this. He remembered one which followed a radical mastoid operation. A curtain had formed across the cavity and the enclosed space was filled with blood-stained fluid.

Result of Conservative Operation—Mr CHARLES J. HEATH, F.R.C.S.—Male, had the radical mastoid operation performed on the left ear, in 1908, after eight years' discharge. On the right ear, a conservative mastoid operation was done in 1910, for otitis media of a few days' duration, as the perforation was rapidly enlarging and the left ear was defective. As the result of a cold, recurrence of discharge took place in the right, in 1923, on return from Aden. Discharge

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escaped through the aditus, not through the drumhead. In a week or two the Eustachian tube cleared up and the aditus closed; the operation originally adopted made observation and treatment easy. He depends on this ear for his work.

Result of Conservative Operation on both Sides—Mr CHARLES J. HEATH, F.R.C.S.—A male had bilateral mastoiditis, acute, following prolonged cold in the head. The left ear was first operated on and paracentesis was done on the right. Mastoid operation was performed on the right a few days later, there being obstruction to antral drainage on each side. Hearing apparently was not diminished by the illness.

The PRESIDENT asked Mr Heath in what way the operation which he did was more conservative than the Schwartze.

Mr HEATH (in reply) said the advantage of the operation over the Schwartze was, that if any recurrence took place it could be treated through the meatus, and discharge did not come through the scar. At the Downs Hospital at Sutton, where he worked, the resident medical officer did not always refer recurrences (after Schwartze operation) to him, but made an alteration in the operation by a fresh incision and by taking away the posterior meatal wall. At that hospital, no Schwartze operation was now done. Most of the chronic cases and all the fairly early ones were done by the method shown on the cases now exhibited and it was very rare to get any difficulties with the dressing. Although they were all children, the sister told him recently that she had dressed 110 cases during the morning. As soon as the post-aural incision was healed, the bandage was abandoned. He went recently to Queen Mary's Hospital, at Carshalton, to operate on two ward sisters. He went down again fourteen days later to see them. They were then at work in the wards, they had no perforation and no wool in the ear, and the ears had been dressed by the same sister who did the 110 dressings in one morning. The same operation was done for the chronic cases also; the Schwartze was not.

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