SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

March 16, 1923.

Chairman—Sir CHARLES BALLANCE, K.C.M.G., M.S., *Vice-President.*

Acusticus Tumours—F. M. R. WALSHE, M.D.—(The Paper is published in the *Journal of Laryngology and Otology*, August 1923, p. 419).

Surgical Treatment of Eighth-Nerve Tumours—WILFRED TROTTER, M.S.—The auditory fibroma is a benign slow-growing tumour, which is almost invariably single. Its great seriousness as a pathological condition is therefore due entirely to its situation. Successful operation leads to a certain cure with very little subsequent disability. The problem as to how these tumours should be removed is thus one which justifies the minutest attention to its purely technical side.

It is important that the surgeon should have a clear idea of the anatomical conditions which (*a*) give rise to the characteristic symptoms of the tumour; (*b*) lead to certain important complications; and (*c*) restrict and condition the method by which the tumour is to be reached.

Of these considerations the most important are those which arise out of the situation of the tumour in front of the cerebellum and to the side of the brain-stem. This situation renders it necessary to approach the tumour after dislocating the cerebellar lobe, and gives rise by pressure on the central canal of the nervous system to the most important complication that is met with, viz., secondary hydrocephalus with a general rise of intracranial tension.

It is when this complication is present, as it almost invariably is in the late stages, that the operation becomes most difficult and dangerous. From the surgeon's point of view it is almost impossible to exaggerate the difference in seriousness of operations undertaken before or after the onset of secondary hydrocephalus.

The principal features of operative technique are as follows:—The patient is in the prone position with the head flexed and supported on a separate head rest. The intratracheal method is the most convenient for the anæsthetic.

The crossbow incision is used, and in dividing the muscles it must be remembered that the close suture of them at the conclusion of the operation is very important. The bone is removed so as to expose the

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lower edge of the lateral sinus on each side, and to open up the foramen magnum freely. Throughout the procedure it is extremely important to restrict the loss of blood in every possible way. To ensure this the free use of Horsley's wax is most important. The dura mater is opened in the foramen magnum over the cone of cerebellum, which usually has been displaced into the spinal canal. The freeing of this part of the cerebellum usually results in an escape of fluid, and a reduction of the local tension. If the tension is not reduced in this way, the lateral ventricle must be tapped through a separate opening in the bone above the superior curved line, by means of a needle passed into the posterior horn. When the dura has been freely opened and everything has been done to relieve the intracranial tension, the cerebellar lobe is drawn inwards until the tumour is reached.

It is important to remember that during this process cystic collections of fluid are apt to be met with, and may be mistakably regarded as the source of the symptoms. When the tumour itself is reached, it is to be recognised by its consistence being greater than that of the brain, by its smooth surface, and by its fixation to the outer wall of the posterior fossa.

No attempt is made to remove the tumour intact. The capsule is opened and its contents removed by curetting or by suction, if the latter is possible. In favourable cases, after the substance of the tumour has been got out, an attempt should be made to remove the capsule. This can in certain cases be safely accomplished, and, if it is not done, a recurrence of the disease is certain to take place sooner or later.

Throughout the intracranial stage of the operation hæmorrhage is often free, but it can usually be controlled by saline packing, and no time should be grudged for this purpose. The dura mater is left freely open, the muscles are very carefully sutured so as to prevent a leakage of cerebro-spinal fluid, and the skin wound is completely closed.

After such an operation, if the patient escapes immediate effects of shock and hæmorrhage, the only serious danger is the development of œdema of the medulla. If this does not occur within the first forty-eight hours the prospects of a satisfactory recovery are very good.

In general, it should be the object of the surgeon to complete the operation at one sitting. He will, however, be occasionally compelled to break off on account of technical difficulties in controlling hæmorrhage or reducing intracranial tension. Such a decision should not be founded on any expectation that a mere decompression operation will be of any permanent benefit to the patient, but should have in view another attempt at removal of the tumour when local conditions become more favourable in the course of a few weeks.

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DISCUSSION.

