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February 3rd, 1933

President—J. F. O'MALLEY, F.R.C.S.

Early or Late Operation in Acute Mastoiditis

The opening papers read by Dr. DOUGLAS GUTHRIE and Mr. C. A. SCOTT RIDOUT are published in this issue of the *Journal of Laryngology and Otology*, Vol. XLVIII, No. 6, pp. 400-16.

DISCUSSION.

DR. DAN MCKENZIE said that his sympathies were on the side of early operation, as they had been when he had introduced the subject in a discussion ten years previously. In the majority of cases of early operation one was not troubled by any misgivings, but cases did at times arise in which one asked oneself whether delay would have been better.

Mr. Guthrie had suggested that in fulminating cases it might be wise to postpone operation for a few days, in order to give the septic material time to consolidate into an abscess, when presumably there would be less chance of broadcast dissemination.

Allusion had been made to the rather startling figures of Neumann, showing that the mortality was highest when operation was performed in the first week. In these figures, however, one would ask whether the early operation had been performed because a definite complication was present, or merely as a routine. The absence of that information rendered the figures valueless. Was it the early operation or was it the complication which raised the mortality rate? One met fulminating cases in which there was a general septicæmia but no localised abscess; and little or no formation of granulation tissue. These cases were diagnosed early by the toxic condition of the patient, the high temperature and a hyperæsthetic condition of the skin around the ear. Early operation in these circumstances undoubtedly exposed the healthy tissues to infection and the result might be erysipelas. Had one been right in operating? Or should one have waited? If one did not operate one was conscious of having left an intense infection close to the labyrinth and to the brain, and the tendency of the disease would surely be to go inwards.

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In operating one did not remove the infection, but the drainage must lessen the tendency for it to strike in.

Taking one hundred of his last cases of acute mastoid infection, he found that six of them had died of meningitis, and in the majority the meningitis was present in the first week, so apparently it was part of the early infection. He still thought, therefore, that the safest course was to open and drain even the most highly septic cases. Much could be said in favour of Mr. Ridout's view, and he was sure all members must have had cases in which they bitterly regretted not having opened the mastoid earlier than they had done. He had recently had a case of mastoiditis in a boy, on whom he deferred operation, as the symptoms were mild, but on the morning operation had been arranged for the temperature rose to 103° F., and in four days the boy was dead from meningitis. Such happenings left an impression that one could not get over in spite of statistics.

Dr. H. M. Hendershott (Portland, Oregon, U.S.A.) said that in his locality an important significance was attached to the blood picture in these cases. If the blood condition did not show that a good fight was being put up against the infection it was taken as an indication for operation without delay. Dr. Osgood, in his college, had done a great deal of work on these cases from this standpoint. The formation of new cells showed a good defensive mechanism.

Mr. E. Watson-Williams said that operation was not necessary in every case of mastoiditis. Some patients recovered without operation, but it was only after considerable experience that one could form an opinion. If a case appeared to require an immediate operation, he could see no reason for delay. The conservation of hearing merited more attention than it often received, and he was glad that Mr. Scott Ridout had mentioned this point. With regard to the fulminating septicæmic cases, in many of these the patient would die, whatever was done, and although operation did no good in these cases, he thought it did no harm.

Mr. T. B. Layton said that he would take the three analogies that had been mentioned by the President in order. They were osteomyelitis, appendicitis, and frontal sinusitis. Osteomyelitis was not an "analogy", mastoiditis *was* osteomyelitis and anything that was right in principle in regard to the long bones was right with regard to the mastoid bone, so long as one remembered that local spread beyond the bone was more dangerous in the ear than in the limbs.

Except that one could not take out the mastoid and remove it completely, there was a relatively close analogy with appendicitis, and this was closer when we took into account the modern teaching of the Edinburgh School. Wilkie had sorted out clinically these dangerous cases of gangrene, which he called appendicular colic, from the more frequent cases of appendicitis in which delay was less

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serious and might even be beneficial. He believed that a similar contrast held for mastoiditis though it was more difficult to determine and to define. In his Milroy lectures last year O'Kell had used the terms " invasion " and " pyogenic " in regard to the varying activities of the hæmolytic streptococcus, and he suggested that these terms should be applied to the two main types of mastoiditis.

