SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF LARYNGOLOGY AND SECTION OF OTOLOGY.

June 10 and 11, 1932.

COMBINED SUMMER MEETING HELD AT THE EYE AND EAR HOSPITAL, PORTSMOUTH.

President—Mr WALTER HOWARTH.

DISCUSSION ON REFERRED PAIN.

Pain Referred to the Ear.

By E. WATSON-WILLIAMS, Bristol.

(*Author's Abstract.*)

EARACHE with a normal ear presents a problem: if referred ear pain occurs when there is otorrhœa, a trap is set. The pain may be due to some cause adjacent to the ear, *e.g.* temporo-mandibular arthritis or mumps. Herpes oticus may simulate otitis media if the pain precedes the eruption: deafness, vertigo, mastoid tenderness; most often of geniculate ganglion origin, but there may be no facial paralysis. It may be from glosso-pharyngeal, or from the vagus, with vocal cord paralysis. Two cases are cited of vagus herpes oticus at the onset of lobar pneumonia. Aural neuritis is often due to cold. Neuralgia of the true geniculate tic-douloureux type is rare.

When there is no local cause, examine the mouth, nose, pharynx, and larynx. Dental caries or impacted wisdom teeth may cause earache without toothache. Foreign body, quinsy, laryngeal tubercle, fibroma of nasopharynx cause other symptoms first. Earache may result from tonsil calculus or from a Vincent's ulcer hidden by the faucial pillar. Cancer of tongue, tonsil, pharynx, especially pyriform fossa, larynx, nasopharynx, causes earache—may be first symptom. "Wool in the ear and a lump in the neck mean cancer." Otitis media occurs with cancer of nasopharynx and Eustachian tube and may mislead. Sphenoidal sinusitis easily mistaken for otitis media, especially in young; pain in ear, fever, history of influenza. Intracranial disease; early pain of meningitis may be felt in ear. Cases of aneurysm of the Circle of Willis and of basilar artery causing earache. Earache due to quasi-hysterical neurosis.

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Societies' Proceedings

Referred Pain.

By Lionel Colledge, London.

John Hunter observed that suppuration in the antrum caused pain in the frontal sinus.[1] In this case the area concerned is confined to the trigeminal nerve and the point at which the nervous impulse takes the wrong direction may evidently be either at the Gasserian ganglion or at the nucleus in the pons.

This kind of referred pain is common. A physician brought a lady suffering from acute pain in the frontal sinus. The nose appeared normal and extraction of an incisor tooth cured the pain immediately. Pain in the face from teeth is common when the teeth are apparently painless, and pain in the teeth often comes from the antrum. Pain is often referred to the wrong tooth, but not across the middle line.

A common but less simple occurrence is pain referred to one ear, which shows neither inflammation nor deafness. Inflammation in the ear rarely causes referred pain, although it may radiate to the temple and, in extradural abscess or caries of the labyrinth, towards the vertex. Reflex cough from syringing the ear is analogous, but there is no reflex pain. Albert Gray, however, mentions in his book a case of[2] otitis media in which pain was experienced only in the gums.

The source of referred pain in the ear is generally either in the pharynx, for instance a calculus in the tonsil,[3] an epithelioma of the pharynx, or else in the teeth. The classical example is an unerupted or partially erupted wisdom tooth, but any molar may cause pain in the ear, and also a bicuspid, which is less common. Unerupted teeth may cause extraordinary reflex symptoms. A lady had pain in the right mastoid process, which was tender, functional deafness in the right ear, and left hemianæsthesia, besides pain in the face. Her dentist noticed that one of the upper bicuspids was a milk tooth. When the unerupted tooth which lay horizontally in the jaw was removed, all the symptoms disappeared.

Other causes of pain in the ear are an empyema of the antrum or of the sphenoidal sinus, and malignant disease on the back of the tongue. Dundas-Grant has spoken of a case in which the pain had its origin in the submaxillary gland.[4] Expressed in another way, a lesion situated in the area of distribution of the trigeminal, of the glossopharyngeal, or the superior laryngeal branch of the vagus may produce pain referred to the ear.

I am indebted to Mr Tilley for the diagrams, taken from Fenton and Larsell, which elucidate the anatomical explanation. They make the observation that for referred pain to arise the ganglion cells of the afferent fibres from both regions must be situated either in or near the same sensory ganglion, and that centripetal processes from both sets of cells must pass together into the bulb.

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These conditions are illustrated in a simple form when the Gasserian ganglion dominates the whole field. It is more complicated to bring the ear into the area of the trigeminal nerve. Fenton and Larsell showed that sensory fibres from the mucous membrane of the palate and nose pass through the spheno-palatine ganglion and the great superficial petrosal along the vidian nerve to the cells of the geniculate ganglion.[5] There is also a small sensory branch of the facial nerve distributed through the auricular branch of the vagus to the posterior part of the external auditory meatus, the tympanic membrane, the skin over the mastoid process and the back of the concha. The fibres of this nerve pass to the cells in the geniculate ganglion. In this way deep visceral and superficial cutaneous or somatic areas are brought into relation, and pain in the ear arising, for example, from the sphenoidal sinus is explained.

In the case of an epithelioma on the base of the tongue or fauces, the path of the painful sensation would be along the glossopharyngeal nerve and the tympanic branch which arises from the petrous ganglion of the glossopharyngeal nerve and reaches the tympanum by the canal of Jacobson provides the explanation of referred pain. In addition, the continuation of Jacobson's nerve as the small superficial petrosal is joined by a branch of the seventh from the geniculate ganglion.

In tuberculous or gummatous laryngitis the painful sensation would arise in the area of distribution of the superior laryngeal branch of the vagus, which takes origin from the lower part of the ganglion of the trunk. The ganglion of the root, which lies above in the jugular foramen, gives origin to the auricular nerve of Arnold, and thus an anatomical explanation is supplied.

Pain in the ear from the submaxillary gland may be explained by the junction of the lingual nerve with the chorda tympani, which supplies the roots of the submaxillary ganglion. The chorda tympani has some fibres connected with cells in the geniculate ganglion.

John Hilton,[6] however, in his *Rest and Pain*, gives a simpler explanation of pain in the ear. He tells of a case in which a man attempted to cut his wife's throat, but only managed to cut the great auricular nerve, and so Hilton was able to mark out, by means of the anæsthesia, the area supplied by the auriculo-temporal nerve, namely, the upper and anterior part of the auricle and meatus. He records cases of ulceration of the tongue with pain in the ear. He marks out the painful part of the ear as that supplied by the auriculo-temporal nerve, and he says that in such cases there may even be ulceration of the meatus and a discharge due to referred irritation.

This path for the reflex is less complicated than the other, and it indicates, I think, that we ought to investigate more carefully cases of referred pain. When a patient has referred pain in the ear we are apt

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to assume that it is in the tympanum, but Hilton is possibly right in his belief that the seat of such referred pain may be in the auricle and outer part of the meatus.