Sir CHARLES BALLANCE (Chairman) said that he saw his first case of tumour of the auditory nerve as long ago as 1887. Sir Seymour Sharkey asked him to see a patient who had come in with absolute deafness in one ear, and double optic neuritis. The case was recorded in *Brain* in 1889. The patient was a male, aged 41, and there had been a gradual onset for about two years, with occasional pain in the head, and tinnitus. He was taken into hospital. The headache increased, he had continual giddiness and tinnitus, and ultimately attacks of unconsciousness. Six months after he (Sir Charles) saw him, the patient began to suffer from facial palsy, and three months later he died. The specimen was in St Thomas's Hospital Museum. Though Sir Seymour Sharkey held the view, shared by others, that it was a case of tumour of the auditory nerve, there was, at that date, no question of operation, and no physician would have listened to a suggestion to remove such a tumour. At the post-mortem examination, it was found that the tumour invaded the internal auditory meatus, which was expanded. Radiography, and the comparison of the meatus on the two sides, were great aids in present-day diagnosis. In Politzer's work appeared a picture of a tumour of the auditory nerve, about the second case the speaker knew of. It was that of a woman who had had deafness for ten years. When seen three months before death she had double optic neuritis, soon followed by facial paralysis and dementia. The specimen was obtained by Dr Von Millengen, of Constantinople, and sent by him to Politzer. The internal auditory meatus was expanded by the pressure of the tumour. In dissecting a tumour of this sort, it was a surprise to see how the facial nerve could gradually lengthen and wander over the side of the tumour, and how late in the case facial palsy might come on. It might be that the palsy supervened when pressure from the growth in the internal auditory meatus occurred. About two years after Sharkey's case he saw another case, that of a woman, and she also died. He saw the post-mortem examination done. The tumour was in much the same position, and facial palsy only supervened three months before the end. As Mr Trotter pointed out, these cases often died of internal hydrocephalus. He (Sir Charles Ballance) had long ago assisted at some of the first operations in London on encapsuled tumours of the posterior fossa. At first these tumours were avulsed much in the same way as weeds are taken from a garden path, but fortunately a more gentle and dainty method now prevailed, care being taken that no drop of blood should be lost. In one early case at St Thomas's Hospital, when he had exposed the tumour he felt he had reached the summit of his ambition, for he thought the growth would come away easily. He removed it, but there was severe hæmorrhage from the superior petrosal sinus. He had seen very serious hæmorrhage from the anterior inferior cerebellar artery, but that from the petrosal sinus was more serious, as it was difficult to control. There was a way to prevent hæmorrhage in exposing these tumours which had not been mentioned. It was a method used by Sir David Ferrier. He used marine sponges, perfectly dry. They absorbed the cerebro-spinal fluid and compressed the brain without injuring it, and it was a method he (Sir Charles Ballance) recommended to operators.

He agreed with Mr Trotter as to the uselessness of a decompression operation in these cases. Decompression seldom relieved serious local

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pressure. With regard to doing the operation in one stage, as Mr Trotter advocated, that, of course, was the ideal method, but he (Sir Charles) thought that in the two-stage operation there was this great advantage that, if one opened the dura mater—and no operation was effectual without opening it —the patient in some cases would stand the operation better. Before the war he knew of two cases in which the dura mater was not opened, and the patient died before a second operation could be done. Many years ago he did some experiments with Sir Charles Sherrington to see what would be the effect of taking away large portions of the skull, and how much more fluid could be introduced into the intradural space after such a large craniotomy. They found that the amount of fluid which could be introduced by removal of the bone alone was infinitesimal. Therefore, it was clear that there was no relief of pressure, however large the craniotomy was; the dura mater must be opened, or the patient was not safe.

With regard to the great discomfort of having even a small patch of anæsthesia, mentioned by Dr Walshe. In some of these cases there was involvement of the fifth nerve, and the fact of the discomfort he could corroborate from his experience of a case he saw after the South African war. A colonel had sustained a gunshot wound of the leg, which divided the external saphenous nerve. It rendered the outer side of his little toe and foot anæsthetic, and though previously a good walker, he could not then march more than 200 yards. Dr Walshe had mentioned a case of mistaken diagnosis, in which spasm of the facial nerve had led to the diagnosis of cerebellar tumour being changed to that of a tumour above the tentorium, as it was looked upon as a Jacksonian symptom. He (Sir Charles Ballance) had experienced that kind of mistake on more than one occasion. He remembered two such instances which had caused him much distress. Both patients were nurses. The first had symptoms of tumour of the brain, and much pain in the head. Dr Hughlings Jackson, Sir William Gowers, Sir David Ferrier and Dr Charles Beevor saw the patient on several occasions, and all concluded there was a tumour in the left cerebellar fossa. He (the speaker) removed all the bone over the cerebellum, and there was no tumour in either cerebellar fossa. Much fluid was let out. She became comparatively well for fifteen months, and then was ill again. She came into the hospital, and died eighteen months after the operation he had performed. An encapsuled tumour of the meninges of the opposite frontal lobe was found which could easily have been removed. She had had crossed cerebello-frontal headache. Three years ago a similar event happened, and he exposed the cerebellum without finding a tumour there. In the case of this nurse also, a most careful examination was made by several neurologists and she died about two years afterwards. There was an encapsuled tumour of the opposite frontal lobe, and if it had been diagnosed and operated on would have come out like a pea from its pod.

