has failed to relieve the obstruction, just as "adenoids" that recur rapidly suggest a malignant post-nasal condition. Failure to detect adenoids in the presence of nasal obstruction should suggest the possibility of the congenital atresia.

7. It would appear that ossification of the persistent bucco-nasal membrane must occur in early childhood, as Brady's case [2] at eight years of age was completely ossified. I am also aware of a case where at five years of age the partition was a complete osseous one.

Ridout [3] exhibited a case, aged 16, which on posterior rhinoscopy revealed "complete occlusion of both posterior choanæ by a whitish membrane." No mention, however, is made of the consistency of the membrane. The sinuses were well developed.

REFERENCES.—[1] Wright, *Journal of Laryngology*, 1922, p. 556. [2] Brady, *Journal of Laryngology*, 1918, p. 49. [3] *Proc. Roy. Soc. Med.*, vol. xxii., No. 2, p. 159.

SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY.

December 6, 1929.

President—W. M. MOLLISON, M.Ch.

SUBJECTS FOR DISCUSSION: THE DIAGNOSTIC VALUE OF X-RAY EXAMINATION OF THE TEMPORAL BONE, AND THE DIAGNOSIS OF EIGHTH-NERVE TUMOURS.

Radiography of the Mastoid Process.

ELSIE MANN, M.B., D.M.R.E.

THE X-ray examination of a patient for disease of the mastoid process can be divided into (1) the taking of the photograph and (2) the interpretation of what the photograph shows. In making X-ray photographs of any part of the body it is advisable to standardise conditions as far as possible. By using the same position of the patient, the same current and the same spark-gap, a more just comparison can be made between films taken from the same patient at different times. The only thing which cannot be standardised is the patient, and so from time to time modifications may have to be made, but when possible a standard technique should be employed.

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TECHNIQUE.

The technique which I use in making X-ray photographs of the mastoid regions depends on whether or not the patient is old enough to keep still for an appreciable length of time. If it will keep still, then I use a Potter-Bucky diaphragm in making the picture. This is a mechanical device by which a moving grid cuts off scattered radiations and so gives clearer pictures, but which considerably lengthens the time of exposure. One mastoid process is flung clear of the other by tilting the X-ray tube to an angle of 30° with the horizontal, so that the photographic ray enters the skull obliquely from above. The patient is made to lie with the ear to be photographed nearest the film, and the tube is centred just above the opposite ear. The exposure is then made. The patient is turned on his other ear and a second film is exposed in a similar manner. With the X-ray plant which I have at my disposal, the necessary exposure during this technique is a matter of eight seconds. This is a long time for a small child to stay absolutely still, so when the patient is very young I concentrate on making the exposure as short as possible. For this reason I do not use a Potter-Bucky diaphragm when the exposure is cut down to less than a second. Instead of tilting the X-ray tube to get one mastoid region clear of the other, the same result is obtained by resting the child's head on a wooden block which subtends an angle of 30° with the table. This block carries the casette containing the film, and the child rests the ear to be photographed on it as on a pillow. The X-ray tube is centred just above the other ear, and the photographic ray enters the head vertically. The exposure is made, and afterwards the process is repeated for the other ear.

As far as may be, during the whole of the taking, developing, and fixing of the films, exactly similar conditions are reproduced for each, so that as nearly as possible the two pictures will be photographically similar. Sometimes with children it is extremely difficult to ensure them staying exactly where they have been placed, but I have never found any clamp of use in helping to keep them still. It has frightened them and negatived its own usefulness by causing them to move.

The right and left positions which I have described are the only ones I now use for taking X-ray photographs of the mastoid processes. For some time I used, in addition, a prone position, with the chin stretched out over—and resting on—the film. The tube was centred over the vertex of the skull. The chief point about this position was that it brought the mastoid processes on one plate and so made comparison easier. This view was occasionally of value, but not so sufficiently often to justify its routine use.

The type of case which presents most difficulty in making X-ray photographs of the mastoid regions is: (1) That of the very young child. I have found that to get a picture which will be of any diagnostic value from a child under three years of age is often more a matter of luck than of good management, unless the X-ray plant being used is sufficiently powerful to make the exposure instantaneous. (2) That of the refractory child. Every now and then in an X-ray department there appears for examination a child who is unmanageable. No amount of coaxing or cajoling has any effect, and, after exhausting the patience of everyone

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round, the child is despatched without being photographed, or else a few useless blurred films are the result.

The radiologist's task is not over with the production of successful photographs. The films have to be interpreted. That this is not always easy I hope to demonstrate in the six cases I have chosen for illustration.

Although in the majority of cases the right and left mastoids are similar, it must always be borne in mind that anatomical variations do occur, and that a cellular mastoid may be present in one side and a non-cellular one on the other.

Frederick M. Law makes a statement with regard to mastoids which is often of great use to the radiologist.[1] He says that, with infrequent exceptions, if there is a cellular mastoid on each side, the cells composing these mastoids will be symmetical. This fact is useful when trying to come to a conclusion as to whether a suspected place in the film is a large cell or the result of bony absorption.

The type of case which is most difficult of diagnosis is that in which both ears are affected. The comparison of right side with left side is then lost to a large extent, and the diagnosis must depend on the appearance which that type of mastoid would ordinarily present.

Illustrative Cases—T. B. LAYTON, D.S.O., M.S., and ELSIE MANN, M.B.—(1) J. H., girl, aged 5. Scarlet fever. Spontaneous right otorrhœa on seventh day of disease. Radiographed six weeks later.

Operation.—Gelatinous granulation tissue in mastoid cells.

Bacteriological Report.—A pure growth of *Staphylococcus albus* obtained. Wound healed and ear dry three weeks afterwards.

Drum-head: no discharge. Small dry perforation in right drum-head.

13th November 1929.—Small perforation; middle ear dry.

(2) G. W., boy, aged 3. Scarlet fever. Right otorrhœa on nineteenth and left otorrhœa on twenty-first day of disease. Radiographed eight months afterwards. Right ear was dry for one month.

Operation.—Large mastoid cavity. One large cell with gelatinous mucosa.

Bacteriological Report.—Pure growth of *Micrococcus catarrhalis*. Ear dry fifteen days later and wound healing.

On discharge right drum showed large dry perforation; left drum-head apparently intact.

13th November 1929.—Left drum-head intact; right, large perforation with healed margin—mucous membrane beneath moist.

(3) W. M., boy, aged 3. Scarlet fever. Right otorrhœa, chronic for one year before admission. Radiographed. Permission for

[1] *Annals of Roentgenology: A Series of Monographic Atlases.* Vol. I., "Mastoids," by Frederick M. Law.

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operation refused. Left hospital with ear discharging and partial destruction of drum-heads. Seen afterwards, ear dry for one month.

13th November 1929.—Destruction of drum-head on each side; ears dry.

