SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY.

February 6, 1926.

President—Mr G. J. JENKINS.

Discussion on Fracture of the Base of the Skull from the point of view of the Ear, Nose, and Throat Surgeon.

Mr G. J. JENKINS (President) said—I propose to deal with certain general principles of surgery, rather than with symptoms and signs or permanent effects of injury to parts in which this Section is particularly interested.

Although it may be generally recognised that examination of the ear and nose is advisable in cases of suspected fracture of the base of the skull, yet in many hospitals the oto-rhinologists are not asked to make this investigation. This is a mistake; for, unless a skilled and thorough examination is made of the ear, nose, and throat, some cases of fracture of the base are likely to be diagnosed as simple brain concussion. Usually this is not likely to lead to serious consequences, as the treatment of the two conditions is more or less the same. Occasionally results are not so satisfactory as would be the case if the lesion had been recognised.

Again, oto-rhinologists have taken rather a narrow view of fracture of the base, and been content with a description of damage in the region of the ear and nose, and symptoms and signs peculiar to the lesion. Ought we not to consider how we can best apply our special knowledge to the diagnosis, general management and treatment of fracture of the base.

I do not propose to discuss the mechanics of fracture of the base, or the various symptoms and signs of this injury, but rather to deal with less obvious clinical signs of fracture and problems in management particular to our special region.

In all cases, before making a routine examination of the nose and ear, it is important to know whether there has been chronic sepsis in these regions.

Diagnosis.—The nose and ears should be carefully examined in all cases of serious head injury, even when no obvious sign of injury exists. In hospital records you will commonly find a full description of the neurological and other symptoms, but the only reference, if any, to the nose and ears may be the simple note, "Bleeding from the ear," or "No bleeding from the ear or nose."

Bleeding from the nose in serious head injuries is commonly due to fracture of the base of the skull, but it may be due to an intrinsic injury of the nose. A short time ago a man had a fall, was unconscious for a time, and had bleeding from the nose. Fracture of the base was diagnosed, but there was a rupture of the mucous membrane on the right

https://doi.org/10.1017/S0022215100029029 Published online by Cambridge University Press

side of the septum, sufficient to account for the bleeding. The exclusion of a fracture of the base in cases in which there is an intrinsic injury of the nose must be very difficult if not practically impossible, and it is on this point especially that a discussion may be helpful.

Is loss of the sense of smell constant in fractures involving the cribriform plate?

On examination of the naso-pharynx a posterior hæmorrhage may be discovered coming from the roof, and occasionally a fine stream may be seen coming from the orifice of the Eustachian tube, even though no blood has been detected by examination with the tongue depressor. Examination, however, is not complete until the nose has been examined for evidence of gross sepsis, and to this I would draw your attention particularly, as it may be a point for discussion later.

Fracture involving the Ear.—When there is either destruction of the labyrinth or a lesion of the lower neuron of the seventh cranial nerve, or severe bleeding, or a flow of cerebro-spinal fluid from a torn tympanic membrane, or from a wound of the meatal wall, then there is little doubt that fracture of the base has occurred.

We are all familiar with the symptoms and signs of destruction of the labyrinth, and these may be left out of the present discussion. One question arises in case of injury of the labyrinth, and that is the possibility of a severe blow affecting the labyrinth without fracturing the capsule. Such a lesion has been demonstrated in lower animals, and it may possibly occur in man, though I myself have not met with it.

Injury of the seventh cranial nerve is common, and it is not unusual for the paresis to increase for two or three days after the accident.

When the patient is seen immediately after injury, there is considerable difficulty in examining the meatus on account of the free flow of blood. In my experience, which is not very large in this connection, I have not been able to detect cerebro-spinal fluid in the free flow of blood. I have seen it when the flow of blood has entirely or almost entirely ceased. Even after the cessation of bleeding, there is sometimes difficulty in making out details of the injury, on account of the presence of blood-clot.

Practically there is no difficulty in making a diagnosis in cases of gross injury of the ear, and for the purpose of this discussion I would rather draw your attention to the less obvious indications of fracture involving this region.

The following is an example: A man was thrown from his bicycle. He was momentarily unconscious, but was able to get home without assistance. He saw a medical friend who recognised that he was ill, but could not find anything definitely wrong beyond a slight deafness. On further examination, however, he was found to have middle-ear deafness on the right side. The right tympanic membrane was blue-black, and there was blood trickling in a very fine stream from the orifice of the right Eustachian tube. This is a typical example of four or five cases that have come under my observation, and represent a class of fracture of the base which is apt to be missed if only a casual examination is made. In my opinion, the presence of blood in the middle ear is sufficient evidence from which to make a diagnosis of fracture.

Again there may be fracture involving the bony external auditory meatus

https://doi.org/10.1017/S0022215100029029 Published online by Cambridge University Press

without rupture of the tympanic membrane or of the membranous meatus. In such, the line of fracture may be indicated by a swelling, sometimes discoloured. At times the bleeding is very slight and the break on the wall impossible to find, but usually the swelling and distortion will indicate a bony injury.