A patient was shown here by Mr Cleminson, from whom the late Sir Victor Horsley removed an auditory nerve tumour, and he observed that there was a dropping of the shoulder. He (Sir Charles Ballance) believed Dr Gordon Holmes, in his Lectures, ascribed this dropping of the shoulder to hypertonia due to involvement of the cerebellum. He (Sir Charles) did not remember, in any cases of tumour of the cerebello-pontine angle he had seen, that dropping of the shoulder was noted before the

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operation. Probably this was due to a failure in observation. Therefore the case shown by Mr Cleminson was of great interest to him.

Dr GORDON HOLMES said that experiences differed, and certain symptoms probably attracted the attention of some observers more than others; but on the whole he agreed with the clinical picture which had been put forward by Dr Walshe and Mr Wilfred Trotter. He had seen a large number of cases of the kind under discussion, especially during the last few years, and previously he had had a rather extended experience of them as a pathologist. He had been impressed by the variability in the shape of the tumour; in some cases it was a firm, more or less spherical mass, in others, a growth of softer structure which moulded itself along the lateral surface of pons and medulla. He thought this fact was the explanation of the considerable variability of symptoms seen in different cases; in those in which a spherical tumour lay in the region of the internal auditory meatus, the upper cranial nerves alone were affected, but in many cases the early symptoms pointed to a disturbance of the lower cranial nerves, weakness of the palate, disturbance of the movements of the vocal cords, dysarthria and occasionally dysphagia occurring. He had that day looked through notes on thirteen cases which he had seen in the last year or two, in all of which the diagnosis had been confirmed either by autopsy or by operation; he found that few had marked anæsthesia on any part of the face, only a small proportion complained of pain or numbness there, though in a large number, but not in all, the corneal reflex on the same side was absent. Therefore it could not be said that there was always clinical evidence of disturbance of the trigeminal nerve. In his experience the facial nerve was more frequently involved than it was described as being by Dr Walshe. The extraordinary feature of these cases, to those who had the opportunity of examining the brains after death, was the infrequency of hemiplegic or sensory symptoms on the opposite side of the body. When one saw the side of the pons deeply excavated, one was almost forced to the conclusion that the function of the pyramidal tract and perhaps of the lateral fillet, must have been seriously involved, yet the proportion of cases in which there was weakness, spasticity, changes in the reflex or any form of anæsthesia of the opposite side was very small. He had not seen any cases confirmed by autopsy which did not present sufficient symptoms during life to justify a definite diagnosis. In every case which had come under his observation there had been obvious symptoms of cerebellar disturbance. These symptoms differed in some respects from those due to lesions of the cerebellum itself, probably because they were mainly a result of compression of the middle cerebellar peduncle rather than of involvement of the cerebellum. A striking feature was that there was often in these cases very little disturbance of tone. It was perhaps presumptuous on his part to refer to the surgical treatment, but so many cases of his had passed through the hands of surgeons that he had had some experience in the matter. He had seen one case only recover after gross removal of the tumour, a man upon whom Sir Victor Horsley operated many years ago, but though he lived for several years he was seriously crippled. The danger seemed to be that total removal necessarily meant a disturbance of the vascular supply, on the same side, of the pons and medulla; the man to whom he referred had after the operation the characteristic symptoms of softening in the

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lateral side of the pons. He saw a few other cases which had survived operation for a week or so after total removal of the tumour, and all showed evidence of acute bulbar involvement. The statement made by Mr Trotter and Sir Charles Ballance as to the inefficacy of simple decompression seemed to be borne out by everyone who had had experience of these cases. But here too there were exceptions. One of the most brilliant results he had seen in the matter of surgical intervention was in the case of a man he saw with Mr Percy Sargent three years ago. Owing to difficulties during the operation, the scalp was at once sewn up after the tumour had been exposed. The patient had now lost most of his symptoms, and though he was a professional man to whom co-ordination was important, he was going about and leading an active life. He particularly wished to know whether in the experience of otologists there was complete nerve deafness in all cases of auditory nerve tumour which had reached the clinical stage at which a diagnosis could be made.