The conclusion is that pain is not referred in an irregular manner, and that we should seek to bring the site of origin and the site of the sensation under one umbrella, as it were, for there is some controlling ganglionic connection.

But even then there is still no explanation why the pain is referred wrongly, nor why the nervous system should make this mistake in localisation. According to Henry Head, the pain is felt in the thalamus and it is analysed in the cortex. Why does the cortex make this mistake? I think that when pain is referred wrongly it generally happens when the affected part is one that is infrequently the source of afferent impulses which reach the level of consciousness, and so the pain is referred by the cortex to a related area more familiar with the appreciation of painful impressions and sensations.

Two cases illustrate briefly how referred pain may be of vital importance. Dr. Watson-Williams has described how a boy from 14 had severe pain in the ear, which showed nothing wrong. He was seen by Arthur Cheatle who found no sign in the ear, and afterwards, when he was dying from meningitis, by Victor Horsley. At the necropsy pus was found around the sphenoidal sinus.

Mr. Mollison sent a patient to me suffering from a lateral wall epithelioma low down in the pharynx. He had been treated for six months by an aural surgeon for pain in the left ear, which was in all respects normal. Although the patient remains well after three years, the operation had, in consequence, to be very extensive.

REFERENCES.—[1] Works of John Hunter, F.R.S., ii. 78, Longman, London, 1835. [2] A. A. Gray, *Diseases of the Ear*, London, 1910, 168. [3] Tilley, *Proc. Roy. Soc. Med.*, 1929, xx. 1279 (Sect. Otol., 67). [4] Dundas-Grant, *Trans. Med. Soc. of London*, 1929, lii. 161. [5] Fenton and Larsell, *Annals of Otol., Rhinol. and Laryng.*, 1928, xxxvii. 739. [6] John Hilton, F.R.S., *Rest and Pain*, 1898, 5th ed., 76. [7] P. Watson-Williams, *Proc. Roy. Soc. Med.*, 1929, xxii. 1430 (Sect. Laryng., 60).

Dr. PATRICK WATSON-WILLIAMS said that the point brought forward by Mr. Colledge as to the way in which the mistake of the cortex in referring pain to the ear when the source was elsewhere could be explained, was one of great importance, but he did not think the explanation given by Mr. Colledge was the correct one. One reason why he did not agree with it was that if one met with an acute tonsillitis, or a peri-tonsillar abscess, with pain sometimes referred to the ear, often from toothache, firm pressure on the tragus had a marked influence in reducing the pain, or even inhibiting it altogether. That had nothing to do with the cortex.

Mr. Colledge had referred to the case which he (the speaker) had published in 1910, in which the sphenoidal sinus was involved, and which

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was subsequently seen by the late Mr. Arthur Cheatle and Sir Victor Horsley. When he (Dr. Watson-Williams) saw the boy, he had had mild symptoms of influenza and was sitting up. Convinced that the pain was not due to the ear, he guessed that its source lay in the sphenoidal sinus, and asked that he might see the patient again in a day or two if he did not get better. The pain, however, became so intense that it was thought that this diagnosis must have been at fault, and so others were consulted. This patient might have been saved if the speaker had been allowed to enter the sphenoidal sinus.

The cases mentioned by Mr. Eric Watson-Williams showed that it was easy to slip the straight trocar and cannula into the sphenoidal sinus, even though there had been no previous opportunity of examining the nose. The contents could be sucked out, and if they happened to be purulent, not only had the diagnosis been made, but the tension in the sinus had been relieved and the patient was in a much safer state, seeing that tension was an important factor in the spread of infection from the sinus. Whenever a patient complained of pain in the ear for which no explanation could be found in the ear itself, the teeth and the nose should be examined. Even when there was trouble in the ear, examination of the nose by endo-rhinoscopy should never be omitted, otherwise one was so liable to miss the source of the pain and—more important—the source of the infection.

C. A. SCOTT RIDOUT said that the importance of the teeth in connection with referred pain should be emphasised. A short time ago a nurse at this hospital was constantly having pain which was referred to one ear. Repeated examination led to no discovery which would cause suspicion that the middle ear or the mastoid was diseased. But X-ray examination revealed an unerupted wisdom tooth, and after that had been removed there was no further pain.

Another case was that of a doctor who had some dermatitis of the right meatus, but with more severe pain than could be accounted for by an ordinary inflammatory condition of the skin. He (the speaker) failed to recognise the cause, but a month later X-ray examination revealed in this case also an unerupted right lower wisdom tooth, removal of which cleared up the pain.

One point which had not been stressed so far was that of an infected antrum. In a case of this kind he (the speaker) had not scored. It was in a female patient who had a discharge from the left ear and a good deal of pain. Although there was neither a raised temperature nor œdema of the mastoid, he had advised the mastoid operation.

This she refused, and examination showed an acute inflammation of the antrum on the same side, causing the pain. Finding the same in other cases had led him to adopt the rule of always examining the nose.

Mr. Eric Watson-Williams had referred to cases of probably functional pain in the ear. There had been several cases at this hospital of severe pain referred to the ear in neurotic people, usually women of about 30 years of age. He had had skiagrams taken in some of them, and some of the patients insisted on his opening the mastoid, and when that was done the mastoid was found to be of the cellular variety. He concluded that it was a functional pain probably due to a negative pressure in the cells,

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corresponding to what was known as a "vacuum frontal sinus." One patient, because of the continual pain, insisted upon operation, and he (Mr. Ridout) prophesied that she would want the other ear operated on within six months. The operation cured the pain, which was probably referred from a vacuum mastoid cell.

F. C. ORMEROD said he was impressed by Mr. Colledge's suggestion that referred pain was due to a mistaken localisation by the cortex. He regarded this as a very good explanation, as it fitted in with the referred pain which occurred in other parts of the body, such as pain felt in the shoulder due to trouble in the right side of the abdomen, and acute pain over the frontal sinus in deformity of the nose, accompanied by pressure between the nasal septum and turbinals. The cases he had seen were mostly those in which pain from disease of the throat was referred to the ear, particularly disease of the sinus pyriformis and tuberculosis of the larynx. In malignant cases pain was usually felt in the ear when the glands of the neck were involved. He had found that among tubercular laryngeal cases those in which pain was referred to the ear were the ones in which the ulceration was in the region of the innervation of the vagus nerve, rather than the glosso-pharyngeal. That gave an indication as to which cases were suitable for anæsthetisation of the superior laryngeal nerve.

D. R. PATERSON (Cardiff) said he would add one or two remarks, chiefly from the historical point of view.

Thirty years ago he was engaged, with Professor Francis Dixon, in a study of this question of the anastomosis between the glosso-pharyngeal nerve and the facial nerve and its significance from the clinical point of view. Dixon had proved, by his embryological work, that the nerve of Jacobson appeared as an outgrowth from the petrous ganglion of the glosso-pharyngeal nerve, and that it accompanied a branch of the facial nerve to supply the tympanum and other parts of the middle ear. In its distribution the glosso-pharyngeal nerve has a large number of terminal branches some of which supply the tonsil and the tongue. Instances were collected which illustrated the importance and frequency of ear-pharynx pain. This question had an intensely practical aspect, for cases such as Mr. Colledge had quoted were not uncommon.

