THE

JOURNAL OF LARYNGOLOGY, RHINOLOGY, AND OTOLOGY.

VOL. VIII. OCTOBER, 1894. NO. 10.

Original Articles are accepted by the Editors of this Journal on the condition that they have not previously been published elsewhere.

Twenty-five reprints are allowed each author. If more are required it is requested that this be stated when the article is first forwarded to this Journal. Such extra reprints will be charged to the author.

The Editors are not responsible for opinions expressed in original Articles or Abstracts in this Journal.

Editorial Communications are to be addressed to "Editors of JOURNAL OF LARYNGOLOGY, *care of F. J. Rebman, Albion Chambers,* 11, *Adam Street, Strand, London, W.C."*

CONGRESS MEETINGS.

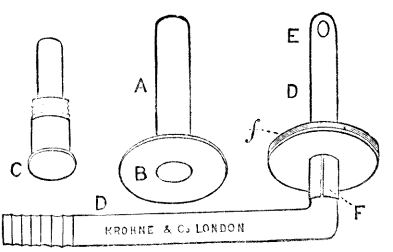
BRITISH MEDICAL ASSOCIATION.

Annual Meeting, Bristol, August, 1894.

SECTION OF LARYNGOLOGY AND OTOLOGY.

A New Antral (Maxillary) Drainage Tube. By W. MILLIGAN, M.D. (Manchester).

IN chronic empyema of the maxillary antrum, free drainage is an essential to successful treatment. In those cases where the opening into the antrum has been made through the alveolar border, some form of drainage tube is usually inserted, in order to drain away the purulent secretion and to maintain a patent opening. The opening into the



cavity should be made of good size, and of the diameter of a previously selected drainage tube. The accompanying illustration shows a form of drainage tube and irrigating canula which will be found useful. The

W W

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

antral tube A is passed into the alveolar opening, the flange B being subsequently attached to a dental plate. C is a screw-plug, which is made to project sufficiently far down to enable the patient to readily grasp it between the thumb and forefinger when required to be removed, but not so far as to cause the teeth of the lower jaw to touch it when the jaws are closed. The tube is made of silver, and is gold-plated.

D is a silver rectangular canula, of such a size as to accurately fit the tube A. Its upper extremity, E, is perforated by three foramina. F is a movable platform, carrying a thick rubber washer, *f*. The distal extremity of the canula is in communication with a glass (containing the fluid for irrigation) by means of a long rubber tube. When in use the screw-plug C is removed; the fluid from the reservoir is sucked through the canula until a syphon action has been established. Temporary pressure is then made upon the rubber tube just at its attachment to the canula. The canula is now run up inside the antral tube, and the platform B raised so as to abut accurately against its flange. The patient's mouth being now closed upon the canula, the head is bent forward, and the pressure upon the rubber tube taken off. The syphon action is thus at once re-established, the irrigating fluid flowing from the reservoir into the antrum, and out through the corresponding nasal passage. In this way thorough cleansing of the cavity may be secured, and can be conducted with ease by the patient.

The tube and canula are made by Messrs. Krohne & Co., several sizes being kept in stock.

On a Better Appreciation of Rinne's Test. The Aero-Osseal Difference. By DUNDAS GRANT, M.D., F.R.C.S.

This valuable test was laid before the medical world in 1855 by Rinne, of Prague, as embodied in the description of his observation that in normal-hearing persons a vibrating tuning-fork, placed on the skull and allowed to die out, was again audible if held opposite the external meatus. This—the "positive" result of Rinne's test—was the concrete application of the great principle, that a normal tympanic apparatus is a better conductor of sound than the bones of the head. Air-conduction, in other words, is in the normal subject better than bone-conduction.

$$A\,C > B\,C$$

The question, then, has to be considered as to how much in the normal ear air-conduction is better than bone-conduction, or what is the "*aero-osseal difference*" (A O D)?

Not to enter for the moment into the question of the mode of conduction of sound through the cranial bones, nor into that of the difference in the mode of communication of vibrations from the blades and from the stem of the tuning-fork, I shall only say that this is a quantity which must be made out by direct experiment on typical normal persons for any particular tuning-fork intended to be used for clinical purposes. A fork which is heard for about twenty-five seconds longer through the meatus than through the bones is a convenient one, and for such a fork the Normal Aero-Osseal Difference would be 25.

$$N\,A\,O\,D = 25.$$

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

If we find that the tuning-fork after ceasing to be heard on the bone is still audible at the meatus, but for less than the normal (assumed) twenty-five seconds—say only fifteen—this loss of ten seconds of aero-osseal difference would indicate either a diminution in the conducting capacity of the tympanic apparatus, or an increase in that of the cranial bones. I do not think any physical change in the bones can increase their intrinsic conducting power, but this faculty is certainly augmented in the presence of increased tension of the tympanic apparatus, a condition which simultaneously decreases the conducting power of the tympanic apparatus for aerial vibrations. In such a state of matters our A O D would be less than 25—A O D diminished—Rinne positive but shortened.

$$A\ O\ D = N\ A\ O\ D - n = 25 - n$$

If n is less than 25—say 10—the Rinne test will still give the so-called "positive" result, but shortened, *e.g.* :—

$$A\ O\ D = N\ A\ O\ D - 10 = 25 - 10 = 15$$

and according to the generally received interpretation of the test would imply a normal state of the conducting apparatus. It must be evident that this is theoretically untrue, although practically of very wide applicability. Although we may accept it as a safe rule that in the presence of a "positive" Rinne there is no considerable degree of disease of the conducting apparatus, there may, however, be a slight one.

In the next place, if n is equal to or greater than 25, then the aero-osseal difference becomes zero or a "negative" quantity, *e.g.* :—

$$A\ O\ D = N\ A\ O\ D - N\ A\ O\ D = 0$$
$$= 25 - 25 = 0$$

and

$$A\ O\ D = N\ A\ O\ D - (N\ A\ O\ D + n) = -n$$
$$= 25 - (25 + 15)$$
$$= 25 - 40 = -15$$

This would indicate a loss of twenty-five seconds, or more, of the normal preponderance of air-conduction.

It is obvious that we have such a result in those cases in which, owing to disease, the tuning-fork, after ceasing to be heard on the bone, is not further heard opposite the meatus. This is the "negative" result in Rinne's test.

As a general rule the following may safely be accepted. When the aero-osseal difference is zero or a negative quantity—Rinne's test is "negative"—there is some definite abnormality of the conducting apparatus.

Given A O D = N A O D (Rinne "positive"), the conducting apparatus is normal.

Given A O D = N A O D − n = + d (Rinne "positive" but shortened), the conducting apparatus is slightly affected.

Given A O D = N A O D − N A O D = 0
or
= N A O D − (N A O D + n) = n
} (Rinne "negative"), the conducting apparatus is considerably affected.

All this, I hold, is independent of the condition of the perceiving apparatus, the termination of the auditory nerve in the labyrinth, its

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

intra-cranial course, and its central continuation terminating in the auditory cortical centre. I beg the most careful attention to this point, because from questions I have at times had put to me, the value of Rinne's test of the A O D has not been properly appreciated, owing to a failure to grasp this principle, namely, that Rinne's test in itself does not directly afford any positive information as to the condition of the auditory nerve distribution, the sound-perceiving apparatus. Its indirect evidence is, however, of the utmost value, and more especially if the A O D is normal, because then we are able to exclude disease of the conducting apparatus, and whatever deafness is present must be ascribed to an affection of the perceiving organs. We may go further, and allow that if Rinne is positive, and the A O D, though not normal, is still a positive number, the amount of disease of the conducting apparatus compatible with this is only slight, and any deafness over and above what this would account for must be put down to the account of the perceiving apparatus. What amount of deafness may be attributed to the degree of disease of conducting apparatus compatible with Rinne's result being positive, *i.e.*, with A O D being a positive number, has been investigated by Lucae. He has arrived at the conclusion that if the patient cannot hear whispered speech at a greater distance than one mètre the degree of defect of hearing is greater than would be accounted for by such slight abnormality of the conducting apparatus as would be compatible with a positive result of Rinne's test. In other words, with Rinne "positive"—

If A O D = N A O D 25, all deafness present is attributable to the perceiving apparatus.

If A O D = N A O D + n + d, any deafness over and above that necessary to reduce hearing power for whispered speech to less than one mètre is attributable to the perceiving apparatus.

If Rinne is "negative," *i.e.*, if the A O D is zero or a negative number, it may be assumed with every assurance that there is decided disease of the conducting apparatus, but this does not inform us that there may not be disease of the perceiving apparatus as well. In point of fact, a combination of disease of conducting apparatus with that of the perceiving apparatus is not at all uncommon, especially as exemplified in the later stages of dry catarrh of the middle ear, when the labyrinth becomes involved, and also in tuberculous disease of the middle ear extending to the labyrinth.

In uncomplicated middle-ear catarrh (I allude now particularly to those cases in which the objective signs give us little assistance) there is an increase of bone-conduction as compared with a normal ear. In uncomplicated nerve-deafness there is a decrease of bone-conduction as compared with a normal ear. If, then, with negative Rinne we have an absolute diminution of bone-conduction, we may unquestionably diagnose the coexistence of nerve-deafness, and this, *à fortiori*, because the middle-ear disease alone would cause an increase of bone-conduction. The case is fairly clear if we have with negative Rinne merely a normal amount of bone-conduction. This would indicate in a young or middle-aged patient either a form of disease of the conducting

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

apparatus, which, while rendering the A O D negative, did not absolutely increase bone conduction ; *e.g.*, simple obstruction of the external meatus, or an amount of nerve-deafness sufficient to neutralize the tendency of middle-ear trouble to cause increase of bone-conduction, of course not interfering with the aero-osseal difference. In an old person the change in the auditory nerve due to senility would account for the absence of increase of bone-conduction.

If with a negative Rinne there is increase of bone conduction, are we in a position to say that there is absence of nerve-deafness? Theoretically we may not, but practically, with an absolute well-marked increase of bone-conduction we may safely exclude any significant amount of nerve disease, taking merely the tuning-fork indications as our guide. I leave out of account for our present purpose the resort to tests by means of Galton's whistle, comparison between hearing for conversation and for the watch tick, the presence or otherwise of paracusis Willisii, the history of the case, and the surrounding circumstances.

From the observation of a considerable number of cases I arrived at the conclusion that the increase of bone-conduction was in uncomplicated dry middle-ear catarrhs fairly equal to the diminution of air-conduction. Thus, with a diminution of air-conduction for the tuning-fork to $-10''$, there should be an increase of the bone-conduction to $+10''$ if there is uncomplicated middle-ear catarrh or tension. I have found sufficient exceptions to prevent me from urging the acceptance of this relation as an absolute standard, but as a rough general rule it will be found of considerable value. Given then—

A O D $= -d$, with B C diminished, there is along with disease of the conducting apparatus an affection of the nerve.

„ „ with B C normal, there is disease of the external ear, or a combination of middle-ear and nerve-deafness (unless in an old person).

„ „ with B C increased in proportion to the diminution of air-conduction (and in most cases whether or not), there is middle-ear disease pure and simple.

I shall now advert to several conditions in which, without due care, fallacies may arise.

In cases of unilateral nerve-deafness it is not uncommon to get an apparently negative Rinne in the following way. The fork is placed on the mastoid of the deaf side, and is heard by the patient. When the sound is no longer audible, it is then held opposite the meatus, and is no longer heard. This is negative Rinne. If, however, we inquire carefully, we shall find that the fork vibrating on the mastoid of the affected side is heard *in the opposite ear*, and we thus escape the erroneous diagnosis of middle-ear disease. Naturally, we do not overlook the nerve-deafness, because the absolute diminution of bone-conduction is usually unmistakable, and a tuning-fork on the vertex is heard best in the good ear. A further check on the patient's statements is afforded by applying the fork on the parietal eminence. To those who have read Burnett's well-known work it will be familiar that under normal circumstances a

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

fork vibrating on the parietal eminence is heard in the opposite ear. In unilateral nerve-deafness it is heard in the sound ear, whichever parietal eminence it is placed on.

In old persons—those at least who are over sixty—it is usual to find that bone-conduction has diminished to a greater extent than air-conduction, and that even with a comparatively considerable amount of disease of the middle ear there is not sufficient bone-conduction to indicate increase, as compared with the normal ear, nor enough even to render Rinne's test "negative." In such patients we must carefully beware of undue readiness to exclude middle-ear catarrh from our diagnosis because we happen to find that conduction by the air is still greater than that through the bones.

It must be remembered that it is for low tones particularly that defects in the conducting apparatus disturb the hearing, and that air-conduction for low-pitched forks is diminished by a lesser degree of middle-ear disease than is necessary to diminish the hearing for high-pitched ones. Similarly the A O D becomes negative for low-pitched forks before it does for the others. We have thus a valuable application of Rinne's test, as practised by means of a series of five tuning-forks ranging at intervals of an octave from C with 256 to C^{11} with 4096 double-vibrations per second. The A O D is tested with all in succession, and a note is made as to whether all or any give positive or negative results. This is best carried out after inflation of the tympanum to a suitable degree by means of Politzer's method, the catheter, or some equivalent process. The prognosis is favourable in proportion to the number of the forks which give a positive A O D, and *vice versâ* (Dench).

In performing the comparative test we have been primarily concerned with simple Rinne. We must avoid using a high-pitched fork alone, as the existence of a positive A O D for such a one is quite compatible with considerable disease of the conducting apparatus. On the other hand, a very low-pitched fork is often so bulky and of such moment that its vibrations are apt to be felt, even when no longer heard. Though excellent and indispensable for physiological inquiry, they are less adapted for clinical work than the model devised by the late Mr. Gardiner Brown, vibrating five hundred and twelve times in the second, light in construction, convenient to manipulate, and, while vibrating just sufficiently long to permit of differential observation, not unnecessarily wearisome so as to deter one from the routine use of the various tuning-fork tests, each of which calls for confirmation by means of the other. In recommending such a fork for the purpose of sparing fatigue and saving time, I can further commend it as, at the same time, exhausting the auditory nerve of the observer and the observed less than the larger ones.

The effect of exhaustibility of the auditory nerve has to be kept in mind as influencing our investigations. An ear exposed to a sound becomes after a time fatigued and unable to hear it so well, although it recovers itself after removal of the source of sound for even an instant. Thus if a vibrating tuning-fork is placed on our own normal mastoid the sound ceases to be heard after a time, but is again heard if it is removed for an instant and then replaced. It is obvious, then, that if, after the first

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

cessation of the sound, we transfer the fork to the mastoid of another person, that person will, if normal, hear the fork, and apparently possess increased bone-conduction. The reverse is also true, and it is therefore evident that there is an undue advantage in favour of the person who is tested in the second place, whether observer or patient. Hence, if in applying the test the fork is placed on our own mastoid, rehearing on the part of the patient would apparently indicate increased bone-conduction. This result has to be checked, unless the difference is very considerable, by a reversal of the process, taking the mean between the two results. A further safeguard consists in removing and replacing the fork on our own ear till no recurrent hearing takes place, and only then applying it to the patient. The attention of the profession was drawn most forcibly to this recurrent hearing by Dr. Corradi, of Padua, and the importance of the effect of auditory nerve exhaustion, as affecting these tuning-fork tests, has only been brought prominently before me by the observations of Dr. St. George Reid, of Croydon, whose valuable clinical assistance I have had the advantage of enjoying for some months. To minimize the degree of exhaustion and consequent source of fallacy, it is advisable to allow the fork to "die out" to the minimum audible volume before applying it to the bones or meatus of either patient or observer. This last point is stated by Bezold, whose classical study of Rinne's test is a well of information on the subject, and is indeed the chief source of inspiration of the writer's reflections in connection with it.

So far the question of exhaustion occurs in reference to comparisons between the hearing of one person and that of another. It will be seen that the same applies to comparison between bone- and air-conduction in the same individual. Here, again, the mode first tested is at a disadvantage, and, in employing Rinne's test as usually done, *i.e.*, by placing the fork first on the mastoid, we place the bone-conduction at a disadvantage. Hence, when the test turns out "positive," a little allowance must be made for loss of bone-conduction through exhaustion, and the result must be checked by reversing the process. When, on the other hand, the result is a "negative," then *à fortiori* preponderance of bone- over air-conduction may be diagnosed without further confirmation, remembering the cautions to be observed in cases of unilateral nerve deafness.

It remains now to explain, in the light of the foregoing, one or two difficulties which I have known to occur to practitioners who were not by any means novices in otology, such as why Rinne's and Weber's tests should give in some cases opposite results, why a "positive Rinne" does not always exclude middle-ear disease, and how far it helps us in diagnosing nerve-deafness, and, lastly, how far "negative Rinne" enables us to diagnose disease of the conducting apparatus.

Weber's test, as we have seen, will indicate the seat of lesion in a case of extreme unilateral nerve-deafness, when Rinne's test would apparently indicate, by "negative" result, a preponderance of bone- over air-conduction on the affected side, the vibrations by bone-conduction being actually appreciated in the opposite ear. In regard to Weber's test we must bear in mind Gradenigo's singular observations with his

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

osteo-tympanic acoumeter—that opposite results are obtained if very loud instead of very feeble sounds are used in testing; only the minimum of audible sound should be employed. This observation was neatly confirmed by Kirchner's case of exfoliation of the cochlea, related before the Congress at Rome. When the tuning-fork was vigorously struck, it was heard loudest in the cochlea-less ear, and when very gently struck it was heard only in the sound ear. A tuning-fork vibrating with the greatest feebleness compatible with audibility should be employed.

A "positive" result of Rinne's test does not absolutely exclude disease of conducting apparatus, because we have seen that although Rinne may be positive, it may be shortened—that is to say, that the aero-osseal difference may be less than the normal, and yet be a positive number. The disease in such cases can only be slight. Again "positive" Rinne enables us to diagnose nerve deafness only in so far as we can by means of it exclude disease of the conducting apparatus as accountable for any of the deafness.

"Negative" Rinne enables us to diagnose obstructive deafness, whether or not there be superadded thereto an affection of the perceiving apparatus.

In practice the test is constantly of the utmost value, and I have endeavoured to show what I believe to be its true position, differing alike from those who under-estimate its importance, and from those who would employ it to the exclusion of all other tuning-fork tests.

Deaf-Mutism as a Clinical Study. By JAMES KERR LOVE, M.D.

Most ancient and many modern authorities fail to appreciate the case of the deaf-mute, and even now it is not easy to grasp exactly the essence of deaf-mutism. The absence or loss of hearing so stunts the development of human faculties, so completely detaches its victim from what is common to men, that the claim of the deaf-mute to be human at all has been questioned. He has been said to be on a par with the idiot, to have his place below some of the animals. He has been called ungrateful, cunning, and treacherous. All sorts of peculiarities have been ascribed to him, and a serious attempt has been made to show that he is generally left-handed. His absence of speech has been supposed to depend on defective vocal arrangements—a stunted larynx, a tied tongue, badly developed lungs. People who talk like this have never tried to teach the deaf, they have never watched them play, they cannot have thought correctly on the cause of the muteness. It is not necessary here to say much on these absurd views about deaf-mutes. But it is desirable to point out that the average deaf-mute is a case of very defective hearing, and nothing more. That is the essence of the case. That is the one fact which must not be lost sight of, either by the clinical observer or the teacher of the deaf. We are studying deafness and its results, the teachers are educating the deaf. All that has happened is this—"The "small music room built of ivory, no bigger than a cherry-stone, which "we call the ear, and in which the performance of the largest orchestras "are accurately reproduced, is absent or has got damaged, and the soul "waits in vain for any echo from the outer world. But the soul is there "all the same, and if your deaf-mute is not as human as his hearing

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

"brother it is because you have failed to reach it, and your educational "methods need remodelling."

Stripped of the poetry with which Dr. George Wilson has invested his sketch of the anatomy of the internal ear, and put into plain English, the deaf-mute is usually a case of disease involving the internal ear and nothing more. There are stupid children in every deaf-mute school, just as there are duffers in every board school. Here and there one comes across an idiot, but the schools for the deaf have no monopoly of idiocy, for the officials of our institutions have sometimes to dismiss idiots with perfect hearing. Sometimes the disease which has caused the deafness has also damaged the eyesight or the brain itself, but eight out of every ten deaf-mute children are just like their neighbours in the board schools, minus the sense of hearing.