Mr SYDNEY SCOTT said this subject interested him from the otological standpoint. He had himself seen forty-five cases in which a tumour involved the auditory nerve. He had sections of the labyrinth showing that the growth often invaded the cochlea, and if an attempt were made to remove the tumour in such cases it would have been necessary to remove the labyrinth to make sure of getting rid of the whole tumour.

Dr Gordon Holmes had suggested there was a period in which the diagnosis could be made before deafness was complete: but in investigating these cases he (Mr Scott) had never felt justified in diagnosing such a tumour until there was almost absolute deafness. The difficulty was to make sure of this, because the good ear was so liable to hear the loud tones used in testing the deaf ear. The use of the Bárány noise apparatus was limited: it excluded tones of low pitch, but it did not exclude high tones; in cases of intracranial tumour, when optic neuritis of high degree was present, there was practically always diminished bone conduction, and some loss for the highest tones. Great loss to low tones was much more consistent with the presence of auditory nerve tumours than was taught in many text-books on otology. Loss to low tones was more important as a sign of auditory nerve tumour than loss to high tones alone, of which latter there were many causes. As a rule, the typical signs were great and progressing loss of low tone appreciation, with diminished bone conduction, and some bilateral loss to high tones. Preservation of low tone appreciation was unusual, but he found this in a man who had a tumour originating not in the auditory nerve, but as a pre-pontine intradural cholesteatoma. The mass spread to one side pressing the pons and the auditory nerve backwards. The patient, an intelligent young man, appeared to be very deaf for conversation; he said he could hear the sound of the voice but could not analyse the sounds. Mr Scott ascertained that the patient could hear, on both sides, a fork of sixteen double vibrations per second, but tones above 440 vibrations were to him an utter blank on one side, while, on the other, he could hear to about 5000 vibrations per second. As the result of Magnus's investigations, Dr Walshe foresaw that our customary vestibular tests were incomplete. Still the caloric rotation and galvanic tests, together with the hearing tests, sometimes took three hours for a single patient; the testing could not be hurried or completed at one sitting, and great delibera-

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tion had to be exercised or the results were unreliable. Sir Charles Ballance had referred to the possible confusion of frontal and cerebellar lesions. This should be impossible. One patient, on whom it was proposed to operate for frontal tumour, on the left side, was next morning sent to Mr Scott to be tested owing to deafness in the right ear. He concluded there was a lesion of the right auditory nerve, because he found the vestibular tests were negative, as in cases of labyrinthine ablation, and there was complete absence of the galvanic test on the affected side. The physician was informed, and the diagnosis altered. A right extracerebellar tumour was found. Another patient with bilateral auditory nerve tumours bore a trans-cephalic galvanic current of 20 ma., without any sign of vertigo or forced movements of eyes, head, etc. A 10 or 15 ma. current in the ordinary person caused forced movements when applied to the normal ear. He had described elsewhere the method suitable for the galvanic test. One electrode was placed on the wrist of the side to be examined, the anode being placed on the ear on the same side, so that the current passed through the vestibular nerve on the side being examined. Whenever possible it was preferable that the patient be tested standing, as weaker currents were required. The galvanic reaction had been positive on the normal side, negative on the affected side in all cases in which the patient had been proved to have a lesion affecting the nerve trunk. There should no longer be any such mistake as diagnosing a frontal tumour for an extracerebellar tumour, or vice versâ. Mr Scott owed his experience of auditory nerve tumours to his colleagues, Dr Gordon Holmes and the physicians at the National Hospital, who had referred so many of their cases to him for special examination. He had used the Bezold-Edelmann tone series and the Edelmann-Galton whistle or monochord for all hearing tests.

Sir JAMES DUNDAS-GRANT asked whether members had been able to confirm the diagnostic point described by Jones in his work on equilibrium and vertigo as an indication of auditory nerve tumour. Jones said that on the same side as the tumour all the caloric tests were negative, *i.e.*, for the vertical as well as for the horizontal canals, and that on the sound side the reflex from the horizontal canal was positive, but for the vertical canals negative. Sir James had shown before this Section a specimen from a case in which these signs had been quite distinct: a tumour was found distending the internal auditory meatus. The supposition was that the strands from the vertical canal ran upwards near the middle line for some distance further than those which crossed to the horizontal canal; therefore the tumour transmitted the pressure through the brain to the strands going to the vertical canals of the sound side; these were so close to the middle line as to be involved, while the strands to the horizontal canal escaped. Much of the testing could be carried out by means of the "cold air" apparatus with little disturbance of the patient; he could rest in bed with his head on a low pillow for the horizontal canals, and could sit up for the vertical canals. The galvanic tests were of enormous value, especially when those for the labyrinth were negative. In the case of an auditory nerve tumour, the galvanic test became negative as well as the caloric.