In the " invasion " type there was danger of septicæmia, either by absorption from the osseous tissue, or from the lateral sinus and there was a great risk of spread through the dura mater to the meninges. There should be no delay in operating upon these cases. But in saying that, he wished to sound a note of warning. It was not necessary to rush the cases into the operating theatre the moment they arrived in hospital ; every patient was better for spending a night there, with a good night's rest and a careful preparation ; and if this could not be obtained, from six to eight hours should elapse after arrival in the hospital or nursing home before the operation. Rigidity of the neck and rigors were the only symptoms that indicated immediate interference. The " invasion " type of mastoiditis was best seen in influenza. There was no pus, there was no absorption of the earthy matter, so that the bone was still hard and could not be scraped away with the sharp spoon. All that was seen was a plum-coloured medulla, and the operator must go on until he could see the difference between this plum-colour and the scarlet red of the oozing bone. For forty-eight hours after the operation the patients were more seriously ill than they were immediately before it, but that was an anxiety that had to be faced.

The pyogenic type was best seen in scarlet fever in these cases to which he had given the name " symptomless mastoiditis ". In them the mastoid bone was eroded, the earthy matter being absorbed, and there remained a cavity containing pus and granulations. There were hardly any symptoms of toxæmia, and in such a case delay in operating, within reason, was not serious. The chief reason for delay was that a diagnosis could not quickly be made.

He was not clear as to what was meant by fulminating mastoiditis. Did it mean a case in which the patient was suddenly and extremely ill ? If so, one had to sort out the symptoms of the primary infection of the upper respiratory tract from those of the mastoiditis. When the former were not marked it would seem to correspond with what he called the " invasion " type.

He agreed with Mr. Scott Ridout and with Dr. Dan McKenzie that by far the most important point in the diagnosis of mastoiditis was the general appearance of the patient. Even tenderness over the mastoid area was not evidence of osteomyelitis ; it was evidence that this had spread through to the superficial periosteum. It might also have spread to the deep periosteum, which was the dura

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mater. One must decide whether there was osteomyelitis, not on the local symptoms, such as tenderness or swelling, but on a general estimate of the patient's condition, and the likelihood of there being more than otitis media present.

The analogy with frontal sinusitis, in his opinion, broke down, because in frontal sinusitis the inflammation was limited to the mucous membrane, it did not spread through to the bone in the way it would in the mastoid region. In the majority of cases of acute otitis media the inflammation, in all probability, spread through the aditus into the mastoid antrum and its associated pneumatic cells. There was an involvement of the mastoid region without there being a mastoiditis, and he believed it was this condition to which Neumann had given the name of "mastoidism". He thought that the most important point in the diagnosis of this stage of the spread of the inflammation was deafness. If a person suffering from otitis media was unduly deaf it was almost certain that there was an involvement of the mastoid region. If in such a case the general symptoms were marked, it meant that the inflammation had spread through the mucous membrane to the bone and that mastoiditis was present. He was the more impressed by the importance of this symptom of deafness because it had long been taught by his colleague, Mr. Mollison, that it was a symptom of mastoiditis, and for many years he had not believed it.

MR. COWPER TAMPLIN said those otologists who had had a general surgical training were in a better position to appreciate and overcome the special difficulties.

Mr. Guthrie had given Neumann's figures of 25 per cent mortality in the first week. Mr. Ridout had had no fatal cases during the first week in his series of 230. How had Mr. Ridout obtained such good results? He (the speaker) thought it was because, for many years, Mr. Ridout had been a skilled general surgeon; his average time for acute mastoidectomy was about fifteen to twenty minutes.

Recently a patient had come to him with a discharging ear which he had had two years, and said that a certain otologist had opened the mastoid (probably a fortnight too late) and had afterwards said: "I am afraid it will discharge for a long time, because I was operating for two hours on your ear, and I did not finish even then." A good surgical training and experience would obviate a two-hour operation in this region!

Mr. Guthrie had given as his first fatal case one of sinus thrombosis, and operation was performed on the fourth day, after the child had had fits and shiverings for two days.

It seemed very late for operation. The other "early" fatal case was in a marasmic child; operation was performed on the third day, but apparently nothing happened until a month later, when the wound was curetted. The result in that case could not be attributed

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to early operation. Again in category " C " there were three cases of otitic septicæmia. In one, operation was deferred for nine days, and in another twelve.

What was meant by " fulminating cases " ? In a case of his own there was a history of only twelve hours pain and eight hours otorrhœa. He saw the patient at five o'clock on the day of admission, and there was acute tenderness all over the mastoid region. At operation pus was found in the mastoid cells ; a large amount of bone was necrotic and was removed—all this within twenty-four hours ! The temperature rose only to a little over 99° F., and after operation it descended to normal and stayed there. Was that a fulminating case ?