Skiagrams shown by T. B. LAYTON, D.S.O., M.S., and ELSIE MANN, M.B.—G. L., boy, aged 16. Scarlet fever. Left otorrhœa on eleventh day of disease. Retro-aural swelling six weeks later; Wilde's incision. Radiographed a week later. Operation: large cell containing fluid; diseased bone. Bacteriological examination not made. Ear discharge ceased after twenty-five days. Drum-head intact on discharge, but small unhealed sinus present posteriorly.

D. R., girl, aged 5. Scarlet fever. Right otorrhœa on fourth day of disease. Radiographed three months later. Operation: diseased bone and granulations in mastoid cells. Bacteriological examination not made. Ear dry; wound healing three weeks afterwards. On discharge: small dry perforation in right drum-head; child very ill during early stages.

A. A., boy, aged 3. Scarlet fever. Left otorrhœa on seventh day of disease. Radiographed eight weeks later (during this time otorrhœa had twice stopped for short periods).

Operation.—Left antrum apparently healthy.

Bacteriological Report.—"Sterile."

Ear discharge continued for eight more weeks. Drum-head, on discharge, intact.

Illustrative Cases—T. B. LAYTON, D.S.O., M.S., and J. V. ARMSTRONG, M.B.—(1) G. L., aged 14. Had running-ear before scarlet fever. While in hospital, virulent diphtheria bacillus was found in the discharge from the ear and persisted for many weeks; postero-superior marginal perforation with granulations suggested disease of mastoid. Diagnosis supported by X-ray findings. Mastoid opened; cultivations from bone showed *Streptococcus hæmolyticus* only. Bone-work of radical mastoid performed; cavity filled from temporal muscle, no skin flap made. Diphtheria bacillus disappeared at once from discharge. Wound healed and ear became dry. Seen in September 1929. Ear discharge recurred. Swab from ear. No diphtheria bacilli found. When shown again, middle ear quite dry.

(2) R. D., male adult. Scarlet fever. After the temperature due to the disease had subsided it rose again and there was discharge from the ear, with some pain. Skiagrams showed definite difference between the two sides of the mastoid.

Operation.—Pus in mastoid. Considerable disease of bone; lateral sinus very deep and very far forward; antrum and iter not discovered.

Cultivations.—No growth, except, after four days, a few staphylococci, due to contamination.

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(3) E. F., girl, aged 5. Scarlet fever. Admitted 28th May 1929 on second day of disease. Temperature did not settle. Vomited 7th June; otorrhœa 11th June without pain or alteration of temperature. No further ear symptoms; discharge profuse. Radiographed 23rd July 1929.

Operation—7th August 1929.—Pus in antrum: diseased bone curetted away.

Discharged 7th September 1929. On discharge: wound healed; perforation with healed edges; middle ear dry. No active disease.

The Diagnostic Value of X-ray Examination of the Temporal Bone.

H. K. Graham Hodgson, C.V.O., M.B.

In studying radiograms of the labyrinth in cases of otosclerosis, I have noted that the extent of the bone changes does not seem to have much bearing on the severity or otherwise of the patient's symptoms. There are cases in which the clinical signs and symptoms are very distinct, and yet the bone changes are only slight. In another case with slight symptoms, the bone changes are very noticeable. One is reminded of arthritis in other parts of the body. The pain seems to depend not on the extent of the bone changes so much as on whether or not they involve the nerves.

In one-third of the cases in which there is clinical doubt I find changes which I have only seen associated with otosclerosis.

In one of the remaining two-thirds I could not detect any X-ray evidence of abnormality. This does not mean that they are normal. It simply means that I have been unable to detect any abnormality radiographically. With the best radiograms possible I do not consider that one could see the earliest changes round the oval window or in the basal cochlea.

The remaining third are cases in which there is some slight lack of definition in the basal portion of the cochlea; in those cases I cannot say whether the condition is pathological or merely a variation from the normal. So that only in about a third of the cases can one by means of X-rays confidently detect the changes due to otosclerosis in the labyrinth.

In the future, when some treatment for the condition has been discovered, radiography may be of use in tracing the progress of bone changes during such treatment. It should also be of use in the selection of cases for treatment, because it is reasonable to suppose that cases with the least bone changes would yield to treatment better than those with marked bone changes. From the diagnostic point of view I do not think it is at present of much use, except in one-third

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of the cases, therefore I should like to see this work carried on from the research point of view in hospitals, where there are the best opportunities of collaboration with colleagues; one can X-ray the cases as often as one wishes, estimate the degree of change and so on, and even if one is not doing that patient any good, one is gaining experience in an exceedingly difficult and interesting branch of radiology, and it costs the patient nothing.

[Dr Graham Hodgson then showed other slides illustrating difficulties of diagnosis.]

Two Skiagrams of the Temporal Bone — E. WATSON-WILLIAMS, M.C., F.R.C.S.Ed.

(1) Skiagram showing extensive destruction of the squamous temporal bone by cholesteatoma. Adult male patient: radical mastoid operation several years previously. Complains of swelling in temporal region, and continuous headache. The skiagram shows that an area of temporal bone, about 3 cm. in diameter, has been entirely destroyed by what was found at operation to be a cholesteatomatous mass exactly resembling in colour, size and shape a ping-pong ball. Complete recovery.

(2) Skiagram showing infection of mastoid cells in acute otitis media. The question arose whether a mastoid operation was necessary, and the skiagram would indicate that it was. No operation; complete recovery. Second skiagram a month later, showing normal mastoid cells.

Osteomyelitis of the Temporal Bone—W. A. MILL, F.R.C.S.—F. H., male, aged 50. Admitted to Guy's Hospital with acute mastoiditis 8th August 1929, after six weeks' otorrhœa. Schwartze operation performed. Discharged 17th August 1929. On 19th September 1929 the drum-head and wound were healed, but for a week there had been a swelling in the temporal region. This persisted, and the patient complained of headache and pain.

X-ray examination 14th October 1929, showed "rarefaction indicative of infection of the squamous portion of the temporal bone."

19th October 1929.—The ear was discharging, and there were granulations in the middle ear. Swelling was most marked above the zygoma, but extended over the whole area of the temporal bone.

Mastoid reopened. Granulations in cavity. Radical operation. Malleus and incus covered with granulations.

Large scalp flap turned down and diseased bone removed. The outer table was reddened and very soft. A layer of granulation tissue extended between the two tables. Over the whole area the dura was thickened and whiter than normal. Anteriorly near the great wing of the sphenoid there were a few granulations on it.

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Flap replaced and sewn in position. Mastoid wound left open. Drainage through lower end of flap incision.

18th November 1929.—Not quite healed, but patient would stay in hospital no longer.

Postscript.—There is now (16th December 1929) some thickening over the region of the masto-occipital suture, and further X-ray examination (30th November 1929) indicates that there is rarefaction, but it is possible that this may be evidence of healing and not infection. The intention is to watch the case and, if necessary, take further skiagrams. The organism found at the time of the original mastoid operation was a gram-positive coccus, probably a streptococcus.