A further point was that a good number of tonsils were nowadays removed because of irritation occurring in that region, and cases were not infrequent in which the tonsil had been well removed and yet there remained definite discomfort, or even pain, in the ear afterwards, associated with hyperæsthesia of the tonsil bed, yielding only to suitable treatment of a general character.

C. GIBB said there was one group of cases which it was difficult to explain on anatomical grounds. In three such cases the patient had complained only of pain in the frontal sinus and had chronic infection of the antrum on the other side. One was a woman, brought by her doctor, who thought that the frontal sinus should be opened. She had had pain for a year, and the only sign of infection that he (the speaker) could find was in the antrum on the opposite side. Since that was treated she had been free from pain. He had since had two similar cases.

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He emphasised the difficulty in cases in which there was something wrong with the ear. Three months ago he saw a woman who had had pain in the right ear for eight years, intermittently, and she had had a retracted drum and definite nerve deafness in that ear. He asked her about a suspicious-looking molar on that side, and she said she had seen her dentist several times about it, and he said it was all right. Her doctor, however, insisted on having that molar extracted, and ever since the extraction she had remained free from pain.

L. COLLEDGE (in reply) said that the kind of pain referred to by Dr. Watson-Williams was radiating pain rather than referred pain. His own meaning was pain which was not felt at the point of its origin, but was felt in the ear. Dr. Watson-Williams had not given any explanation why the cortex made this mistake.

DISCUSSION ON THE TYPES OF NASAL INFLAMMATION WHICH PRODUCE INFLAMMATORY CONDITIONS OF THE EAR.

By HAROLD BARWELL, London.

I know little about the types of nasal inflammation which produce inflammatory conditions of the ear, but it is an important subject, for if we know what nasal conditions are liable to cause aural inflammation, we may be able to protect our patients from a frequently serious complication. I shall limit myself to the frankly acute inflammatory affections.

Before trying to discover what types of inflammation in the nose are especially liable to produce inflammation in the ear, we should consider what are the paths by which the inflammation may extend from the one region to the other. Spread of inflammation by the lymphatics or by the blood-vessels is so rare that it need not be considered in this connection, although it is possible for the ear to be involved in the course of a septicæmia of nasal, as of any other origin; but ordinarily the inflammation reaches the ear, either by continuity along the mucous membrane to and along the Eustachian tube, or by discharges from a septic focus in the nose being blown through the Eustachian tube into the tympanum, without involvement of the intermediate tract of mucous membrane. The latter is, I think, by far the commoner method.

There are, I suggest, three factors which may influence the extension of inflammation from the nose to the ear. They are (1) the situation of the nasal lesion, (2) the previous condition of the ear and the Eustachian tube, and (3) the virulence of the infecting micro-organisms.

(1) As to the situation of the nasal lesion, it is obvious that a furuncle at the anterior nares or a septic condition of the vestibule is unlikely to be followed by aural complications; on the other hand, any inflammatory disease in the nasopharynx is liable to affect the ear. But we are limited to-day to diseases of the nose, not including the

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throat, and I do not find that suppuration in the posterior sinuses is more frequently followed by aural inflammation than is that in the antrum; indeed, the discharges from all the sinuses pass backwards into the nasopharynx and have equal access to the Eustachian tube.

(2) The condition of the ear and especially of the Eustachian tube is of importance in rendering the ear more susceptible to invasion. The short, wide Eustachian tube of children is a probable cause of their liability to aural complications; and increased susceptibility may be ascribed to the presence of adenoids or adhesions in the neighbourhood of the Eustachian orifices.

(3) I believe that the most important of these three factors is the virulence of the organisms causing the nasal inflammation. As well as general virulence, there seems also to be a quality in some strains of infection which has a special tendency to attack the ears, though I confess that such a statement begs the question rather than advances our knowledge. We are all familiar with epidemics, especially in schools, of measles and scarlet fever, in which there is a high incidence of aural complications, while in other epidemics, in other ways apparently not less severe, ear disease is much less frequent. Different epidemics of influenza behave in a similar manner, aural complications being particularly common in one and pulmonary complications in another. Professor C. C. Okell, in his illuminating Milroy Lectures of this year, supports the view that the different diseases—including scarlet fever—due to the hæmolytic streptococci are caused essentially by one species of streptococcus, diseases outwardly so unlike being accounted for by factors of varying susceptibility and varying virulence of the pyogenic property and erythrogenic toxin of the cocci. He quotes the recent work of Glover and Griffith to the effect that, when epidemics of influenza, severe common cold, measles and tonsillitis occur in schools, there appears to be an exaltation of the epidemic activities of hæmolytic streptococci; not only do such pyogenic affections as otitis and mastoid disease become common, but cases of scarlet fever may arise apparently *de novo*.

But, if the most frequent method of infection of the ear from the nose is by discharges being blown through the Eustachian tube into the tympanum, it is obvious that this may occur wherever septic matter is in the neighbourhood of the Eustachian orifice. It is largely a question of violent or improper blowing of the nose. It is somewhat in the nature of an accident, and is analogous to the otitis which occurs after bathing, and it may be encouraged by washing out the nose or a nasal sinus, unless great care be taken. I am inclined to the opinion that this "accidental" happening is the most important factor of all in the production of inflammatory conditions of the ear from nasal inflammation.

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Royal Society of Medicine

T. H. JUST, London.

The subject of this discussion is so vast, that I propose to deal only with a few points, which I hope may help to make it of value.

Certain types of bacterial nasal infection are prone to cause inflammation in the ear. The *Streptococcus pyogenes* is by far the most common infecting organism of the ear. The pneumococcus is second, *B. influenzæ* and the staphylococcus third, and the rest are rare.

Therefore it is obvious that acute nasal infections usually mixed, in which the streptococcus occurs, are largely responsible for aural inflammation. Predominant pneumococcal infection of the nose is also a relatively common cause of severe infection of the ear.

It seems odd that severely infected noses, such as occur in atrophic rhinitis, with crusting, should so seldom give rise to any aural symptoms. In the same way, chronic suppuration of the antrum, whether of nasal or dental origin, is in my experience a rare cause of ear trouble. Chronic ethmoiditis with massive polyp formation, comes into the same category. It therefore seems that virulence, and not heaviness of infection in the nose, causes inflammation in the ear. I want particularly to speak of sinus infection. As already said, chronic antrum and ethmoid infection, *per se*, are rare causes. Frontal sinusitis, undoubtedly from its position, is still rarer; overlooked sphenoidal suppuration may sometimes cause chronic suppurating ears to persist.