For the purpose of comparison, examination of the other ear should not be neglected, and, of course, the presence or absence of chronic middle-ear suppuration should be noted.

General Management and Treatment.—Under this heading I would direct your attention to the important matter of the prevention of infection, especially preventing the extension of sepsis to the meninges.

When a healthy nasal cavity is involved, the obvious suggestion is to leave it carefully alone, but where there is severe damage to the nose, there is a temptation immediately to correct the deformity. Is there any risk in doing this when fracture of the base has not been quite excluded? What do you suggest should be done when there is gross sepsis in the nasal cavity?

Fracture Involving the Ear.—When there is no bleeding, I often advise dropping 2½ per cent. alcoholic solution of iodine into the meatus, cleaning up the pinna and dressing aseptically. Frequently the bleeding is so profuse that the application of antiseptics is out of the question, and we have to be content for the time being with cleaning the pinna.

When the bleeding has subsided, or is only slight, the problem of cleaning the meatus arises. I know that many surgeons hold that any attempt to clean the meatus is associated with a greater chance of contamination than of sterilisation. I do not agree with this, but at the same time I fully realise that care is necessary in removing the clot, and, possibly also cerumen, in order to let the solution of iodine into the deeper part of the meatus. I do not advise the removal of thin, dry blood in the deep meatus, but prefer simply to fill the meatus with the iodine solution. Syringing the ear in these conditions is a practice that I regard with some apprehension.

What is to be done when a fracture has occurred through an ear with chronic suppurative middle-ear disease? I know of two cases of fracture of the base, affecting an ear in a state of chronic suppuration, in which the patients recovered without any unusual symptoms, but I do not know that in either of these cases there was any escape of cerebro-spinal fluid.

One would naturally suppose that the risk of extension of sepsis in such cases would be considerable, and that when the dura mater had been torn, as indicated by the escape of the cerebro-spinal fluid, the danger would undoubtedly be great. Since this question has arisen in my mind, the problem has not actually occurred in my practice.

If there was an obvious escape of cerebro-spinal fluid in such a case, I should endeavour to make the drainage of the region as free as possible, even to the extent of going through some of the stages of a radical mastoid operation, and of exposing the dura mater along the line of fracture in the immediate neighbourhood. Should there not, however, be any indication that the dura mater has been damaged, I should clean up the region as well as possible at regular intervals, and wait for other indications to proceed further. It is probable that in some of these cases I should

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operate as if damage had been done to the dura mater. My reason for not operating readily when there is no obvious evidence of a damaged dura mater, is that any operative procedure on the bone, in a case of recent fracture, may cause movements of the fragments and so cause serious damage to the membrane. I do not think the risk of damage by the bone fragments is likely to be so great after two or three days have elapsed.

Lastly, I shall refer to certain cases of localised extension of sepsis that may come under our care. Perhaps I can best illustrate what I mean by describing briefly two out of three cases that have come under my observation recently. A man of about thirty years of age had a fracture of the base involving the external auditory meatus in the postero-superior part. About six or seven days after the accident he complained of pain in his right ear; there was marked tenderness over the mastoid process and there was facial paresis on the same side; there was also increase of temperature. I operated and found pus in the antrum and along the fracture. He recovered completely.

The second case was similar, but the pain and tenderness were localised over the squamous part of the temporal bone and there was definite œdema. On operation I found pus in the tympanic antrum and along the fracture, which involved the squamous part of the bone. It was necessary to remove most of the squamous portion, even as far forward as the temporo-sphenoidal suture.

It is possible that some of these localised extradural or even intradural abscesses may not be recognised until too late, unless the possibility of their occurrence at almost any stage of convalescence is kept in mind, and unless the patient is under constant skilled observation.

Sir CHARLES BALLANCE said that hæmorrhage from the ear came from the tympanum, or from the veins, sinuses, or surrounding arteries. He (the speaker) had never seen hæmorrhage from the internal carotid coming out of the external auditory meatus, except in a case of tuberculous disease of the petrous bone; though one was familiar with those cases in which fracture of the base and middle fossa passed through the anterior clinoid process and produced a pulsating exophthalmos due to an injury to the internal carotid artery and cavernous sinus. It was very rare for hæmorrhage to come from the lateral sinus. When it did occur it was likely to prove rapidly fatal. Hæmorrhage from the middle meningeal artery might also be very profuse. The surgeon must try to arrest the hæmorrhage; that was an ordinary surgical duty. Also, sepsis must be prevented, and if important parts had been interfered with, efforts must be made to restore function.

Hæmorrhage in some cases persisted for days, in others it was slight, and generally by the second day was no longer of importance. Associated with the hæmorrhage there was often concussion and unconsciousness, and then there was only one thing to do, namely, decompression, and the earlier this was done the better for the patient. One took away the thin bone in the temporal region, and came upon blood outside the dura mater. A bulging dark dura mater showed a collection of blood inside, and it should be opened to let out the fluid blood and clot; then the wound should be closed. If there was hæmorrhage from the opposite ear, he (Sir Charles) advised repeating the operation on this side also. These operations should

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be done quickly; very likely by the next day the patient would have become conscious. This advice applied not only to the otologist, but to any surgeon. Harvey Cushing published sixteen cases before the war, and all except two recovered. All the sixteen were immediately trephined in the temporal region. When bleeding was profuse it showed the case was serious; also when the patient was only semi-conscious or was unconscious.