At the second operation the diseased bone yielded a mixed growth of *Streptococcus hæmolyticus* and large Gram-positive cocci.

On account of the thickening and whiteness of the dura, Wassermann and Khan tests were done on two occasions, but they were negative.

The Value of Radiography in Symptomless Mastoiditis.

T. B. Layton, D.S.O., M.D.

There are no symptoms of inflammation of the mastoid diploë. Those which we use to make a diagnosis in acute disease are not symptoms of the inflammation of the osseous tissue, but of the spread of this inflammation locally to surrounding structures or generally by the blood-stream. In many cases there is no such spread. These are cases of symptomless mastoiditis. They are probably more numerous than otologists have formerly thought. They can be recognised by X-rays. Every case of otitis media which is not well in a fortnight should be considered as a possible case of symptomless mastoiditis, and a skiagram should be taken.

At this stage the change seen is a blurring of the outline of the lamellæ of osseous tissue which form the walls of the mastoid cells. If this is seen the mastoid should be opened, and the diseased bone removed if there is any ear discharge. In this way one is almost sure of securing a healed drum-head with normal hearing.

At a later date sclerosis supervenes, with deposition of earthy matter. This can be recognised under X-rays. When it has occurred the performance of the simple operation indicated above is less likely to be successful. Therefore the operation should be performed before sclerosis has begun. If we did this we should probably eliminate those tragic cases of intracranial complications of the chronic running-ear in middle age.

I believe that this sclerosis begins about two months after the onset of acute otitis. In every case of acute otitis media, accompanied by symptomless mastoiditis, there are therefore two months in which

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to affect a cure: after that time the best chance has gone for ever. For a generation otologists have been pegging away at the naso-pharynx as the key position whence an acute inflammation of the middle ear degenerates into a chronic condition. I suspect that the other end of the middle-ear tract is more often the important one. Therefore in a case of unhealed otitis media of recent date, an operation upon the tonsils or naso-pharynx should not be performed until a skiagram of the mastoid has been taken. If this shows evidence of changes in the diploëtic tissue, the operation must be done *not* upon the throat but upon the mastoid.

Two of the cases illustrated by Dr Mann's skiagrams are good examples of symptomless mastoiditis. In one (J. H., girl, aged 5) the sole symptom was ear discharge; there was not even a rise of temperature. In the other (D. R., girl, aged 5) there was a rise of temperature, but the child was already desperately ill with scarlet fever and diphtheria, which were enough to account for that rise.

I wish to give one word of warning in the form of a question. In an acute otitis media is there always, or frequently, some inflammation of the mastoid bone which subsequently clears up? If so, we must be careful not to call this condition an acute mastoid and to consider that it needs operation. I believe that radiography will clear up this matter, and give some indication of the pathology of the bone in acute otitis media.

Discussion.

Mr E. Watson-Williams said that in just those cases of doubt in which additional help beyond clinical signs would be valuable, it was not forthcoming from radiography. In the second case, which he had now shown, and in three or four others, there was a general blurring of the cells and opacity in the skiagram, so that had he assigned weight to the skiagraphic evidence, he would have advised operation. In actual fact he did not operate and a perfect recovery ensued.

He did not agree with Mr Layton that radiography would help a decision in most cases; in ninety-nine out of a hundred the diagnosis should be made on the clinical findings, and if, three weeks after the onset the condition was not improving, active measures should be taken whatever the skiagraphic findings.

Mr Alexander R. Tweedie said he was sure that Mr Layton did not mean that we should rely entirely on a skiagram for this purpose. Examination of the aural fundus, the condition of function, and of the patient generally, were the most valuable guides.

Mr T. B. Layton (in reply) said that the kind of case in which he found radiography valuable was one in which there was no other evidence of inflammation of the mastoid bone. There would be a variety of opinion as to the value of that evidence. He was interested to learn that Mr

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E. Watson-Williams did not find radiography of much value in doubtful acute cases, which were becoming semi-acute. It was when a symptomless case was threatening to become chronic that radiography was of value. Dr Mann and himself had purposely brought up some cases in which the decision, judged by the skiagrams, had been wrong, *i.e.*, in two of the eight or nine shown. In one, operation was refused, and the patient recovered in spite of that refusal. In the other, the mastoid when opened, appeared normal and no organism could be cultivated from the piece of bone removed. In both of them the mastoid was of the infantile type, in which type it was more difficult to make accurate deductions from the appearances.

He did not think it was opening the antrum and affording post-aural drainage of the middle ear which was the valuable thing. The views he was developing with regard to the symptomatology of mastoid affections and the value of radiology were based on Dr Dan McKenzie's recommendation, made some years ago, to open the mastoid if the middle ear did not heal. He did not think that when there was no disease of bone, post-aural drainage got rid of the disease. If there was disease of the bone, removal of that disease enabled the patient to get well. If there was not disease of bone, he doubted whether drainage did much good. In cases with ears which had been discharging for some time, more evidence was needed to tell which had some bone inflamed, and which had not. That evidence was supplied by radiography. Before an X-ray plant was installed at the Metropolitan Asylums Board[1] he had tried opening of the mastoid when the ear did not get well. In two he had chanced to find a small focus of disease and these cases were great successes. In the others, the mastoid was normal and none of them recovered. That was the type of case in which he advocated the taking of a skiagram before taking out tonsils. When one saw tonsils which one would remove whether there was a running-ear or not, he admitted that removal of those tonsils might give the running-ear a chance of getting better; but if there were tonsils which one would not remove except because of a running-ear, he had never known of a case in which removal had done good.

Some Notes on the Diagnosis of Acoustic Tumours.

T. H. Just, F.R.C.S.

The rarity of this condition is the justification for this paper. All my conclusions are drawn from the clinical notes of the cases, made during the routine examination of the patients.

They are based on a series of 33 histologically proved cases, which I have seen at the National Hospital during the last six years. This comparatively large number gives one some fair grounds for dogmatising on the relative frequency of occurrence of the various signs and symptoms. I shall also, for the purpose of differential diagnosis, refer to 3 cases of endothelioma of the dura mater of the lateral

[1] Ref., M.A.B. Reports, 1922.

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recess and also to 2 cases of cholesteatoma of the lateral recess, that rare tumour one sometimes sees growing from the dura mater.

In spite of the rarity of the condition, any otologist must, at some time or other, see cases of eighth-nerve tumour, sometimes at first hand, as some patients at the beginning complain of purely otological symptoms such as deafness, tinnitus, and giddiness, and as in some of these cases, the deafness is of a middle-ear type, it behoves the otologist to investigate the aural condition completely.

I do not propose to discuss all the neurological findings which occur. From the welter of sometimes contradictory findings, I shall confine myself to the more striking and constant symptoms which an otologist can recognise. The average otologist has neither the training nor the time, to make a detailed neurological examination of a doubtful case of trouble in or near the lateral recess, and from the wealth of signs elicited, always to draw a right conclusion.