The recognition of deafness is only difficult in the very young. In nearly all children positive evidence of the presence of hearing is given during the first weeks of life. The child is awakened by a noise, and the chief difficulties most mothers have is to arrange for the quiet consistent with the unbroken sleep of their babies. A mother's assertion that her child did hear at birth is therefore usually reliable. The diagnosis in older children is easy. Sharp, loud sounds are produced behind the back of the child, and the face watched, and if aerial hearing be present some change in expression will be noticed. The amount of this hearing when present can be measured, but as a paper on this subject is promised by Mr. Harsant, I refrain from further discussion of it.

The clinical aspects of deaf-mutism may be studied either in young children who are losing their hearing or in the finished article as it exists in the deaf and dumb institutions. Neither of these classes have received the attention from the doctors which they deserve. Deaf-mutes have always been regarded as outside medical practice. Our profession has never shaken off these popular fallacies about deaf-mutes; first, that they have all been born so; second, that they are all quite deaf; and third, founded to some extent on these two, that they are helpless, defective characters not capable of taking any useful place in society. I have discussed and reported the first two of these fallacies,[1] and will content myself with a restatement of the facts that most deaf-mutes are born hearing, and that few mutes are totally deaf. The third fallacy is being daily reported by the devoted body of teachers of the deaf in America, on the Continent of Europe, and in our own country.

Congenital deafness so often "runs in the blood," and is so marked by heredity that its social aspect claims most attention. It has a clinical aspect. But practically the prevention of congenital deafness resolves itself into the discouragement or prohibition of inter-marriage between the congenitally deaf.

In the larger class of cases, those of acquired deafness, the practitioner has a better field. A large proportion of these cases of acquired deafness have never had an aural speculum used before they enter the institutions for the deaf and dumb. I make this statement on the authority of the

[1] "Archives of Otology," Vol. xxii.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

parents of the children, and of the medical men these parents employ. This means that medical men generally cannot use an aural speculum or are careless about the diseases which cause acquired deafness.

I find that cerebral inflammations, convulsions, and fits cause a third of the cases of acquired deafness. Now if all cases of this type ending in deafness were carefully observed and reported by those in charge of them, what a flood of light would be let in on the hazily defined group of ailments embraced by these terms. Not only the deafness, which is the most distressing result of the illness, but the essence of the disease might become clear. It is useless to talk of the treatment of deafness thus resulting; what we want first is more accurate diagnosis of the diseases causing the deafness.

Measles, scarlet fever, and other infectious diseases account for about another third of the cases of acquired deafness. Here the duty of the practitioner is very clearly defined. The application of the principles of surgical cleanliness to the suppurative otitis accompanying these diseases would prevent many cases of deaf-mutism. We have not yet reached the time when a suppurating sore in the tympanic cavity is intelligently treated by the general practitioner. There is supposed to be something special about this sore, which takes it out of the range of ordinary surgical principles.

Primary ear affections account for a smaller number of cases of deafness than one would suppose—hardly a tenth. The remarks I have made in connection with the otitis of the exanthemata apply here with equal force.

The only other cause I think worthy of separate mention is hereditary syphilis. Parents never put this down as a cause of deafness in their children, and doctors hardly ever insert this in the admission schedules. Nevertheless I have discovered evidence of syphilis in several children in the Glasgow Institution where no other cause of deafness was stated or ascertainable, and the fact is worth emphasizing.

Coming now to the finished article—the deaf-mute at school—we have an enormous field for observation and practice. All children entering a school for deaf-mutes should have their ears carefully examined and their hearing tested. The examination at this stage is much more important than the testing. One's means of communication with an uneducated deaf-mute are so limited that the result of the test must be accepted with great care. Within a few weeks, too, the teacher will find out any hearing which is worth developing, and then a more careful testing may take place. But the examination of the ear must be done at once and thoroughly. All sorts of foreign bodies will be found in the ears, and many cases of ceruminous collection will be discovered. Now the removal of these obstructions to aerial vibrations will not restore hearing and let the child attend an ordinary school. It will improve hearing in some cases. But these collections and foreign bodies exist in ears in which suppurative disease is easily set up, and as suppurative disease is not only a danger to the remaining hearing but a menace to life, its occurrence should be anticipated by the removal of every cause. Then a few cases of active suppurative disease will be found, and the suppurative otitis of deaf-mutes

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

is the most obstinate type I have ever treated. This is not to be wondered at when one remembers the antecedents of these children. But it can be controlled and generally cured. Persistent cleanliness with antiseptic insufflations—equal parts of iodoform and boracic acid powders is the best mixture—will heal most cases.

In the great majority of cases inspection will show the middle ear to be altered in both congenital and acquired deafness. But an indrawn or perforated, or even an absent membrane, does not account as a rule for the high degree of deafness which causes mutism. The tuning-fork test will show that the damage is not confined to the middle ear, but that the internal ear has suffered too. It is this, along with the fact that the deafness is usually of long standing, which makes improvement in the hearing of deaf-mute children so hopeless. Here and there one meets a case in which the history and the presence of a good remnant of hearing suggest the use of the air-douche. Indeed, were it not for the enormous work involved, one would like to try this method of treatment somewhat largely in our institutions.

The tonsils and naso-pharynx are found notably diseased in about two-thirds of deaf-mute children. Should anything be done for this condition? I do not refer to cases where throat symptoms are present. In these one would apply the same principles as in healthy children. But in the absence of painful symptoms what inducement is there to rid a deaf-mute child of enlarged tonsils or adenoid growths? That depends on the kind of education being given to the deaf child. The highest blessing you can confer on him is to give him back his means of converse with the hearing and speaking world. The best teaching methods aim at this, in as large a percentage of children as possible. It is not enough to teach a deaf child to speak with his fellow mutes. More may in many cases be impossible, but more should in every case be attempted. If, then, the deaf child is to speak well, we must rid him of all obstructions in these organs of speech—the throat and nose. This means entering a fresh field of work. In no country, so far as I am aware, has the oral system called in the help of surgery for the improvement of its results. The condition in the throat and nose of many oral pupils would make distinct speech in hearing children impossible. How frightfully then is the deaf-mute handicapped by these obstructions. Without the help of the aural surgeon the best results under the oral system are impossible.

The following suggestions arise out of the consideration of this subject:—

1. In connection with every deaf and dumb institution in the United Kingdom should be an aurist, whose duty it would be to examine the ears and test the hearing of every child admitted to the institution. Medical men need not mix in the war about teaching methods, but should supply the information without which the best method cannot be determined. Where the oral system is to be taught, surgery can do something to improve the articulation. Any treatment which promises improvement in hearing should be tried.

2. Otologists should continue to direct the attention of the profession and of the public to the more careful treatment of diseases of the ear,

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

and especially to those ear affections which complicate the exanthemata. Local authorities should include measles amongst those diseases to be compulsorily notified, for the disease is one of the most fruitful sources of deaf-mutism.

3. Marriages among the congenitally deaf should be discouraged, or, if necessary, prohibited.

4. The temporal bones and the brains of deaf-mutes who die from whatever cause should be carefully examined, and the reports published.

It is only by careful work on these lines that we can diminish the number of those on whom this terrible calamity of deaf-mutism has fallen, or ameliorate the lot of those who neither speak nor hear.

Discussion on Dr. Love's Paper.

Dr. Dundas Grant: Such an endeavour as Dr. Love has made in his interesting paper cannot be too highly appreciated. In my opinion a new era is dawning in relation to deaf-mutism. We require more men with special attainments ready to take up in Dr. Love's spirit the case of the deaf-mute, and I am ready to support him in all he has said. I would, however, like to call his attention to the results obtained of late by Prof. Urbantschitsch, of Vienna, and which are creditable alike to his scientific energy and his self-sacrificing goodness of heart. He must not be allowed a monopoly, and I hope that his *modus operandi*, so freely set forth in his papers in the "Wiener Klinisch. Wochenschrift," will be followed. He finds that in all the supposed totally deaf cases (with deaf-mutism) brought before him there is a residuum of hearing power amenable to methodical cultivation. He finds them soon able to appreciate vowels; later, consonants and words and sentences. The hearing faculty gradually increases, and the power of speech in those trained in lip-reading is enormously improved. In addition to daily special individual instruction from the professor or his assistant, the patients can exercise each other, and the patient can exercise at the same time his speaking and hearing by speaking into the bell of a long flexible speaking-tube, the other end of which he places in his own ear.

This method of training must be taken up by all those who sympathize with every means of improving the condition of the deaf-mute—indeed, by every student of deafness who wishes to keep up with the times. My attention was most strongly drawn to this subject by Dr. Goldstein, of Boston, U.S.A., whose enthusiasm had been fired by personal observation of Prof. Urbantschitsch's methods and results. Dr. Goldstein's demonstration on several deaf-mutes astonished me and those teachers of deaf-mutes who were present.

Dr. Bennett: Among the methods adopted in the training of deaf children, the speaking tube can be used with benefit. There is often a certain power of hearing, which is not developed, because it is not sufficient for ordinary speech. If, however, the speaking tube be used, the slight amount of hearing which exists is developed, and not only is some benefit derived in this way, but further, the tone of the voice in those trained in the oral system is improved.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

With regard to the question of operating when deaf-mutes suffer from obstructed respiration, this should always be done, since it tends to improve health, and lessens the tendency, so frequently present, to chest disease. This may be done with the greater confidence, because in rare cases the hearing is improved in consequence of the operation, even in apparently hopeless cases.

Dr. WARDEN, having been a Medical Officer to the Royal Deaf and Dumb Institution at Edgbaston, had had some experience in the condition of the ears in deaf-mutes. They depend on such a variety of causes that, although there was some improvement in a few cases treated, the majority were not capable of satisfactory relief, the nerve lesion being so prominent a feature, and which, unfortunately, does not yield easily to remedies. With regard to the systems of teaching, he was of opinion that the combined system is most advantageous—the manual in some, the oral in others.

Mr. HARSANT had recently examined the hearing power of forty-five deaf-mutes in the Bristol Institution, and had been struck with the large number of children who had some remaining hearing power. Out of forty-five children, he had found three who could hear and imitate words, and another seven who could hear and imitate vowel sounds. He suggested that these children might be instructed by the oral or acoustic method, by which their hearing power might be improved.

Dr. MCKENZIE JOHNSTON (Edinburgh) had listened to Dr. Love's paper on deaf-mutism with the greatest interest. As an aurist to a deaf and dumb institution, he had made a routine examination of a large number of cases, and his experience was quite in accord with that of Dr. Love. The proportion of the children having some slight hearing power he found to be great, and the proportion of cases having throat catarrh, large tonsils, adenoids, &c., was even greater still. Without expecting any benefit to the hearing power, he was inclined, for the sake of the general health, to operate where the nasal respiration was markedly interfered with.

Dr. LOVE, in reply, said he attributed the great attention paid to his paper to a large-hearted interest which was now waking up in the minds of the members of the profession about the poor deaf-mute. He put much importance on the development of hearing, and thought the method he had called the oro-acoustic method was worth trying in many cases. The greatest practical difficulty in the medical treatment of deaf-mutes, and in the adoption of the best methods of education, was the apathy of those in charge of the institutions. Directors, too, often managed these institutions on purely commercial principles, and seldom was any member of the board skilled in the nature or management of deaf-mutes.

Case of Recurrent Fibrinous Rhinitis. By Dr. BURN MURDOCH (Edinburgh).

A. R. U., female, aged thirty-three.

Previous history: The patient enjoyed good health, with the exception of severe attacks of migraine. In the summer of 1885, fully four years before the attack about to be described, she had her first attack of hay

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

fever, and in each subsequent year has suffered from it in an increasingly severe form.

History of first attack of fibrinous rhinitis: This commenced on November 18th, 1889, with a slight cold in the head, which rapidly became very severe. In four days the nostrils were completely closed down to their orifices. A continuous discharge of muco-gelatinous secretion necessitated the constant application of towels to the nose by night and day. The nose itself became swollen and painful. Speech was indistinct and difficult.

On the sixth day white membranes were observed to protrude from the nostrils. They were tough, and came away in casts about the size of half the shell of a boiled bean, which they resembled in shape, but were not so opaque. They could be seen adhering to the mucous membrane of the inferior turbinated bones. Large quantities of them were cast off daily. The running from nostrils and general discomfort was such that reading or any work was prevented. Blowing of the nose was impossible, as the passages were completely blocked.

The whole appearance of patient's face was altered. The nose became much swollen, and seemed to rise out of the forehead and cheeks and project in a short cone. Slight erythema was noticed on the cheeks.

In a week's time the running had nearly ceased, occasional opening of the nostrils by blowing was possible, but they remained in general closed for three or four days more. The whole attack lasted about a fortnight. Frequent attacks of severe sneezing accompanied the malady, preceded by tickling in the back of the throat. There was no rise of temperature.

Till the second attack the throat remained irritable. There was persistent cough and frequent sneezing, but no actual cold in the head. About a week previous to this attack the fauces and larynx had been examined one evening in the usual manner. Whether owing to this or not the left half of the tongue swelled largely during the same night, so that by morning it was very difficult to articulate. The condition was suggestive of an effusion of blood, and I thought I should have to incise it. The swelling, however, subsided quickly in the morning.

Second attack: Commenced on February 15th, 1890, in a manner almost similar to the first. The running from nostrils was even more severe. Towels had again to be employed. Corrosive wool put into the nostrils afforded some relief; when removed the membranes adhered to it, appearing as if they had grown into the wool. The nose and cheeks were considerably swollen and became hot, red, and painful. The uvula swelled and the throat felt hard and dry. Breathing was difficult and the general discomfort intense. Hot bathing, iodoform, menthol, fluid vaseline and cocaine afforded no real relief.

Morphia and aconite in small doses checked the discharge a little. Towards the end of the attack when the nostrils were opening, cocaine also somewhat checked the running. The membranes practically ceased at the end of first week, but after the nose had become clear for a day or two, the muco-gelatinous discharge and closing of the nostrils commenced again and became as troublesome as at the commencement. The whole attack lasted a fortnight. A feeling of great irritation of the skin

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

generally accompanied this attack, and towards its termination some dark coloured spots were noticed down all the front of the left thigh. Some ran into each other. These persisted for several days. They resembled purpuric spots. Quinine and iron were given during attack.

Third attack: Commenced on the evening of April 17th, 1890, after travelling from London to Edinburgh. A slight sensation as of a cold in the head coming on accompanied it. During the greater part of the journey the patient felt chilly and suffered from cold feet. Next day (18th) she had a cold in the head with running of nostrils and sneezing. On third day (19th), cold was aggravated. Uvula was œdematous, and nose slightly swollen by the evening. During the night the nose ran freely, and the pillows were stained with muco-gelatinous discharge as on former occasions. Towels had to be used. The patient passed a miserable night on account of the nasal obstruction, throat swelling and pain in nose, which by next morning (20th) was much swollen, and the whole appearance of the face was again entirely changed. Some fibrinous membrane became detached from the left nostril.

April 21st: Nose more swollen, felt pulsating, frontal headache was present, accompanied by profuse discharge. Numerous well defined casts were thrown off from both nostrils. The temperature, though frequently taken, remained normal.

April 22nd: Face was very swollen, eyes puffy and lids œdematous. There was sneezing, with much discharge, and frequent casts.

April 23rd: Membranes stopped during night; skin over cheeks and lips tender and indurated. During evening swelling of eyes and nose recurred, and fresh membranes formed in the right nostril.

April 24th: Breathing was much impaired by swelling of throat, and pronounced œdema of throat and uvula. The nose was completely blocked. The right eye became suffused, In the evening the skin over back and front of body, arms, hands, and legs grew very irritable. The least rubbing produced a red blush.

April 25th: During the night a large ovoid hard swelling occurred in the right half of the tongue, which by morning was much swollen and painful, rendering speech and deglutition difficult. It subsided entirely during the day. A spatula had been used gently the day before to depress the tongue during examination of throat. Throughout the 25th the skin irritation diminished. Face and nose were less swollen; smell and taste commenced to return.

Improvement now gradually progressed, with the exception of a slight relapse on 28th, but sneezing, pricking of the throat, and more or less complete obstruction of the nostrils remained persistent.

Fourth attack: Commenced on May 26th, 1890, and lasted for fully a week. The symptoms, including the discharge of membranes, were similar to but not so severe as those formerly described.

Fifth attack: Commenced on November 13th, 1890, and lasted eight days. It was like the fourth in not being of so severe a type as the earlier ones.

Subsequent history: During the summer of 1890 and spring of 1891 the throat and nose remained irritable. Hay fever occurred as usual, but

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

in an aggravated form. In June, 1891, Dr. McBride examined her, and after carefully searching the mucous membrane of the nostrils for any specially irritable points he cauterized them with the electro-cautery. Since this cauterization no attack of fibrinous rhinitis has occurred (till a recent one a fortnight ago, about to be described), nor has the patient had a bad cold in the head. The spring and summer of 1892 were spent by the patient in bed, on account of a severe illness, and it is interesting to note that no hay fever occurred.

In June, 1893, patient suffered from a very bad attack of hay fever, which was confined *entirely* to the eyes, and which became so swollen that she was blind for several days. On July 1st, 1894 (after this paper was written), having been exposed in the sun on a hot day in a meadow, an attack of hay fever commenced, which chiefly affected the throat and eyes. Nose symptoms shortly developed, and the patient for the sixth time suffered from an attack of fibrinous rhinitis. This closely resembled the former ones, a pronounced erythema, with œdema of the eyelids and cheeks being very marked. Membranes were shed on the evening of the 6th for the first time. They were not so numerous as on former occasions, and only appeared in the left nostril. Dr. McBride saw them *in situ*, and verified their appearance.

This attack undoubtedly began as hay fever usually does, and the patient had no nose symptoms till the erythema of the cheeks spread to the nose. No rise of temperature was at any time detected. The attack ran the usual course, but left the nostrils, especially the left one, much blocked.

Convalescence was accompanied by constant irritation of the throat and nose and a continuous sero-mucous discharge from the nostrils. Dr. McBride cauterized the mucous membrane of both the inferior turbinated bones on July 21st, since when decided improvement has set in.

The rarity of the case, the obscurity of its causation, and its intractability to treatment, have induced me to bring it before this section.

Pathological Report by W. F. Robertson, M.B.

The microscopic structure is of great interest, and very difficult to interpret. The membrane seems to be composed mainly of fibrin, containing numerous round cells, and is devoid of vessels. In addition, there are epithelial cells so arranged as to make me inclined to think that at places the whole depth of the mucous membrane has been shed.

Sections stained by Loeffler's method show no bacilli or other organisms. Sections stained by Gram's method show a few groups of micrococci which have no special significance.

Discussion on Dr. Burn-Murdoch's Paper.

Dr. Dundas Grant: It seems quite unlikely that this could be a diphtheritic case. My experience of fibrinous rhinitis is limited, and I relied upon Dr. Sendziak's belief that they are not diphtheritic. Subsequent results have led me to an opposite opinion. In the case of a

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

child with fibrinous rhinitis, post diphtheritic symptoms followed and others were infected. In another case presenting signs of post diphtheritic paralysis, there was a history of previous extrusion of a fibrinous cast.

Excision of the Malleus as a Preliminary Operation to Opening the Antrum in Cases of Suppuration from the Attic and Antrum. By THOMAS BARR, M.D. (Glasgow).

I have, within the past year, removed the malleus from seven ears affected with intractable suppuration from the attic and antrum. Six patients—five males and one female—were operated on, as in one patient both mallei were excised. In all the cases the purulent disease had existed for a very long period, ranging from seven to twenty-five years, and had been treated, at the hands of experts, by all the recognized ordinary methods—in no case for a shorter period than six months. In every one the discharge had been persistently offensive in spite of regular antiseptic cleansing. In three cases the tympanic membrane was entire, with the exception of a small perforation in Shrapnell's membrane. In the other four there was larger destruction of membrane, but clear evidence that the source of the discharge was in the attic or antrum or both. In regard to anæsthetics, chloroform was administered in four cases, and in three, cocaine, applied repeatedly during the operation, was used with very satisfactory results.

In the three cases, having simple perforation of Shrapnell's membrane, I removed the upper part of the tympanic membrane so as to include the whole of the malleus. The spade-shaped knife was used for separating the head and neck of the malleus from their connection, afterwards suitable forceps were employed for extracting it. Sharp scoops, such as I show you here, were used to clear out the attic as thoroughly as possible, as well as in some cases to scrape away the softened bony edge of the Rivinian segment. The incus was in no case found, as probably in these cases it is destroyed by erosion, or so displaced as to be inaccessible by operation through the canal of the ear.