Turning to acute sinus infection, an otitis media occurring simultaneously with a homolateral antrum infection nearly always ends in an acute mastoid infection. The acute ethmoid is less virulent from the aural point of view. These two acute conditions obtain under ordinary conditions, the sinus and the ear being infected simultaneously.

I have no doubt you have all experienced during the past five months, cases of sinusitis, especially infection of the antrum, which have occurred during the influenza epidemic.

In my experience, unless dealt with as conservatively as possible, these have given rise to an acute otitis media which was not present before operation on the sinus and in most cases fails to clear up, so that the mastoid needs draining. I should be grateful for guidance in dealing with these cases, as they have been a real source of anxiety during the last few months.

T. B. LAYTON said that of the large subject before them that day he proposed to speak only of acute osteomyelitis of the mastoid bone, due to the hæmolytic streptococcus. The striking factor of that affection was its protean nature. It varied from a subacute infection, absolutely symptomless, in which the diagnosis could be made only by inference, to an infection as devastating as any that occurred within the human body. There were three possible explanations of this

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variation, either in the virulence of the invading organism or in the resistance of the individual, or in a "tertium quid." While making every allowance for the effect of the first two, he did not think this effect would explain all the variabilities of the disease. He felt that there must be a "tertium quid" and wished to put forward as a basis of discussion the suggestion that this would be found in the second organism in the upper respiratory tract. With this in his mind, he had drawn up the list that they had before them and to which he would draw their attention.

A Classification of Infections of or through the Upper Respiratory Tract, according to the liability of the patient to develop an Osteomyelitis of the Mastoid Bone due to the *Hæmolytic Streptococcus*.

(A) *Infections by Bacteria*—

(*a*) In which mastoiditis does *not* occur—

Cerebrospinal meningitis. Whooping-cough.
Rheumatic fever.

(*b*) In which mastoiditis does occur, but the organism causing the infection is different from that causing the mastoiditis—

Diphtheria. [Common cold.] [Influenza.]

(*c*) In which mastoiditis does occur and the organism causing the infection is the same as that causing the mastoiditis—

Scarlet fever. Follicular tonsillitis.
Acute septic inflammation of the throat.

[(*d*) In which mastoiditis does occur and the organism causing the infection is closely allied to that causing the mastoiditis.]

[Scarlet fever.]

(B) *Infections by Filterable Viruses*—

(*a*) In which mastoiditis does *not* occur—

Acute anterior poliomyelitis.
Encephalitis lethargica. Smallpox.

(*b*) In which mastoiditis does occur—

Common cold. Measles. [Influenza.]

NOTE.—The above list, to the completeness of which the compiler lays no claim, is submitted as a basis of discussion. It contains many debatable statements. An attempt has been made to indicate some of these by brackets. Thus, the subsection (A) (*d*) has no place for

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those who hold the "unitarian" view of the streptococci (Okell, *Lancet*, 1932 (i), 867), and influenza is included in (A) (*b*) for those who hold that *B. influenzæ* (Pfeiffer's bacillus) is the causative organism of this infection. There may be some who will not yet accept that the common cold is caused by a virus (Dochez, Mills and Kneeland, *Lancet*, 1931 (ii), 547). Other statements are equally debatable; thus, it has been said that "it is impossible at the present moment to find any criterion that we can apply to enable us to distinguish between two possibilities, viz.: (1) that a virus behaves like a bacillus and (2) that it behaves like a growth-promoting substance" (Boycott, A. E., 1929, *Proc. Roy. Soc.*, B. 104, 560, quoted in *Med. Res. Council Bact.*, vii. 17), and it may, therefore, be premature to speak of infections by filterable viruses.

In considering this list, one striking thing would be noticed. The diseases in which mastoiditis did not occur (Class *a*) were also those in which there was no reaction in the upper respiratory tract. They might be described as infections *through* rather than *of* this area. The dividing line between the class with mastoid complications and those without corresponded absolutely with that between the infections of the upper respiratory tract and the infections through it.

In diphtheria, mastoid disease was not remarkable, though, when it occurred, the diphtheria was the important factor rather than the disease of the bone. In scarlet fever also the striking examples of symptomless mastoiditis might be seen. It was in influenza that they were faced with such grave anxiety, and it was the same with measles once the petro-mastoid suture was closed. In the infant with measles the vulnerable tissue was the mucous membrane of the bronchioles, and if the ear was affected the inflammation spread out through this suture so that a snick could be made into the resulting swelling until such time as the condition of the lungs warranted a major operation. In the older child and adult the mucous membrane of the lungs was no longer so vulnerable and the suture across the mastoid antrum was closed, and in such patients an osteomyelitis of the mastoid bone in measles was quite as dangerous as it was in influenza.

Passing to sequences of infections, the seriousness of the local disease was still more striking. One such sequence was measles following scarlet fever, which he thought was more serious than scarlet fever as a complication of measles. It was certainly a very serious matter for a child to develop mastoiditis in the course of an attack of measles following scarlet fever in which otitis media had arisen; but in his experience the most dreaded sequence was for scarlet fever to arise in a case of influenza in which the ear was involved. The two cases he had seen had quickly died (*Guy's Hospital Reports*, 1931, p. 82, cases 35 and 36).

With these things in mind let them return to cases of acute follicular

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tonsillitis and allied conditions. In these the osteomyelitis of the mastoid process bore no relation to the severity of the primary infection. One did not often see it, either in an acute tonsillitis or an acute septic sore throat, and if one did it was not necessarily a virulent type of mastoiditis. On the other hand, a severe form of mastoiditis might arise with very little change in other parts of the upper respiratory tract. He thought there was some reason to suspect that the association of a common cold was the determining factor in the severity of the disease. He would not put this forward as proven; but asked members to observe and consider the point.

If this suspicion should prove correct, there was the striking fact that the three diseases—common cold, influenza and measles—in which invasion of the mastoid by the hæmolytic streptococcus was particularly severe, were caused each by an ultra-microscopic body.

He suggested that the factor determining the severity of an osteomyelitis of the mastoid process due to the hæmolytic streptococcus was the presence of a second organism, and believed that this would prove in the majority of cases to be a filterable virus.

A. Lowndes Yates said there were not only two main types of infection, but two main clinical types, the leucocytic and the serous. Most of the cases of sinusitis seen, when they were established, were of the leucocytic type. But frequently cases of influenzal infection of the nose recovered satisfactorily, leaving a chronic infection in the ear. The reason of that was that the infected tract which was in the ear was not sufficiently large to create immunity, and so the cases proceeded to chronic deafness. Nothing could be found wrong with the nose because it had completely recovered. That was of great importance, because aspiration with the tube would cure early cases; and this was not sufficiently practised in this country. It was a simpler procedure, and it was done on the lines recommended in displacement. A vacuum was caused in the nose, and that vacuum sucked in the tympanic membrane. The result was immediate, because a patient who had been unable to hear, at once heard well, and often retained the hearing. The contents contained scarcely any leucocytes, but epithelial cells were found, and that was characteristic of the serous type of infection. The more chronic cases, in which the infection was not of such great degree, showed a nasal mucous membrane which had recovered, but in which the ear would "go dead" from thickening of the membrane.