The incidence of the condition is as follows: *Sex*—Female, 24 cases; male, 9 cases. *Age*—Three patients under 20 years (youngest 18); 12 between 30 and 40; 11 between 40 and 50; 5 over 50 (oldest 62).

The duration of symptoms before the patient was examined varies from one month to five years. This period is indefinite, as symptoms such as deafness of long standing are probably due to some other cause.

The following is a list of symptoms complained of by the patient himself, in the series of 33 cases, with their frequency of occurrence:—

Headache	25	Vomiting	15
Failing vision	22	Falling or lurching	23
Diplopia	12	Paresis—	
Giddiness	18	(1) hand or arm	10
Deafness	26	(2) leg	5
Tinnitus	16	Slurred speech	4
Sensory disturbances (practically all of upper fifth distribution)	14	Facial spasm	3

The most common symptom was deafness, and seven patients who did not complain of loss of hearing were found, on examination, to be suffering from unilateral deafness. Deafness may therefore be taken as constant. Headache in a large number of cases was occipital, but in others was general or even frontal. There was loss of tone in the arm or leg of more patients than are grouped under the heading of paresis. This loss of tone was illustrated in the case of the arm by a certain clumsiness in the performance of definite repeated movements, such as the finger-nose-finger test; and in the case of the leg, in the inability of the patient to stand steadily upon the affected foot.

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CASES OF ENDOTHELIOMA AND CHOLESTEATOMA.

Symptoms.	Endothelioma (3 cases).	Cholesteatoma (2 cases).
Headache	3	2
Tinnitus	3	1
Deafness	3	2
Giddiness	3	1
Failing vision	2	1
Lurching	2	2
Vomiting	2	2
Diplopia	1	0

N.B.—In one case of cholesteatoma there was definite diminution of function of the homolateral vestibular nerve.

Thus it appears from the differential diagnosis point of view, that the symptoms complained of in cases of lateral recess tumours not connected with the eighth nerve are practically the same as those of definite eighth-nerve tumours.

Signs of Eighth-Nerve Tumour.—These may be divided into (1) those connected with the eye, (2) those connected with certain cranial nerves, especially the fifth, sixth and seventh, (3) signs of cerebellar involvement, and finally (4) the findings on examination of the eighth nerve.

Vision.—Sight varied from normal to complete blindness in 20 cases in which the vision has been recorded. Of these: In 1 case sight was normal; in 7 cases sight was equal in both eyes; in 6 cases sight was less on affected side; in 7 cases sight was less on contralateral side. It will be seen from this that except for the fact of loss of vision, the degree is of no help towards lateralising the tumour.

Papillœdema.—Present in 27 cases; not present in 3 cases; no record in 3 cases.

Papillœdema varies from 0.5 D to 5 D. Less on affected side in 13 cases, equal on both sides in 7 cases, greater on affected side in 7 cases. The intensity of the papillœdema does not appear very helpful in lateralising the tumour.

Visual Fields.—Reduced in 8 cases, particularly to colour; on the affected side (4 cases), both sides (2 cases), contralateral side (2 cases).

Spontaneous Nystagmus.—Present in all 33 cases; coarse on deviation towards the side of tumour and fine towards the contralateral side (26 cases); fine towards the side of tumour and coarse towards the contralateral side (4 cases); fine to both sides (2 cases); fine nystagmus on deviation to the side of the tumour, with no nystagmus to the opposite side, in one case only. In 15 cases there was a fine, jerky nystagmus on looking upwards and downwards, sometimes slightly rotatory in character. This proportion of a slow coarse

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nystagmus towards the side of the tumour is what one would expect, considering the relation of the tumour to the cerebellum.

Corneal Reflex.—Absent in 14 cases, diminished in 16 cases. No record in 3 cases. It is seen from this that diminution or absence of the corneal reflex is present in every case examined.

Sensation.—In 18 cases there was a diminution in sensation of cotton-wool and pin-prick over the area of the upper fifth nerve of the homolateral side. In some few cases the diminished sensation was more widely spread, and in one extended to the whole homolateral side of the body.

External Rectus Paresis.—On the side of the tumour (8 cases), on both sides (3 cases), on the contralateral side (1 case). Weakness of the rectus on the same side, therefore, appears to be of diagnostic help in lateralising the condition.

The Facial Nerve.—Facial weakness occurred: On the side of the tumour (16 cases), on the contralateral side (2 cases). Facial spasm in 3 cases on the homolateral side. Facial weakness may therefore help in the diagnosis of the condition.

Palate.—Showed weakness on the side of the tumour in 3 cases.

Tongue.—In one case the tongue was protruded to the side of the tumour.

Decrease of Power in Arm and Leg.—Arm: Decrease of power on the side of the tumour in 16 cases. To this must be added some which showed lack of accuracy in constantly repeated movements. Leg: In 9 cases there was weakness of the leg on the side of the tumour.

Position of Head.—Chin directed away from the side of the tumour (7 cases), towards the side of the tumour (3 cases).

Falling Reactions.—Patient veered or fell to the side of the tumour in 11 cases; to the contralateral side in 2 cases; both ways in 2 cases. Unsteadiness on homolateral foot in 20 cases.

Skiagram.—In 14 cases in which reports on skiagrams were included in the notes, 4 cases showed enlargement of the internal auditory meatus and 10 showed no change.

I have rather stressed the signs found on examination of the eyes, as in my opinion they are of the greatest importance. I have omitted notes of the various reflexes found, as I think they are rather neurological than otological.

The Eighth Nerve.—Cochlear branch: (1) I have only detailed notes on the ears in 29 cases. Of these there was absolute deafness (13 cases), some loss of bone conduction (8), middle-ear deafness (8).

The fact that middle-ear deafness is present in so many cases is, from the point of view of diagnosis, disturbing. There may be some loss of function of the nerve, but if, on examination, it is found that

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air conduction is less than bone conduction, the Weber is referred to the deaf ear and a tuning fork placed on the affected mastoid is heard when a noise-box is sounding in the opposite ear, then one is forced to the opinion that one is dealing with a case of middle-ear deafness.

Method of Testing the Eighth Nerve.—The method which I personally find gives the most consistent results, and I have in all cases tried to make the method as simple as possible.

In testing the cochlear division I use only a heavy middle fork and a noise-box. Patients with a papillœdema of 2 to 5 D are not good witnesses, and I do not think that very detailed testing of exact hearing or tone range can be looked upon as accurate in many of these cases. When the patients have absolute deafness it is easy, but to be certain of a small diminution of the bone conduction, when the Weber is referred to the good ear, or in mixed deafness is, in many cases, not an exact scientific fact but a matter of opinion. Still, I hold that by these simple methods—used with discretion—one can practically always determine the type of deafness, if not its exact degree.