During the first week, fine powder of iodoform and boracic acid was insufflated as a dressing; afterwards the attic, and as far as possible the antrum, were regularly and daily syringed with a two per cent. watery solution of carbolic acid by means of an attic syringe, followed by the injection into the attic of a spirituous solution of carbolic acid or resorcin. The attic syringe, which I find most useful, has a wider bore than the usual intra-tympanic syringe, whose narrow lumen I have found of little service in washing away the purulent and cholesteatomatous matter, which is so commonly found. It is necessary that the stream should be larger and stronger in order to exert a sufficiently strong mechanical effect upon the purulent *débris* in these spaces. I have rarely found it possible to syringe the attic efficiently previous to the removal of the malleus, the space leading up to the attic being too small for the introduction of the tube of the syringe. After the removal of the malleus, however, there is no such difficulty, the space being amply wide to allow of most effective syringing.

The therapeutic results from these operations have been improvement

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

in all, but permanent cure in none. In all, the discharge was lessened—in some, very markedly, and the offensive odour destroyed, at least so long as the attic syringe was employed. The most successful case was that of a young man, twenty-one years of age, whose left ear had discharged for eight years. There was a very small perforation in Shrapnell's membrane. He had been under treatment for at least two years without result. About a year ago the malleus and upper part of the membrane were removed. The subsequent use of the attic syringe brought away considerable quantities of desquamative matter. The result has been that, instead of a constant discharge, the ear now remains perfectly dry for several weeks, but it is then found to yield a slight moisture, which ceases for the same space of time after a single use of the attic syringe with an antiseptic solution.

In two, which showed least improvement, it was resolved, after some months, to proceed to the larger operation of opening the antrum from behind, and so gain access to the attic, hoping in this way to effect a cure. These two operations were performed by Dr. McEwen, of Glasgow, who operated with the dental burr and gouge. In both cases the incus was found in the anti-tympanic passage. It was removed along with granulation tissue and cholesteatomatous material, while the walls of the antrum and attic were scraped and burred as carefully as possible. Afterwards the spaces were filled with powder of iodoform and boracic acid, and stuffed with gauze. The parts remained undisturbed for a fortnight, when the powder and stuffing were removed without syringing, the cavities being looked at and re-stuffed weekly for a month or thereabouts. The opening behind into the antrum was all along treated on the dry method, but after six weeks the ear itself was occasionally syringed. The first case was operated upon on the 16th of March last, and was that of a lady twenty-eight years of age, with a history of twelve years' suppuration, with perforation in Shrapnell's membrane, the discharge having been all along most offensive and copious. I removed the malleus on 30th September, 1893, with the effect of only slightly diminishing the quantity of the discharge, and the major operation was performed on the 16th March of this year. The result has been most gratifying. It is now over three months since the operation, and the ear is entirely dry; indeed, there has been no discharge after first cleansing after the operation. The hearing power of the ear, however, is less acute than previous to the removal of the malleus, but this is considered a small matter compared with the vastly important effects upon the purulent disease.

The second case operated upon by Dr. McEwen was that of a gentleman thirty-two years of age, both of whose ears had been affected since childhood by a fœtid purulent disease. I removed both mallei; the one on the 23rd June, 1893, and the other on the 11th September, 1893. Large quantities of caseous matter were from time to time removed from both attics with the attic syringe. The hearing improved and the discharge markedly diminished in the right ear, but in the left it remained pretty much the same. In the left ear, after a time, the opening into the attic contracted so as to prevent the efficient use of the syringe. The major

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

operation was performed on the 6th of June last, and so far the result promises to equal the first case. Here the incus was also found in the anti-tympanic passage and removed.

In regard to these two cases, we cannot, of course, base very much upon so limited an experience, but, so far as this limited experience has gone, I am disposed to think that when the removal of the malleus and corresponding part of the membrane does not lead to the entire cure of this persistent form of purulent disease of the ear it may prove a very useful preliminary operation to the more serious one of opening the antrum and attic. I think the latter operation may have a better chance of success after the former. Only larger experience, however, will determine whether the preliminary operation of removing the malleus and, if possible, the incus may not ensure that a better result will follow the opening of the antrum, and whether we should not, in all cases after finding that only partial success follows the smaller operation, proceed to the major one.

Discussion on Dr. Barr's Paper.

Dr. Knapp (New York): From the little experience I have in the removal of the hammer alone, I cannot but agree with Dr. Barr's statement that this operation rarely produces a permanent cure. We know that the anvil is more often carious than the malleus. Excellent results are obtained by Stacke's operation, as I have convinced myself by witnessing and watching several cases operated on in my clinic by an assistant of mine, Dr. Vulpius, a former assistant of Stacke's. I think, however, that oftener than by any of these operations the cleansing of the middle ear will be successfully accomplished by penetrating into the tympanic cavity and attic through the mastoid antrum and its neck, after the soft posterior wall of the ear canal has been detached and pressed against the anterior. In this way I have operated several times myself In many cases, however, we have to operate more than once to obtain a permanent recovery.

Observations upon Excision of the Ossicula Auditûs in Chronic Suppurative Otitis Media. By Dr. Milligan (Manchester).

Mr. President and Gentlemen,—Among the various problems which have of late years been occupying the attention of otologists, the question of the advisability or otherwise of removing the ossicula auditûs (*per meatam*) in chronic suppurative affections of the middle ear has held a prominent place. So far this question has by no means been settled, nor, indeed, have the exact indications or limitations for its performance been definitely agreed upon.

At the present moment, therefore, the surgeon has to rely mainly upon his own individual judgment in any given case without having the benefit of that definite expression of opinion which alone is to be derived from the free discussion of any question about which there is considerable divergence of feeling.

In the Otolological Section of this Association last year I had the privilege of reading a short communication upon "The Treatment of

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

Chronic Suppuration of the Middle Ear by Excision of the Auditory Ossicles," and of recording several cases in which this procedure had been attended with favourable results. Since that time my attention has been much given to this subject, and, as there are many points connected with the indications for the operation, the actual *modus operandi*, and the necessary lines of after-treatment, I have taken the liberty of again bringing the matter forward, with the hope that the views of some of those here present may be given, and points which appear as doubtful be fully discussed.

It may be taken, I think, for granted that any idea of such operative interference is entertained only in those cases in which the more usual, or what one might call the minor methods of treatment have been carefully and persistently carried out, and have failed to check the purulent discharge. By such minor measures I mean the regular flushing of the middle ear, either *per tubam* or by means of intra-tympanic canulæ of one form or another, the local application of astringent, antiseptic or caustic preparations, the removal of masses of granulation tissue tending to maintain purulency and to retain discharge, the tamponing of the part, as suggested by Gruber, and the employment of all those measures, hygienic and tonic, which tend to promote the general well-being of the patient. Notwithstanding, however, all possible care and perseverance, the surgeon will frequently be disappointed with the continuance of the morbid process. This happens not only in those cases in which the focus of the disease is in the tympanic attic, but also in certain cases in which the brunt of the disease is located within the atrium. If we look for the reason why this should be so, we shall, I think, in most cases find it due to one or other or both of the following causes:—

1. Imperfect drainage.
2. The presence of bone disease.

The first cause is undoubtedly the more important, for I presume that if we could obtain proper surgical drainage from the outset the second cause, the presence of bone disease, would rarely exist. The long-continued suppurative inflammation of the muco-periosteum lining the middle ear causes progressive erosion, with the result that bone is laid bare and carious processes are set up. As the muco-periosteum lines the tympanic cavity and clothes the ossicula auditus, it is obvious that in time we may have parietal or ossicular caries, or the two combined. Bearing this in mind, it will readily be seen how essential it is to secure free drainage from the outset, so as to minimize at any rate the chances of secondary bone trouble. In those cases in which the morbid process is situated in the epitympanum, everything would appear to be against the attainment of this great principle. The accompanying perforation is high up upon the surface of the membrana tympani, is as a rule small, and frequently surrounded by granulation tissue. The folds of mucous membrane also normally existing in this region form loculi, which tend to retain the discharge, thus favouring stagnation and subsequent decomposition. Added to this is the clinical fact that in many such cases inflammatory adhesions shut off the atticus from the atrium.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

Hence we find a localized purulent collection constantly bathing the head of the malleus, the body of the incus, the crura, and the foot plate of the stapes hemmed in above by the thin and at times dehiscent tegmen tympani, and upon the inner wall by the upper portion of the pars promontoria.

The extent and the situation of these secondary changes is naturally a matter of great moment and one not by any means always easy to estimate. Where extensive disease has taken place in the parietes of the middle ear, the mastoid antrum, and even the mastoid cells, no surgeon of any experience would, I presume, anticipate a cure of the morbid process by the mere removal of the remnants of the membrana tympani and the two larger ossicles. These bonelets play but a small and a secondary *rôle* in the pathology of the disease now under consideration. Nevertheless, they are prone to become diseased from the reasons stated above, and when diseased they naturally become more or less functionless, while at the same time they, from their presence and from their connection with other and adjoining structures, not only form a barrier in the foreground—a barrier which prevents the all-necessary local treatment from being satisfactorily carried out—but act also in the capacity of foreign bodies. The primary disease undoubtedly lies deeper, but if the portal be inefficient, how can the purulent exudations find an easy exit or remedial agencies an efficient entrance? It has been said that in these cases the disease is never limited to the soft parts and the ossicula, but that the surrounding bony parietes are eroded, while at the same time the antrum and even the mastoid cells are similarly affected; hence that the mere removal of the membrane and the bonelets could in such cases have no curative effect whatever. Were these premises always correct, I admit that the operation must of necessity be doomed to failure. It appears to me, however, that clinically we meet with a certain class of case (I admit it is but a small class) in which the morbid process has so far, at any rate, involved only the soft parts lining the atticus or the antrum and the portions of the ossicula lying in this immediate neighbourhood, while the parietal portions of the bone, if affected at all, are so to a limited extent. Such cases, we know from experience, are the very cases in which the morbid process is prone to become chronic, while at the same time it is just in these very cases that good results may be expected from ossicular excision.

It may be contended that in such early cases other and simpler methods of treatment will suffice to arrest the suppurative process, but experience does not, I think, bear this out. Circumstances are decidedly in favour of the process becoming chronic. I can recall but few cases of attic disease which, having passed beyond the acute stage without complete recovery, have been found to yield to any of the minor methods of treatment as previously detailed; while, on the other hand, every aural surgeon knows how troublesome chronic disease in this region is, and how his resources are frequently taxed to the uttermost, to say nothing of the patience of his patient. The presence of the malleus prevents proper access being gained to the epitympanum; hence the necessity of removing it, the more so of course, if diseased.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

When local treatment should be stopped and when surgical treatment should be commenced is indeed a fine point to decide. I take it that the value of operative procedures in this region lies in the fact that, a series of intricate spaces having been opened up, room is gained for drainage, for inspection of the diseased tissues, and for the application of remedial agencies.

The diagnosis of ossicular caries is not by any means always an easy matter. If, however, a slender probe with slightly bulbous extremity be carefully introduced through the perforation and search made, rough and eroded surfaces upon the bone can, as a rule, be detected when present. Granulations bulging through the perforation are not certain signs of caries, although naturally suspicious; neither is fœtor of the discharge, for the loculi formed by the folds of mucous membrane in this region may readily retain the secretion until decomposition has set in. Where the perforation occupies the posterior part of Shrapnell's membrane, caries of the incus will be found to be more frequent than when it is placed anteriorly.

It has been contended that ossicles have been removed which, on minute examination, have been proved to be quite free from disease. Even if this be so, no great harm would ensue. By their removal the recessus epitympanicus is opened up, better drainage is secured, and more space is afforded for manipulation, while, at the same time, it must be borne in mind that the ossicula are by no means essential for the purposes of good hearing. The indications which have, up to the present, been taken as necessitating operative interference are—

1. Chronic purulent disease of the recessus epitympanicus, with ossicular caries.

2. The presence of cholesteatomatous masses in the tympanic cavity.

It seems to me that, in the light of our present knowledge, these reasons are too vague, and that the main indications will be found to be either the presence of early chronic disease in the epitympanum, where examination reveals the presence of ossicular disease alone, or with but slight involvement of the surrounding bony parietes, or chronic disease in the atrium, where proper drainage cannot be maintained, and where ossicular disease is proved to be present. Knowing as we do the marked tendency cholesteatomatous masses have of producing erosion and disintegration of bone, it seems to me that a more radical operation is required when such masses exist.

I would venture to narrow the scope of the operation to these two indications, and would even go a step further and say that if attic disease has existed for more than a few months, and has been carefully treated without the desired result having been obtained, the operation should be undertaken. Should the suppuration fail to be arrested even after this, then we would have an indication that other and more deep-seated carious areas existed either in the tympanum, the mastoid antrum, or the air cells of the mastoid process. Excision of the drum head permits, at any rate, of a more thorough and more accurate diagnosis by means of the probe, and the possibility of direct irrigation and cauterization of the diseased areas of bone; while, on the other

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

hand, opening of the mastoid antrum would not in any way be complicated by what had already been done. It may be urged, on the other hand, that it is preferable at once to perform some form of antrectomy, but I think we must bear in mind that opening and draining the mastoid antrum is a much more serious manipulation, on account of our uncertainty beforehand as to the course and depth of the lateral sinus, and of the relation of the antrum to the base of the middle cranial fossa. In addition, the after treatment of an antrectomy is much more troublesome and more tedious, and hence it seems to me that the patient should get the benefit of the minor operation before any idea of the major is entertained.

If this be accepted, it will be seen that the scope of the operation is indeed limited, and such I believe it to be. Great discrimination must be exercised in selecting the cases for this particular line of treatment. In my experience only those cases are suitable where, as before stated, ossicular disease alone—or, at any rate, with but slight parietal disease—is found. Where more extensive trouble exists, Stacke's modified mastoid operation will be found the surest means of attaining success.

On the other hand, however, it may be said, "Why operate at all under such circumstances? Should we not rather wait and watch the development of affairs, ready to step in at once if evidences of extension of disease appear or symptoms of retention manifest themselves? As the hearing power in cases of attic disease is frequently hardly appreciably affected, should we by performing an operation run the risk of injuring this delicate sense?" Are we justified, however—even supposing the case be kept under close observation—in allowing the patient to run the risk which may quite suddenly ensue from gradual erosion of bone, with consequent absorption and dissemination of pathogenic organisms? Questions such as these are most difficult to answer, but most important to definitely decide.

The question of anæsthesia during the operation becomes an important one. A general anæsthetic may be given, the patient lying upon the table with the head slightly raised; or ether having been administered, the patient may be propped up in a chair, and the head held by an assistant. Or again, local anæsthesia may be induced by the injection of a four per cent. solution of cocaine into the middle and external ear. If the patient be placed lying upon an operating table, considerable difficulty will be experienced, as the position of the parts appears somewhat altered, and instrumentation becomes difficult. Local anæsthesia with cocaine may in certain cases be sufficient, but at times entirely fails. With the patient propped up in a chair, ether may be safely given by a skilled anæsthetist, and as the parts are in much the same position as one is accustomed to, the necessary manipulations may be carried out with comparative ease.

Hæmorrhage becomes at times a real and serious trouble, as with the field of operation flooded it becomes impossible to see what one is doing. This is more especially the case where one has to deal with the presence of small tufts of granulation tissue growing from areas of diseased bone. Instillations of cocaine solution (four to ten per cent.) may be used previous

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

to the operation, or the solution may be injected subcutaneously in the region of the tragus, or behind the attachment of the auricle. Or again, Ludwig's suggestion to inject subcutaneously solutions of *secale cornutum* may be adopted. I am rather in favour in such cases of dividing the operation into two stages, and upon one day removing under cocaine anæsthesia the granulation tissue, and upon another completing the ossicular excision.

As the incus is the bonelet most frequently found diseased, careful search should always be made for it, and extraction effected. At times this will be found very difficult, but can usually be accomplished by one or other of the incus hooks now in use. In many cases, however, the incus will be found absent, having been destroyed by the previous suppurative process. When present, both malleus and incus should, I think, always be removed together. Regarding the after treatment of operation cases, it is important to decide what line of procedure should be adopted. Should the parts be kept quite dry, the secretion being merely mopped away by means of a cotton-armed probe, or should daily irrigation be practised and antiseptic lotions used?

I have endeavoured, sir, to present a few of the practical difficulties connected with excision of the auditory ossicles to this meeting, in the hope that some definite working basis may be formulated. The success which has attended excision of diseased ossicula in chronic suppurative middle-ear disease has been such that there exists a tendency to extend the indications for its performance to cases not strictly suitable. Disappointment consequently ensues, with the result that there is a danger of the operation falling into discredit. It seems to me, sir, that the difficulty lies not so much in the carrying out of the necessary *technique* as in knowing exactly when the operation is indicated and when it is contra-indicated.

A Successful Method of Examining the Larynx, and Removing Laryngeal Growths in very Young, Nervous, or Unmanageable Children. By SCANES SPICER, M.D. (London).

About six years ago, a case of chronic hoarseness and stridulous breathing in a child aged eight years, due to multiple papillomata on the vocal cords, led the author to perfect a procedure by means of which the larynx could be examined without failure and laryngeal growths removed.

In laryngoscopy in these children the chief difficulties to be overcome are that the patient, from lack of self-control or terror, is unable to give the observer the assistance given by an adult; and that, even if it can be so far managed, involuntary spasm of the pharynx and upper orifice of the larynx blocks the view; or, even if the child at first admits of examination either without or with cocainization, and even an introduction of the forceps, it is unable to stand the necessarily repeated moppings and forceps introduction.

On resorting to general anæsthesia with chloroform, two difficulties are encountered, in addition to special dangers of chloroform in laryngeal operations: firstly, unless a very deep degree of narcosis is produced, the pharyngeal and laryngeal reflexes are not abolished, and spasm

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

occurs on introducing forceps, etc.; secondly, salivation and the secretion of mucus is inconveniently profuse.

To overcome the first difficulty, the author suggests the cautious use of a spray of ten per cent. cocaine solution, and, for the second difficulty, the free use of a dry mop of cotton-wool. Five assistants are required: No. 1 to give the chloroform, maintaining moderate general anæsthesia; No. 2 nurses the child in the usual position for laryngoscopy; No. 3, standing behind the patient, keeps the head erect and square to the operator; No. 4 stands behind and to his right, holding the mouth-gag; No. 5 holds the tongue out with forceps.

In this way the operator can remove the growth piecemeal—first spraying the larynx with cocaine, then mopping, and finally using the forceps in the usual manner.

Dr. Spicer has found the method useful both for examination and for operation.

Dr. FELIX SEMON (London) said that Dr. Scanes Spicer's new method of examining the larynx and removing laryngeal growths in very young or unmanageable children certainly appeared to deserve a fair trial, and, if serviceable, would prove a real boon in a class of cases hitherto hardly accessible to intra-laryngeal treatment.

Dr. DUNDAS GRANT (London) thought he saw a new field of usefulness for his safety endo-laryngeal forceps for the removal of growths under combined chloroform and cocaine anæsthesia.

Dr. WILLIAM HILL had successfully used Dr. Spicer's method in two cases.

Treatment of Acute Laryngeal Stenosis. By WILLIAM PERRY NORTHRUP, M.D. (New York).

In the interpretation of our subject (acute laryngeal stenosis) we shall assume in this paper that we have to do with diphtheria, true or false, involving the larynx in children. Concerning its treatment we shall emphasize two methods, a medicinal and an operative (at present in favour in New York), viz., calomel fumigation and intubation.

What medicinal treatment have we to recommend beyond steaming, vomicants, etc., to determine a favourable course in laryngeal diphtheria, to relieve by milder methods the urgent symptoms? Our answer is calomel fumigation.

This method was first publicly advocated by Dr. J. C. Corbin, of Brooklyn, in 1881, was later taken up by Dr. O'Dwyer, in New York, and has steadily gained in favour. It is believed that by all former methods of treatment, without operation, about ten per cent. of pseudo-membranous laryngitis recover. (J. L. Smith and O'Dwyer.)

Statistics have not accumulated sufficiently to frame a strong argument in regard to calomel fumigation, but the conviction of those best capable of judging is positively favourable. In two hundred and seventy-five cases of "true croup" collected by McNaughton and Maddren, 48·7 per cent. recovered, the only treatment being calomel fumigation ("sublimations"). Again, this medicinal treatment is advised after operative procedure has been required, and here its advocates are equally positive

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

that it acts favourably. Dr. Brown gives four hundred and eighty-three cases of laryngeal diphtheria treated *without* calomel fumigations, with 35·4 per cent. recoveries ; two hundred and fifty *with* calomel fumigations, with 47·5 per cent. recoveries.

It goes without saying that a child which tides past the urgent symptoms on fumigation, without operation and without wearing an intubation tube, other things being equal, makes the better and speedier recovery.