The Nasal Air-way in the Newborn Child. Demonstration of Model.—Gavin Livingstone.

Specimens of still-born fœtal noses varying in age from five months to full term were obtained from different sources. It is difficult to get noses of children at post-mortem examinations because of the

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mutilation necessitated. The specimens have been investigated in various ways; some have been decalcified and embedded in celloidin and cut into serial sections; others have been dissected (microscopically) to show the state of the turbinates and paranasal sinuses.

No physiological experiments have so far been carried out on animals, but such experiments may be undertaken at a later period.

A model has been reconstructed with a $12\frac{1}{2}$ magnification. The method employed was the usual one for serial construction but briefly the steps were as follows:—First the sections were projected on sheets of paper, so that the images were magnified to the required amount, which depended on the thickness of the sections. The images were traced by hand and then rolled on sheets of wax one millimetre thick, that is 1000μ thick. These sections were cut at 40μ and each alternative section was traced. This is the same as taking each section and calling it 80μ. A section of 80μ thickness has to be multiplied by $12\frac{1}{2}$ to make it 1000μ thick. This was the reason for choosing 12·5 magnification.

The tracings on the wax sheets were placed on a flat surface and cavities cut out. The series of sheets were superimposed and an accurate reconstruction resulted. Any measurement of volume, size, or shape, in the fœtus can readily be calculated from similar measurements of the model. The air-spaces in the nose have also been reconstructed and the volume of the air-channels and paranasal sinuses measured.

The model has been halved, the septum removed and a portion of the middle turbinal cut away from one side, but it still forms an accurate basis for examining the air-channels.

The inferior turbinal is well developed but is close to the lateral wall. The anterior end does not project into the lumen and thus guides air into the inferior meatus which is small. For the purpose of description, the middle turbinal has two portions, an ascending and a horizontal limb: the ascending portion stands out from the lateral wall and projects boldly into the cavity; the horizontal portion is closer to the lateral wall. Thus the middle meatus is long and funnel-shaped. The superior turbinal is developed behind this upward turn of the middle turbinal and is flat with no projection, sloping gently to the posterior choana. The superior turbinal in this case is well developed and projects into the olfactory channel.

From this arrangement on the lateral wall the inspired air has the choice of two main channels. The first and the more important is through the middle meatus. The projecting middle turbinal with its ascending free border deflects the air where it must pass over the uncinate process, the hiatus semilunaris and the poorly developed ethmoidal bulla. These irregularities set up currents and eddies which

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delay the air and allow it to reach the infundibulum and the air cells which drain into it. During this delay the air undergoes the physiological modifications which are so important; it becomes moistened by the mucosa and it is warmed by the plentiful supply of blood-vessels.

The other channel is above the middle and the superior turbinals. The inspired air impinges on the roof of the nose, the superior turbinal and the spheno-ethmoidal recess which tend to turn it back. A circular motion is set up which causes delay and allows the olfactory mucosa to be stimulated.

The vestibule and the antrum of the middle meatus seem to be larger in proportion in the child than in the adult, and thus more air passes by the olfactory channel. This may account for the statement that smell in a child is more acute than in an adult. Very little air goes by the superior meatus, which is small and narrow, but rich in olfactory mucosa.

The olfactory area has often been mapped out, and it is limited to a small area on the upper third of the septum, the superior turbinal and a small portion of the middle turbinal. By means of the serial sections it is possible to mark out the transition from olfactory to respiratory mucosa. Although it is not always sudden it is usually quite definite. Occasional islands of olfactory cells are separated from the recognised area by respiratory epithelium. I have not yet finished plotting the area, but it appears in this case to extend further than is stated by Brum or Read. [Two slides showing the transition between the two types of epithelium, one from a guinea-pig, the other human, were shown.]

The cast of the infundibulum shows that it is quite a large chamber with the anterior and middle ethmoidal cells budding off, but as yet not very big. Both the uncinate process and the ethmoidal bulla are poorly developed although they contain cells. When they are fully developed they may obstruct the middle meatus, deflect the air current and cause further delay.

The maxillary antrum is small, being more developed on one side. On the right side it is triangular in coronal section and extends about one centimetre in length. The lining is columnar ciliated epithelium but of a more simple type than that of the nasal mucosa. There are fewer glands and less erectile tissue. The floor of the antrum is above the level of the floor of the nose and the external wall is nearer the midline than the supraorbital nerve; in the adult the reverse is the case.

On the left there is no lumen to be seen. The two layers of mucosa are in apposition but the actual length and depth are the same as in the right maxillary antrum. It was impossible to show this on the model. This inequality is common and the state of the development varies in the full-time fœtus.

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In several specimens there has been congestion. The venules and capillaries were engorged, extravasation of blood having taken place between the cells. The mucosa had been lifted away from the glandular layer, and the lumen of the nose was filled with epithelial cells and débris. This shedding of epithelium may be an artefact but all the specimens have been prepared in a similar manner, and only those showing extreme congestion show the shedding of mucosa. This congestion is more marked in the upper parts of the nose than in those parts which are drained by the ethmoid veins to the ophthalmic vein and so into the cranial cavity.

Obstructed labour and any factor which will cause increased intracranial pressure have a deleterious effect on the nasal mucosa, especially the olfactory mucosa, which has no definite basement membrane and is more delicate than the respiratory mucosa.

Further specimens of the noses of babies who have died during, or shortly after, birth from blue asphyxia, excessive moulding and, in one case, ruptured tentorium cerebelli, are being prepared in celloidin. When these are cut they will demonstrate more clearly this congestion and injury to the mucosa.

V. E. NEGUS said that he had been associated with Dr. Livingstone in his work at King's College Hospital. The models were of the greatest value ; it was difficult to show small details without an enlarged model, but only those who tried to make models on so large a scale could appreciate the labour involved. It was surprising that the olfactory membrane had not been found to be more extensive. In some monkeys and many lemurs the turbinals were convoluted, and the scent of those animals was well developed ; they had an epiglottis shutting off the mouth from the air stream, so that inspiration must take place through the nose. In the chimpanzee, the orang, and the gorilla, the acuteness of smell was less, and the epiglottis did not shut off the mouth. If the younger fœtus were investigated it would show a convolution of the superior turbinals, and a much wider distribution of olfactory mucosa.

Cinematograph Demonstration and Specimen of Retrosternal Carcinoma of the Thyroid Gland.—J. R. B. HERN.