Dr WALSHE replied that he had expressed himself as of opinion that we were apt to have unduly precise notions as to the typical clinical picture of

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eighth-nerve tumours, and it was not surprising, therefore, that in the course of his exceptional experience Dr Holmes had observed cases not presenting the usual clinical picture. Nevertheless, he believed that the symptom-complex he had described was the most typical, though there was really no disagreement between Dr Holmes and himself on the general question.

April 20, 1923.

Chairman—Sir CHARLES A. BALLANCE, K.C.M.G., M.S., *Vice-President.*

The Morbid Anatomy and Drainage of Otitic Meningitis—EDWARD D. D. DAVIS, F.R.C.S. (See *Journal of Laryngology and Otology*, August 1923, p. 427.)

DISCUSSION.

Mr SOMERVILLE HASTINGS asked what Mr Davis considered to be the clinical indications for occipito-atlantal puncture. He himself had never done it, and he would be glad to hear what was its technique.

Mr J. F. O'MALLEY asked what symptoms would induce Mr Davis to open directly through the labyrinth, or, to put a drain through the wall of the antrum in front of the lateral sinus; or did he think it an advantage to do both at the same time?

Mr T. B. LAYTON said he was interested to hear that there was some danger in doing lumbar puncture. He used to imagine that it was a small operation which could not do any harm, and, therefore, in any case of doubt it should be carried out to help the diagnosis. Mr Davis's paper seemed to show that although it might be undertaken in order to obtain further evidence when necessary, there were cases in which the question should be carefully considered. He asked whether, in either of Mr Davis's cases which were successful, organisms were found in the cerebro-spinal fluid. Information was needed as to what was the kind of case in which drainage of the cerebro-spinal cavity was advisable, in the hope of saving the patient's life, as distinct from cases in which removal of the infected bone in relation with the dura mater was all that was necessary.

Sir CHARLES BALLANCE (Chairman) said this was an extremely important subject, as the treatment of these cases was a matter of life and death. Mr Layton had referred to lumbar puncture; he (the Chairman) had known sudden death occur from lumbar puncture, which should never be done without careful consideration in certain cases, because it produced a change in the position of the cerebellum, and affected the vital centres in the medulla. Another important question mentioned by Mr Layton was as to whether organisms were present or not. Frequently, in past years, he (the Chairman) had done lumbar puncture and had found turbid fluid; and he thought there was no question that organisms had been present, but the reports frequently stated that the milky condition of the fluid was

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due simply to the cells, since no organisms could be cultivated from it. If no organisms were in the fluid, and the proper treatment was carried out, the patient would, almost certainly, recover. But if organisms were present, the difficulty of saving the patient was likely to be very great indeed. In the fulminating cases of meningitis the patient might die within thirty hours of the onset. In such cases the outlook was at present hopeless, though the attempt to save life should not be abandoned. He had been interested in Mr Davis's remark about methylene-blue injections into the subarachnoid space. During the war, he (the Chairman) had found that washing out the subarachnoid space from the lateral ventricle in cases of meningitis, and putting the puncture-needle into the lumbar theca, the salt solution coloured with methylene blue came out of the lumbar puncture cannula in twenty-five seconds. It was therefore extraordinary to hear now that in a dead body the fluid obtained by lumbar puncture was not coloured by the methylene blue, which had been injected definitely into the subarachnoid space of the cranial cavity. There was no doubt, as Mr Davis had said, that the only possible treatment of these cases was by operation, and that the surgeon should be able to operate within a very short time of what he believed to be the onset of meningitis. That, however, was very difficult to ensure, because the usual experience was that patients in these cases were not seen until they were practically moribund. At first the symptoms were slight, but later, unconsciousness supervened, and the surgeon was called in in the hope of saving life when that had become impossible. The course of the cerebro-spinal fluid in health was well known, and in the living body the fluid carried coloured material rapidly in various directions. In Golla's experiments on the cat, injections into the lumbar theca spread rapidly almost everywhere. It was known, also, that the fluid was secreted by the choroid plexuses, and came out of the ventricles through the openings in the roof of the fourth ventricle, spreading into the great cisterna at the back of the under surface of the cerebellum, and then travelling forward into the interpeduncular space and various cisternæ at the base of the brain. It also flowed down the spinal canal. It then spread, as Mr Davis described, over the surface of the hemispheres in the direction of the superior longitudinal sinus, especially in the region of the Sylvian fissure. Probably some members had seen the spread of this rapidly fulminating subarachnoid meningitis; he had watched it on the operating table; the greenish pus underneath the subarachnoid membrane spreading from sulcus to sulcus between the convolutions. Everyone wished to know how this process could be arrested. He (the Chairman) disagreed with Mr Davis on one point—namely, that occipito-atlantal puncture was a surgical operation which should replace drainage. To his (Sir Charles Ballance's) mind, such a view was reactionary, in the sense that none of them nowadays would think of treating an acute abscess in any other position by means of puncture with trochar and cannula. Occipito-atlantal puncture was easy to do, and there was no danger in it, unless the operator was in doubt of his ability to perform it. But he felt strongly, from what he had seen post-mortem in meningitis cases, that no puncture was capable of arresting the process which was spreading in the subarachnoid space. If the condition was due to infective organisms, he (Sir Charles) thought the only possible surgical way of