Method of fumigation.—A tent or canopy is rigged about the top of a crib in any way most convenient. A sheet is thrown over supports, and allowed to fall about the four sides of the crib. The supports may be upright sticks lashed to the four corners of the crib, or a line stretched between two uprights at diagonally opposite corners, or a step-ladder placed astride the middle of the crib, or any other extemporized frame suggested at the time by the ingenuity of the persons in charge. The main point is to have a fairly large and fairly tight enclosure. In such a tent the child lies undisturbed ; if sleeping, so much the better.

The crib "tent" shown in photograph is in use in the Willard Parker Hospital, New York ; it contains about fifty cubic feet of air.

The apparatus for furnishing fumes must first of all be safe from upsetting and the danger of fire. Such a one is easily extemporized in the following manner :—Select some deep vessel, a wash-bowl, saucepan, or *pot de chambre* ; place in this an alcohol lamp, lay across the top a tin strip of any kind, and over the spot where the flame of the alcohol lamp touches the underside of the tin make a little compact pile of the requisite amount of calomel for a single fumigation.

A special lamp has been constructed by Geo. Ermold, the instrument maker. This can be hung up by wire, or can stand on a plate or in a pan, as desired. As to the child, fumigation is often given while it sleeps, and it needs no preparation. Ordinarily, eight to ten minutes are required to volatilize the calomel, and the tent should be kept closed about fifteen minutes.

A very safe and satisfactory method in severe cases is to volatilize in an ordinary crib tent fifteen grains every two hours for two days and nights, then prolonging the intervals to three hours on the third day, four hours on the fourth day, fumigating three times a day ; thereafter according to indications. (O'Dwyer.)

Attendants become easily salivated from inhaling calomel fumes, and must be cautioned. The room should be thoroughly aired after opening a tent. It is well, when circumstances permit, to fumigate in a separate room, removing the child and attendants to fresh room while the other is freely aired.

Now what effect has fumigation upon the patient, the child? It does not suffer ptyalism. Occasionally, especially older children, after days of treatment, have a mild stomatitis, sometimes diarrhœa. If the calomel is impure there may be conjunctival irritation. Chemically pure calomel is essential. After prolonged use there is more or less anæmia. This must be combated by administration of iron, and if there is associated prostration a little whisky may be required before fumigation.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

The above directions are quite in the line of moderation. Many physicians vaporize twenty to forty, or even sixty grains, and make the intervals in urgent cases no more than half an hour at first. Such practice is considered safe and justifiable, but symptoms of prostration and anæmia are likely to appear after a few days. It is a desperate disease, and warrants heroic treatment.

I am not one of those who urge calomel fumigations in all diphtheria as a prophylactic, nor one of those who think they know how it acts; but I am of the number who believe it affords relief from the urgent symptoms, many times, when no other medication will, and helps the patient to survive the stress without operative procedure. To this intent I employ it, to this extent I recommend it.

INTUBATION.

A progressive dyspnœa, uncontrolled by calomel inhalations, comes at length to require operative interference. Our part is to speak of intubation, and we shall discuss it under the following heads:—

When to operate.
How „
How to remove the tube.
When „ „
Dangers and difficulties of operation.
„ „ „ wearing.
„ „ „ removal and thereafter.
Advantages.

When to Operate.—When a progressive, unremitting dyspnœa, despite all previous treatment, allows any considerable part of the posterior portion of the lungs to become non-inflated, when the laboured breathing begins to produce sensible exhaustion, intubation is to be performed promptly. From this moment nothing but harm can come to the lung and to the heart. If air cannot be aspirated, blood will be, and pneumonia is invited.

How to Operate.—The *technique* of intubation having become so thoroughly a matter of literature, we will emphasize only certain points. Wind the child from chin down in a light blanket, shoulders, arms and hands included. Pin the blanket closely about the neck, and yet do not make a bulky roll to interfere with depressing the introducer handle. In this way the elbows are pinioned to the side and the hands are held across the child's abdomen.

These precautions cause no annoyance to the child; it does not worry or resist, and when the time for rapid action arrives it cannot move. The nurse who is to hold the child should sit in a high, firm chair bolt upright. The child should be placed upon her lap, nurse and child exactly facing the operator. The nurse being upright, not leaning back, should grasp the child's elbows firmly, outside its winding blanket of course, and clasp the child's legs between her knees, making sure she twines her own about the legs of the child. All these precautions are to secure the child in a firm grasp, to immobilize it without interfering with the expansion of its chest, and may be taken without causing any

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

apprehension or excitement. *The position of the child should be as though it hung from the top of its head.*

The physician assisting should stand behind the chair of the nurse, grasp the child's head between his hands, hold it firmly, and when the gag has been inserted include it within his grasp to insure its firmness and steadiness. The operator, seated or standing squarely facing the child and nurse, inserts the gag, opens the mouth widely, and gives the handle into the keeping of the assistant. At this point, for the first moment the child worries; yet from this point to the end of the operation need be but a few seconds, though it takes some moments to describe it. The introducer, armed with the proper sized tube, is supposed to be threaded and at hand.

Just at this point it is well for the operator to be sure that all the above directions have been carefully carried out, that the position is exact, the gag well held, the grasp firm. A moment suffices, and it is time well spent. Next he inserts his left index finger, hooks up the epiglottis, crowds his finger to one side, passes the tube past it till it engages in the chink of the glottis, elevates the handle, gently passes the tube down till the head is within the box of the larynx and the introducer lies crowded upon the tongue. He then, with the trigger, loosens the obturator, holds the tube with the left index finger while withdrawing the obturator, and with a gentle thrust presses the tube's head well into the larynx and removes the finger and gag. Just here let me emphasize what is stated above—keep the introducer in the middle line; otherwise the obturator will pinch in the calibre of the tube and drag the tube with it as it is withdrawn.

The handle of the introducer should be held most lightly between the end of the thumb and the fingers. In this way it is impossible to use enough force to make a false passage. It is easy for a right-handed operator, inadvertently, to carry his handle to the left of the child's middle line. It is often that the child manages by one effort to slip down in the nurse's lap, while the grasp which the assistant exerts tilts the head back, and the tube may then impinge on the anterior wall of the larynx. The lines and angles must be maintained to insure quick intubation. The lack of observance of, and carelessness in, these points explain many failures of inexperienced operators.

Again: suppose on the first attempt the tube is not successfully placed in the larynx? How long shall one try? Shall one repeat the attempt? It is better to make repeated short attempts than prolong one.

Having placed the tube in the larynx, there will be rattling in the tube on first respiration, and subsequent cough and expectoration. A vigorous cough argues well for the sensitiveness of the parts, and for evacuation of accumulations below. The gag is removed as soon as the tube is in place, but not so the thread; it must remain till it becomes evident that all obstruction to breathing has been overcome, and no partially-detached false membrane is in the trachea below the tube. The thread at first acts as an inciter to cough, which is desired; ordinarily, ten minutes are sufficient.

How to remove the tube.—Place the child in the position for intubation

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

as described above. Thrust the left index finger past the epiglottis, hook it up, rest the tip of the finger upon the two arytenoid cartilages and carry the extractor point to the end of the left index finger at the pulpy portion generally regarded the most delicately tactile. The situation is then as follows :—The finger tip upon the arytenoids marks the posterior boundary of the glottis in the median line. Now, if the extractor point be carried along the median line to the end of the finger and the handle be elevated, the point will naturally be prized forward from the end of the left index finger on the arytenoids, into the aperture of the tube. To me this seems the most satisfactory method for a beginner. I have described it to several, and their successes have justified the plan. The guard screw of the extractor-lever should be carefully set to avoid injury to the tissues in case the extractor-jaws should be opened by mistake in the soft parts instead of in the tube. Of course the difficulty of removal is to find the opening in the tube. Many operators, both in Germany and America, leave the thread attached throughout the whole time, and occasionally a tube is coughed out after the swelling releases its grip. So in actual experience one is not called upon to extract so often as to intubate. The fact remains that extubation is more difficult.

When to remove the tube.—This depends on the age of the child and duration of the disease before intubation became necessary. The older the child the earlier the tube can be dispensed with. Estimating the maximum of the disease to be seven days, five days' wearing the tube is considered, on an average, sufficient.

DANGERS AND DIFFICULTIES OF THE OPERATION.

In the hands of an *experienced* operator there are practically *no dangers to life* at the time of operation.

A few authentic cases of pushing down membrane before the entering tube have been recorded. It happened to O'Dwyer three times in his first two hundred and nine cases, on first intubation. Expert intubation presupposes that the thread has been left attached, and therefore easy immediate removal is possible. What does it mean, then, to push loose membrane into the trachea from tissues above the larynx, for instance ? It means more room in the larynx. If the tube is removed, the mass of membranes is forcibly ejected, and the patient is really benefited by the proceeding, and at no time endangered. This experience with loose pseudo-membranes occurs more often late in the disease, and in re-intubations.

To the *inexperienced* there are many dangers : (1) asphyxia from prolonged attempts, (2) laceration of the parts, false passages, etc. The explanation usually given to those two most common accidents is "pushing down false membrane." So called syncopal attacks are simply lesser attacks of asphyxia. Convulsions are recorded, and instruments have been broken in intubation.

DIFFICULTIES.

An experienced operator may encounter two difficulties.

1. The point of the tube may enter one of the ventricles of the larynx. This is not common, for the original disease usually fills and obliterates

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

these cavities. Such obstruction, however, does occur. It may readily be seen how an inexpert, sure that his tube and handle were exactly in the middle line, might force his tube into the tissues of the neck. He certainly has but to remember the cardinal points of advice, and he will use most gentle pressure; indeed, he need but look at the light introducing instruments to appreciate that they are for delicate work.

2. The second difficulty or obstruction that an experienced operator may meet in intubation is subglottic stenosis—or what is so often described as "œdema." The narrowest part of the respiratory ways is the cricoid ring. This fact, so far as I know, came to light for the first time, in Dr. O'Dwyer's early investigations in intubation. If the head of an intubation tube be forcibly crowded down from above, it may pass the vocal bands, and yet resist all effort at the cricoid ring. Given a resisting cartilaginous ring lined with mucous membrane, we have the very elective conditions for stenosis. Fortunately, the swelling and infiltration are not often extensive enough to cause serious obstruction, but may be. Operators come upon cases where the properly selected tube surely passes into the larynx, and yet encounters resistance—even "creeps back," as someone says, "like an oiled cork in a bottle." If one is sure of the diagnosis, and a proper size fails, a smaller tube may, with moderate pressure, be introduced. This is the only condition where force is justified in intubation.

DANGERS AND DIFFICULTIES OF WEARING.

1. The tube may become obstructed by loosened *plaques* of false membrane. This constitutes the one important danger in wearing an intubation tube. It is easy to understand that large *plaques* may become loosened and detached in the trachea, especially after several days of the disease.

A detached *plaque* may act like a valve at the tube's lower end, closing on expiration, opening on inspiration till the lungs become quite distended from accumulated air. Such is exactly what happened in three of O'Dwyer's first two hundred cases, with three deaths.

At this point let me interject the symptoms of loose membrane:—(1) croupy character of cough (tube being in); (2) flapping sound; (3) most important, sudden obstruction to outgoing air, especially during coughing.

If the string had been left attached in O'Dwyer's three cases this danger would have been obviated. Most Continental operators loop the thread about the ear, protecting it along the cheek with rubber adhesive plaster, and leave it throughout the wearing of the tube. This is advisable outside of hospital, with beginners, and in case loosening pseudo-membrane is suspected in the trachea. Possibly, mucus may gradually collect in the tube, of such a tenacious quality, especially in mouth-breathers suffering from high temperature, that it becomes an embarrassment or even danger.

Short tubes (*loose-membrane or foreign body tubes*).—At this point let me call attention to the special tubes devised for the easy expulsion of loose membrane and foreign bodies. They are short, hollow cylinders of large calibre—short enough not to push down the tracheal membrane,

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

yet long enough to reach below the cricoid stenosis and large enough to permit masses to pass through them.

Occasionally a long tube loosens the upper attachment of a tracheal cast and crumples it into a wad below the end of the tube. The usual result is, as would be expected, apnœa. Immediate removal of the tube is commonly followed by either expulsion of the cast or other disposal of the mass in the comparatively large trachea. At this point, when the long tubes have failed to give relief, the short cylindrics become of temporary service.

These tubes are of various sizes, seven in number. Since they have no retention swell it is necessary to use the largest size possible, wedging it into the larynx, and for obvious reasons in the line of pressure, not leaving them more than a few hours in place. They require a special introducer with long curve in order to carry the short tube well through the cricoid constriction before withdrawing the obturator.

In short, to allow the expulsion of loose membrane from the trachea, the largest possible hollow cylinder is passed through the narrowed larynx, allowed to remain for a little, and removed as soon as the resulting cough has expelled the foreign body requiring its insertion.

2. Ulceration from too large a tube making pressure within the cricoid ring, and ulceration at the lower end of the tube. The former can be of a serious nature, destroying the cartilage; the latter is superficial and of little import. Ulceration within the cricoid is due to improper size; ulceration below to improper construction of tube.

Properly constructed tubes are difficult to describe, more difficult to secure from a maker, even if a most faithful and conscientious servant. But one maker in this world has succeeded in making tubes that embody all the ideas of the inventor. He alone has been willing to try over and over to make O'Dwyer's tubes. All others have felt the quiet self-conceit that the inventor thought he knew what he wanted, but in the maker's mind he did not, and would get over it sooner or later.

Every swell and knob, every constriction and crease, every hole, the canting back of the head or collar—all is the work of the inventor, to make the tube conform to the anatomy of the parts.

I should not dwell upon this so much had I not on former visits to England seen tubes from your best makers, which tubes embodied every vice which the inventor has sought by most careful description to warn against.

I say again, but one maker in this world makes O'Dwyer's tubes, the others make maker's tubes.

FEEDING AN INTUBATED PATIENT.

There is one disadvantage after operation. Feeding is difficult. The larynx is sore. Many times it is sorer because of the inexperience of the operator. The less the larynx is bruised in intubation, the less the child will dread the clasp of the pharyngeal muscles in the act of deglutition. The fact remains that there is more or less difficulty in swallowing, both from pain and cough. The latter arises from fluids entering the trachea, though many patients acquire the accomplishment, and learn to swallow

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

very well. The method of feeding adopted by Dr. Casselberry, of Chicago, has very much relieved the situation. The child is inclined, head down, so that it swallows uphill, and any fluid that may get into the tube in the act of deglutition quickly gravitates out again. The directions are as follows :—Place the child across the nurse's lap, bend the head well down, and feed either with a spoon or through a nursing bottle. At first these patients object, but when they learn that by so doing they can swallow without coughing they give no further trouble.

Medication can be continued after intubation as well as before.

DANGER OF REMOVAL AND THEREAFTER.

If the tube is removed on the fifth day in a case having an average fair course, there is little or no danger. The operator should remain half an hour. If in this time there has been coughing and clearing of the throat and trachea, and no loose pseudo-membrane remains, and no dyspnœa there will be no sudden urgent necessity of rapid reintubation. Even yet it is deemed desirable to be within easy call for some hours.

I once considered I had on an average four hours' leeway, but, exceptionally, prompt aid was needed sooner, and a few cases needed reintubation twelve and twenty-four hours afterwards. Whether, pressure removed, the mucus membrane becomes quickly congested, or whether muscular spasm sets in, or membrane reforms, I know not, but I have learned to respect the emergency of the first twelve hours after removal of the tube, especially if it be a premature removal.

RETAINED TUBES (LARYNGEAL CANULÆ).

Rarely, it is necessary to reinsert a tube many times. The child may get along half a day or two days and yet require the reintroduction. If the tube is not of proper anatomical conformity it may cause granulations about the head. To relieve this and cure the condition, a special tube has been devised, having a prolonged or built-up head. It rides above and causes pressure upon the granulations, with consequent absorption.

Finally, not to recapitulate the literature of the subject, I may mention advantages. *First of all, parents will consent.*

It is a bloodless operation ; no cutting, no anæsthetic, and this means much to the friends. It is quickly performed, requires no trained assistants or trained attendants (it is trained operators that are needed). The air inspired is warmed and moistened through natural passages. Results are equal to or rather better than those of tracheotomy under similar circumstances, whether in hospital or outside.

DISCUSSION ON DR. NORTHRUP'S PAPER.

Dr. FELIX SEMON : The speaker asked for information as to the frequency of obstruction of the tube after intubation, and expressed his misgivings about the risks thereby incurred, unless the patient could be kept under the constant supervision of a practitioner skilled in the performance of intubation, and ready, if necessary, to reintubate immediately. He further asked what the *rationale* of intubation in cases of new growth in the larynx, and of bilateral paralysis of the abductors

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

was, in which it also had been recommended, and dwelt upon its risks (detachment and pushing down of fragments of growth, asphyxia, hæmorrhage, "Schluckpneumonie") in the former class of cases, whilst expressing his belief that it could be of no lasting use whatever in the latter. Finally, whilst fully admitting the usefulness of intubation in certain cases of chronic fibroid stenosis of the larynx, he warmly recommended, in cases particularly of *syphilitic* stenosis in which the voice had already been lost and tracheotomy been performed, thyrotomy with subsequent excision of the fibroid tissue as a means to enable the patient to dispense with the permanent wearing of the tube. Mr. Butlin's simple after-treatment of thyrotomy had divested that operation of most of its dangers.

Dr. BLACKADER: I desire merely to express what I believe to be the opinion of the profession in Montreal in reference to intubation, the merits and methods of which have, I think, been so clearly stated in Dr. Northrup's paper. In the first place, we find it comparatively easy to induce the parents to accept intubation for their children when it is really called for. It is always difficult to obtain their consent for tracheotomy till the case becomes desperate, and the strength of the patient much impaired. Again, O'Dwyer's tubes pass beyond the region of narrowing in the cricoid. The danger of obstruction below this, except from detached membrane, we think is comparatively slight. The introduction of the tube by a really skilled person involves little distress to the patient. I have never actually performed it myself, but only watched its performance on my patients by others. I was therefore in a position to judge. The quiet tranquil breathing through the natural passages, which follows the introduction of the tube, is in marked contrast to the rather distressing breathing after tracheotomy. Any difficulty in feeding has, in my experience, been easily overcome by the lowered position of the child's head. In my personal recollection during the past few years I have had ten cases of intubation with four deaths, two of which were almost hopeless when the operation was performed. My previous records were twelve tracheotomies with nine deaths. My friend, Dr. Armstrong, gives me the following as his record of intubations and tracheotomies performed by himself during the past ten years: thirty-two intubations with seven deaths, twenty tracheotomies with fourteen deaths. Let me emphasize one thing more—the necessity of careful and prolonged previous training, both on the dead body and on animals, of anyone who attempts to do intubation on the sick child. In Montreal we delegate the work to one or two, who in this way perfect their experience. Only by those experienced will the best results be obtained. An inexperienced person attempting to pass a tube on a sick child, in my opinion, will only do harm.

Dr. THOMAS EASTES: It is difficult for a meeting to turn its attention from such interesting surgical points as were brought before us at the opening of this discussion to the medical side, but I wish to bring forward the subject of treatment of diphtheria by the specific diphtheria antitoxin. We all know clinically that certain diseases produce an immunity from their recurrence, of longer or shorter duration and more

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

or less uncertainty. There are some peculiar occasional exceptions which I know no explanation for, such as the return of scarlet fever soon after the primary illness, and the relapses of typhoid. The immunity is due to a material in the blood, a solution of which can be made and preserved, and by this solution immunity can be artificially produced, but we must not expect more than we get in immunity produced in the natural course of the disease. The first cases I saw recorded were published in the epitome of the "British Medical Journal," May 5th, 1894, and the percentage of recoveries was shown to diminish every day the treatment was delayed: thus, first day 100 per cent. recovered, second day 97, until the fifth day only 56·5 recovered. In my own four cases, the first was published in the Journal for July 21st, and was perfectly successful; the second was a girl of twenty, who had been ill before my first case, and for whom I had tried to procure some antitoxin, but was unable to do so until the seventh day, when she was beginning to improve, and therefore I waited; but by the twenty-first day her improvement was so slow that I injected five cubic centimètres, as my first case had done so well. She was quite well on the twenty-seventh day, but I do not consider the case to prove anything, and only mention it to complete my cases.