Patient, male, aged 53. History of twelve months' progressive cough and, recently, increasingly urgent dyspnœa and orthopnœa. The cough was typically brassy, and other features, on examination, were deviation of the larynx about half an inch to the right, and engorgement of both jugular veins, especially the right. There was no swelling to be seen or felt above the clavicle, and in the chest there were no signs except trifling impairment of the note over the manubrium sterni and alteration of breath-sounds near the inner end of the right clavicle suggesting considerable deviation of the trachea to that side. The heart was slightly enlarged to the left, raising the suspicion of an aneurysm.

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A skiagram showed a well-defined, non-pulsating mass high in the superior mediastinum with displacement of the trachea to the right and forwards, and of the œsophagus to the right and backwards.

Bronchoscopy under cocaine showed the larynx and hypopharynx deeply engorged, the laryngeal movements normal, and the trachea lower down stenosed by lateral pressure. The Wassermann reaction was negative.

After a single dose of deep X-ray treatment at Guy's Hospital the patient began to cough a large lump into the left supraclavicular fossa. At the end of each paroxysm the act of inspiration sucked the lump back again beneath the sternum. The moving picture showed this plunging action followed by the more important steps in the operative removal of the tumour by Mr. E. G. Slesinger (the owner of the film, by whose kind permission it was shown). The cinematography was carried out by Mr. R. C. Brock.

Removal was undertaken as there was now evidently a thyroid tumour, possibly benign but rapidly asphyxiating the patient. The entire left lobe was taken from beneath the manubrium, and microscopic section showed it to be malignant. He was progressing well in convalescence, but ten days after operation right-sided pleurisy developed, followed by a streptococcal empyema, and the patient died. At post-mortem examination the rest of the gland and the adjacent lymph glands were found to be malignant. There were no distant metastases.

The complete diagnosis was apparently carcinoma in a congenitally misplaced thyroid gland—a rare type of so-called "substernal thyroid."

HERBERT TILLEY said that the case reminded him of a middle-aged woman, whom he saw many years ago. She complained of hoarseness, slight stridor, and the left vocal cord was paralysed. On pressing his fingers deeply behind the upper borders of the sternum he felt a firm dome-like structure. Screening of the chest showed a large oval shadow behind the sternum. The patient was sent to Sir James Berry, who removed a dermoid cyst from behind the sternum. The patient recovered from the pressure symptom, but the vocal cord remained *in statu quo.*

CASES.

C. A. SCOTT RIDOUT.

I. Otological.

Cerebellar Abscess after Twelve Years.

F. T., aged 30, female. Admitted hospital 16th December 1919.

Temperature 100·8°, pulse 90. Complains of pain in head. Left otorrhœa on and off for some years, has vomited continually since 14th December, loss of power down left side.

Operation, 16th December.—Left mastoidectomy. Mastoid infected and pus present in antrum.

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Progress.—Improved for a few days, then severe vertigo, vomiting, headache. Pulse 46, temperature subnormal; almost complete left facial paralysis.

Second Operation, 24th December 1919.—Wound opened up. Very foul cerebellar abscess discovered deep to fragment of necrosed bone at lower posterior angle of mastoid antrum; 2 to 3 oz. very fœtid pus evacuated. Modified Carrel-Dakin treatment carried out. Patient made steady uneventful recovery.

May 1932.—Is in good health. Facial paralysis has recovered to a considerable extent, but some weakness remains.

Cerebellar Abscess after Ten Years.

F. L., aged 8 years, male.

3rd May 1922.—Ill two weeks, pain left ear, no otorrhœa. General headache, vomiting, left mastoid tender. Temperature 98°, pulse 60.

5th May.—Still headache, vomited several times, pupils unequal, complained of vertigo.

Operation.—Left mastoidectomy. Extensive extradural abscess found tracking back about 2 in. when a large rent in dura was found to communicate with extensive cerebellar abscess. Drained; modified Carrel-Dakin treatment carried out.

The mastoid cells appeared to be only slightly affected and there was no pus in the mastoid antrum but only some mucus. Left facial paralysis followed operation. No further vertigo or headache. Pus grew streptococci. No further vomiting. Tube removed after ten days.

12th July 1922.—Renewed vomiting every morning.

18th August 1922.—Recurrent cerebellar abscess, incised and drained, with good recovery. Subsequently developed hernia cerebelli which protruded as a granulomatous mass; dressed with rectified spirit.

May 1932.—Patient, now aged 18, has developed well, can hear loud sounds in left ear but cannot distinguish words. Cerebellar hernia very slight. Slight facial weakness present.

T. H. JUST said that before Professor Neumann gave his address to the Section of Otology he (the speaker) had not realised how horrible the result of operation for cerebellar abscess was, and it was encouraging to see two people who had had the disease—but were well so many years after the operation. Except for a slight error in pointing, the woman was now a normal person. Apparently, when the abscess was present there were no very definite cerebellar symptoms. Cortical cerebellar lesions, unless affecting the basal nuclei, or the dentate nucleus, gave no recognised cerebellar symptoms.

As to the approach through the ear, naturally otologists opened brain abscesses through the source and channel of infection, but there still remained some surgeons who preferred to operate through the clean uninfected brain; he had seen cases opened by a large occipital decompression, the ear condition being left untouched. An appalling hernia was left, which would

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not clear up as long as a septic focus remained in the patient's ear.* There was danger of infecting the brain by going through clean brain tissue, as there was no inflammatory barrier thrown up in the surrounding tissue by a septic focus in the mastoid. The mastoid route was not only the easiest way to find the abscess, but the terminal results were good, as the patient got a hard scar, without any soft place being left in the skull.

W. J. HARRISON (Newcastle) said that the greatest difficulty in these cases was the drainage. Tubes did not usually work satisfactorily. Recently he had tried packing the cavity with bipp gauze. It was as yet too early to say whether it was a better method or not. One patient had been going on well for ten days, and then he (the speaker) tried to hasten matters by putting in a tube and leaving out the packing. Then the temperature ran up, cerebritis developed and the patient died. In another case a small child had an abscess packed for three weeks, and did well. A tube was then put in, and that case also went wrong and the child died.

A. LOWNDES YATES said that the question of the method of drainage was of great importance. Some otologists in America held that drainage should be by cones of silver filigree or by tubes, while others said that it was the drainage which caused the damage to the brain which killed the patient. The latter contention had led to an interesting series of cases in the United States, in which the abscess cavity was not drained but aspirated at repeated intervals by a small blunt needle. The results were claimed to be better than those by drainage.

The experiment of any one observer was too small to warrant any definite conclusions, but it would seem that there was a type of case in which drainage might do harm and reaspiration of the abscess would be the best form of treatment, while there were others in which drainage would give the best results.

II. Laryngological.

Multiple Papillomata of Larynx.

W. S., aged 25, male, engineer. First seen in 1915, when three papillomata were present, two on the right and one on the left vocal cord. Treated with cautery.

8th December 1925.—Condition more advanced, four distinct papillomata present, one of which was growing from superior ventricular band on the left side and overlapping the true cords, and one from the base of the epiglottis. Voice very husky.