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dealing with it was by Haynes' method. If the stream of fluid could only be directed out through a surgical opening in the great cerebellar cistern, its spread in the other directions might possibly be arrested. He had always been much impressed with the fact that meningitis and other infections in the skull were greatly helped by increased pressure. If the pressure of the fluid in the subarachnoid space were reduced, he believed there would be a good chance of preventing the further spread of the infection. If, then, by opening the great cerebellar cistern, one could diminish the pressure of the fluid in the subarachnoid space, and start the current of fluid in a new direction, the hope of stopping the spread of inflammation over the brain surface might be entertained. But as matters stood at present one could not expect to cure all these cases. He thought, however, that the condition should be treated as an acute suppuration in any other part of the body was treated.

Mr E. D. D. DAVIS (in reply) said that the method adopted for occipito-atlantal puncture was as follows: The head must be slightly flexed and the needle entered at a point in the mid-line of the neck immediately above the spine of the axis and directed in the mid-line to the frontal-nasal suture. The needle would be felt to go through the occipito-atlantal ligament with a jerk; then it was necessary to move carefully and to see that the direction to the fronto-nasal suture was correct. The operation could be done without an anæsthetic. It was now frequently performed without mishap. He (Mr Davis) thought that occipito-atlantal puncture might be sometimes more useful than Haynes' operation. He considered that the cisterna magna contained pus only in the very late stages of meningitis, hence Haynes' operation was generally unsuccessful at so late a stage of meningitis. Occipito-atlantal puncture was valuable in cases in which the patients were more or less moribund, and in which the surgeon felt impelled to do something. In reply to Mr O'Malley's question as to when to drain through the labyrinth, Mr Davis said that if it was decided that the meningitis had arisen from labyrinthitis—that is, when the signs of labyrinthitis had preceded the meningitis—drainage should be established through the internal auditory meatus and the labyrinth. He admitted that it was sometimes difficult to decide upon labyrinthine drainage in suspected meningitis when the diagnosis was uncertain, as it required some courage to go through the labyrinth and destroy the internal ear. But if there were indications that meningitis had reached the skull through the labyrinth, then drainage through the internal auditory meatus must be done. When meningitis arose from lateral sinus thrombosis or infection, he (the speaker) left the labyrinth alone and drained in front and behind the lateral sinus. One of the two cases he had mentioned, was that of a patient whom he had shown at a former meeting of this Section. She had all the symptoms of meningitis—headache, vomiting, drowsiness, and the cerebro-spinal fluid gave pneumococcus on culture. He had operated practically as soon as he saw her. There was a large extradural abscess between the posterior surface of the petrous bone and the dura, arising from a perisinus abscess which tracked forward between the dura mater and the petrous bone; he had drained this and had left the wound open so that, later, if there was no improvement, he could drain through the dura mater. The patient had done well for

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a few days, but then she had become more drowsy and vomiting had recommenced. He (Mr Davis) therefore drained the subarachnoid space in front and behind the lateral sinus and the patient recovered. He thought it was a localised meningitis of the posterior fossa. In the other case, the patient had had an acute attack of suppuration sometime after a radical mastoid operation performed elsewhere. There had been a temperature of 103° F. and signs of meningitis, therefore the mastoid had been opened up again and the posterior fossa drained behind the lateral sinus. The cerebro-spinal fluid had contained pneumococci. The patient had done well.

The cases recorded by Mr Lawson Whale and Mr Martyn appeared to have been similar to these two cases.