Vestibular branch: All cases tested showed diminution or complete loss of the function of the eighth vestibular branch. The difficulty of testing the majority of these patients for the function of this branch lies in the fact that they all exhibit spontaneous nystagmus, practically always in both directions and varying in degree. Many of them are giddy, and some of them fall on standing with their feet together. Again, I do not dogmatise on which is the test of election. I shall merely relate the methods I use.

Rotation Test.—I find this test applicable to so few cases that I have ceased to use it, as I could never satisfy myself that the added nystagmus on swinging one way was of longer duration than the added nystagmus on swinging in the opposite direction, when there was a marked spontaneous nystagmus. Also, the differential falling and giddiness between the two sides was difficult to be sure of in patients who were spontaneously giddy and who had a weakness of the homolateral leg.

The Galvanic Test.—I have always found this galvanic test rather uncertain. At times it seems difficult to bring off, the nervous patient complaining of pain before nystagmus or swaying appears. Again, it has been shown that sometimes, at any rate, the galvanic test stimulates centres in the brain stem and not the nerve. The nystagmus caused by the galvanic stimulation is nothing like as marked as that obtained by prolonged stimulation with cold, and in view of the spontaneous nystagmus which is always present it is, I think, almost impossible to determine whether there is any added nystagmus. The sway, when it occurs, is most typical and conclusive (though not necessarily of a functioning eighth nerve). The absence of a sway is not so conclusive.

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It may be due to my faulty technique, but I have never felt absolutely certain of the galvanic test. I have used it often in cases of eighth-nerve tumour, and have found it useful in conjunction with the cold caloric test, in cases in which there was evidence of old suppurating or obsolete otitis media, in which one could not be sure otherwise that the labyrinth had not been destroyed by disease.

Cold Caloric Test.—I have found this the most useful test of the eighth nerve, as in my opinion it practically never fails. The nystagmus produced on prolonged stimulation is very marked and of wide excursion, the sensation of giddiness in normal patients is also well marked, typical labyrinthine falling reactions may readily be elicited, and errors in past-pointing are usually quite definite. One stimulates the affected ear and the affected ear alone, with the cold caloric test. Even with the cold caloric test in some difficult cases, there is so much spontaneous nystagmus, giddiness and falling, that the question as to whether the eighth nerve is functioning or not, is a matter almost of opinion, rather than of fact. I should like to emphasise this point, and it would be simplest if I quote the findings on testing the eighth nerve in some cases which were definitely proved to suffer from eighth-nerve tumour:—

(1) Left membrane scarred. Weber to left. Vibrating fork heard over left mastoid, with noise-box in right ear. Apparently middle-ear deafness. Cold caloric test, left. Apparently no added nystagmus, no giddiness or falling reaction. ? "Dead left vestibular nerve."

(2) Some loss of inner-ear hearing (left). Not by any means absolute. Cold caloric test (left); impossible to detect added nystagmus, as the spontaneous nystagmus is so marked. After prolonged syringing, no giddiness, nausea or falling. Left vestibular eighth is at any rate hypo-sensitive, if it is functioning at all.

(3) Left ear, cochlear division, eighth, not functioning. Cold caloric test, left, no added nystagmus, giddiness or falling. Past point touch. Galvanic test, left, no reaction or swaying; right, no very convincing sway. "I think the left eighth nerve is not functioning."

(4) Left ear, membrane very dull. Very deaf. Weber to right. Spontaneous past pointing, touch both hands. Does not fall. Cold caloric test, left. "I cannot satisfy myself that there is any added nystagmus with the head in any position." Past pointing touch both hands, no falling, nausea or sensation of giddiness.

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(5) Left ear, membrane thickened and retracted. Patient very deaf. Impression that there is nerve deafness. Spontaneous nystagmus with head in all positions. Falling backwards and to the left with all positions of the head. Past pointing, eight inches outwards with the left hand. Cold caloric test, left. "I cannot satisfy myself that there is any added nystagmus for any position of the head." There is practically no giddiness. The past pointing and falling are the same as before stimulation. "My impression is that the left eighth vestibular nerve is not functioning."

(6) Right ear, slight deafness. No loss of high or low tones. Cold caloric test very sluggish and practically no giddiness or falling. With galvanic test, sways alternatively to right and left, on receiving current added nystagmus in both directions during stimulation with either pole. (Tumour the size of a cherry growing from eighth nerve.)

It will be seen from these reports, that the cold caloric test may be of help when the galvanic test is uncertain. Again, these cases show the difficulty in judging whether there is added nystagmus or not on stimulation, and show the importance of the loss of sensation of giddiness, falling and past pointing, as aids to determining whether the eighth-nerve vestibular branch is functioning or not.

Let us now try to gain some sort of clinical picture of a case which may be that of an eighth-nerve tumour. The patient exhibits the following signs and symptoms: Deafness, spontaneous nystagmus, loss or diminution of the corneal reflex, papillœdema, loss of vestibular function. If to these findings there are added any or all of the symptoms and signs already described, then the case is almost certainly one of tumour of the lateral recess, and with involvement of the eighth vestibular branch it is almost certainly a tumour of the eighth nerve. Although some interference with the function of the eighth nerve may occur, in cases of extra-cerebellar tumours of the dura mater of the posterior fossa, merely from pressure, in all cases of acoustic nerve tumour the function of the vestibular branch is interfered with, even though the cochlear branch may escape, and therefore the findings in these cases of a partly or completely damaged eighth vestibular branch is for practical purposes pathognomonic of an acoustic nerve tumour.

In conclusion, I should like to thank my colleagues at the National Hospital for their kindness in allowing me to use the case notes of patients under their charge.

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Royal Society of Medicine

Tumours of the Eighth Nerve.

J. S. Fraser, M.B., F.R.C.S.E., and W. T. Gardiner, M.B., F.R.C.S.E.

During the years 1918 to 1928 (inclusive) 13 suspected cases of eighth-nerve tumour were seen in the Ear and Throat Department, Royal Infirmary, Edinburgh. In 8 of these the diagnosis was definitely confirmed by operation or post-mortem findings.

Sex.—Of our 13 cases, 11 were females and only 2 were males. *Age*—Three of our patients were under the age of 21 years; 6 between 31 and 41; 2 between 41 and 51; and 2 just over 51.

Infection.—None of our cases had evidence of middle-ear suppuration. In 9 cases the drumhead on the affected side was normal, and in the remaining 4 only slight opacity and indrawing were noted.

Side.—It is interesting to note that in 9 of the cases the right side was affected, in 3 the left, while in 1 case the tumour was bilateral. (Case improving.)

Symptoms.—As the subject is being treated from the otologist's point of view, symptoms which arise in connection with the eighth nerve will naturally fill the picture and are dealt with first.