In a recent issue of a medical journal he had read as follows : " What justification can there be for opening up a mastoid process within a few hours or days, when actual pus formation cannot possibly have occurred ? " Throughout the article there was no suggestion that the otologist should see the case early and keep it under observation. He wished to protest against this attitude. A fortnight ago he had been called to see a child who had had a discharging ear for a week, and was acutely ill. When he said to the doctor, " I ought to have seen this case earlier," the reply was, " They are better at the end of a week ! " When he (the speaker) had opened the mastoid in that case he had found granulations over the lateral sinus for three-quarters of an inch, and an extradural abscess larger than a farthing. If he had seen the case earlier—and it must be remembered that pus formation could take place in the mastoid within twenty-four hours—he could have saved the patient a good deal of suffering. If the general practitioner could be brought to understand, through the medical journals and otherwise, that these cases needed careful watching and that an expert should be called in as early as possible, it would be all to the good.

Sir James Dundas-Grant said that tenderness should always be regarded as an important sign of mastoiditis, but during the first week it was not an indication in itself and must be taken in association with other symptoms. Portmann dwelt on the throbbing noise synchronous with the pulse, which the patient experienced in the mastoid, as an evidence of mastoiditis. Recently he (Sir James) had had a case in which the patient was very ill and had this throbbing. When the mastoid cell was opened to some depth before pus was apparent, it was found in the apical cell.

One indication for operating on the affected ear more promptly was deafness in the other ear ; operation was then indicated, to preserve the hearing on the affected side. Politzer once published a number of cases, chiefly influenzal, in which there was a large suppurating cell just under the cortex of the mastoid, and in which when this was opened, without going into the antrum, recovery took

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place. Cases, therefore, differed very much, and might sometimes depend on differences of anatomical conformation. Bezold had pointed out that in those with a large cell there was apt to be mastoid involvement, because there was a smaller area of phagocytic surface in such a cell than in a multicellular mastoid.

For a certain time there was an infection of the mucous membrane alone, before the bone itself was involved. It was important to be guided largely by one's clinical judgment as to the patient's general condition.

Mr. W. Stuart-Low said that he had been at this work for many years, and surely the statistics one could produce after that time constituted a valuable guide. He was strongly on the side of those who believed in early operation in these cases; indeed, he was surprised to hear any hesitation expressed about operating early. Among the practical points were, firstly, careful inspection of the meatus and middle ear, and if there were pulsation in that site, especially if, having aspirated pus from it, pus had returned within twenty-four hours, he would operate at once. Secondly, if on pressing over the antrum, over the apex below and in front, pain was elicited, operation should be performed. Thirdly, if pain or tenderness over the exit of the mastoid vein was complained of, operation should not be delayed. Of these three, tenderness over the apex was the most important, as it proved that the septic trouble had extended down into the apical cells.

Mr. Scott Stevenson said that when he was younger he thought one should operate at once on every case of mastoiditis, but now he was sure that was a wrong policy. Last year's report from the Ear Department of the Mayo Clinic showed that their results were better since operation had been delayed, rather than performed immediately. There were some curious features about Neumann's statistics: of 1,302 cases, he operated on only twenty-eight in the first week, and there must have been a reason for that. Sixteen of these had complications, showing that the majority of the twenty-eight were probably opened because of the complications. Nevertheless, the lack of complications in the cases when operation was delayed to the second, third or fourth week was very striking. He (the speaker) did not say that every case should be left, but in the ordinary case of mastoiditis the patient should be put to bed and watched, and a four-hourly chart of temperature and pulse-rate kept; a case should not, however, be left under the care of a general practitioner in the country, in case operation was necessary sooner than expected. Last autumn he had had three patients sent up by doctors to have mastoid operations performed after otitis media caused by sea-bathing; although their temperatures were raised and their mastoids tender he had all the patients put to bed for forty-eight hours, and they recovered without operation, except

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that one had adenoids removed. In spite of the fact that the influenzal case was sometimes fulminating, even cases of influenzal mastoiditis often settled down without operation. He agreed with those who said that each case must be taken individually, and he thought it wrong to rush to open every inflamed mastoid, in obedience to some pre-conceived notion.