15th December 1925.—Papilloma removed by direct laryngoscopy.

January 1926.—Further portion of growth removed.

22nd January 1926.—Another papilloma removed (local anæsthesia, indirect method), and again on 14th February, 14th March, and 26th September.

10th November 1926.—Voice much stronger.

6th November 1927.—Papilloma removed from epiglottis, and portion of right vocal cord punched out with a papilloma attached.

* *Proceedings*, 1930, xxiii. 1045 (Sect. Otol. 41).

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January 1928.—Small recurrence left false cord.

November 1929.—Papilloma removed from anterior commissure.

April 1932.—Still multiple nodules but good voice and general development.

Recurring Papilloma of Larynx.

A. W. E., aged 8, male. First seen 12th October 1927, on account of aphonia and laryngeal obstruction.

14*th October* 1927.—Tracheotomy. Removal of large sessile papilloma almost occluding glottis. Pathological report—papilloma.

11*th November* 1927.—Tonsillectomy, removal of adenoids. Discharged, much improved.

27*th June* 1928.—Dyspnœa following a "cold," immediate tracheotomy.

3*rd July* 1928.—Papillomatous growth removed from vocal cords. Tracheotomy tube kept in for four months.

9*th January* 1929.—Better voice returning.

24*th April* 1929.—Some recurrence of papilloma on right cord.

26*th March* 1930.—Respiratory difficulty. Tracheotomy. Large papillomatous mass removed from right vocal cord. Rubber tracheotomy tube kept in for several months, in spite of which a further papilloma was removed from glottis and subglottic region 3rd October 1930, and base cauterised with chromic acid. Improved for several months, but on 3rd November 1931, a further papilloma was removed.

13*th April* 1932.—Much improved, cords seem clear. A small permanent tracheotomy fistula is present.

HERBERT TILLEY said that in the second case there was a congested sessile type of papilloma which could be removed by the direct method without much difficulty. In such cases one could get a better result if the surface from which the growth was removed were dried, and painted lightly with glacial acetic acid. In one or two cases so dealt with there had been freedom from recurrence for a longer period than he had formerly experienced. He referred to a little boy whose mother stated that forty-seven operations for recurrent papillomata of the larynx had been performed before they finally ceased to reappear.

Lambert Lack had a similar experience with a little boy on whom many operations were performed in Golden Square. Children, especially, seemed to suffer from multiple growths and they were likely to recur after removal. On the other hand, it was common experience that they eventually ceased to appear and therefore drastic measures should not be employed for dealing with the condition.

Squamous-celled Carcinoma of Naso-Pharynx treated by Radium.

Mrs. K. H.

History.—Increasing sense of obstruction at back of nose. Able to breathe through one nostril only. Patient looks pale and ill.

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Examination, 25th April 1932.—Large soft polypoid growth occupying almost the whole of the naso-pharynx; bleeds freely on examination. Piece of growth excised proved to be squamous-celled carcinoma.

Treatment, 2nd May.—25 mgrm. tube of radium inserted through right nostril into growth for 72 hours. This was repeated on 5th May through the left nostril also for 72 hours.

19th May.—Patient much improved, growth distinctly less. Is now able to breathe through either nostril.

Papillomatous Condition of Vocal Cord. (Further Report of Case previously shown.*)

E. M., aged 49, female. Shown 7th November 1930.

25th November 1930.—Following advice of Members of the Section, laryngo-fissure was performed and right cord extensively removed.

Pathological report: No evidence of malignancy [section shown].

A new vocal cord re-formed and also one isolated papilloma, which was noticed on 25th March 1931, but apparently dropped off shortly afterwards.

May 1932.—Functional result good. Movements of re-formed cord good.

WALTER HOWARTH said these cases varied in their tendency to recurrence. The most trying were those in which there was a multiple papillomatosis, extending on to the pharyngeal wall, especially when they spread to the trachea below the tracheotomy wound. A patient under the late Mr. Beetham Robinson underwent about sixty operations for such a condition, and died because there was a mass above the bifurcation of the bronchi. Nothing was better than removal and touching the base with acid; probably the best was trichloracetic, monochloracetic being too penetrating. The man's voice might have been improved by removing the papilloma of the right cord. The woman's pedunculated papilloma might also be removed by the direct method with considerable advantage, and in that case preliminary laryngotomy would be a help. This procedure had suffered rather an undeserved eclipse.

The case last shown was very remarkable, as there seemed to be a good vocal cord on that side having perfect movement; one would not think that the cord had been removed. He congratulated Mr. Ridout on his success.

T. B. JOBSON said that in a case of sessile papillomata he had tried a flat electrode applied to one cord for diathermy treatment, switching the current on and off. After three applications the patient did very well. There was no reaction and no œdema, nor respiratory difficulty after the operation. The voice was greatly improved.

C. A. SCOTT RIDOUT (in reply) said the case about which he was anxious was that of the little boy, who had been under treatment five

* *Proceedings*, 1931, xxiv. 308 (Sect. Laryn. 8).

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years. He still hoped that this child would outgrow the papillomata. There was a little permanent fistula, which he regarded as a safety-valve, in case of dyspnœa. With regard to the case of large recurrent papilloma, he had not seen the patient for ten years.

Tuberculosis of Mouth.

Male, aged 18.

Disease first noticed in nose at age of 4 years. Subsequently affected gum of upper jaw in region of incisor teeth. Has spread over roof of mouth, and soft and hard palate. Senses of smell and hearing are both impaired.

Had radium treatment for nose and gums seven years ago with unsatisfactory results. Eighteen months ago treatment with sanocrysin was begun.

F. C. ORMEROD said he thought that this was a more active type of ulceration than lupus. There was a distinct loss of tissue in the upper jaw, which had been treated by radium, and also by sanocrysin. Sanocrysin usually aggravated tuberculous disease in the upper respiratory tract and larynx, and might, in this case, have kept the process going. The better course seemed to be surgical treatment of the jaw followed by diathermy.

Destruction of Nose and part of Face by Squamous-celled Carcinoma of Rodent Ulcer Type.

F. S., aged 60, male.

November 1926.—Ulcer the size of a florin on right ala nasi, exposing septum, excised and edges fulgurated by diathermy.

Patient was admitted on several occasions during 1926-1931 for diathermy for small recurrences, resulting in total destruction of nasal bones and external nose.

4*th August* 1931.—There being no evidence of recurrence, and the edges of the destroyed area appearing healthy, a pedicle graft containing a portion of rib cartilage was formed on the upper part of the chest with a view to remaking a nose. This was moved upwards at fortnightly intervals until it reached the left cheek in March 1932, but no further progress could be made as recurrence of the growth had taken place, with increasing destruction towards the left eye, in spite of further diathermy.