Eighth Nerve (*Cochlear Division*).—It must be admitted that it is difficult, or impossible, in many cases to obtain an accurate chronological history of the onset of the symptoms. Patients with unilateral deafness may for long periods fail to notice it when the hearing in the other ear is normal. It is usually stated, however, that deafness is the first symptom, generally accompanied by noises. In all our 13 cases the patients complained of deafness, but in only 2 was tinnitus noted. In the 8 cases in which the watch was employed in the examination, it was noted that it was not heard either by air or bone-conduction on the affected side. In the 6 cases in which the Rinne test was employed, it was found that while the tuning fork was not heard at all by air conduction, it was heard by bone-conduction almost certainly in the sound ear, *i.e.*, Rinne's test was "absolute negative." In the 5 cases in which Weber's test was employed, the fork was lateralised to the good ear. When the higher-pitched forks, 1024, 2048 and 4096 were held opposite the affected ear, the patient said that she could hear them, but if the noise-box was going in the good ear the patient could not hear them. Voice test: With the noise-box going in the good ear twelve of the thirteen patients were absolutely deaf; the remaining patient heard the distinct voice at a foot.

Vestibular Division.—Giddiness was noted in 9 of the 13 cases; in one case giddiness came on before deafness.

Vestibular Tests.—Spontaneous nystagmus to both sides was present in 5 cases; spontaneous nystagmus to both sides, along with nystagmus

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on looking upwards, was noted in 7 cases, while in the remaining case there was spontaneous nystagmus to both sides and nystagmus on looking down. This symptom, spontaneous nystagmus to both sides, with vertical nystagmus—appears to us to be the most valuable of all in the diagnosis of eighth-nerve tumour, at least so far as otological examination is concerned. In 2 of our cases the nystagmus was most marked to the opposite side and in another 2 to the same side. This accords with the findings of other observers, though Cushing believes that the nystagmus is more marked when the patient looks towards the side of the lesion.

Spontaneous Pointing Error.—The absence of this is also a pronounced feature. Spontaneous pointing was normal in at least 11 of our 13 cases. This is in marked contrast to the conditions found in cerebellar abscess and intra-cerebellar growths.

Rombergism is not a very noticeable feature. There was slight swaying on this test in only 5 of the 10 cases in which the condition was noted, and it was definitely absent in 2.

Rotation Test.—We have not employed this test, as it is very difficult to observe the result in cases of eighth-nerve tumour on account of the spontaneous nystagmus.

Galvanic Test.—It has also been found difficult to obtain satisfactory results by this test, not only in cases of eighth-nerve tumour but in other conditions. Patients almost always complain of such severe pain that the current has to be reduced and stopped before nystagmus is produced; indeed, the only condition in which a satisfactory nystagmus has been produced on the galvanic test is that of chronic middle-ear suppuration with large perforation of the drumhead, in which zinc ionisation treatment is used.

Cold Caloric Test.—This is important. In view of the presence of spontaneous nystagmus to each side, it should of course be carried out with the eyes looking straight forward. The reaction was found to be absent in 10 of the 13 cases. In the other 3 the test could not be carried out, as the patient would not allow it. In 2 of the cases it was noted that on syringing the sound ear a very marked and prolonged nystagmus was obtained; this agrees with Neumann's finding.

Nausea and vomiting were noted in only 5 of the 13 cases. It was definitely stated that there was no vomiting in 2, while in the remaining 6 there is no note under this heading.

Staggering and falling were present in 8 of the 13 cases, while in the remaining 5 there is no note. In one case the patient stated that she fell towards the side to which she attempted to turn.

Other Cranial Nerves.—(I) In no case is there any mention of loss of olfaction. (II, III, IV and VI) 5 of the patients had optic

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neuritis. In 3 cases the patients complained of diplopia. (V) 9 patients complained of headache; in 2 of these it was definitely stated to be frontal. Only in 4 cases was there loss of the conjunctival reflex or diminution of the sense of touch on the cheek of the affected side. (VII) Facial paralysis was present in 7 cases, absent in 3, and in the remaining 3 there was no note, but it is almost certain that there was no facial weakness. Loss of taste on the affected side of the tongue was noted in 3 cases. (IX and X) In only 1 case was there difficulty in swallowing. Slow or slurring speech or difficulty in articulation were noted in 5 cases. In 2 cases there was paresis of the palate. In the 4 cases in which the larynx was examined there was no abnormality. (XI) In no case was there any abnormality of the sterno-mastoid or trapezius muscles. (XII) In no case was there any hemiatrophy or difficulty in protruding the tongue.

The *pronation and supination test* was only noted in 2 cases, in which there was fairly well-marked dysdiadokokinesia on the homolateral side.

Increased *tendon reflexes* on the contralateral side were noted in 3 cases, while tremor of the upper extremities was noted in 2 cases.

In all cases tested, the Wassermann reaction was negative.

In several of the cases X-ray examination of the temporal bone was carried out in the oblique lateral position to show the internal meatus superimposed on the external meatus. In none did the radiogram give any definite evidence of enlargement of the internal acoustic meatus. In two cases which we are allowed to quote by kind permission of Mr Dott, X-ray examination was of the greatest use.

Differential Diagnosis.—Eighth-nerve tumours have to be distinguished from: (1) Acquired syphilitic affection of the labyrinth and eighth nerve, including syphilitic basal meningitis (Wassermann test).

(2) Neuritis of both divisions of the eighth-nerve which rarely causes complete permanent deafness and loss of vestibular reaction.

(3) Serous meningitis in the lateral cistern, and various forms of labyrinthitis associated with suppurative otitis media, and therefore unlikely to be mistaken for eighth-nerve tumour.

(4) Ménière's disease; here again complete deafness and absence of vestibular response are almost unknown. The presence of choked disc would negative Ménière's disease.

(5) Multiple sclerosis, bulbar paralysis and locomotor ataxia: the diagnosis of those diseases falls to the neurologist rather than the otologist.

(6) Tumours of the cerebellum: in these one would expect to find a well-marked pointing error, which is absent in eighth-nerve tumours.

(7) Cerebellar cyst.

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The following case is quoted in full to show the difficulty in making a diagnosis of eighth-nerve tumour before the appearance of ? neurological symptoms :—

T. B., male, aged 57, seen 8th May 1925, complaining of attacks of giddiness and vomiting during the previous five years. Also complained of deafness and continuous noises in left ear of three years' duration. Wassermann reaction negative.

On examination: Drum-heads were normal. Watch heard on right mastoid but not on left. Rinne's test absolutely negative on the left side and no tuning forks could be heard by the left ear with the noise-box in the right. Further, the patient was quite deaf with the noise-box in the right ear. There was some spontaneous nystagmus both to right and to left, most marked to right. There was no pointing error and very little, if any, Rombergism. Cold syringing of the right ear produced the normal reaction, whereas cold syringing of the left ear produced no nystagmus even in three minutes.

Examination of the nervous system was negative. There was no indication of involvement of any other cranial nerves. The fundus oculi was normal. Radiograms did not show any dilatation of the internal meatus on the left side. The electrical reaction on the right side was normal but no reaction was obtained from the left ear.