My third case was a boy of five years, whom I was asked to treat on the fifth day as he was getting rather seriously ill, and applications to the throat were very irksome to him. I injected five cubic centimètres at once, and all other treatment was stopped. By the next day he was much better, the swelling of the throat having diminished, and by the fourth day (ninth of disease) he was quite well. My fourth case was a girl of twelve, early in the second day of the disease—a well-marked case with swelling, redness, and membrane on both sides. Temperature 99 degrees. I injected 5 cubic centimètres of the antitoxin without any other treatment at all. Next morning the swelling was much diminished and temperature normal: and I have just received a telegram sixty-four hours after injection—"Patient seems quite well; temperature normal; throat clean; swelling much less."

The most marked and earliest effect is the diminution in inflammatory œdema, which may be noticed after a few hours; the membrane may sometimes increase for a time, I am told by others who have used antitoxin successfully. Apparently antitoxin is quite harmless, and solutions that can be procured now may be used in doses of five to twenty cubic centimetres, and repeated if necessary according to the duration of the disease before treatment, and the age of the patient. If there is not some improvement after twenty-four hours, or in severe cases after twelve hours, repeat the dose.

I believe we have now entered upon a new epoch in the treatment of diphtheria, and that bacteriology has again gained another victory over disease by a remedy which in the early stages will be found to be almost perfect.

Dr. W. F. BROOK (Swansea): Whatever difference of opinion may exist as to the respective merits of tracheotomy and intubation in diphtheritic stenosis, I think there can be no doubt that intubation should be adopted

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

in the great majority of cases of acute non-diphtheritic stenosis, and in a certain class of cases of chronic stenosis of larynx.

During the last four years I have been in the habit of regarding my intubation instruments as equally as essential to the proper dealing with emergencies as my case of catheters. And just as in the great majority of cases of obstruction to the urethra one never dreams of puncturing the bladder before attempting catheterization, so in the vast majority of cases of stenosis of the larynx I attempt intubation before proceeding to tracheotomy.

For acute non-diphtheritic stenosis I have intubated under the following circumstances :—

For œdema glottidis, the result of scald in a child aged two, the tube was dispensed with after two days, and not again required. In another case I failed to get into the larynx on account of the immense swelling of the epiglottis, which projected backwards like a cherry. I was proceeding to tracheotomy when I found that my attempts to intubate had torn the mucous membrane of the epiglottis and caused bleeding, thereby reducing the size and relieving the obstruction. Here the epiglottis was alone œdematous.

Scarification is inadmissible unless one is prepared to follow up immediately with tracheotomy. I know of a case in which tracheotomy was performed at great disadvantage to save a child in whom, after scarification, blood had got into the larynx and completed the obstruction.

For simple laryngitis in infants (in whom the stenosis called for operative interference), I have intubated three times within the last two years.

In one, a child aged eighteen months, the tube was worn for two days and then removed without recurrence of dyspnœa. The inflammation, however, extended down, and the child died a day and a half later from broncho-pneumonia.

In the second case, a boy aged five years, the inflammation remained localized in the larynx. The tube was worn for two days. After removal the dyspnœa gradually returned, and five days later it was necessary to intubate again. The introduction of the tube, about which there was no difficulty, was immediately followed by the coughing up of a few drops of blood and a drop of pus. The following day the tube was removed, and dyspnœa did not again recur. I was not able at any time to obtain a view of the cords, so cannot describe the exact condition.

The third case was one in which laryngitis supervened in the course of broncho-pneumonia in an infant aged four months. The smallest of O'Dwyer's tubes afforded complete relief. It was worn for a day and a half. The child recovered.

In the first and third of these cases my only assistants were the parents or neighbours hastily summoned.

In all these cases tracheotomy must have been performed in the absence of intubation instruments. In none was there any opposition on the part of the relatives to the operation. There was no difficulty in feeding in any of them ; all took their ordinary food, the four months' baby remaining at the breast while the tube was in.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

For the following conditions, when I get an opportunity, I intend to use intubation :—

1. In spasm of the glottis from any cause.

2. In bad cases of laryngismus in infants, as the best means of assuring a quiet night to the patient and all concerned.

3. Whenever there is the slightest suspicion of the presence of a foreign body in the trachea. By performing intubation in these, instead of waiting for further evidence of the presence of a foreign body, I am sure many lives would be saved. I know of two cases in which the further evidence took the form of sudden spasm of the glottis. One child died before aid could arrive. In the other, my own case, all attempts at breathing had ceased for three minutes before I arrived. Fortunately, the child was resuscitated after tracheotomy, and a ring of beads hooked up from the bifurcation of the trachea.

For chronic stenosis resulting from ulceration due to the wearing of a tracheotomy tube, intubation is, I believe, the only available method of treatment. I have had experience of five such cases in which it was adopted. Four of them are described in a paper by Mr. Bernard Pitt and myself, which is published in the "Transactions of the Medical Society of London for 1890." In all five it had been impossible to dispense with a tracheotomy tube, which had been worn for periods varying from six months to five years. All were treated by intubation, but not successfully until a thorough exploration had been made, and the cicatricial tissue, which in three cases existed as a complete web across the junction of the larynx and trachea, had been thoroughly dissected away. The after-treatment consisted in passing large-sized intubation tubes, gradually increasing the size, and leaving them *in situ* for periods varying from two or three days to a fortnight. Evidently when the usual means of leaving off a tracheotomy tube have failed, the correct treatment is to explore the parts, thoroughly remove all cicatricial tissue, and close the incision over an intubation tube. Had this been done in these cases the after-treatment would probably have been measured by days instead of months.

In another case of chronic stenosis, which had slowly developed and for which tracheotomy had been performed, having failed to get a view of the child's larynx I intubated, with the result that a papilloma the size of a pea was coughed up through the tube. The instrument had detached it on its way down. I do not suggest intubation as a routine treatment for papilloma, but evidently it may prove useful at times.

A point of no small practical importance in intubation for chronic stenosis is the following. It often happens that it is necessary to exert continuous pressure on the obstruction with the point of the tube before it will give way, so that there is danger of causing asphyxia. This difficulty can be got over by partially withdrawing the obturator, at the same time keeping the tube in place with the finger, and so allowing a small current of air to pass through the tube. Pressure is then again applied, and the stricture generally yields before it is necessary to repeat the manœuvre.

In no case of intubation for non-diphtheritic obstruction, acute or

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

chronic, have I seen any difficulty in feeding. Pulpy food was generally given for the first day or two, after which ordinary solid diet was given.

After considerable experience in tracheotomy and intubation for diphtheria while house surgeon at St. Thomas's, the West London, and the Children's Hospital, Great Ormond Street, I came to the conclusion that in ordinary cases intubation might well take the place of tracheotomy, but that it should entirely supplement it I do not hold. The lines upon which I now work in private practice are as follows :—I should intubate in all cases except those in which there is extensive deposit of membrane on the palate, tonsils, and pharynx, or in which there is excessive nasal discharge, or in which there is foul ulceration of the palate and tonsils, such as occurs in scarlet fever or when diphtheria complicates scarlet fever.

My experience in about thirty cases is that immediately after introducing the tube a large piece of membrane (sometimes a complete cast of half the trachea) is generally coughed up, either through the tube or bringing the latter up with it. Whenever in the course of the treatment the tube has been coughed up, an interval of an hour or more has elapsed before it has been necessary to replace it.

Although I have seen some fifteen autopsies after intubation I have never seen that extensive destructive ulceration of the larynx which has been described by some. Slight excoriations of mucous membrane opposite the end of the tube and the enlarged part (and, where the string has not been removed, to the left of the epiglottis) are the most I have seen. I cannot help thinking that the cases in which denudation and destruction of cartilages and sloughing of the cords have occurred, were cases in which the virulence of the disease had so reduced the vitality of the tissues that destructive ulceration would have occurred around a tracheotomy tube equally readily ; or else that they were cases in which too large a tube had been used. Nevertheless, in view of the possibility of these injuries, if the tube cannot be left out by the fourth or fifth day I shall be inclined in the future to replace it by a tracheotomy tube.

I generally make a practice of replacing the gag and removing the string after the first fit of coughing incident upon the introduction of the tube is over. The larger percentage of recoveries after intubation as compared with tracheotomy is, I think, due mainly to three factors.

First : The dyspnœa is generally relieved earlier than when tracheotomy is performed, the patient's strength being thereby husbanded to enable him the better to struggle against the disease.

Second : A certain number of lives are saved, which would have been lost simply as the result of prejudice against tracheotomy.

Third : The necessity of giving an anæsthetic is avoided, resulting in a certain saving of life.

Dr. PAGAN LOWE advocated the treatment of diphtheria with local applications of alcohol, which in the form of brandy and water, whisky and water or spirits of wine, in equal parts, forms a suitable, safe, and very convenient method of treatment. To be effectual it must be applied thoroughly. Chloroform even should be administered rather than to fail in thoroughly disinfecting the area affected.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

Dr. BENNETT : As the discussion has been confined almost exclusively to diphtheria and acute stenosis, I will merely mention two suggestions made by Mr. Bond, of Leicester, without any comment. Some years ago he introduced a T-shaped tube for stenosis of the trachea. In a recent case of syphilitic stenosis of the glottis he shortened one end of the tube and attached to this an india-rubber tube long enough to pass from an opening in the trachea well into the larynx. When first introduced chloroform was administered, the adhesions separated and the tube introduced. It was found to lie in position without causing any irritation of importance. Subsequently it could be removed and re-introduced with ease. In the future treatment it is proposed that this tube should be introduced by the patient at night or at such intervals as may be required, and a tube without the india-rubber worn during the day-time in order that the patient may speak.

In the treatment of chronic syphilitic stenosis he suggests further that the larynx be opened, the cords separated, some of the fibrous tissue pared off, and skin flaps turned in and fixed so as to form a new coating to the vocal cords.

Intubation in the Treatment of Chronic Stenosis of the Larynx. By Dr. J. O'DWYER.

The writer proposes, in response to your kind invitation, to briefly set forth his accumulated personal experience in the treatment of chronic stenosis of the larynx by intubation.

In December, 1885, there came to my office a woman with laboured stridulous breathing. She was forty years old, married, the innocent victim of a dissolute husband. The morning of the previous day she had visited a prominent laryngologist of our city (New York), who advised her to have tracheotomy performed before the sun went down. Soon after she met a colleague of the writer, who advised a trial of intubation. So came to me the first case of chronic stenosis ever treated by intubation.

The stricture resulted from the healing of oft repeated tertiary ulceration ; the tissue about was dense cicatricial ; the aperture scarcely sufficient to admit air enough to allow the patient to move easily about. The stenosis was of two years' standing, and slowly progressive. At this time there was no such thing as an adult intubation tube. I therefore had a set constructed, the largest of which was made in accordance with the measurements of several normal adult larynges, and the smallest of a size that was supposed to be barely sufficient to admit of easy respiration in a state of rest. The gap between these two extremes was filled in with several easily graded sizes. After repeated attempts, it was found impossible to pass the smallest tube of this set through the stricture, and the largest of the croup-tubes was therefore substituted and inserted only after the employment of considerable force. The plan of treatment thereafter was as follows :—The tubes were introduced as in children, by the sense of touch, and allowed to remain in position for several days, when removal was accomplished by the aid of the mirror. A larger size was then immediately inserted, or if too much irritation of the larynx existed,

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

an interval of one or two days' rest was allowed. Owing to the necessity of having the retaining-swell small to facilitate introduction,the tubes were expelled on several occasions in less than twenty-four hours, when a larger size could always be used without difficulty. Rapid dilatation was accomplished in this manner, so that the patient was allowed to return to her home at the end of eighteen days, with ample breathing room in her larynx. Tubes were inserted nine times, and retained an aggregate of one hundred and seventy-three hours.

In two and a half months the patient returned suffering from dyspnœa almost as bad as before the treatment was begun. The same course was adopted, and after thorough dilatation was accomplished the patient was instructed to return once a week for treatment, the necessity for occasional dilatation extending over a considerable period of time being now apparent. This interval was gradually increased to a month and sometimes to six weeks without any return of the dyspnœa in the interim. In the report of this case before the Laryngological Section of the Ninth International Medical Congress, the following prognosis was given :— "It is now one year and nine months since I began the dilatation of this patient's larynx, and there is scarcely any doubt that it will be necessary to continue it during the rest of her life." About fifteen months after this unfavourable prognosis was given, or three years from the beginning of treatment, the cicatricial tissue lost its power to contract, and the patient has remained now over five years free from any return of the stenosis.

The second case, a woman thirty-five years old, was sent to me in April, 1886, with the diagnosis of incurable bilateral paralysis of the abductors, of syphilitic origin. This patient had been seen by the late Dr. Elsberg and several other laryngologists, who concurred in the above diagnosis. Antisyphilitic treatment, electricity, etc., were tried without result, and tracheotomy was finally resorted to while the patient was unconscious and moribund, the crico-thyroid space having been selected in order to save time.

It was not expected that intubation alone would accomplish any permanent result in a case of this nature ; the operation proposed was to remove a portion of one or both cords, and then place a tube in the larynx until the wound thus made had healed. On investigating the case I found that her ability to speak even in the faintest whisper was entirely lost, which proved that no air passed up through the larynx. Neither could a small probe be passed down between the vocal cords, which were closely approximated but otherwise normal in appearance. There was therefore complete occlusion of the larynx between the vocal bands and the external wound, which occurred at some time since the introduction of the canula two years previously. In consequence of this unexpected feature of the case it was decided to break up the adhesions and try intubation alone for a time before resorting to the more radical operation. This was done under ether by enlarging the external wound to admit of the introduction of sounds from below. Entering from above was not considered safe, under the circumstances, owing to the liability of the sound to engage in one of the ventricles. An intubation tube two and a half inches long was then inserted, but the lower end came out

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

through the wound and no means could be devised to retain it within the trachea. As all the large tubes thus far were made of the same length the tracheal canula was replaced until a tube three inches long could be procured. This was inserted and retained without difficulty. The patient was seated on a chair while an assistant with one hand drew the trachea forward by means of a small retractor inserted into the lower angle of the wound, and with the other hand pressed the tube backward as it passed the opening, using a lead pencil made concave at the end for this purpose. This plan of treatment was not long continued, as the vocal cords dropped together as soon as the tube was removed or expelled, necessitating the immediate introduction of the tracheal canula. The original operation was therefore resorted to, a portion of each cord being removed after enlarging the external wound, and the same tube was replaced. It was removed at the end of a week, and the patient could breathe comfortably through the larynx with the tracheal wound hermetically sealed. A laryngoscopical examination showed the beginning of granulation tissue, which threatened soon to fill the gap made by the excised portions of the cords. This demonstrated the necessity for more lateral pressure, which the intubation tubes were especially constructed to prevent. A tube almost cylindrical in form was therefore procured and placed in the larynx instead of the flat oval one previously used, and the external wound was allowed to close. The patient now felt so comfortable and happy at being able to breathe through the natural passages, and to dispense with her writing pad, that she failed to return for ten months, and then only because of some dyspnœa due to the development of granulation tissue which partially overlapped the proximal aperture of the tube. It required considerable force to remove the tube, which was much eroded and deeply imbedded in the tissues. This patient was kept under observation for four months, during which time several laryngoscopic examinations were made, but no change could be discovered except a gradual reduction and final disappearance of the granulation tissue referred to above. No trace of the vocal cords could be discovered, but a large cylindrical opening replaced the chink of the glottis.

The most remarkable and instructive feature of this case was the existence of distinct motion of the arytenoids during attempts at phonation, which teaches an important lesson in the treatment of bilateral paralysis of the abductors supposed to be incurable.

(For details of these and other cases see "Transactions of the Ninth International Medical Congress," Vol. IV.)

These two illustrative cases, while on the one hand serving as a groundwork for this paper, may on the other be taken as types of two classes of this condition into which, for convenience of description, all cases of chronic stenosis of the larynx requiring intubation may be divided.

First, those for which intubation is resorted to for the twofold purpose of relieving present dyspnœa, and at the same time producing gradual dilatation of the stricture. Second, to get rid of retained tracheal canulæ, the intention being due either to a persistence of the original obstacle to respiration, for the relief of which tracheotomy was performed, or to a

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

new form of obstruction resulting from the operation and presence of the canula, and subsequent disuse of the larynx, or to a combination of both. As each of these classes of cases presents difficulties more or less peculiar to itself, they will be discussed separately. In cicatricial stenosis of the first class, the chief obstacle to be overcome is the first introduction of a tube of sufficient calibre to admit of free respiration. This having been once accomplished, the subsequent treatment is comparatively easy. The development of cicatricial stenosis is such a peculiarly slow process that the patient gradually becomes accustomed to breathing through a small space, so that when urgent dyspnœa finally supervenes, the lumen of the larynx will be found extremely small, often not larger than that of a crow-quill. Through such a close stricture, composed of unyielding cicatricial tissue, it would be impossible to force even one of the smaller croup-tubes. Either divulsion, internal or external incision must therefore precede intubation in extreme cases of this nature. The length of time that intermittent intubation will be required to effect a permanent cure will be influenced largely by the amount of cicatricial tissue present, and its location. If confined to the chink, a more speedy result may be expected, because of the stretching which is exerted by the expansion of the glottis with every breath. After the normal lumen of the larynx has been restored, or at least ample breathing room secured, a tube should be inserted once or twice a week, and allowed to remain in position from twelve to twenty-four hours. This interval can be gradually increased according to indications, and continued until the tendency to recontraction has been permanently overcome. It is important to remember that the danger of apnœa attending intubation in this class of cases is greater than in croup, owing to the resistance offered by the stricture, and the longer time liable to be consumed in completing the operation. In other forms of chronic stenosis than those due to cicatricial tissue there is little difficulty at the outset of passing tubes of sufficient size to afford ample breathing room, and therefore to dispense with the necessity for frequent intubation.

INTUBATION FOR THE REMOVAL OF RETAINED TRACHEAL CANULÆ.

The difficulty of getting rid of a retained tracheal canula will be influenced to a great extent by the following conditions :—First, and most important, the length of time the canula has been retained. Second, whether there is complete or only partial occlusion ; in other words, whether the respiratory function of the larynx has to some extent been retained, or completely abolished. As a rule, the longer a canula has been worn the more difficult it is to get rid of. The causes for this will be given later.

In recent non-cicatricial cases, such as croup and other acute inflammatory affections of the larynx in which the original cause of the obstruction has disappeared, intubation usually effects a cure very promptly. In the reference already given will be found the report of the case of an adult male, on whom tracheotomy was performed for the relief of dyspnœa due to a subglottic neoplasm. The neoplasm proved to be a mass of fungous granulations which had developed around an impacted foreign

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

body. These were removed, and the canula was reinserted for a few days, when the wound was allowed to close. As it did so the dyspnœa returned, and a reopening of the trachea became necessary. Some time later the larynx was again laid open, to seek and if possible to remove the cause of the obstruction to respiration, but nothing was found, and the patient continued to wear his canula for three months. At the end of this time an intubation tube was inserted, and worn for one week, which resulted in a permanent cure.

Narrowing of the chink of the glottis from general thickening of the mucous membrane, with partial anchylosis of the arytenoids from disuse of the larynx, was probably the principal cause of the retention of the canula in this case, as it undoubtedly is in many of the cases following tracheotomy for croup and other self-limited diseases, in which the obstruction to respiration persists after the original cause has disappeared.

In the course of time, other changes of a more serious and permanent character are superadded.

The following quotation from the first edition of "Holmes' System of Surgery," Vol. XI., p. 316, has an important bearing on this subject :—

"When the tube has been worn for a considerable time, the cavity of the "larynx becomes so much contracted that it is necessary in many cases, "if not in all, for respiration to be carried on through the artificial "opening. In the museum of St. Bartholomew's Hospital may be seen "the larynx and trachea of a man on whom the operation of tracheotomy "was performed twelve years before death ; the patient continuing to the "time of his death to breathe through a canula passed through the opening "made in the operation. The orifice in the trachea is situated immediately "below the cricoid cartilage. The rima glottidis is almost closed by the "thickening and contraction of the mucous membrane lining the larynx. "The chordæ vocales are also so much shortened that the arytenoid "cartilages are within a quarter of an inch of the angle of the thyroid "cartilage."