Case of Complete Deafness dating from a Fall—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—Male, aged 48, became completely deaf about three and a half years ago, after a fall of 6 ft. on to his feet, not striking his head but suffering pain in his neck several days later. He felt ill and had to be helped home. During the night he had diarrhœa and vomiting and next morning was quite deaf. He was told that he shouted when speaking. The result of gross suggestion treatment was negative and in favour of an organic lesion. The anomalous character of the data has rendered the diagnosis difficult.

In May 1922, he appeared to be totally deaf for sounds of any kind, there being then no voice-raising with noise-machines in the ears; the click of the large "distinette" produced a palpebral reflex. Marked spontaneous nystagmus to the left and slight past-pointing to the right; the voice was monotonous. Lip-reading had not been spontaneously acquired. Rotation to the right, with external canals horizontal, produced no increase of nystagmus to the left. Rotation to the left produced active nystagmus to the right but no past-pointing. Cold air to the right external canal caused nystagmus in thirty-five seconds; to the left external canal no nystagmus after sixty seconds; to the right vertical canal caused slight rotary nystagmus to the left; to the left vertical no response. Past-pointing and giddiness were not induced by any of these tests. Galvanism (tested in November) on either side with 15 ma. excited nystagmus in the direction of the cathode.

These tests suggest a lesion—concussion—of both labyrinths, the auditory nerve trunk being unimpaired. The left labyrinth appeared to be more affected, yet the spontaneous nystagmus was to the left side. The symptoms varied slightly from time to time, so as to suggest a functional element in the case, as also did the diminution of the pharyngeal reflex.

Case of Deafness greatly increased after a Fall—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—Female, aged 29, had been dull of

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hearing for nine or ten years, but became extremely deaf ten months ago after a fall of 25 ft., in which her head was knocked, and, after which, she was unconscious for seven or eight days When first seen in September 1922, whispered voice at 12 in. on the right side and 2 in. on the left, reduced by inflation to 6 in. and ½ in. respectively. Ordinary voice at 14 in. and 4 in.; after inflation 3 ft. and 2 ft. respectively. The hearing for Gradenigo's tuning-fork (64 d.v.) was reduced considerably, viz., to 3 and 2 instead of 6. Bonnier's test (tuning-fork 128 d.v. heard through condyles of femur) was positive. Paracusis Willisii was present. Bone-conduction on mastoid normal; Rinne markedly negative; Weber positive. Galton's whistle normal (1.1). Eustachian tubes were slightly narrow. The features were essentially those of otosclerosis; no family tendency; no initial tinnitus.

Occasional inflation and frequent self-inflation; small doses of ignatia amara, 5 minims of liq. hydrarg. perchlor., thrice daily. This last remedy was given because of Erichsen's use of it in the treatment of "railway spine" concussion, to which the traumatic condition in the present case seemed analogous. In October, she felt better and freer from tinnitus. Condition now stationary. She states she hears as well as she did before the accident.

The nature of the change induced by the accident is to some extent a matter of conjecture. It may have been either functional or organic. The history supplies sufficient ground for either or both.

Case of Long-standing Deafness attributable to Falls on the Head; Improvement—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—Male, aged 25, with deafness of 15 years' duration with a history of a fall when 10 years old, followed by giddiness and commencing deafness.

First seen October 1921. Whispered voice 5 in. right and 10 in. left. On inflation 12 in. right, no change in left. C 64 d.v. not heard. Tuning-fork by bone-conduction on vertex equal both sides and on mastoids slightly increased; Rinne negative. C 128 d.v. heard by femur condyle (Bonnier). Galton's whistle reduced to mark 4 on the right and 3.2 on the left. Eustachian tubes narrow. Gellé negative right, positive left. Rombergism to right, nystagmus to left. Cold air, nystagmus delayed; past-pointing normal.

The features are those of nerve-deafness, probably cochlear, with concomitant chronic Eustachian catarrh.

The patient is well-built (up till recently played football), cheerful in disposition, but with a somewhat monotonous voice. There is a slight asymmetry of the face. His deafness was so considerable that he was unable to use the telephone, and his livelihood was in

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jeopardy. He was also so unsteady and apprehensive that he had to be accompanied by his brother.

Inflation (catheter, Politzer, etc.), and in November reported improvement. Eustachian tubes appeared more pervious. Was ordered glycerophosphates and paraffin.

In January 1922, whisper, right 2 ft., improved by inflation to 5 ft.; left 2½ ft. improved to 7 ft. Galton (left) 4.6. Induction of nystagmus still delayed.