MR. STIRK ADAMS said he wished to report a case of fulminating otitis illustrating recovery by the use of serum without mastoid operation, where mastoid infection was certain. The patient was a boy, aged 14, who, within thirty-six hours of the onset of the otitis had a temperature of 103°, a profuse serous exudate from the paracentesis opening, a rigid neck and positive Kernig's sign. The temperature continued at this level without remission for four days, and then subsided under treatment by antiscarlatinal serum. Throughout this period the mastoid had remained acutely tender, but during the following week the tenderness subsided, and six weeks afterwards the ear had completely healed without any mastoid operation. In this case he was certain that the decision not to operate had saved the child's life.

Statistics obtained from the Children's Hospital, Birmingham, concerning cases admitted with symptoms of acute mastoiditis in which no operation was required must make us doubt whether early or any operation was required in many of the cases in which symptoms suggestive of definite mastoid involvement were present. During the last eighteen months, one hundred patients had been admitted with clinical mastoiditis, and of these sixty had required, then or later, a cortical mastoid operation, while forty had recovered with paracentesis alone. He stressed the importance of close watching—by a trained otologist—of cases in which operation was deferred.

MR. L. GRAHAM BROWN said that the President's analogy between the mastoid and the nasal accessory sinuses was the only true one which had been advanced. These bones of the skull, similar in development, had natural openings ; the appendix had not, neither had the long bones. He thought there was a period when one could hope for natural drainage from the mastoid antrum and cells. Even in influenzal epidemics he had sometimes seen these cases clear up if operation was delayed. When empyema occurred, as e.g. in the nasal accessory sinuses, something further must be done. But how was one to know when empyema had occurred in the mastoid bone ? One could only form one's judgment on clinical and, particularly, physical signs. This might mean delay of from twenty-four to forty-eight hours. By taking this into consideration one could recognise cases which might possibly seem to have demanded operation but in which the disease, being limited to the muco-periosteum, cleared up without operation.

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MR. J. A. GIBB said that since the late War he had performed over one thousand mastoid operations. In appendicitis one often found that the pain and temperature subsided but the pulse continued to be rapid. This was an indication for that operation ; and the continuation of a rapid pulse strongly pointed to the pressure of pus.

He agreed with Mr. Layton that in the kind of cases under discussion there was no need to operate for the first twenty-four or forty-eight hours, but to leave the case for a week was asking for trouble. Mastoiditis in the child was different from that in the adult. The mastoid antrum, with its lining membrane, was not developed until the fourth year. If the inflammation was severe the lining membrane might be arrested in its development ; this was one reason for early operation in cases of acute mastoiditis in children. In the acute fulminating mastoid associated with influenza, there might be difficulty in deciding the value of the symptoms ; in any case influenzal mastoiditis was always a serious condition and must be considered urgent.

The following case might be quoted as one of fulminating mastoid disease.

A boy, having a chronically discharging ear, was brought into hospital with a temperature of 103° F., an acute swelling behind the ear, violent nystagmus, and the meningitic cry. He (the speaker) operated at once, and found advanced mastoid disease. Previous to operation the fundi were examined by the ophthalmic surgeon who said that papillœdema was present. He (Mr. Gibb) therefore decided to trephine the temporo-sphenoidal lobe. The dura was incised and pus was sought for but was not discovered. The next day the boy was free from pain, was conscious, and had no nystagmus. A few days later his temperature was subnormal and his pulse-rate 40. Examination of the eyes showed marked papillœdema of both fundi. It was suggested that this indicated pus below the tentorium. Trephining far back and above the lateral sinus, the dura was opened by crucial incision and the brain exposed ; there was no pulsation, the veins were engorged but silent ; the speaker needled in every direction but no pus declared itself. The wound was dressed with saline and the next day the pulse rose to normal. The patient was now working in a brickyard.

He (the speaker) did not think that there were any hard and fast rules to guide one as to when it would be better to delay.

MR. SOMERVILLE HASTINGS said he felt that not enough stress had been laid on the fact that mastoid disease, *per se*, was not a lethal affection. Recovery might take place, or the abscess might burst outside. He had seen cases recover which had definite pain on pressure and even swelling. Therefore the point to decide was whether complications were likely to occur or not. If they were likely, operation must be carried out. One of the least important

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features was tenderness on pressure ; the general condition of the patient was much more important.

MR. W. J. HARRISON said one could not tell what anatomical peculiarities there might be in any given case, such as very thin bone forming the roof of the antrum or covering the lateral sinus, through which infection could extend readily. When once the diagnosis was made operation should follow immediately.