With regard to nasal injury, the same principles should govern the treatment. He (the speaker) considered that the nose could not be rendered aseptic. When there was a fracture across the cribriform plate one should do a decompression and introduce some such material as sterilised gauze between the brain and the fracture, in order, if possible, to prevent infection. In some of these cases the fracture passed through the posterior fossa, and this was a much more serious injury, as the injury was nearer to the vital centres in the brain-stem; hence the operation should not be delayed.

The President had alluded to cases in which there was previous sepsis. If there was chronic mastoid disease, chronic temporal bone disease, and a fracture through the base of the middle fossa with blood coming from the ear, the surgeon's duty was to do a complete mastoid operation at once, to remove the septic disease and expose the dura mater, and if possible separate it from the fracture area which was probably infected.

With regard to prognosis, it was difficult to know which patients would have meningitis and which would not. In cases in which the fracture was a bad one and blood poured down the pharynx it seemed as if there were no means of antagonising sepsis, and that meningitis must result; yet in some such cases the patients recovered. Why meningitis developed in one case and not in another, he (the speaker) could not say, but he advised treating every case as if meningitis was likely to result, and so doing one's utmost to counteract the possibility.

Concerning the question of function, his own experience was that in some of these cases in which fracture occurred through the middle fossa, there was total deafness with total facial palsy. There might be recovery from the deafness, there was seldom recovery from total facial palsy. He (Sir Charles) thought the reason was that the internal ear was surrounded by very hard bone, and escaped fracture on that account, though it did not escape concussion and hæmorrhage; while the facial nerve in the aqueduct might be ruptured, and some displacement of the fractured ends of the aqueduct would take place so that union of the broken nerve became difficult. Moreover, so that a nerve which was in a bony canal could unite, much new tissue had to be formed; and the resulting pressure became a factor which also militated against the recovery of the facial nerve.

The main object of the surgeon, in regard to these fractures when seen early, should be to antagonise the unconsciousness of the patient and prevent the occurrence of sepsis by doing a decompression operation, and by causing a compound fracture to become a simple fracture so far as the brain and membranes were concerned.

Mr SYDNEY SCOTT said that their experiences at St Bartholomew's and King's College Hospitals were evidently very similar. A large number of skull fractures involved the middle ear only, especially in patients not fatally injured, and resulted in middle-ear deafness. There was a group

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in which absolute deafness occurred with destruction of labyrinthine functions, and in which there was facial palsy. The pathological specimens collected by Mr Cheatle would include more seriously injured cases in contrast with others seen clinically. Cases of head injury, even with aural symptoms, were dealt with in other departments of the hospital, and the otologist was asked occasionally to see only certain ones. In the majority of those referred to the Ear Department, he (Mr Scott) had found that the deafness was of the middle-ear type. The ultimate results were sometimes surprisingly better than one would expect. A boy to whom he had referred at a former meeting fell 40 feet on to a cement basement, and was brought in unconscious with bleeding and fragments of brain tissue in the ear (proved to be such by the microscope). A year later this boy had completely recovered. The drum membrane and meatus were normal and hearing was fully restored, sixteen double vibrations per second (Bezold-Edelmann series) being heard.

In a number of cases bleeding into the middle ear occurred without ruptured tympanic membrane, and when it was possible to keep the Eustachian tube clear, there had been much improvement in hearing. Of course many cases were hopeless.

Grave injuries were sometimes of academic interest only. He (Mr Scott) had secured the temporal bones of a deaf-mute child who had been killed by a motor omnibus, a wheel having passed over the child's head. The petrous portions of the temporal bone had been dislocated *en masse* into the brain tissue on each side. He (the speaker) had found evidence of advanced middle-ear disease of long standing and this would explain the deaf-mutism.

As to treatment; when there was rupture of the meatus or tympanic membrane, he would avoid syringing or irrigation; he preferred to remove the debris with forceps and to employ drying methods. His own experience in cases in which there were already chronic suppuration and fracture of the temporal bone had been unfortunate; the greater proportion of the patients had died from meningitis, scarcely any from brain abscess. Lateral sinus infection in these cases was unusual. In cases of fractured temporal bone, with chronic middle-ear suppuration, he advocated mastoid drainage.

Mr A. R. TWEEDIE said he hoped the discussion would lead to the compilation of some statistics with special reference to fractures involving the petrous bone and nasal cavities. He agreed with the President as to the importance of otologists seeing these cases as soon as possible, both as regarded immediate therapy, by way of assisting towards the maintenance of function, and also with a view to possible questions of compensation in the future. He (the speaker) also advised the avoidance of operative interference except in cases in which a suppurative otitis media was already present.