The radical mastoid operation was performed by J. S. F., followed by Neumann's labyrinth operation, with division of the seventh nerve on the affected side and opening of the internal acoustic meatus. No tumour was found. Meningitis supervened eleven days after operation, and the patient died on the fifteenth day. Post-mortem showed meningitis only.

To summarise :—

Acusticus tumour should be suspected in a case in which there is absolute loss of cochlear and vestibular function, accompanied by (?) spontaneous nystagmus in all directions, *i.e.*, lateral and vertical, but with no spontaneous pointing error or Rombergism. It follows also from what has been said regarding cerebellar cysts that a definite diagnosis cannot be made before the appearance of neurological—as apart from otological—symptoms unless X-ray examination shows dilatation of the internal auditory meatus on the suspected side.

Discussion.

Sir James Dundas-Grant said that he would urge more strongly than Mr Just did, the value of the galvanic test. It should, however, be unilateral only, with the cathode pole on the back of the neck and the anode pole on the ear. Then with very few amperes there should be produced a definite sway towards the anode. It was in the cases in which the disturbance was not very advanced that one wanted to make a diagnosis, and it was there the method was of use. For the caloric test he recommended his cold-air apparatus. Mr Sydney Scott had said that this gave positive results when cold water did not, and was not so likely to be refused by the patient. In all cases of obscure nerve deafness the corneal reflex should be tested; this would put one on the track of a

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pontine-cerebellar tumour at an earlier stage than would otherwise be the case. The galvanic current need not be used to the extent of producing nystagmus, as that required 10 to 15 milliamperes and caused pain. In the absence of labyrinthine reaction one wanted to know how the nerve reacted, and the galvanic test told us this.

Mr ALEXANDER R. TWEEDIE said he noted with regret that these authors also had not found the rotation tests of much value, but he himself still carried out these tests, hoping that they might yet prove of diagnostic value.

He, too, had been rather disappointed in the caloric and galvanic tests, until he realised that the value of responses had a direct relation to the fineness of the resistance of the electrical apparatus in the galvanic tests, and to the minimal amount of cold water used in the caloric test.

With the galvanic test, in physiological cases, the leaning effect was produced before the nystagmus, whilst in pathological cases this sequence was sometimes reversed.

The cold caloric test was chiefly of use in indicating the functional integrity of the peripheral organ, whilst the galvanic test was solely a test for the vestibular nerve *and* probably its distal ganglia, as pointed out in a recent paper by Dr Gösta Dohlman ("Experimentelle Untersuchungen über die galvanische Vestibularisreaktion," *Acta Oto-Laryngologica*, 1929, Suppl. viii., 48). He agreed with Mr Gardiner that these tests should never be restricted to the side in question; their value was largely dependent on the result of a general systematic bilateral examination.

Mr SYDNEY SCOTT said that many cases of deafness might be associated with a peripheral lesion of the vestibular nerve, as Mr Tweedie had said, so that there was a negative caloric reaction, but a positive galvanic reaction. He (the speaker) had also seen many cases of lateral recess tumours which, upon operation, had proved to be cases of auditory nerve tumour. In all of them there was a negative galvanic reaction on the side of the lesion. In one case there was no galvanic reaction on either side, and that patient had bilateral auditory nerve tumours.

Mr TWEEDIE—If the resistance is adjusted the galvanic test will not cause pain.

Mr BROUGHTON BARNES said Mr Just's statement that eight out of thirty-three cases had middle-ear deafness caused him (the speaker) some anxiety with regard to diagnosis. Had Mr Just found any marked changes in the middle ear in those cases, or could he give any explanation of the fact?

Mr E. WATSON-WILLIAMS [communicated later]—The explanation of the *conduction* deafness observed in some of Mr Just's cases in which there was little or no *perception* deafness may possibly be found in the "choked labyrinth," of which examples were shown at the meeting; that is to say, in an exudation of lymph into the scala tympani and scala vestibuli, the organ of Corti escaping damage. The condition would then be that described by Claoué [1] as "humoral deafness," a deafness due to alterations in the perilymph, and characterised by tests indicative of conduction deafness.

[1] Claoué, "Les Surdités Humorales," *L'Oto-rhino-laryngologie internationale*, July 1924, p. 373.

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Mr JUST, in reply, repeated that he did not wish to decry the galvanic test, but simply to say that in his own experience he found it less reliable than the cold caloric test. In many cases he used both. In cases in which there was a marked spontaneous unsteadiness on standing, and one could not be sure of the presence of added nystagmus, by the more violent stimulation of the cold caloric test one could judge whether the patient became giddy and had pointing reactions, better than one could with the galvanic. He always used one electrode strapped on the head, the other on the wrist of the same side, so that the patient was clear of the stimulator. He usually tested both sides, in order to compare the responses of the normal and the affected areas.

Until he looked up his cases he had not realised that deafness in the affected ear occurred so often. He could not be certain, in most of those cases, whether there was a slight degree of nerve deafness. In the cases of eighth-nerve tumour the drum might be dull and slightly retracted, but usually no definite change was present.

Mr W. T. GARDINER, in reply, said that both Dr Fraser and himself found the cold caloric test of much more value than the galvanic.

Fibroma of the Eighth Nerve simulating a Tumour of the Cerebellum—T. B. JOBSON, M.D.—E. C., married woman, aged 31, admitted to Guildford Hospital, 21st January 1929, on account of failing vision.

History.—Initial symptom was deafness, beginning on right side two years previously, increasing mental dullness (three months), vertigo, falling forward and to right, attacks of headache and vomiting (six weeks).

Physical Signs.—Vision: right $\frac{6}{36}$, improved with glasses to $\frac{6}{24}$; left $\frac{6}{12}$, improved with glasses to $\frac{6}{9}$. Papillœdema, right and left about 2 D. Pupils dilated; right does not react to light. Double ptosis, paralysis of right sixth nerve. Coarse symmetrical horizontal nystagmus. (Dr R. Lang.)

Central Nervous System.—Right corneal reflex absent, deviation of jaw to right side. Knee-jerks, right +, left + +. No ankle clonus. Plantar reflexes absent. Abdominal reflexes (?). No Kernig's sign or head retraction. Generalised inco-ordination and muscular atony. Mental condition, "very lethargic, almost stuporose." (Dr A. F. Tredgold.)

Ears.—Membranes show evidence of catarrhal changes; both dull, right retracted. No evidence of suppuration. Patient's mental condition precluded any accurate hearing tests. Could hear loud voice with left ear, but nothing with right.

Abdomen, heart and lungs normal. Wassermann reaction negative. Slow pulse (60).

Diagnosis.—Tumour of right auditory nerve confirmed by stereo-radiogram.