The PRESIDENT said that it seemed impossible, after hearing these papers, to set anything like a time-limit for operation ; in each case it was a matter for the individual surgeon to decide.

In the discussion certain analogies had been mentioned, one being a comparison of mastoiditis with appendicitis but no one had yet suggested an analogy between mastoiditis and acute frontal sinus disease. It was the general feeling now that there were risks in attempting early surgery in cases of acute frontal sinus disease, and that analogy might obtain in regard to the mastoid.

MR. DOUGLAS GUTHRIE (in reply) said that it did not surprise him to find that most of the speakers advocated early operation. This was sound practice in the vast majority of cases, but he still thought that in a small minority—notably in that class which had been designated " fulminating "—a delay of from twenty-four to forty-eight hours, under close supervision, might sometimes be a life-saving measure. Also it was a well-established fact that many mild cases of " suspected " mastoiditis would clear up in a few days under a policy of waiting. No rigid rule could be laid down, and it was therefore a mistake to operate at sight in every case. He was entirely at one with his colleague, Mr. Ridout, when he advised that every case of a disease so treacherous as mastoiditis should be brought under skilled supervision, so that operation might be carried out at the most favourable stage under the most favourable conditions.

MR. RIDOUT (in reply) said he agreed with Mr. Layton that frontal sinusitis was mainly a mucous infection. He also agreed that frontal sinus and ethmoid infections could be more easily drained, as they could be more dependent, and it could be brought about by the exhibition of cocaine, and so there was a good deal of difference between frontal and ethmoidal sinusitis and the mastoid condition. He was still an unrepentant advocate of early operation for acute mastoiditis, not in a few days, but within twenty-four hours.

CASES

Case for Diagnosis.—E. WATSON-WILLIAMS, M.C., F.R.C.S.

M.M.W., aged 35, spinster. *May*, 1932, complained of pain below the ears and severe deafness in the right ear for five years

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and slight deafness in the left ear of recent origin. Pain goes down the neck from the front of the right mastoid process; also some pain and tenderness behind and all round the ear. Right tinnitus, constant—" like a train "; intermittent " whistling "; vertigo since onset, bad three years ago and, recently, has had up to three bad attacks a month; aura " like a blow on the back of the head, then cramp in the head," falls down (has hurt herself), too giddy to rise for an hour, " things go round to the left "; nausea, no vomiting; may go to sleep afterwards. Shorter and milder attacks also; falls, but goes on with work afterwards.

Family history negative. Lives over garage with brother; patient is anxious to become fit to obtain work, as brother is going to be married soon. Never any aural discharge, but much wax. Never has chilblains. Lumbar aching since age of five years. *November*, 1927, at Exeter, " ? tumour " was treated with ethyl chloride and luminal; *December*, 1927, went to London Hospital, no diagnosis given; 1928, Tonsil operation; *January*, 1930, attended Guy's Hospital, no diagnosis given; *May*, 1930, King's College Hospital, " otosclerosis ", no treatment; *May*, 1931, diphtheria; free from symptoms for three months.

Condition on examination.—A well-grown, well-nourished, intelligent woman; worried expression; no obvious illness; is taking luminal, "sleepy with it". *Right* membrana tympani indrawn, dull, posterior scarring; *left*, slightly dull and indrawn.

Tuning fork, 256. Air conduction: *Right* 0 (?); *left*, slightly diminished. Bone conduction: *Right*, diminished; *left*, slightly diminished. Rinne: *Right* − ; *left* +. Weber equal: Tuning fork, 32. Bone conduction: *Right* 0; *left* normal; Upper tone limit normal. Vestibular tests: Rotation 10 turns in 20" to *left*, after nystagmus practically nil; rotation to *right*, after nystagmus, 40". Galvanic test: No response either side (5 m. amp., 3'). Caloric tests: Cold air, *right*, no response; cold water, response after 3'50" only. Temperature 98°-99° F., occasionally 96° in the morning. Resting, pulse 72-80; respiration 20-22%.

X-ray examination.—Mastoids, sella turcica, sinuses and teeth normal. Cervical spine: two small cervical ribs. Wassermann reaction negative. Cerebrospinal fluid clear; pressure slightly raised; two mononuclear cells per c.mm.; globulin 0; total protein 0·020%; glucose 0·070%; no bacteria.