With regard to the nose, we should largely rely on the physiological action of the nasal mucus, and if any assistance were required this should be restricted to the use of ointment or liquid paraffin.

Mr J. F. O'MALLEY said that hitherto the otologist had proceeded in this class of case in a somewhat haphazard fashion; but if the statistics asked for by Mr Tweedie could be collected, they would put otologists on the look-out for such cases.

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He (the speaker) had had a case of fracture of the base associated with loss of smell in an air-officer who had had a crash. There had been hæmorrhage from the anterior fossa, and subsequently the loss of smell had occurred.

With regard to treatment from the aural surgeon's point of view, he (Mr O'Malley) considered that as little as possible should be done, and he would be very careful even about syringing. There seemed to have been a consensus of opinion during the war that in cases of injury of the tympanic membrane from gun-fire it was unwise to syringe, and it was probably equally unwise to do so in fracture cases. Some escape of blood was beneficial from its immunising effect on any sepsis in the wound. A good method of keeping the wound free from sepsis was to pack with boracic powder; this caused free exudation of serum from the blood-supply in the neighbourhood of and through the wound.

Mr ARTHUR H. CHEATLE showed twenty-three specimens from the Royal College of Surgeons' Museum of fracture of the base of the skull involving the temporal bone, seventeen from his own collection, and six from the main part of the Museum. The most common type, seen in ten specimens, showed a double line of fracture, one line passing through the roof of the middle ear and meatus and the other through the roof of the middle ear, antrum, and posterior meatal wall separating a somewhat triangular piece of the squamo-zygomatic portion.

Mr Cheatle said that some years ago he had shown at a meeting of the Section a patient who, many years previously, had suffered such a fracture and in whom the healed line of fracture could easily be seen in the posterior meatal wall; the membrane was intact and the hearing good.

In only four specimens had the fracture passed through the bony labyrinth, so that the deafness following a fracture of the base was more often of the middle-ear variety, although internal ear deafness might be associated, due to concussion or hæmorrhage, in those cases in which the fracture did not pass through the labyrinth.

It was obvious that a fracture involving the temporal bone might occur without the escape of cerebro-spinal fluid, which was due to tearing of the meninges, fracture through the labyrinth, or both. It might also occur without hæmorrhage from the ear; some years ago he (Mr Cheatle) had examined a boy who had been thrown from a moving motor-car on to his head; he was deeply unconscious, the left middle ear was seen to be full of blood with an intact membrane and no sign of injury of the meatal wall, and blood could be seen trickling down the pharynx from the naso-pharynx, but none from the front of the nose. The meatus was purified and an antiseptic dressing applied in case rupture of the membrane should occur; this did not happen, the blood became absorbed and the hearing was ultimately unaffected.

The facial nerve was divided in eight of the specimens shown and the Fallopian canal was opened in two; there was therefore a hope of recovery in cases of paralysis in fracture of the base. In all fractures of the base of the skull an examination should certainly be made of the ears. If there was injury, purification of the ear should be carefully undertaken; he wondered whether this had been done in the cases related by the President, in which sepsis had occurred some time after the injury.

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The purification of the ear should be carried out on a definite plan. If a platinum loop smear was taken from the cartilaginous meatus among the hairs and cerumen, a plentiful growth of all sorts of organisms could be obtained, while, if it was made in the deep meatus through a purified speculum, little, if any, growth resulted, so that if the ear was purified by initial syringing, organisms were likely to be driven right down to the site of injury in the deep parts. It was wiser first to scrub the concha and cartilaginous meatus with a strong antiseptic, using mops of wool or gauze, and then to fill the meatus through a purified speculum with the warmed solution, letting it stay there for a quarter of an hour, and then, after purifying the outer parts, applying the outer dressing. The antiseptic he (the speaker) used was 1 to 20 carbolic, which had the power, as Lister used to point out, of penetrating greasy substances, a power which perchloride of mercury did not possess.

It was a difficult question to decide as to what should be done if a fracture passed through an ear in which there was chronic middle-ear suppuration. The President had knowledge of such cases in which nothing operative had been done and nothing untoward had occurred. He (Mr Cheatle) had not met with such a case, but in the light of the President's cases he should feel inclined to adopt an expectant attitude, especially if there were no flow of cerebro-spinal fluid, for in operating there might be a risk of opening up fresh areas for infection.

Mr G. J. JENKINS (President) (in reply) said that he still had some doubt as to whether one should operate in all cases in which there was suppuration of the middle ear. The difficulty was that one did not know when the dura mater had been damaged.

He agreed with Mr Cheatle that the meatus should be cleaned. There had not been much said in the discussion as to the methods of doing this. He did not use carbolic, but iodine solution.

A Case of Otogenic Encephalitis: Treatment by Decompression: Recovery.—DAN M'KENZIE, M.D.—The patient, a lady, aged 59, had a radical mastoid operation performed in Montreal by Dr R. H. Craig in April 1923, for chronic suppuration of the middle ear. The middle fossa was low-lying and "the dura mater was exposed for half an inch square in front of the sinus." Convalescence "was protracted." "At no time was there any evidence of labyrinthine or intracranial involvement apart from occasional attacks of dizziness on rising in the morning." She remained under Dr Craig's care until October 1923.