F. J. CLEMINSON said this case was similar to one which he had had ten years ago, which was marked by the relentless march of the disease involving the nasal bone, the ethmoids, and eventually the orbit, so that a series of operations had to be carried out at different times, at one of which, with the co-operation of Mr. Affleck Greaves, the eye was removed, along with the floor of the orbit, the inner wall of the antrum, and the rest of the ethmoid. Later the disease spread towards the roof of the skull and attacked the frontal sinus and the floor of the anterior cerebral fossa. During operation the dura was opened and a small amount of cerebrospinal

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fluid escaped; the opening was packed with flavin and closed in ten days. Then the patient seemed free from disease for a time, but later there was a further recurrence. He had not been seen recently and it was feared that he was now dead. The manifestation in this case was purely local; there was no glandular involvement at any stage. He (the speaker) regarded the outlook in such cases as hopeless.

J. F. O'MALLEY said that in the previous year he had had a case of extensive rodent ulcer involving the cartilage of the ear and the side of the face as far as the angle of the jaw. Though the region permitted an extensive excision, the result was poor. Later he buried a number of lightly charged radium needles in the surrounding sound tissue and on the floor of the ulcer, and there was complete healing. If that had been done in the present case, when the disease was restricted to the ala of the nose, the extension might have been prevented.

Tuberculosis of Nasal Bones. (Further Report of Case previously shown.*)

E. T., aged 51, tramwayman.

There is a clean, permanent deficiency in the bridge of the nose and a granulomatous condition is still seen intranasally. General health good.

During the past eight years and a half he has had an open-air job with no special treatment except an oily nasal paint containing thymol and creosote.

Complete Occlusion of Posterior Choanae (Congenital), treated by Operation. (Further Report on Case previously shown.†)

L. G. C., aged 20, male.

Operation (*23rd November* 1928).—Right and left posterior choanae made patent. Occlusion found to be mainly membranous, but posterior portion of vomer was removed and also portion of posterior edge of hard palate.

20th April 1932.—Has developed well since and can run much better (was before operation accustomed to long-distance running). Sense of smell not greatly improved. Intranasal appearances now normal. Posterior choanal openings functioning well.

Follow-up Case.

Œsophageal Pouch removed by Operation.

F. H., aged 60, female.

History.—Dysphagia for one year. Food returned up to twenty-four hours after swallowing.

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* *Proceedings*, 1924, xvii. (Sect. Laryn. 13).

† *Proceedings*, 1928, xxii. 159 (Sect. Laryn. 3).

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Radiograph [shown] shows well-marked œsophageal pouch on left side at about the level of fourth dorsal vertebra.

Examination — 26th June 1930.—Œsophagoscopy showed well-marked opening of pouch into œsophagus, the normal lumen of œsophagus being reduced to a small anterior slit. On manipulation the œsophagoscope passed into this quite easily.

Gastrostomy was then performed.

5th July 1930.—Pouch removed by external operation, œsophagoscope being first passed into the pouch and held in position by an assistant. This enabled the pouch to be easily defined, dissected up, ligatured at base, divided with cautery and buried into œsophageal wall.

24th July 1930.—Œsophagoscopy showed normal œsophageal lumen, dimpled scar seen at site of pouch, gastrostomy allowed to close.

WALTER HOWARTH said this case also was a credit to Mr. Ridout, as the woman was free from any symptoms, and was likely to remain so. The skiagram was typical, and the œsophagoscopic appearance showed a large opening into the pouch. He noted that Mr. Ridout removed the pouch at one operation, but he (the speaker) preferred a two-stage one—in the first, finding the pouch and slinging it up towards the mastoid, so as to bring the dependent hole uppermost, and packing round the neck of the pouch with gauze; in the second, exposing the pouch and dissecting the muscular layer from the mucous layer, turning it in, like an appendix stump, and cutting it off. This operation had been well described by Ivor Back and Lionel Colledge many years ago and was most satisfactory.

L. COLLEDGE said that gastrostomy was not really necessary as the patients were able to swallow freely immediately after the first stage of the two-stage operation mentioned by Mr Howarth.

HERBERT TILLEY said he had met with only one case in which malignant disease had developed in a pharyngeal pouch, but that it was not a rare complication was evident from the number of cases recorded in French and American literature.

C. A. SCOTT RIDOUT (in reply) said that the patient had been starving and her condition had improved greatly after the preliminary gastrostomy. It was difficult to see how any food could possibly pass down the ordinary channel. Knowing that in these cases suppuration was sure to take place, he had not closed the wound entirely. The pouch had been easily removed. The patient merely took sips of iodised water afterwards, and the wound had healed completely within twelve days. He preferred the one-stage operation with absence of granulation tissue.

Functional Aphonia. (Abnormal Voice.) — E. COWPER TAMPLIN.

E. W., a boy, aged 15. Is said to have spoken quite naturally until about two years ago, when there gradually appeared the faint high voice and slight lifting of the head now present. The boy is normally developed and nothing abnormal has been found in the larynx.

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Abstracts

F. C. CAPPS said he thought that the tonsils were enlarged. If one held the head down and prevented the boy from raising his larynx under his tongue, he produced a normal voice, and also for a short time after letting the head and larynx go; then he produced a falsetto voice again. Re-education of the voice should be tried before any decision was made with regard to operation.

ABSTRACTS

EAR.

Creatin Bodies in Conditions of Cochleo-vestibular Angiospasm. V. FAIREN (Saragossa). (*Acta Oto-Laryngologica*, Vol. xvii., fasc. 2-3.)

Availing himself of the micro-method, the author has studied the quantity of guanidine base present in the blood and the urine of patients who, with or without an injury of the kidneys, were suffering from tinnitus or vestibular claudication of the paroxysmal type and has obtained curves representing the correlation existing between the increase of guanidine base and certain vascular disturbances of the anterior and posterior labyrinth. The author has also studied the effect of liver extracts and insulin on these vascular contractions.

Author's abstract.

Temporo-sphenoidal Abscess following Fractured Base involving Petrous Bone: Recovery. W. GRETE. (*Arch. Ohr., u.s.w., Heilk.*, June 1932, cxxxi., pp. 245-264.)

Cerebral abscess is a very rare late-complication of fractured base. The author describes a case in which he opened and successfully drained a temporo-sphenoidal abscess. The complication arose six months after the original injury, a cycle accident with severe concussion and fractured base.

The literature on the subject is scanty. This particular "Spätkomplikation" has been described more often in connection with basal fractures involving the anterior fossa of the skull and the nasal cavities. Every fracture of the base of the skull which involves either the tympanic cavity or a nasal sinus is, strictly speaking, a *compound fracture.*

Certain general rules can be laid down for cases in which the basal fracture includes the temporal bones:

Longitudinal fractures of the temporal bone are very rarely followed by cerebral abscess, as in the above case; while *transverse fractures* through the labyrinth are more often followed by meningitis. When the skull injury is followed by a persistent middle-ear discharge, the patient must remain under close observation. There is a constant

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