Notwithstanding the teaching of physiology as to the central origin of the respiratory movements of the glottis, the clinical fact remains that when respiration is carried on exclusively through an artificial opening, if these movements do not cease altogether, they are at least too slight to prevent anchylosis of the arytenoids, which is necessarily followed by atrophy of the posticus muscles. With the smallest possible opening in the glottis the ability to speak, or at least to whisper distinctly, is retained, but the air necessary for this purpose is supplied through the canula. The vocal function of the larynx being thus retained and frequently used while its respiratory function is practically abolished, it follows that the adductor muscles must soon get the better of their antagonists, and gradually draw the cords closer until the chink is finally obliterated. This is what actually occurs, and whether the respiratory movements of the glottis are wholly of central origin, or partly central and partly reflex, or whether the interference with these movements under the circumstances mentioned is due to some inhibitory influence on the respiratory apparatus resulting from deflecting the current of air through an unnatural channel, are matters of no practical importance. When the vocal bands are in actual

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

contact, which occurs more rapidly in children owing to the very small space that normally exists between these ligaments while in a state of rest, it is very apt to be mistaken for bilateral abductor paralysis, and with injurious results. This happened about six years ago, in the case of a boy twelve years old, who was sent to me from a distant city for advice in regard to a retained canula that had been inserted for the relief of croup one year previously. The vocal cords were very close together and immovable, but not in actual contact throughout. There was room enough to allow him to breathe for a minute or two with the canula closed. Intubation was recommended, and a speedy cure predicted provided no other obstruction existed below the chink. Before submitting to the operation, the father of this patient consulted a prominent laryngologist, who pronounced the case one of double posticus paralysis, and consequently not amenable to any mechanical method of treatment. As a result of this erroneous diagnosis this boy still continues to wear his canula, now seven years. Even a slight amount of daily practice of the respiratory function of the glottis through ever so small a space renders the prognosis, as regards speedy cure, much more favourable, because the nutrition of the abductor muscles is thus to some extent maintained, and complete anchylosis of the arytenoids prevented. Enforced inactivity of these little articulations is more disastrous in its results than it would be to any other joint, owing to the fact that in the normal condition they never rest, day or night, during the whole course of life.

In addition to the form of obstruction just described, there is another of later development and of more serious import. It is a stricture which develops at the upper angle of the wound as the direct result of the long-continued irritation of the canula, and is found in a large proportion of the cases, especially in young subjects and when the operation is high, involving the cricoid cartilage or its immediate vicinity. This stricture is composed largely of cicatricial tissue, and requires intubation extending over a considerable period of time to effect a cure. When the wound is still higher, that is, wholly within the larynx, complete occlusion with adhésion of the vocal cords is very liable to occur, as in the second case reported above. It is in fact a combination of the two secondary forms of stenosis previously described, with the binding together of the cords superadded. Owing to the complete suspension of all the important functions of the larynx, these are the most difficult of all classes to cure.

In a case of this nature in a boy eight years old, in whom a canula had been inserted in the crico-thyroid space for the relief of croup eight months before he came under my observation, continuous intubation for over three months was required before the vocal cords would remain sufficiently separated without the tube to permit of respiration through the larynx for even half an hour at a time. Granulation tissue springing from the lateral aspects of the base of the epiglottis, above the level of the ventricular bands corresponding to the points of greatest pressure in he vestibule of the larynx, was a source of considerable trouble in this case. It originated from leaving a metallic tube continuously in the larynx for four weeks. This difficulty can always be avoided by removing the tube once a week, and occasionally changing the size or shape of the

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

head or shoulder of the tube, so as to prevent erosion of the mucous membrane at any one point from long-continued pressure. Granulation tissue developing in the neighbourhood of a tracheal wound is not of serious consequence ; it usually promptly disappears after the removal of the cause, aided by the pressure of an intubation tube.

In adults intubation can be accomplished, as a rule, with greater ease by using the mirror as a guide than by the sense of touch, which is the only means available in young children ; in fact, it is the only method practicable in a certain proportion of the cases wearing tracheal canulæ, owing to the deeper situation of the larynx under these circumstances, which sometimes places it beyond the reach of the finger. In three adult males of this class, the most I could do was to touch the tip of the epiglottis, without any power to control it. In two of these cases intubation was performed by the aid of the mirror, and in the other without any guide whatever except keeping the tube directly in the middle line. As soon as the tube has been inserted as far as the short curve on the introducer permits, the mirror must be dropped, and the finger quickly inserted to carry it well home, until the retaining swell has passed beyond the stricture. Considerable force is sometimes necessary at this juncture, and the finger will be found too short to follow the larynx, which recedes under the pressure. To supplement the finger under these circumstances I have used a small steel sound, with a shoulder a short distance from the tip. The extremity of the sound engages in the aperture of the tube, which prevents slipping, while the shoulder prevents it from entering too far.

Metallic tubes should not be allowed to remain continuously in the larynx for much longer than a week, owing to the irritation produced by the calcareous deposits which always occur on the outside to a greater or less extent. This deposit does not take place on vulcanite tubes, which are therefore to be preferred because they may be allowed to remain in position almost indefinitely without serious consequences. Small tubes cannot be made of hard rubber on account of the great thickness of the walls necessary for safety, which must be at the expense of the lumen.

With the simplest precautions there is practically no danger while wearing an intubation tube of sufficient calibre in uncomplicated cases of chronic stenosis. The patient should be instructed to clear the tube by coughing, whenever secretions are found to be accumulating. In the early stage of treatment, while using tubes of small calibre the thread should always be left attached, in order to guard against any possible danger from the tenacious secretions which are thrown out immediately after the introduction of the tube. The inhalation of steam is very grateful to the patient, and aids in liquefying the mucus. In practising intubation for the removal of a tracheal canula, the wound under all circumstances must be kept open until sufficient breathing-room through the natural passage has been secured to sustain life, in case the tube should be coughed out. This is, as a rule, extremely difficult to accomplish, especially in children. The hard rubber plug devised by Drs. Pitts and Brook, and used in a series of cases, appears to be the most practicable for this purpose. It is provided with a collar similar to that on a tracheal canula, by which it can be held in position.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

In adults, when the opening is well in the trachea, the best plan is to wear a small tracheal canula, corked together with the intubation tube, for which there is plenty of room. In one case I was obliged to resort to this method, and permit the patient to respire through both channels, because the tube in the larynx was too small for comfortable breathing. In the beginning, adults experience the same difficulty in swallowing after intubation, whether for acute or chronic stenosis, that is found in children after this operation for croup. (This subject will be more fully discussed by my colleague Dr. Northrup.) When continuous intubation for a considerable period of time is required, the ability to swallow almost perfectly is soon acquired, which proves that the epiglottis alone, unaided by its constrictor muscles, can protect the vital opening in the glottis, the action of the latter being nullified by the presence of the tube. Conversely, it has often been demonstrated that deglutition can be performed perfectly after complete destruction of the epiglottis. In either case some time is required to educate, so to speak, either of these safeguards to assume the duties of both, in excluding foreign substances from the air-passages. For this reason the ability to swallow well is seldom acquired after intubation for croup, because of the short time the tube is usually worn.

With the Casselberry method of feeding, which is more practicable in adults than in children, there will be little difficulty in tiding over the early period of treatment in chronic stenosis, or until the epiglottis has learned to do double duty.

The set of adult chronic stenosis tubes here shown was developed almost exclusively from the experience derived from the two cases reported in the beginning of this paper. It consists of ten tubes, an introducer and extractor. The smaller sizes can be used in any form of acute stenosis during the years of adolescence, for which period of life no provision has been made in the set of croup tubes. Owing to the small size of the heads, they are not safe without the string in any form of stenosis in adults, except the cicatricial. No set of tubes can be devised that will suit all the various distortions of the larynx that are sometimes found in long-standing cases of chronic stenosis. Special tubes will, therefore, have to be constructed to meet such indications.

Bibliography of Intubation in Chronic Stenosis of the Larynx.

"Transactions Ninth International Medical Congress," Vol. IV.
" Tenth " " " " IV.
"New York Medical Record," June 5th, 1886.
"Philadelphia Medical and Surgical Reporter," May 14th, 1887.
"New York Medical Journal," March 10th, 1888.
" " " February 22nd, 1890.
" " " December 9th, 1893.
" " " October 28th, 1893.
" " " December 31st, 1892.
" " " December 9th, 1893.
"Deutsche Medicinische Wochenschrift," Leipzig, August 31st, 1893.
"Journal of the American Medical Association," October 22nd, 1892.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

"Journal of the American Medical Association," May 3rd, 1890.
"Journal of the Respiratory Organs," February, 1890.
"Louisville Medical Journal," March, 1894.
"The American Practitioner and News," September 9th, 1893.
"Buffalo Medical and Surgical Journal," July, 1891.
"Boston Medical and Surgical Journal," July 7th, 1892.
"Transactions of the London Medical Society," 1892.
"La Semaine Medicale," May 6th, 1891.
"Revue de Laryngologie, d'Otologie, et de Rhinologie," Paris, July 15th, 1891; October, 1891; November 1st, 1892.
"Archives Internationale de Laryngologie, d'Otologie, Rhinologie," November and December, 1892.
"El Progresso Ginecol. y Pediatria," Valencia, May and June, 1893.
"Bolletina della Paliambulanza di Milano," May and June, 1892.
"Separat Abdruck aus der Monatsschrift für Ohrenheilkunde," No. 1, 1892.
London "Lancet," January 23rd, 1892.
"Annual of the Universal Medical Sciences," 1892, 1893 and 1894, Vols. IV.
"Archiv für Kinderheilkunde," Vol. XV. 5 and 6, 334-93.
"Schmidt's Jahrbucher," January 10th, 1894.
"Louisville Medical Monthly," March, 1894.

Laryngeal Paralysis in Chronic Nervous Disease. By W. PERMEWAN, M.D. (Lond.), F.R.C.S.

That the bulb is often affected in locomotor ataxy has been known pathologically for some time to nervous physicians; it is to be hoped that in the future that relation will also be recognized clinically, and that physicians will look to the larynx, where the effects of bulbar damage are most easily to be seen. There is one disease, however, which is much more common than tabes, but allied to it in causation, symptoms, and pathology, the connection of which with laryngeal paralyses has not been fully or systematically investigated—viz., general paralysis of the insane. Of the cases of tabes recorded by Barger in his well-known monograph, it is noteworthy that a considerable proportion were affected either simultaneously or subsequently by general paralysis of the insane, and he quotes several suggestive remarks by various authorities on the relation between these two affections.

The author examined laryngoscopically thirty-four cases of general paralysis in the County Asylum, Rainhill; of these only three were in the well-marked third stage, nine were in the first stage, while the remaining twenty-two were in the varying periods of the second stage, including several said by the medical officers to be in the transition period between the first and second, and second and third stages.

The results were as follows:—

1. *Character of the Voice.*—In some cases it was notably high-pitched and monotonous, "sing-song" it might be called; in others it was quite normal. In only one case, where there was almost complete paralysis of one vocal cord, was any characteristic quality noted.

2. *Sensibility of Pharynx and Larynx.*—In the early stages mostly normal, but in nearly all the second and third stage cases it was notably diminished. In two cases there was hyper-sensitiveness of the pharynx.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

3. *Paralysis of Palate.*—In only two cases was there any want of power, one with a normal larynx, the other combined with bilateral abductor paralysis of the larynx.

4. *Laryngeal Paralysis.*—In seven there was more or less disturbance of laryngeal movement, viz. :—

Case 4. E. H., male, aged thirty-nine, stage three. Pupils unequal, inactive to light ; knee-jerk exaggerated ; epiglottis very erect ; adduction of cords perfect, but paresis of abductors.

Case 7. Thos. H., aged forty, stage two. Pupils inactive to light ; knee-jerks normal. Palate moves well. Abductor paresis of both cords. They move outwards only slightly beyond cadaveric position ; on forced inspiration they move inwards.

Case 10. Thos. H., aged thirty-seven, stage two. Pupils inactive ; knee-jerks exaggerated. No paralysis of palate. Abductor paresis of right cord.

Case 17. Christopher C., aged forty-five, stages two and three. Duration of disease two to three years. Pharynx rather insensitive ; palate normal ; cords do not abduct fully ; some paresis of abductors. Adduction normal.

Case 27. Ed. Q. Pupils active ; knee-jerks normal. Palate does not move well. Both cords in the middle position—do not abduct on inspiration ; bilateral abductor paralysis. They adduct well. Voice not notably altered. Epiglottis flaps to and fro during inspiration.

Case 32. Richard K., early stage two. Pupils sluggish ; knee-jerk weak. Cords do not fully abduct. Adduction good.

Case 34. John H., late stage two. Formerly a good tenor singer, but during preceding twelve months has lost vocal power, and now sings in a weak and toneless voice. No paralysis of palate. Paralysis of left cord almost complete, does not reach the middle line in phonating ; right cord passes across middle line, but does not meet left one completely. No local cause discoverable for paralysis of left cord.

In all cases where signs of paralysis were noted, repeated examinations were made, and in all cases confirmed by the opinion of Dr. Wood, the Medical Superintendent of Rainhill Asylum.

The author arrives at the following conclusions :—

1. That the larynx is not unfrequently affected in general paralysis of the insane ;

2. That this affects first and chiefly the abductors ;

3. That this does not necessarily depend on the association of tabes dorsalis with the more generalized disease, but is the direct result of the degenerative and inflammatory changes which affect the central nervous system in general paralysis.

Disseminated Sclerosis.—In two cases examined the laryngeal muscles were unaffected.

Bulbar Paralysis.—The author lately examined one case in which he was able to watch the onset of abductor paralysis becoming absolutely complete, and the supervention on it of affection of the adductors. The other usual symptoms of bulbar paralysis were present in a marked degree.

Dr. FELIX SEMON (London) congratulated Dr. Permewan upon his paper, which broke quite new ground, and expressed his gratification that

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

his investigations had so fully corroborated the law of the particular susceptibility of the abductors of the vocal cords to succumb to organic disease.

Turbinal Varix. By WYATT WINGRAVE, M.R.C.S.

Turbinal varix may be defined as a particular form of hypertrophy which involves the posterior half of the inferior turbinated body, and characterized by a permanent distension of the venous sinuses.

Morbid Anatomy and Pathology.—It is expedient to classify the varieties of hypertrophic rhinitis according to the predominating morbid changes. These in their order of frequency are—1. vascular; 2. mucoid; 3. lymphoid; 4. glandular. In the simple and temporary cases all these features are present, and it is only in cases of a chronic or permanent character that certain features predominate, and readily determine their nature on histological examination. It is to the special form of the vascular group that the author invites attention in this paper. Although this variety occurs occasionally in the middle turbinal, and even in the septum, it will be found to constitute a disease almost peculiar to the inferior turbinal itself, owing to its peculiar structure. Thus serial section cutting shows that, whilst the smooth anterior region is characterized for the most part by the presence of glandular and lymphoid structure, the wrinkled posterior part is mainly occupied by cavernous vascular spaces lined by epithelioid plates.

These vascular channels, the "Schwellkorpe" of Zuckerkandl, are surrounded by several layers of visceral muscle fibres. Many writers seem to have ignored these muscle fibres entirely. Thus even so high an authority as Greville Macdonald describes the venous sinuses as (1) "consisting of a thin layer of connective tissue, apparently not elastic, and lined with endothelium." He further states that he failed to find muscular fibres in the trabeculæ. This oversight is probably explained by the fact that specimens were examined whose walls were already the seat of morbid changes.

Your attention is specially directed to these muscular fibres, because in their morbid conditions is to be found an interpretation of the pathology of one form of turbinal disease.

Owing to the courtesy of my colleague, Mr. Carmalt Jones, an abundant supply of material has afforded me an opportunity of tracing the varying degrees of degeneration which this erectile tissue undergoes, and the conditions were so constant in their appearance as to justify the view of a more than merely coincidental connection.

The peculiar villous or brain-like macroscopic appearance of the surface was seen microscopically to correspond with a cystic invagination of the surface epithelium, covering distended loops of vessels with very thin walls, imbedded in mucoid tissue—that is connective tissue in which the matrix mucin was in excess of the fibrous reticulum and cells. The muscular walls of the vascular sinuses presented well-marked atrophy and degeneration, varying from simple thinning to complete disappearance, owing to the fibres apparently sharing the surrounding mucoid changes. In places this intervening mucoid tissue simply

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

formed their boundaries, whilst in other parts the walls seemed to have undergone fibrotic changes. This condition is therefore not a mere hypertrophy of the structures, but consists of a true degeneration and infiltration of the walls of these vascular spaces, for the walls gradually losing their power of *active* recoil, the vessels by degrees become more and more distended, and a permanent enlargement ensues, which is in fact a varix.

Etiology.—These degenerative changes, which develop so gradually, are probably due to some tropho-neurotic influences, local or general, and excessive erectile activity of the parts must play an important *rôle*. Unhygienic conditions of living, by keeping up a constant irritation, hereditary tendency, often associated with a highly emotional temperament, and the male sex, are important predisposing factors, as well as all conditions in which the venous flow is interfered with (hepatic cirrhosis, gout, pulmonary and cardiac diseases, etc.).

Symptoms.—The most notable are chronic nasal stenosis, parosmia, a slimy sanguinolent discharge, occasional epistaxis, and either painful tenesmus of the faucial and pharyngeal muscles or paresis of the palate.

Diagnosis.—If seen from the front, a dull red purple mass may be found at a varying depth, in one or both sides, which does not shrink much under cocaine, but readily yields to the probe, and does not change its position on forcible respiration. Posterior rhinoscopy will reveal a red or purple brain-like mass projecting into the post-nasal space on one or both sides.

In all instances, however, digital examination will at once afford by far the most reliable and available evidence. A soft resilient yet sharply circumscribed mass will be felt on each side of the nasal septum, free all round except at its attachment to the inferior turbinal bone.

Treatment.—This will be palliative and radical. Palliative remedies such as alkaline and astringent douches, with general depletion, can only afford temporary relief, and must only be considered as preliminaries to a more thorough and permanent treatment, by removal of the obstructions in the anterior regions of the nostrils, afterwards treating the varix itself.

Direct treatment will be determined by the size of the varix, its duration, and its response to the action of cocaine. If it contracts under cocaine the galvano-cautery or fused chromic acid will afford relief. But when the swelling is large and does not shrink under cocaine, caustics are absolutely useless and complete removal is necessary. This may be effected either with a snare or by means of a cutting instrument. Of the former we may use Krause's snare when only soft structures are to be removed, and Jarvis' or Wilkin's where it is decided to include the bone. But by far the most satisfactory results, as far as complete enucleation is concerned, are to be obtained by the ring or draw-knife as introduced by Spencer Watson, and greatly improved by Carmalt Jones. It is introduced, after cleansing the nostrils with an antiseptic douche, until the varicose posterior extremity is engaged in the ring, and then it is sharply but firmly withdrawn, cutting its way through the turbinal body. Bleeding is easily controlled by tannin and lint plugs and these should be followed by plugs of boric lint firmly packed in, and

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

left for twelve or twenty-four hours, absolute rest in the recumbent position being insisted upon. The plugs are then removed and the nostrils gently cleansed with Dobell's solution.

Two important complications must be guarded against—viz., septic changes and secondary hæmorrhage.

Results.—Having personally investigated the subsequent history of over two hundred cases of turbinations at the Central London Hospital, some of which were operated upon as far back as three years, none of the evils that have been advanced as likely to occur have arisen.

DISCUSSION.

Dr. FELIX SEMON (London) expressed his surprise that so large a number of these operations should have been necessary within, comparatively speaking, so short a time, and took this observation as the starting-point of some general remarks on the desirability of avoiding operative hyper-activity in connection with theories which often enough did not stand the test of time.

Dr. SCANES SPICER had been in the habit of removing vascular growths from the lower turbinated body, but usually without including any of the bones. His practice was to use the cold snare, and he rather dreaded severe hæmorrhage from the use of the cautery knife. He did not hesitate to operate on the nasal cavity whenever there were symptoms of obstruction or irritation.

Dr. DUNDAS GRANT had used the cutting ring-knife in a number of cases, with excellent results. He frequently used the snare, but for these posterior hypertrophies he found the ring-knife more applicable, as he thought cocaine undesirable, and preferred to operate under nitrous-oxide gas, the instrument permitting of the rapidity that nitrous-oxide required.

Dr. WILLIAM HILL did not consider that two hundred cases of moriform growths in three years at the Central London Hospital was greater in proportion to the number of cases met with in the combined clinics of himself and Dr. Spicer.