In 1924 she came under the care of Professor Ruttin, of Vienna, who found the external meatus contracted.

In February 1925, when I first saw her, I found the meatal lumen reduced to about the diameter of a pin-head, and as deep pulsation was visible and there was considerable purulent discharge, a re-opening of the mastoid was made. At the operation I was surprised to find that the pulsation was cerebral and that in a mass of granulations in the upper part of the mastoid cavity there lay the opening of a sinus

https://doi.org/10.1017/S0022215100029029 Published online by Cambridge University Press

leading about 1½ inches into the temporo-sphenoidal lobe. The tympanic cavity was filled with dense fibrous tissue, so that the source of the free discharge from the ear must have been the sinus in the brain. When and how this sinus formed nothing in the history was forthcoming to tell us. At no time had there been any phenomena suggestive of brain abscess.

Ten days after the re-opening the patient was seized with general epileptiform convulsions lasting five hours; and two days later she was seen by Sir Charles Ballance, who advised free exposure and incision of the dura mater of the fossa. The base of the antro-tympanic and mastoid roofs being removed, along with part of the squama, the dura mater was opened from end to end of the exposed area. The brain immediately herniated in a mass into the mastoid operation cavity. The post-aural wound was closed, and since then (7th March 1925) no further serious symptoms have appeared. The ear still discharges some pus, but the patient is leading a normal life (10th December 1925) and has returned to her home in Canada.

Mr G. J. JENKINS (President) said that the notes suggested the possibility that at some time there had been an injury of the brain or dura mater in that region.

Mr SYDNEY SCOTT said that he had seen a very slight abrasion without a penetrating injury of the dura mater followed by infection which had passed through the membrane. This, as the late Mr Hunter Tod had pointed out, also led to infection of the lateral sinus.

Mr LIONEL COLLEDGE said that the history given of this case suggested that a complication had arisen from want of drainage through the meatus, although a radical mastoid operation had been performed. He (the speaker) assumed that no flap had been cut, or, if so, that part of the operation had failed. He knew of a case in which a woman had undergone an operation for lateral sinus thrombosis, and, although desperately ill, she had recovered. Fifteen years later she was sent back to the hospital very ill; pus cells were present in the cerebro-spinal fluid. He (Mr Colledge) had re-opened the back of the ear and found that behind the cartilaginous meatus pus had collected and had ulcerated through the dura mater. There was an abscess of the temporal lobe. He (the speaker) had cut a wide flap, and, after repeated lumbar punctures the patient had recovered. He thought the making of an adequate opening through the meatus was very important in doing a radical operation.

Mr T. H. JUST said that he had had a case which was similar to that shown by Dr Dan M'Kenzie, as his (Mr Just's) patient also had suffered from generalised convulsions. There might be infection of, and within, the dura mater without any very obvious cause. He (the speaker) had had a patient, a child, aged 7, on whom he had performed a radical mastoid operation. The case had been apparently straightforward. The dura mater was not exposed during the operation. Three days later there was a generalised convulsion, which lasted for two hours. He (the speaker) had made a lumbar puncture and found that the fluid was under slightly

https://doi.org/10.1017/S0022215100029029 Published online by Cambridge University Press

increased pressure, but was not turbid. He had removed the tegmen antri and opened up bone over the middle fossa. He had found a localised area of the dura mater about the size of the end of a lead pencil, which was dusky blue in colour, and was obviously infected and almost gangrenous. He presumed that there had been some infection of the bone in contact with the dura mater at this point. He had excised the infected dura mater and made two parallel incisions through it both above and below the infected area. Cerebro-spinal fluid under tension flowed from the incision. The brain had herniated into the openings. He (Mr Just) thought that the fit was due to cortical irritation, brought on by the localised serous meningitis. The child had made a good recovery. The infection of the dura mater would probably have gone on to a severe intracranial lesion, either meningitis or brain abscess, if free drainage had not been provided at the time.

Dr DAN M'KENZIE (in reply) said he agreed that injury to the dura mater was a possibility in the case. It was certainly remarkable that the dura mater was so frequently exposed in operating, yet so little harm resulted. And it must be often punctured in operations without any serious result. He thought an abscess must have followed the first operation and burst spontaneously into the mastoid cavity.