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Operation (Mr G. H. Steele, F.R.C.S.).—Bilateral posterior fossa decompression, using Cushing's cross-bow incision. Occipital bone between and below lateral sinuses removed, including posterior margin of foramen magnum and posterior arch of atlas, to relieve pressure of the large medullary cone which was present. Palpation revealed a nodular circumscribed tumour $\frac{1}{4}$ in. below the surface of the cerebellum apparently completely imbedded in the right lateral lobe. Retraction of the cerebellum was begun with a view to inspecting the eighth nerve, but before the internal auditory meatus was reached, free hæmorrhage put a stop to the operation and the wound was closed. After an interval of six weeks the wound was reopened. A typical auditory fibroma, the size of a hen's egg was found, occupying the cerebello-pontine angle, having been extruded from the cerebellar substance. The tumour was now completely free from the lateral lobe of the cerebellum. Intracapsular removal by morcellement was commenced, but free hæmorrhage again obscured the field and extracapsular enucleation with the finger was now resorted to, the tumour coming away quite readily. Hæmorrhage, however, was controlled with difficulty and the patient died a few hours after the operation.

Remarks.—From the point of view of radical operation, the differential diagnosis of tumours in the posterior cranial fossa resolves itself into the distinction between the two commonest groups of neoplasms which are found there, namely tumours of the cerebellum and fibromata of the eighth nerve. The importance of this differentiation is that apart from simple cysts the majority of growths in the first group are not amenable to extirpation, whereas most auditory fibromata can be removed to a greater or lesser extent. In some cases the distinction is easy, but extracerebellar tumours may give rise to symptoms of pressure on the cerebellum, while true cerebellar tumours may involve the other structures, such as cranial nerves, in the posterior fossa. This being so, the diagnosis is not always supported by the operative findings and this case illustrates this point.

The interest of this case lies in the apparent confutation of the diagnosis by the fact than an extracerebellar neoplasm had buried itself in the cerebellar lobe, by a process similar to that by which an endothelioma of the dura mater embeds itself in the cerebral substance without infiltrating it. The tumour, felt through a thin surrounding layer of cerebellum, had simulated exactly a tumour in the very centre of the lateral lobe. It was also extremely interesting to observe the effects of the extrusive powers of the cerebellum, when brought into play by the release of pressure consequent upon decompression. The brain substance had expelled the foreign tumour, and in doing so had attempted to approximate to the normal condition of affairs in the posterior fossa (G. H. S.).

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Pathologist's Report on the Tumour.—Size, 3 in. by 2 in. by 1½ in., encapsulated, lobulated. Homogeneous throughout on cross-section, with several hæmorrhages of varying sizes. Section, stained hæmatoxylin-eosin, shows the characteristic reticulum with glial or pseudo-glial fibrils. Nerve-fibrils are very scarce. The fibrous bands throughout show a whorled appearance, with fibroblasts in varying stages of maturity. Very little hyaline changes in the fibrous tissue, these being confined to the vessel-walls, being especially well seen in one of the larger vessels at the junction of the reticular and fibrous bands. Some areas of œdema in the reticular tissue, but this is not very marked.

The tumour appears to be a typical neuro-fibroma of the eighth nerve.

[R. C. Matson.]

When a case of this kind comes to the ophthalmic department it is too late, because it means that pressure-signs have developed. It is to the otologist one has to look for the early diagnosis of the condition. The operation was one of great magnitude, and needed exceptional skill. Only by getting these cases early can the death-rate be reduced. In Cushing's clinic the death-rate has been reduced from 80 per cent. to 20 per cent. after many years of special experience, and this reduction is due to early recognition and careful elaboration of the technique. Cushing takes four hours to perform this operation.

Tumour of the Nervus Acusticus demonstrated by Radiography—D. A. Imrie, M.D.—X-rays have been used as an aid to diagnosis of eighth-nerve tumours, to show destruction of bone about the internal auditory meatus of the affected side.

The majority of eighth-nerve tumours appear to arise in or about the internal auditory meatus, and cause irregular enlargement of the canal or destruction of the surrounding bone.

The difficulties which the radiologist has encountered are: (1) The deep situation of the petrous portion of the temporal bone does not permit a very clear delineation of the bone structure on the film. (2) It is almost impossible to produce symmetrical views of the two sides when attempts are made to pass the beam of X-rays along the internal canals. Mistakes have arisen when the external canal has been regarded as a dilated internal canal.

Both Cushing and Henchen have remarked on the unsatisfactory information afforded by X-ray examination in these cases.

Conte, of Turin, suggested the transorbital view, in which the beam of X-rays passes through both orbits, and the petrous bone of both sides is shown on one film.

The case demonstrated was diagnosed from films produced by this projection, using stereoscopy. As there was a considerable destruction of bone, the diagnosis was made with assurance. At the preliminary operation of decompression, the tumour could be felt in the cerebellum, under the dura, and doubt was thrown on the accuracy of the diagnosis. The subsequent operation verified the diagnosis.

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The value of this projection of Conte is that truly symmetrical—and therefore comparable—views of the petrous bone on both sides can be obtained on one film. Supplemented, as he recommends, by a view with the mento-vertex-plate projection, in favourable cases, good views of all three semicircular canals and two views of the cochleæ are shown.

Objective Tinnitus—G. GILL-CAREY, F.R.C.S.—Mrs S., seen in May 1929, complaining of severe tinnitus. A crackling sound, not synchronising exactly with the pulse, could be heard by the unaided ear a foot away from the patient.

There was no clonic contraction of the palatal muscles, and the left Eustachian tube, seen through the naso-pharyngoscope, was normal. Pressure on the carotid artery did not modify the sound.

Radiographic examination of the left temporal bone by Dr H. Graham Hodgson showed no abnormality. Wassermann reaction negative.

DISCUSSION.

Mr O. POPPER referred to a case entitled "Nystagmus of the Tympanic Membrane" shown two years previously and said that he himself could voluntarily reproduce the condition, which was, he believed, due to the contraction of the tensor tympani.

Sir JAMES DUNDAS-GRANT said that in this case he had seen no movements of the short process of the malleus under the influence of the tensor tympani. He thought that no explanation of the condition was known.

Mr L. GRAHAM BROWN said that he had shown a case, in a middle-aged woman, of both objective and subjective tinnitus which was like the cawing of a rook and could be heard with the stethoscope. There had been symptoms of increased blood-pressure, and the tinnitus had disappeared on pressure of the carotid artery on the same side and had therefore been labelled "arterial bruit."

Mr A. D. SHARP said that years ago he showed a case in which the tinnitus could be heard about a foot from the patient. It had resembled the humming of a bee, and the unfortunate patient had in consequence become known as "the man with a bee in his bonnet." He (Mr Sharp) had observed that the frequency of the clicking noise in this present case was greatly reduced when the patient stopped breathing.

Sir JAMES DUNDAS-GRANT demonstrated on the screen the skiagrams from the case of a man who had fallen down and had remained unconscious for some time afterwards. There was complete labyrinthine deafness in the right ear. The question arose as to whether there had been an effusion into the labyrinth, due to the fall, or whether the fall had been due to the labyrinthine trouble. A line seen in the right orbit was considered by the radiologist to indicate a fracture.

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