Dr. GREVILLE MACDONALD thought many specialists were too anxious to produce an artistically correct condition of the nose, irrespective of symptoms, yet at the same time he was bound to confess that he numbered among his most successful cases those where chronic laryngitis was ameliorated by restoring nasal respiration. Yet it was always to be remembered that whereas nasal obstruction was of no moment whatever to one individual, it became very serious to another. He thought that the only nasal reflexes to be seriously considered were the physiological, *e.g.*, sneezing, etc., though perhaps the cure of asthma by correcting nasal abnormalities, one of the most striking instances of the success of rhinology, ought to be included. He believed that although all such cases were built upon a neurotic basis, yet the treatment of slight nasal obstruction, which in the non-neurotic were of no importance, did more for the patient than the physician could accomplish. Finally, he objected to complete removal of the inferior turbinated bodies, holding that these structures were of great physiological importance.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

Dr. MILLIGAN (Manchester) said that during the last four years he had only seen two cases of turbinal varix necessitating the performance of such an operation as Mr. Wingrave had just described. He was at a loss to explain the great discrepancy between his observations and those of some of the previous speakers. He saw many cases of slight hypertrophy of the posterior ends of the inferior turbinals, but local treatment generally sufficed to relieve.

Mr. WINGRAVE, in reply to the observations that had been made, said that whilst sharing Dr. Felix Semon's depreciation of indiscriminate and wholesale operations on the nose for obscure and purely subjective symptoms, he protested against such an interpretation being applied to the conditions of this particular disease, for the indications were not imaginary but real, obvious to the surgeon, and due to mechanical causes. He further replied severally to other points alluded to in the course of the discussion.

Coryza Caseosa. By P. MCBRIDE, M.D., F.R.C.P.E., F.R.S.E.

In May, 1892, I was consulted by a gentleman seventy-three years of age, whose case presented the following points of interest. He had been aware of a certain stuffiness in the right nostril since the autumn of the preceding year. The nasal obstruction became worse after influenza in November, 1891. Examination of the anterior nares revealed nothing of importance on the left side. The right nostril, however, showed an irregular warty-looking mass with a good deal of inspissated pus lying about, and a marked tendency to bleed on touching it with a probe. In my notes I find it recorded that the right choana, when examined with the rhinoscopic mirror, seemed to be blocked by an angry red mass dotted here and there with pus.

The teeth were perfect; there was no history of pain, but slight enlargement of the nose on the affected side was noted. There were no enlarged glands anywhere. There was, however, a certain amount of fœtor. My provisional diagnosis was that probably malignant disease existed, but that possibly inflammation might account for the condition. I, however, in writing to Dr. McDougall, of Coldingham, the patient's medical adviser, expressed my fears as to malignancy, but removed a portion of the growth for microscopic examination. Mr. Alexis Thomson very kindly cut sections, and gave his opinion most decidedly that the neoplasm was inflammatory, an opinion which was corroborated by Mr. Stiles.

From the clinical aspect of the case, certainly this seemed unlikely, but on the strength of the favourable report I proceeded on the 13th June, in the presence of Dr. McDougall, to remove the tumour. At first the presenting growth was snared off, and it was a somewhat noteworthy fact that this did not seem to have increased in size during the month that intervened between the patient's first and second visits. After this had been removed, a sloughy-looking mass remained, which could be taken away with the wire loop. It turned out to be a putty-like substance, having an almost fæcal odour. As much of this *débris* was removed as possible, but masses were still visible high up in the nostril.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

I suggested the employment of a spray of soda, borax and carbolic under the direction of Dr. McDougall. Under this treatment absolute recovery seems to have occurred. The patient has been unable to be in Edinburgh since, but Dr. McDougall, writing in February, 1893, says, "The deformity, "which was very marked, has now entirely disappeared. The copious "offensive watery and purulent discharge, which was such an annoyance "to the patient and his friends, is quite gone. The nostril is in every "respect natural, and, so far as my examination with an ordinary nasal "speculum and lamp-light can assist me, there does not appear to be the "slightest trace of any abnormality of the nose remaining."

It will be observed that Dr. McDougall considered the external deformity of the nose more marked than I did, and there can be no doubt that on this point he was better able to judge, as he was intimately acquainted with the patient, while I saw him only twice.

On the 8th May in this year there came under my care H. C., an unmarried cook of thirty-six. Her chief complaints were: (1) pain on the left side of nose, worse at night; (2) swelling of the left side of face, which was noticeable on inspection, under the eye and at the side of the nose—extending to the malar region; (3) headache, frontal and occipital; (4) discharge of matter from left nostril, worse on lying down; (5) watering of the left eye.

Three and a half years ago the patient had an attack of influenza, and then suffered from a pain over the bridge of the nose, which continued for some months; there was, however, no other local complaint, and H. C. had no further trouble until the middle of April last, when she began to have pain over the whole left side of the head and nose. The pain was least when going about, aggravated by stooping and in bed. There were some bad teeth and these were removed, but no benefit followed. When I first examined the patient, on the 7th May, I found a reddish-pink mass of firm consistence blocking the left nostril; it was surrounded at its margins by greenish-yellow-looking matter. The growth seemed attached to the inferior turbinated body, and a portion of it was extracted. After this masses of greenish-yellow, solid cheese-like material, with a foul and fæcal odour, came away. Some of this was kindly examined by Dr. Muir, who reported: "The material taken from "the nose shows broken-down cells, chiefly pus corpuscles, a large amount "of granular *débris* and enormous masses of bacteria of various kinds. I "examined carefully for tubercle bacilli, but could find no trace of such."

The use of a syringe brought away some more of the caseous substance. On the 9th May I again operated, removing with the electric cautery a mass of tissue about as large as a hazel nut from the left (*inferior?*) turbinated body. This was followed by the escape of a large quantity of very fœtid cheesy matter, the main masses having the shape of very large almonds, and being manifestly casts of the nasal passages. Posterior rhinoscopy showed the presence of some muco-purulent substance in the left choana. The patient's nostril was now sprayed with a solution of bicarbonate of soda, and a considerable quantity of inspissated matter cleared away.

On the 11th May the patient felt very much better. There is seldom

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

pain, swelling has almost entirely disappeared, and the eye has ceased to water. On examining the nose on the 12th May, hypertrophy of the mucosa covering the inferior turbinated was noticed far back. On the 20th June examination showed the middle turbinated mucosa to be thickened and almost pendulous, while below it there inclines to form a hard crust of secretion, which, however, has no odour. I may add that on the 17th June I washed out the left antrum with a Lichtwitz's canula, in order to exclude an empyema, and that the fluid (boracic) flowed off by the nostril quite clear.

On the 8th June Dr. Muir reported as follows on a portion of the polypoid mass removed :—

"Tissue is chiefly cellular, and is composed in great part of numerous "thin-walled vessels and capillaries, with abundant accumulations of "leucocytes between. There is, however, some myxomatous tissue under "the epithelium covering it, and from the general appearance I think it "is a myxoma or myxo-fibroma which has been in a state of inflammation "for a long time, the inflammatory process having obscured its structure. "It is covered on the surface by the deep layers of stratified epithelium, "except at some places where there is ulceration."

Another portion of the cheesy material was also examined by Dr. Muir, who reported: "I could find no cholestearin, but there are numerous "small needle-like crystals (?) of fatty acids, and there are small granules "and globules which give the fat reaction with osmic acid; otherwise the "structure is as before—broken-down leucocytes and masses of bacteria."

On the 11th June Dr. Noel Paton, at Dr. Muir's request, kindly reported as follows: "I extracted with alcohol and ether, and filtered hot. "On evaporation hardly any residue was left. This consisted chiefly of "cholestearin. Fats and fatty acids are present only in very small "amount, if at all."

On the 14th June Dr. Noel Paton writes: "By saponifying the "alcoholic extract from the cholestearin I was able to get undoubted "traces of fatty acids. These may have been free or combined with "glycerine."

I may say that this case is still under observation, and I may possibly have something further to add.

Before seeing either of those typical cases I had in the spring of 1892 seen a patient, in consultation with Dr. Whitelaw, who gave the following history: In December, 1891, he had toothache and swelling of the face, followed by a nasal discharge. In April, 1892, his complaints were of nasal discharge and stuffing of the left nostril, the former being more marked in the morning. On examination a polypoid growth was found in the left nostril springing from the anterior part of the middle turbinated body. This was removed and afterwards about a teaspoonful of curdy pus came away. I advised the use of a spray, and on the 7th June saw the patient again. There was then found diffuse thickening of the mucosa in the region of the middle turbinated body, and on pressing this aside curdy purulent masses were seen. Illumination gave no translucence on either side. On the 6th July the discharge was greatly reduced, but still reappeared on sitting with the head down. The symptoms seem to have

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

become less and less, and in February, 1893, Dr. Whitelaw reported the nostril to be quite normal.

I have recorded these cases because, whatever interpretation we may put upon them, they illustrate a clinical type of rare occurrence. Obviously the last and at the same time least characteristic presented many features which would make one incline to classify it as a latent empyema of the antrum, and I am even now by no means sure that it was not. Only if it was it ran a most anomalous course, and its spontaneous cure also seems to militate against this view. In my second case the antrum has been proved free from disease, but it is still conceivable that the secretion may have flowed from the frontal, ethmoidal, or sphenoidal cells, and have afterwards become inspissated. I do not, however, think this probable. In my first example, too, the whole course of the affection militates against the view of any accessory cavity disease. It seems to me very improbable that fluid pus flowing into the nostrils should be there retained long enough to permit of its drying up into such cheesy masses as have been described. I do not think either that the hypothesis of degenerated nasal polypi can very well be upheld.

It seems to me that the first two cases, at least, must be classed as examples of coryza caseosa. The earliest description of this affection with which I am acquainted is that by Duplay and Follin. ("Pathologie Externe," vol. iii., p. 806.) These authors define the affection as "an accumulation within the nasal cavities of a cheesy substance analogous to that contained in certain sebaceous cysts, which may form in sufficient quantity to deform the face and lead to loss of smell." They also refer to observations by Maisonneuve, Verneuil, Guyon, and Reverdin.

In Verneuil's case, however, the cheesy masses seem to have resulted from the presence of a nasal calculus, and therefore cannot be considered as illustrating the occurrence of coryza caseosa as a distinct clinical entity.

Nélaton also endorses Duplay's description ("Pathologie Chirurgicales," vol. iii., pp. 717, 718), and confirms the existence of cheesy rhinitis as an independent affection. Among specialists, Cozzolino ("Bol. delle Malattie dell'Orecchio," etc., 1884; "Annales des Maladies de l'Oreille," etc., 1889, p. 645) was the first authority who called attention to the affection, and he has since elaborated his observations, although in all he has only met with three cases. In the last of these he made a careful examination of the caseous matter, and found (1) fatty material with crystals of margarine and stearin; (2) epithelial cells; (3) circular black bodies (aspergillus niger); (4) white corpuscles; (5) microbes. Cozzolino now proposes to apply the term cholesteatomatous rhinitis to the affection. Beausoleil ("Revue de Laryngologie," etc., April 15th, 1893) briefly refers to two cases he has met with; according to the short description, where I gather that in both there were polypoid projections from the middle turbinated body, and in one the diagnosis pointed to empyema of the antrum, these examples thus proving a very marked parallel to the cases I have recorded here.

In addition to these observations, Strazza ("Bol. delle Malattie dell'Orecchio," vol. ix.; "Annales des Mal. de l'Oreille," etc., vol. xvii.,

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

1891) and Neumann ("Virchow's Archiv," vol. v., 132) have recorded cases, in both of which masses of cheesy *débris* were found. In both a complete cure seems to have followed removal of the caseous material. In Strazza's case microscopic examination showed the foreign substance to be composed of epithelial cells, undergoing fatty degeneration, and white corpuscles which stained with osmic acid. Neumann states that he found the substance removed by him to consist altogether of cholestearin.

I am unwilling, gentlemen, to take up more time than I can help. Besides, I do not know that any great value attaches to speculation and hypothesis. My cases—at least, the first—certainly correspond in their clinical features with the affection as it is described by the majority of the authors quoted. Neumann's case certainly seems unique, if indeed the mass consisted of cholestearin only. In that case it would form an analogy to certain cases of biliary calculi.

I may add that I think the history of my cases negatives the idea of any foreign body having been introduced, nor was any such substance detected.

Typhoid Fever of a Peculiarly Virulent Type communicated by the Breath. By P. WATSON WILLIAMS, M.D. (London).

I record these five cases of typhoid fever from a single source, mainly in order to invite attention to some special points of interest, and more especially as tending to prove that typhoid fever may be communicated by the breath or expectoration of infected persons.

Though only one of these cases was under my care, I think it will simplify matters and render the course of events more appreciable if I relate the cases in the order in which they occurred, and not in the order in which they came under my notice.

The first case, Ernest S., aged twenty, a painter, began to feel ill on February 9th, with headache and general malaise, and on the 15th was admitted to the Bristol Royal Infirmary, under Dr. Prowse. Shortly after admission the temperature was 104·6 F.; he was drowsy, and complained of severe backache. There were several typhoid spots on the abdomen, and his spleen was enlarged.

On February 18th the case was notified as typhoid fever.

On February 20th the patient's symptoms had become more aggravated; he was delirious, and continually trying to get out of bed.

On February 24th, the estimated seventeenth day, the morning temperature began to remit, but he was still delirious. For some days there had been a good deal of laryngeal and bronchial catarrh, and the patient was constantly coughing and expectorating about the bed. He began to improve, and

By February 28th the condition of the patient was considerably better, the temperature had fallen by lysis, and on this day reached the normal, but later in the afternoon he began to have a relapse.

On March 7th, seven days later, he developed fresh typhoid spots, and the temperature reached 103°. There was now discharge of pus from his right ear, and epistaxis had occurred on two occasions.

March 10th: Symptoms of acute laryngitis, with some glottic

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

obstruction, came on in the evening. A steam bed relieved him considerably, but in a few hours he became more cyanosed, and he died suddenly, it was supposed, from cardiac failure.

Post-mortem examination showed all the typical lesions of enteric fever, typhoid ulcers in the intestines, enlarged spleen, etc., but the lungs were extremely congested, and the lower lobes of both lungs consolidated.

The foramen ovale was patent, with a valve-like opening.

In the larynx, the epiglottis and ary-epiglottic folds were œdematous, the ventricular bands were ulcerated extensively, yellow and sloughy. The right vocal cord had an ulcer on the vocal process, with an area of congestion all round.

On making inquiries as to the possible source of the infection of this case, Dr. Davies, Medical Officer of Health, informed me that the inspector visited the boy's home on the 19th February, and reported that there was no evidence of the source of contagion.

Cases 2 and 3. Brothers of Ernest S., and aged five and eight respectively, were notified as suffering from enteric fever at their home on the 28th February—*i.e.*, thirteen days after their elder brother was removed to the Royal Infirmary, but the symptoms, of course, must have begun some days before they were notified as cases of typhoid fever.

These two were removed to the Bristol Union Workhouse, to be under Dr. Henry Grace, who has been good enough to write me to the effect that they were under his care for about seven weeks. "The "cases were certainly of a severe type, especially in the younger, in "whom the typhoid fever was followed by an abscess in the hand; they "had no special laryngeal symptoms."

Case 4: Nurse F., aged twenty-five, who had been nursing Ernest S. in Ward V. of Royal Infirmary, began to have a rise of temperature on March 25th, with pains in the back and limbs.

March 27th: Scarcely any sleep, headache and general pains being very severe, but relieved temporarily by exalgine; temperature fluctuating between 100° and 104°.

On March 31st, the sixth day of her illness, there was some abdominal distension, but no splenic enlargement. The lungs remained clear, but the headache was still a very marked symptom.

On April 3rd, the ninth day, the patient lay in a semi-conscious condition, being aroused with difficulty. She had been passing excreta in the bed for two days. Pulse and respiration frequent; *rales* were heard extensively over bases of both lungs; the abdomen was distended and the spleen enlarged, and typhoid spots appeared.

On April 10th she was very ill indeed, semi-conscious, and presenting every indication of profound nervous depression. Pulse, 148; respiration, 50. The temperature reached 105·2°. She had been ordered digitalis and nux vomica the previous day, and brandy. She did not sleep at all during the night, but was a little better the following morning. Ordered ol. terebinth with each dose of the digitalis and nux vomica mixture every three hours. At one p.m. put in a bath at 78° gradually cooled to 70°. This reduced the temperature of the patient in forty minutes from 103·8° to 101·2°, and it subsequently continued

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

to 99·8°. Baths were given at intervals during the next eight days; but on April 19th she became cyanosed, and respiration was laboured, with cough and inability to expectorate.

On April 20th tubular breathing was heard over the left lung, and the patient became unconscious and more and more cyanosed. Several injections of strychnine and digitalis under the skin seemed to restore the patient considerably, and she became conscious and was able to answer questions. She, however, became more cyanosed again, and died at 12.30 p.m., remaining conscious till within a few minutes of death.

There was no *post-mortem* examination of this case.

Case 5: James V., aged thirty-eight, the only one under my care, had been attending as an out-patient, and was admitted to Ward V. of the Bristol Royal Infirmary on November 18th, 1893, under Dr. Shingleton Smith, for aneurism of the thoracic aorta. Subsequent events proved that the line of treatment adopted by Dr. Smith succeeded in practically curing the aneurism.

He had contracted syphilis twenty years before, and for the five years previous to admission the patient had been subject to cough, especially in the winter, and to attacks of laryngitis, his voice having been permanently hoarse for some years.

Laryngoscopic examination showed hyperæmia of both vocal cords.

On November 24th he was placed on Tufnel's diet and thirty grains of iodide of potassium daily. At intervals this was increased, till on March 23rd he was taking thirty grains every four hours, but by this time the pulsation had so markedly diminished that the patient was allowed to get up, and ordinary diet had been resumed in moderate quantities. In fact, by this time Dr. Smith felt justified in expressing his hope that a firm deposit of fibrin had occurred in the aneurismal sac, and that there was every prospect of the aneurism being cured, and at the *post-mortem*, twelve days later, the sac was found to be almost completely obliterated by the deposit of firm *ante-mortem* fibrinous deposit.

But in the meanwhile, on March 23rd, the temperature was slightly raised, 101·2°. On the 25th the patient began to complain of intense neuralgic pains on the right side of the head, which persisted, or rather increased in severity several days. The headache was unrelieved by large doses of bromide of potassium, antipyrin, caffeine, or analgen, but it was slightly relieved by the ice-bag continuously applied, and occasional hypodermic injection of morphine. The intensely severe right-sided headache with vomiting led me to examine the optic discs, but they were normal; the temperature had risen steadily each day, till it was now persistently above 103°. There was no diarrhœa, but the mental condition and general aspect of the patient, and an enlarged spleen led me to watch for any further indications of enteric fever, though how he could have contracted it I could not conceive, seeing there were no cases in the ward.

On April 1st some typhoid spots appeared on the abdomen, which was tumid, and there was some tenderness on the right iliac fossa, and typical loose enteric stools. I then learnt that a nurse had become ill

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

with symptoms of enteric fever, and that it was thought she had contracted it from the patient who had died with laryngeal complications from typhoid fever in the other ward. My patient had just been through a course of Tufnel's diet and large doses of iodide of potassium, and with lungs considerably damaged by his aortic aneurism, besides being an old syphilitic and alcoholic subject. Needless to say, his conditions were such as to render him wholly unfit to cope with an attack of enteric fever. Two days later, on April 4th, his breathing became very difficult, and he appeared to be sinking from cardiac failure. On entering the ward shortly after these grave features supervened, I found him greatly cyanosed, with laboured breathing, but with a very fair pulse. Fearing laryngeal œdema had occurred, I got a momentary glance of the larynx, which showed that there was extensive ulceration on the cords, but no glottic obstructions here. We placed him in a steam bed and freely administered stimulants, but in a few hours he died, having become gradually more cyanosed and passed into unconsciousness. The *post-mortem* examination revealed all the typical lesions of typhoid fever at the twelfth or fourteenth day, and these I need not recount.

But in the larynx superficial ulceration was found on the posterior thirds of the vocal cords, and on the anterior surface of each arytenoid cartilage.

From the large and pulpy spleen, following Gaffky's directions, I inoculated some agar culture tubes. The larynx having been removed, it was divided through the posterior commissure with clean and unused scissors. A fresh stream of water direct from the tap was allowed to run on the ulcerated surfaces. I then inoculated other agar tubes with a platinum point, first sterilized in the usual manner by heating to a white heat, and then on cooling plunged into the ulcers on the vocal processes. As I hoped to obtain evidence which might solve the vexed question as to the true character of these ulcers, I endeavoured to insure against possible contamination of the larynx or any of the instruments used with typhoid bacilli from other parts of the organism, but I should add that the scissors with which the larynx was divided posteriorly were not sterilized, and thus a possible, though improbable, source of error was introduced.