Case of Necrosis of the Petrous Bone with Unusual Complications—F. W. WATKYN-THOMAS, F.R.C.S.—Mrs S., aged 54, came to hospital on 1st January, complaining of headache for three days and pain in the right ear. The meatus was blocked by a polypus; there was no pain or vertigo produced on moving the polypus. It was snared under gas anæsthesia, and she went home quite well an hour later. The same night she had violent vertigo, with falling to the right. She was admitted to hospital on 2nd January. When sitting she fell to the right, but the nystagmus was to the right and bone conduction was present. Cold caloric test on the right gave normal nystagmus with normal reversal on forward bending. On this evidence it was decided that the right labyrinth was active. A radical mastoid operation was done. The mastoid was eburnated and acellular; cholesteatomatous debris was found in the antrum; there was a fistula above the ampulla of the external canal. The stump of the polypus was found in the sinus tympanicus. Lumbar puncture yielded clear cerebro-spinal fluid not under increased pressure. On the morning of 3rd January she was much better, but the night temperature rose to 101° F., and the following morning the nystagmus had swung over to the left; there was right-sided facial paralysis, ptosis and ophthalmoplegia of the right eye, and she was very drowsy. Lumbar puncture showed turbid fluid under pressure. The mastoid cavity was re-opened, and the labyrinth opened above and below the facial nerve. Pus was found in the labyrinth and was followed upwards and inwards through the petrous bone, forward into the middle fossa, apparently in the region of the cavernous sinus. A

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translabyrinthine drainage was then done, but no flow of fluid was obtained (it was discovered, post-mortem, that the internal auditory meatus was blocked with blood-clot). Accordingly the dura mater was exposed behind the descending portion of the lateral sinus and incised; a rubber tissue drain was passed forwards in front of the cerebellum. The patient never recovered consciousness and died that night. Autopsy (by Dr Scott-Williamson) showed necrosis of the whole petrous, extending to the apex; the Gasserian ganglion was disintegrated and lay in a pool of pus, there was thrombosis of the cavernous sinus and of the internal carotid within the sinus. There was extensive sub-pial hæmorrhage over the pons and mid-brain. There was no sign of infection of the sphenoidal air sinuses, and the opposite temporal bone was absolutely normal and of a highly cellular structure.

Dr SCOTT-WILLIAMSON said that he had made the post-mortem examination on this case, and had found septic necrosis of the petrous bone. In taking out the left petrous bone he had noticed that the sepsis and necrosis had spread to the extent of involving the roof of the bony canal of the carotid, and had induced an ulcer on the artery. And it was curious that the sepsis had spread between the dura mater and the bone, forward towards the Gasserian ganglion, rather than over the roof of the ear itself. There was a very mild degree of meningitis, namely, in scattered petechiæ over the meninges. The cerebro-spinal fluid and the bone had yielded pure growths of staphylococci. In 230 post-mortem examinations in ear cases apart from tuberculosis, he (the speaker) had encountered necrosis of the petrous with staphylococcus in eleven cases; in two cases the pneumococcus was also present. This almost suggested that necrosis was primarily a staphylococcic infection of bone.

Mr G. J. JENKINS (President) said that for such an extensive lesion to have formed, the process must have been very rapid, and there must have been a very extensive system of air-cells to the tip of the temporal bone. Mr Cheatle's specimens of temporal bones included such a type. He asked whether in this case the extension of pus was beneath the semicircular canal, or over the canal. It was fairly easy to explain extension of middle-ear sepsis to the posterior aspect of the temporal bone, but it was not so obvious how it might get to the superior aspect.

Fistula of Semicircular Canal—SYDNEY SCOTT, M.S.—Female, aged 25, has suffered from bilateral otitis media for several years. In 1921 a polypus was removed from the right ear. Six months ago she began to complain of giddiness, and she developed a "fistula symptom" (vertigo on pressing the finger into the left external auditory meatus). "On turning her head suddenly to the right she would nearly fall to the left. She had some headache, not severe, but she said that her head 'felt heavy' on the left side."

On 12th January she was admitted to St Bartholomew's Hospital. There was muco-pus in the left external auditory meatus, and a granulation in the fundus obscuring the drum membrane. Hearing

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was impaired, but not lost. Compression of the air by the finger in the left meatus caused violent vertigo and *diplopia*, both eyeballs primarily rotating horizontally to the right, the excursions of the left eyeball being greater than those of the right, causing strabismus. The primary deviation was followed by return movements, and gradually subsiding "to and fro" horizontal nystagmus—in fact, the ordinary "fistula reflex symptom" associated with a labyrinthine fistula of the external semicircular canal—with this difference, that the primary movement of the left eyeball exceeded that of the right eyeball to such an extent as to cause strabismus.

On 13th January an epi-tympano-mastoid operation was performed. There was no incus. Cholesteatoma was removed from the antrum, aditus and epi-tympanum. A large fistula of the external semicircular canal was seen. Pressure on the fistula produced slow deviation of the eyeballs (but no nystagmus) to the right, under light general anæsthesia. The fistula was not probed and the labyrinth was not explored. The cavity was lightly packed with dressings.

On 14th January: No spontaneous nystagmus; pressure with the fingers on the dressings caused no ocular movements, but release of pressure provoked marked vertical nystagmus, with primary movement of both eyeballs upwards; no strabismus.

The same reflex response was observed daily until 11 A.M. on 18th January, when it was less marked. At 4.10 P.M. pressure on the dressings caused torsional nystagmus, that is, rotatory about an antero-posterior axis, the upper meridian rotating to the patient's right. This appeared to an observer as an anti-clockwise primary movement, followed by a return movement clockwise on release of pressure to the dressings.