In view of the traumatic factor he was ordered tentatively small doses of liq. hydrarg. perchlor. In March, whisper, right 3 ft. improved to 5 ft.; left 5 ft. improved to 20 ft. In December, whisper right side 2 ft., improved to 4 ft.; left 18 ft., improved to 18½ ft. In February of this year, influenza with retrogression in hearing-power. The improvement in general alertness and usefulness is unmistakable in what at first appeared a most discouraging case.

He is to be examined by an ophthalmologist on account of defect of vision in his right eye; this may throw fresh light on his case.

Sir CHARLES BALLANCE (Chairman) said that no surgeon objected to perchoride of mercury being given to any patient, and in these particular instances the drug appeared to have been useful.

Mr F. J. CLEMINSON said he had recently seen a man aged 29 who, while crossing the Channel in a gale, was quietly sleeping in a saloon when a slab of marble, weighing 1 cwt., fell on to his head, causing not only profound traumatic neurasthenia, but considerable deafness in both ears, especially in the right. That had occurred twelve months ago, and the patient had had treatment for some time, and had eventually brought a suit against the railway company; it was in that connection that he (Mr Cleminson) had seen him. The condition he had found was a marked deafness to both the voice and acumeter on the right side, and to a less degree on the left. A 30-in. watch had been heard at 8 in. by the right ear, and at 16 in. by the left. When the ears were syringed with cold water, there had been a delayed response on the right, and the tests with the tuning-fork, etc., had pointed to internal ear deafness on that side. He (Mr Cleminson) was unable to visualise the lesion which occurred in such cases; perhaps Sir James Dundas-Grant could suggest what happened. He had only seen the patient twice, at an interval, and he did not know what had happened to him since the last occasion.

Mr J. F. O'MALLEY said these cases often presented difficult problems, *e.g.*, as to why a patient should be seized with sudden deafness, apart from injury. A fortnight ago, a woman engaged in selling newspapers in the street came to see him at the clinic, accompanied by a friend who stated that the patient had been well until four days previously, then deafness had suddenly occurred, and she had been unable to hear anything since. There was no history of an accident or of vertigo which would suggest a sudden lesion of the labyrinth, rupture of a blood-vessel, or an invasion of a syphilitic nature. He (Mr O'Malley) had had the patient's vestibular

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reaction tested, and there was a good response. In the case of a deaf and aphonic soldier whom he had seen during the war, when, after producing a vigorous vestibular reaction with a cold application, he had applied a speaking-tube, and shouted down it, he had obtained a prompt answer. But he had obtained no answer from the patient in the case to which he was now referring. Sir James Dundas-Grant's second case seemed to him (Mr O'Malley) to be one of otosclerosis ; but it would be difficult to explain how the fall had increased the deafness, as the tests showed that bone conduction was good all the time. He thought there was a large element of functional disturbance in that case. In the third case he had noticed the peculiar voice—a manner of speaking associated with deafness in early childhood ; the patient learning to speak better as he grew older. He (Mr O'Malley) had found that kind of voice in cases in which the patient had had an attack of cerebro-spinal meningitis in early life, but in which the hearing had not been completely obliterated, and later, difficulty had occurred in controlling the pitch of the voice.

Mr E. D. D. DAVIS said that during the war he had seen several cases of injury in the region of the mastoid process in which the deafness was permanent. In the commoner concussion case, such as that from a motor accident, the hearing really did improve. If the hearing did not improve in six weeks after the accident, he (Mr Davis) considered that the deafness was likely to be permanent. He asked whether one was justified in that conclusion. It was his experience that in deafness occurring after a shell or bullet wound in the region of the mastoid process or posterior fossa of the skull, without any direct injury to the ear itself, the loss of hearing was usually permanent.

Sir JAMES DUNDAS-GRANT (in reply) said it was useful to remember the old observation that when the handle of a broom was struck on the ground, the handle was driven more deeply into the broom-head. A fall on the feet sometimes caused fracture of the base of the skull, and there might be real damage to the delicate structures in the internal ear even in the absence of skull fracture. He (Sir James Dundas-Grant) believed that these injuries were often accompanied by fractures which healed and left no trace, even on post-mortem examination years afterwards. He thought that in some cases of injury of the head, at some distance from the ear, there was a fracture through the internal ear, or at all events such a shaking up that the internal ear was rendered insensitive, and it might be completely disorganised by hæmorrhage either into the labyrinth or the internal auditory meatus. He agreed with Mr Davis that if no improvement took place within six weeks, there had been something more than a mere concussion and that destruction had occurred. But his experience in the third case showed that it was a pity to despair too soon.

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