I considered that the recurrence of pain was probably a neurosis (? due to brother's approaching marriage). Dr. J. R. R. Trist thought that there was " no evidence of psychosis or psychoneurosis "; Dr. J. R. Charles said that there was " no evidence of organic intracranial disease ". I advised quinine with hydrobromic acid; this stopped the bad attacks of vertigo, but the noise became worse,

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and she "felt drunk all the time". Therefore in *July*, 1932, I removed the malleus and incus (to relieve vertigo caused by cicatricial otitis).

October, 1932: no vertigo; ear dry; pain around ear very severe and intractable. Ordered bromide, strychnine, and thyroid (Dr. Trist). Pain persists to date.

DISCUSSION.

Mr. SOMERVILLE HASTINGS said that many years ago he had learned from the late Mr. Mark Hovell the value of pilocarpine given by the mouth in the treatment of chronic catarrhal deafness with giddiness. He (the speaker) gave it in doses of from a hundredth to a fiftieth of a grain thrice daily, and in from 70 to 80 per cent of the cases it either completely cured the giddiness or greatly relieved it, though it had no effect on the deafness or the noises.

Sir JAMES DUNDAS-GRANT said that he attributed the relief of the vertigo to the ossiculectomy, and referred to a case of his own in a man, aged 57, with attacks of vertigo. He had recently had attacks every day, lasting for thirty seconds. He fell towards his deaf side. The cold air test showed that the labyrinth was still active. The ossicles were fixed, and galvanic tests normal, there was a slight relief from quinine, but with a feeling of increasing deafness. Ossiculectomy was performed in *February*, 1931. Since then he had had no further giddy attacks. The hearing in the right ear was unaltered. The stapes had been partially immobilised by cicatricial tissue. Fixation of the stapes by the immobile malleus and incus was the mechanical condition on which the vertigo depended.

In Mr. Watson Williams' case the meatus was inflamed, but he (Sir James) thought this was only an intercurrent condition and not responsible for the pain, for which no organic cause was evident.

Mr. R. WORTHINGTON said that this patient had been under his care in the Devon and Exeter Hospital three years ago. He had not operated as he believed that the pain was mainly functional. There was nothing physical to justify pain over the mastoid: and exploration had not relieved it although she had some remission after vesiculectomy was performed.

Mr. P. J. JORY said he agreed that there was a functional element in this case, but he thought there must also be something physical. The patient looked hysterical, and the palatal reflex was absent; also she seemed gratified by the amount of attention she was receiving during examination.

Mr. E. WATSON-WILLIAMS (in reply) said that the patient's visual fields were limited to a 20° circle; but although this finding had been repeated, the ophthalmologist did not feel convinced that it was a true one. The right antrum was slightly more opaque than the left, but this was not considered sufficient to explain the origin of the pain, and it was the pain that continued to worry her. Dr. Trist had said he was sure that this was not functional, and it was true that

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there was a physical basis for her troubles. He had been averse to performing a mastoid operation, as the end-result might be a painful scar.

Case in which Cold Caloric Stimulation of Canals produces Nystagmus of the Ocular Type.—W. M. MOLLISON, M.Ch.

Patient, male, aged 49, complains of tinnitus and vertigo of twelve months' duration.

Condition on examination.—Membranes normal. Deaf in right ear, normal hearing in left ear. Cold caloric stimulation, right or left, produces nystagmus of ocular type on looking to the contralateral side only.

Central nervous system normal. Wassermann reaction negative.

DISCUSSION.

Mr. HAROLD KISCH suggested that the eye movements in this case might be congenital.

Mr. HUGH JONES pointed out that as the patient sat in the next room, without any experimental stimulation of the labyrinths, one could note a definite horizontal jerking of the eyes, to both right and left, while there was no " ocular " or " pendulum " nystagmus present —either horizontal or rotatory.

The PRESIDENT said that the only case he could recall in which there was ocular nystagmus was a spontaneous nystagmus in an albino. By caloric tests one could elicit both a vestibular and a static disturbance as well. In the present case, apparently, it was the ocular type of oscillatory movement which was elicited by the vestibular test.

ABSTRACTS

EAR

Concerning the Normal Function of the Vestibular Apparatus. O. H. MOWRER. (*Annals of O.R.L.*, Vol. XLI, No. 2, June, 1932.)

" Investigators of the vestibular eye reflexes have usually employed either galvanic, caloric, rotational . . . or some other artificial form of stimulation, and the responses obtained have been correspondingly artificial, and not indicative of the real purpose of the underlying mechanism. A far more promising approach to the problem seems to lie in the study of these reflexes as they occur during normal bodily activity."

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