This tortional nystagmus was accompanied by lateral deviation of the head "to and fro" towards the left, then to right shoulder.

On 19th January: The same reflexes obtained.

On 20th January: No response.

On 21st January: Direct pressure on the fistula caused lateral horizontal deviation of the eyeballs to the opposite side, as before the operation.

On 27th January: The operation cavity was skin grafted, except over the fistula.

On 4th February: Caloric tests; no reactions obtained with water at 115° F., or with water at 70° F., but at 45° F. the reaction was seen. The original fistula symptom was still present. Pressure in the stapedial region provoked *vertical* nystagmus, the primary movement being upwards.

Sir JAMES DUNDAS-GRANT asked what was the position of the fistula. (Mr SCOTT: In the lateral canal.) The case was curious, because such tremendous disturbance following the relaxation of pressure (comparable

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to rarefaction) was most marked when the suction was through the fenestra ovalis, which was equivalent to a fistula in the utricle rather than in the lateral semicircular canal. He (the speaker) had a case in which the stapes had been dislocated, and while compression caused very little disturbance, the suction rarefaction almost sent the patient off his chair. The suction action on the utricle caused vigorous movements of the endolymph in all the canals; hence the violence of the reaction. In semicircular canal fistula one was taught that the twitch should come to the same side as the compression. But, as Mr Sydney Scott had said, there was often great difficulty in saying in which direction the nystagmus occurred.

Mr G. J. JENKINS (President) said that the point of great interest was that, though the labyrinth did not react to the caloric test until a very strong stimulus was used, yet nystagmus could be produced by pressure over the fistula or on the stapes. Loculation in the labyrinth would explain the interference with the defective response to the caloric test, and also by this means a pressure applied at one point might be directed to one ampulla, and this would explain the actual nystagmus by pressure on the stapes.

Mr A. R. TWEEDIE said he was indebted to Mr Scott, as he had examined this case the previous day. The only regrettable point was that it was not a purely unilateral case, owing to the fact that there was an active attic suppurative lesion on the opposite side. The caloric tests (Kobrak's method) gave the following results: 5 c.c. of water at 45° F. applied to the right ear induced a "normal" nystagmus to the left, after a latent period of 30 secs., and lasting 30 secs.; but, although the tympanic membrane was, of course, absent on the left side, 10 c.c. of water at the same temperature was required in this ear to induce similar nystagmus directed towards the right. The left labyrinth, therefore, was presumably hypo-sensitive. Pressure over the fistula induced a deviation of the eyes to the right (contralateral side), which was accompanied by nystagmus, the latter being inhibited when the eyes looked to the left side. Pressure on the stapes induced a vertical nystagmus, the upward movement being the strongest; but, as this was accompanied by head-nodding, the observation was made rather difficult. The responses were, perhaps, rather contrary to what one would expect, but he agreed that loculation was the probable solution of this disturbance of what one might expect to be the "normal" effect. He hoped that, later on, the effect of the rotation tests might be reported. An attempt was made to obtain the otolithic reactions, but no nystagmus or by-pointing could be elicited by alteration of the position of the head. With regard to the strabismus, he raised the question with Mr Scott as to whether this could be due to meningitis of the sixth nerve (Gradenigo's symptom), but he understood from Mr Scott that, in his opinion, this could be excluded.

Mr SYDNEY SCOTT (in reply) said that after trying cold syringing and failing at 70° F., he tried Sir James Dundas-Grant's method of employing cold air, and this produced a reaction at 45° F. in 60 secs. He was not sure whether Mr Tweedie and he were on common ground as to the designation of nystagmus, *i.e.*, whether the nystagmus was to the opposite side or

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to the same side. It had generally been agreed that when we said "nystagmus was to the right" we meant it was more marked when the eyeballs were deviated to the right and the more rapid jerk was toward the right. In this patient one could not say the jerk was definitely more rapid to the right than to the left. He (Mr Scott) therefore preferred to state that there was nystagmus, and that the first and primary movement was to the right, and that would correspond to what was generally described under the term "nystagmus to the left." There was not a more rapid jerk to the left than to the right. He considered the President's suggestion a very interesting one, that there might be some loculation in the labyrinth, in this patient.

Dr W. F. WILSON wondered whether rotation would clear up the question of loculation. If so, the sooner it was done the better, before the patient obtained compensation.

THE VIENNA RHINOLOGICAL SOCIETY,

3rd November 1925.

MONATSCHRIFT FÜR OHRENHEILKUNDE, *January* 1926.

(*Abstract of Proceedings, by Alex. R. Tweedie, F.R.C.S.*)

Unilateral Purulent Rhinitis (? Maxillary Antrum) in a child six weeks old (pneumococcal infection)—Dr HOFER.—The exhibitor considered that he was able to exclude the presence of a foreign body and diphtheria. Wassermann and von Pirquet's reactions were negative. Recovery took place with local treatment. The suggestion of an infection of the maxillary antrum was criticised.

Tumour of the Posterior Pharyngeal Wall, probably Luetic—Dr WEISS-FLORENTIN.—The condition was regarded as due to gummatous spondylitis evidenced by the X-ray picture; there was a strongly positive Wassermann reaction, and the tumour entirely disappeared with anti-specific treatment.

Adeno-Carcinoma of the Left Maxilla; Radical Operation with Radium Treatment Eleven Months ago: Recovery—Dr KOFLER.—Patient was a woman, aged 59. The dosage of radium was 3000 m.g. hours (spread over three weeks)—25 m.g. being applied without interruption for some 36 to 48 hours in one place at a time, and changed to various positions.

Severe Pyæmia of Aural or Nasal Origin: Recovery—Dr HAARDT.—Female, aged 20, was admitted to hospital in January 1924. Fourteen days previously, she had had resection of the nasal septum, and ten days later, left purulent otitis media occurred. This necessitated, eight days later, the mastoid operation, and two days after this she had a general pyæmic condition with metastatic abscesses. Recovery took place after six months.

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At the discussion which followed, the condition was suggested as really being aural in origin, and as such, not altogether uncommon.

Two Cases of Paralysis of the Recurrent Laryngeal Nerve, following Removal of the Thyroid Gland: Gradual Functional Recovery following Treatment — Dr HUTTER. — Case (*a*). Operation on 8th May: Previous to the operation, patient had a normal voice and immediately afterwards there was hoarseness. Complete paralysis of the left recurrent laryngeal nerve was present. Treatment consisted in inunction of iodine ointment in the neighbourhood of the operation area with faradisation both internally and externally.

Three months after the operation, the patient reported that the voice suddenly became normal, but on examination, the left vocal cord was found immobile during phonation and respiration.

Case (*b*). Operation in September: Just before the operation, examination of the larynx showed normal activity of the vocal cords. Immediately after the operation there was hoarseness; inspection revealed complete left-sided paralysis. Treatment was as in the previous case.

In October, both abduction and adduction began to reappear, and at the present time the movements are almost restored.

A Case of Mutism with Aphonia — Dr STERN. — The exhibitor had only seen the patient, a man of 32 years, a few hours before the meeting. Apparently on the 14th of August, during a course of cacodylate injections for psoriasis, the patient suddenly lost the power of speech. A variety of treatment by the neurologists, up till the present time, had been of no effect, and he was able to produce no sound or whisper.

On examination, the vocal cords were seen to make ataxic movements. The pharynx was hyperæsthetic, and it was noticeable that he was anxious and made strong efforts to make himself understood.

The exhibitor considered it to be a case of hysterical-mutism. At the discussion which followed, it was suggested that the case did not differ essentially from many others of a similar nature, which were often seen.

Fibroma of the Post-nasal Space: Radical Operation and Recovery—Dr HAJEK.—The tumour was on the right side, and some days before the operation the external carotid artery was tied. The operation was conducted mainly under a local anæsthetic, but it was found necessary to administer ether for about four minutes at the end, after turning back the cheek. The growth was removed via the maxillary antrum.

The exhibitor urged that no fixed operation could be recommended

https://doi.org/10.1017/S0022215100029029 Published online by Cambridge University Press

for these tumours, but that each case must be approached according to its particular requirements.

Peri-tonsillar Abscess after Radical Removal of the Tonsils—Dr MENZEL.—A woman, aged 24, had for many years two peri-tonsillar abscesses annually on each side; tonsillectomy had been performed in July 1924.

In October 1925, the patient applied for treatment on account of an abscess, the size of a walnut, which was found above the site of the left tonsil; this was opened.

The exhibitor had seen a similar case three years previously. In the discussion which followed, it was suggested that such cases were due either to some septic inclusion between the pillars of the fauces, or more frequently to some remains of tonsillar tissue; and it was further suggested that the condition was also, in some way, comparable to similar occurrences which are occasionally found in wounds after operations on the mastoid.

ABSTRACTS

THE EAR

Cholesteatoma of the Middle Ear: its Etiology, Pathogenesis, Diagnosis, and Therapy. F. R. NAGER, M.D. *Annals of Otology, Rhinology, and Laryngology*, December 1925.)

From statistics founded on the entire material from the Munich and Bâle clinics for twenty years (83,000 patients), cholesteatoma was a complication in a third of all cases of chronic middle-ear suppuration. The mortality from ear disease associated with cholesteatoma points to its being the leading lethal ear affection.

With regard to its origin it would be difficult to prove that cholesteatoma is congenital. It is acquired, with its origin during life. The differences of opinion as to the cause of the squamous epithelium in the middle ear are discussed. No case arises where the perforation is central. The perforation must be marginal and through this the epidermis grows from the meatus into the middle ear. Special notice is taken of cholesteatoma in cases of isolated perforation of Shrapnell's membrane, and in cases of intact, unperforated but retracted pars flaccida. In such cases Bezold assigns an etiological rôle to Eustachian obstruction consequent on persisting adenoids.

The following percentages as to the cause of the suppuration in cases of cholesteatoma are given by Ulrick: In more than 30 per cent. the exanthemata; about 20 per cent. influenza and affections of the

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