One of the splenic culture tubes gave a pure culture of the Eberth-Gaffky bacillus, and one of the "larynx" tubes yielded a plate culture of numerous typhoid bacilli colonies, with a very few colonies of some liquefying micro-organism. From this plate culture, secondary cultures of the Eberth-Gaffky bacillus were readily obtained.

We may recognize that these two preparations of undoubtedly identical micro-organisms may be the Eberth-Gaffky bacilli of enteric fever.

Firstly: by their appearance. They are numerous, very short, rod-shaped micro-organisms, which are so short in proportion to their breadth that they might be almost mistaken for micrococci under a low magnifying power, and they tend to arrange themselves in parallel fasciculi.

Secondly: by the naked eye characters of the culture, with an abundant surface growth in the stab culture, and numerous small discrete growths in the plate culture, without liquefaction.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

Thirdly: they do not liberate carbonic acid gas when grown in glucose broth.

Fourthly: they grow in phenol broth, containing ·1 per cent. of phenol and ·15 per cent. of hydrochloric acid.

Fifthly: they were obtained in pure cultures from the spleen in a case of typhoid fever.

The true nature of ulcers of the larynx in typhoid fever is still an open question.

Are they simple catarrhal ulcerations following the somewhat common complications of typhoid fever, catarrhal pharyngitis and laryngitis, or are they specific ulcers of typhoid fever analogous to the ulcers in the intestine? Osler states that he believes that the bacilli have not yet been found in the ulcers, and Fagge, Murchison, Roberts, Liebermeister, Strumpel, and Bartholow are cited by Lincoln[1] as being of opinion that the ulcers are always secondary and not specific lesions of the typhoid process; while, on the other hand, Klebs, Rokitansky, Landgraf, and Morell Mackenzie are among those who take the view that they are due to a specific deposit upon the laryngeal mucous membrane.

Typhoid ulceration of the larynx is rare in England, having been observed in about three per cent. of cases in which the larynx has been examined, and I regret that in both cases these interesting specimens were not kept, but the importance of these cultures from the larynx is sufficiently obvious. The specific bacilli have been found also in the lungs as well as in the blood of typhoid cases. This discovery throws some light on the method by which the disease may have been communicated, by case 1, the patient first admitted, to cases 4 and 5, for I think, in view of our elaborate and careful precautions, it is practically impossible for any case of enteric fever to be communicated by fæcal contamination in the Bristol Royal Infirmary. But although I never saw the larynx of case 1, I have little doubt now that his expectoration contained the specific microbe, and as he was delirious and was coughing and expectorating in all directions, I conclude that from this cause the nurse in attendance contracted the disease.

I also ascertained that my patient, having recovered from his aneurism, and being allowed up, was in the habit of going into Ward V., to see another patient, and though he never went within a few feet of the typhoid case, there can be no manner of doubt that he contracted the disease during his visits to this ward. Very possibly, the fact of his having an old-standing laryngitis rendered him particularly vulnerable in this region.

There is no evidence as to how the two brothers of Ernest S., viz., cases 2 and 3, became infected. Ernest himself had been working at several houses, but there was no history of illness at these places nor amongst his fellow workmen. The water supply at his home was "Company's," and there was no reason to suspect the milk supply. The brothers were supposed to have been secondarily infected from stools kept in the house owing to the situation of the w.c.'s several yards away.

[1] Burnett's "System," Vol. II. p. 655.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

I would direct attention to the peculiarly virulent type of fever here presented. All the three cases in the Royal Infirmary began with very severe headache and backache, profound nervous prostration supervened very early in the cases, and all three died apparently from respiratory failure.

In two at least there were laryngeal ulcers, and probably also in the third, the nurse.

In case 1 there was purulent discharge from one ear, and in case 4 an abscess formed in the arm; and in this connection we may bear in mind that Chantemesse and Widal consider that the specific bacillus is the cause of chronic osteo-myelitis following typhoid fever, while in some of the cases attended with pus formation typhoid bacilli, often of extreme virulence, have been found in the pus even eighteen months after the fever.

The futility of seeking to prevent relapses in typhoid fever from the administration of so-called intestinal antiseptics hardly requires to be emphasized. It has long been known that the specific organisms can generally be found in the mesenteric glands and in the spleen, the enlargement and softening of which is due to their presence in this organ, and I think that there are very few now who have not ceased to expect much result in this direction. But the practical importance of bearing in mind the possibility of typhoid fever being communicated by the expectoration cannot be over-estimated.

These cases would seem to explain the possibility of typhoid fever being infectious, as maintained by Budd—a view endorsed by Collie[1]—and brings home to us the necessity for more careful prophylaxis in cases exhibiting laryngeal complications.

In conclusion, I acknowledge with sincere thanks my indebtedness to Mr. F. Wallis Stoddart for the kind and skilled assistance he rendered in undertaking the investigation of the cultures.

The Surgical Treatment of Chronic Empyema of the Antrum Maxillare. By SCANES SPICER, M.D. (London).

The method which I have adopted in treating cases of chronic empyema of the maxillary antrum during the last two years, and which I have applied to cases previously treated by others and myself without success by the more ordinary measures, was referred to in a few lines *apropos* of a case shown at the West London Medical and Chirurgical Society in the "British Medical Journal" of June 23rd, 1894, p. 1361; but, as no detailed account of it has been published by me, I have ventured to submit it to this section as a contribution to the present discussion.

In the first place, the diagnosis having been established, the patient is placed under the influence of a general anæsthetic, and, after a crucial incision over the canine fossa and reflection of flaps with a raspatory, a large opening is made with a chisel and mallet in the anterior wall of the antrum according to the methods of Dr. Robertson as published in the JOURNAL OF LARYNGOLOGY and "Lancet" in 1892. Great care is taken that the bone is chipped away down to the level of the floor of the antrum and a groove established down the alveolus. The opening is

[1] "On Fevers," p. 52.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

large enough to admit the finger, and so to explore the interior. The interior surface is now curetted thoroughly so as to remove every trace of soft fungous granulation tissue, abscess sac, polypi, cysts, necrosed bone and atheromatous material. Instead of now closing the operation, I introduce the finger into the antrum to act as a guard, and pass Krause's trocar and canula down the inferior meatus of the corresponding nostril well behind the nasal duct opening, and make *one* or *two* large perforations through the inner wall. Chips of bone are usually pushed into the antrum, and can be detached by manipulation. We have left now, as well as the large opening in the anterior, a permanent large accessory ostium maxillare in the inferior meatus.

The antrum and nose are now irrigated with boracic lotion, and the cavity of the antrum packed with creolin gauze for forty-eight hours, the gauze being made to tightly fit and distend the bucco-antral opening until the tissues around are matted together and the passage established. After forty-eight hours the gauze is removed, and *no form of mechanical drain* is used. Free irrigation is practised thrice daily with a Higginson syringe, and, in addition, the patient is instructed to do two thin gs first, to frequently blow air through the antrum from the nose to the mouth, and *vice versâ*, and also to pass antiseptic lotion (boracic solution) from the mouth through the antrum to the nose. The object indeed of the large additional opening in the inferior meatus is to permit of the frequent passage of this free blast of air, which at once moves along any secretions tending to loiter in the antral recess, and at the same time has the practical effect of keeping the bucco-antral opening patent for a sufficient time—at least, usually so. However, if the soft tissues should close over too soon, it is only necessary to apply cocaine and make an incision down to the perforation in the bone. *Pari passu* with the diminution of the secretion the opening contracts, but seldom heals up entirely, and, indeed, this is markedly so in my most successful cases, the patient when completely cured of suppuration being able to blow air through the antrum either way.

By this method we avoid the almost indefinite continuance of discharge into the mouth which, in my experience, attends the adoption of the other methods, and which, I believe, is due to the great irritation produced sooner or later or periodically by the drain used. As a practical result the period of treatment is greatly shortened. To illustrate this and the permanence of the result, I will refer to four cases.

W. R., aged thirty-four. Purulent fœtid catarrh in left nostril for twelve months; the usual classical symptoms; diagnosis confirmed by transillumination; eighteen months before a tooth in the region of the left antrum was carious and stopped: "gum-boil" every two months since. Tooth extracted and perforated through the alveolus. No pus at first. Cautiously pushing on the trocar through the thin plate of bone, some very foul pus was discovered. The antrum was then operated on on *May 19th*, 1892, by Robertson's method, and the usual drains were used. Decided improvement for some time, but relapse. Necrosed bone was removed from the nose. Suppuration continued.

Operation repeated on January 28th, 1893, with the addition of large

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

opening in inferior meatus, and no drainage apparatus used. Within a month suppuration scanty. After two months only a head occasionally. When last seen (June 3rd, 1893) had observed no pus for three months. Report from doctor, June, 1894 : Patient had seen nothing for over a year, and considered himself completely cured.

F. H., lawyer's clerk, aged thirty. First treated by alveolar opening and gold tube fitted to the plate, December 27th, 1890, by Mr. Boyd Wallis and myself. Temporary improvement. After some months the tube caused great irritation and pain, and had to be several times altered, and finally removed. In May, 1892, he was operated on in St. Mary's Hospital, Robertson's method being used, and subsequently the drainage apparatus. Again benefit, but relapse.

In April, 1893, the anterior opening enlarged ; curettement repeated ; large naso-antral opening made in the inferior meatus ; no drainage apparatus used. Discharge soon entirely ceased. Patient was exhibited at the West London Medical and Chirurgical Society in May, 1894. He had seen no matter for nearly a year.

D. F., warehouseman, aged thirty-eight. Well-marked case, of three months' duration ; of dental origin.

Operation carried out by method described, on November 16th, 1893. Report on January 9th, 1894 : Free communication between nose, antrum and mouth ; no discharge of any kind ; no bad smell ; no nasal obstruction. Expresses himself as completely cured, and I have ascertained he was so in June, 1894, eight months after operation.

G. H. S., aged nineteen. Commenced treatment for profuse nasal suppuration on March 5th, 1891. Had extensive intra-nasal disease, of some years' standing. After rectifying the condition of the nose, suppuration continued, and operation on the left antrum was suggested. This was done in February, 1894. Discharge ceased in a month, and patient has been well since.

From the results of these cases, and others, my opinion is that the method I am advocating is the method *par excellence* for operating on antral empyema of long standing, and where we have reason to suspect there are any fungous granulations, atheromatous cysts, necrosed bone from ethmoid, polypi, etc., in the antrum. It is impossible to attack these through an alveolar opening, and it and the single opening through the anterior wall demand a drainage apparatus, which of itself usually prolongs the period of suppuration by irritating the parts ; whereas by this method all intra-antral disease is removed, and a radical cure is speedily effected. I have purposely avoided speaking of concomitant disease of other accessory spaces, and of intra-nasal disease, which would naturally receive the treatment they demand, and have brought forward cases in which one could exclude disease of other sinuses.

Chronic Suppuration in the Ethmoidal Sinuses. By CHARTERS J. SYMONDS, M.S., F.R.C.S.Eng.

The time at my disposal will not permit of my dealing with the whole of the subject set down for discussion, so I propose to limit myself almost entirely to disease of the ethmoid.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

Suppuration in the maxillary sinus is so common, and, above all, the diagnosis can be so easily and safely confirmed by exploration, that this class of case presents no special difficulty. The intra-nasal changes produced by the irritation of pus in the middle meatus give rise to appearances not unfrequently mistaken for local disease, and it is a common experience to see the granulations on the outer wall of the meatus treated by the cautery or other means, on the view that they represent a primary affection. So difficult is it to decide, in some cases, whether the pus comes from the antrum or one of the upper sinuses, that exploration of the antrum becomes a routine method in diagnosis. I have not myself found transillumination of any great service. In women it has some value, but in men, with thicker skins, it is difficult to detect small differences. I put it thus; when there is a marked shadow it is confirmatory; when there is no difference, or a doubtful difference, I explore.

If empyema of the antrum is easy of diagnosis, and the nasal discharge still more easily removed by puncture and drainage, it is unfortunately not so simple to get rid of the tube. In my cases it has been many months before the tube could be removed. I would set down the time at over a year on the average except, of course, in the acute cases.

In my experience I find the most difficult case to diagnose and to treat is the following: a patient with polypi in the middle meatus, associated with discharge of pus. On removing the polypi and curetting the meatus, the discharge of pus continues. The antrum is explored and found healthy; the middle turbinated looks swollen and pale, and, on removing it with punch forceps, it is found soft and gelatinous. The better view thus obtained shows the pus coming from high up in the nose and many vascular granulations. A probe may be passed a long way and impinge on bare bone. After further curetting and treatment, the pus continues to flow, the granulations to develop, and, for fear of disturbing the cribriform plate, one feels bound to desist. The patient has, in some cases at least, to make the best of it, and to obtain alleviation by syringing and cleanliness.

This is a disease either of the ethmoidal sinuses or of the frontal, or of both. Can we easily exclude the frontal sinus? The spot from which the pus exudes and the direction the probe takes aid considerably, and when the pus is seen to travel along a probe, approximately in the frontal sinus, the diagnosis is strengthened. So far as I have seen, there is, in these frontal cases, less pus in the back of the meatus, and no "gelatinous" change in the middle turbinated.

In a doubtful case I am disposed to explore the frontal sinus, and obtain the same definite information as we do in the case of the maxillary sinus. Selecting a point at the inner angle of the orbit, where indeed pus spontaneously finds its way out, an opening may safely be made. Finding the sinus healthy, we are left with the most difficult case of all—that which I have sketched above, and the question I would put to-day is this: What is the best plan of treatment? and ask, What measure of success has followed?

In the following remarks I offer to you my own experience, and, when

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

I reviewed it for the purpose of this paper, I felt that I had little to say, and needed more to be taught than to teach. I felt that, though I had acquired some confidence in diagnosis, and appeared to see the best line of treatment, yet that I had accomplished very little indeed. I must ask you to accept this communication simply as an effort to deal with a difficult class of case, and as relating my personal experience in the hope that it may be helpful to others.

The first case is an example of simple suppuration of the left frontal sinus. There is no history of a preceding catarrh, though the termination of the case suggests some simple cause of this kind.

Case 1. *Suppuration in Left Frontal Sinus, with Œdema of Forehead and Eyelids. Spontaneous Recovery.*—Mrs. F., aged forty-nine, was sent to me on June 18th, 1894, by Dr. Alexander, of Faversham, to whom I am indebted for the notes of the case and for permission to publish them.

She stated that she had had pain over the left side of the head for six weeks. Three weeks ago the left frontal region became œdematous, and soon a prominent elevation was noticed at the inner angle of the orbit. A purulent discharge from the nose made its appearance about three weeks ago. It began in the night, and has been occasional. Some relief follows the escape of the pus. The eyelids, cheek, and forehead puff up very much for a time, and then get better. The first complaint, says Dr. Alexander, was of a neuralgic pain over the left side of the head—relieved by antipyrin. Three days before I saw the patient there was an unusual amount of discharge, but there has been less since.

When I saw Mrs. F. there was œdema over the left brow, and a soft swelling at inner angle of orbit, evidently due to an abscess of the frontal sinus pointing at this site. On examining the nose, pus was seen covering the anterior and outer part of the middle turbinated bone, and on removing the secretion the mucous membrane looked swollen and granular, and the pus soon reappeared. There was no difficulty in confirming Dr. Alexander's opinion, that the case was one of suppuration in the frontal sinus. I suggested that he should incise over the swelling, enter the sinus, and enlarge the aperture into the nose. When he went to do this the next day, he found that a fairly free discharge had taken place from the nose, and the œdema had diminished. The operation was postponed, and never required. She was treated by a blister and a nasal spray, and was pronounced well about July 20th.

This I take to be an example of simple suppuration of the sinus similar to that occurring in the antrum, in connection with acute catarrh. It is this class of case which more often comes under the notice of the ophthalmic surgeon. It exhibits the usual site for spontaneous discharge, and indicates this as the point we should select for exploration of the sinus.

No instance of uncomplicated chronic suppuration in the frontal sinus has come under my own treatment, so far as I know. In three cases at present under my care, I suspect that this sinus is affected in association with the ethmoidal, and I propose to explore the sinus from the outside.

Two methods of effecting drainage can be adopted, the one by

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

removing the anterior end of the middle turbinated bone and passing a canula suitably curved, the other to enter the sinus from the outside at the inner angle of the orbit. From numerous experiments on the cadaver, this proceeding seems simple and safe, and certainly may be accomplished with little or no resulting scar or deformity. I hope in the future we may use this means, for diagnosis and treatment, with the same security as we enter the maxillary sinus.

Next let me draw attention to the most difficult, and in my experience the most dangerous class of cases, that of suppuration in the ethmoidal sinuses. This, in my own experience, is far more common than suppuration in the frontal sinus. The cause of this affection requires much investigation ; we find the cases in middle life, though now and then in young people. It certainly is, as a rule, associated with the presence of polypi. At first the case seems to be one of simple polypus, but the very presence of pus indicates the existence of further disease. It is a well-known axiom, I imagine, to all present that pus with polypi, especially when unilateral, indicates suppuration in one or other of the sinuses. Is the disease a primary suppuration, and are the polypi merely pendulous granulations grown into myxomatous tumours ; or is the polypus primary, and the suppuration caused by retention of secretion? Or again, is there such a disease as a primary caries or necrosis of the ethmoid? One is tempted to ask one more question ; is not the cautery responsible for some of these cases? I think I have seen it produce empyema of the antrum, and if thrust blindly out of sight high up into the ethmoid, I should fear the consequences. The first of the four following examples ended after prolonged treatment in complete recovery, and was from the first a by no means extensive case. One was able to see the patient frequently, and to keep the granulations under pressure, and the part more or less aseptic. In no class of nasal cases does so much value result from a daily dressing as in these. The more one treats them on the same lines as granulations in the tympanic cavity, I mean by antiseptic applications and by pressure, the better are the results. In the following case, the first polypus, which was of large size, was removed in December, 1887. She was under treatment from time to time till August, 1889, when there was very little discharge. After an interval of nearly two years the patient returned, with a considerable amount of purulent discharge, still from the right side only. It had never quite ceased, and of late had increased. She was then regularly and frequently seen for three months, after which she remained well.

Case 2. *Nasal Polypi; Chronic Suppuration in Ethmoid*; *Recovery.*—Miss A., aged sixteen when seen with Dr. Bull, of Chislehurst, December 6th, 1887 ; we removed one very large mucous polypus from the right side, and several smaller ones, under chloroform.

In February and March, 1888, polypi were removed again with the snare, and the cautery applied.

In June, 1888, the membrane over the middle turbinated was noted to be thickened, and the middle meatus narrowed. No definite polypus, therefore she was left alone for two months. There was a good deal of discharge.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

In August the mucous membrane, being much thicker, was cauterized.

In October, the discharge still continuing, the cautery was again used.

In December a polypoid mass was removed with the snare from the middle turbinated. As nasal breathing was never complete, and as the meatus was now free, we removed some adenoids with benefit.

In January, 1889, she could keep her mouth shut more easily, but the discharge of pus persisted. A polypoid mass was seen in the middle meatus, and removed.

In August she was much better. There was still more discharge from the right than the left side. The middle turbinated had shrunk, so that now for the first time there was a passage between it and the septum. There was still a little pus.

For family reasons, the patient did not return till May, 1891, when the discharge from the right nostril was more abundant, very troublesome, and distinctly purulent.

On examination, granulations occupied the middle meatus, and pus oozed from this cavity.

The anterior part of the middle turbinated was removed, and then by repeated curetting, application of carbolic acid and of chromic acid, the discharge slowly and gradually disappeared, and ceased by the end of September. She was continuously under treatment for three of these four months. The greater part of the middle turbinated was removed by degrees, and I think the anterior sinus was opened. The actual cautery was not used more than once during these months.

In August, 1892, nearly a year after the cessation of treatment, the patient wrote that she remained well.

It is to be noted here that there was pus from the beginning of the case. It is impossible to say which was primary, the polypi or the condition of the ethmoid; I incline to think the former. Had the use of the cautery in the early period of the case anything to do with the prolonged suppuration? I can only say the remedy was used carefully, and applied only to parts within view.

I next select three cases typical of the advanced and persistent form of this disease, and examples of the condition referred to in the opening remarks. In one there was also empyema of the antrum. All three came under observation first as examples of nasal polypi, and in all the presence of pus was an early feature. In the policeman's case recurrence of polypi was distinctly traced to the irritation of the pus from the antrum

Case 3. *Nasal Polypi; Purulent Discharge from the Middle Meatus; Empyema of the Antrum; Suppuration of Ethmoidal Sinuses.*—A police constable attended as out-patient at Guy's Hospital with discharge from the left nostril, with obstruction. After removing several polypi from the middle meatus the discharge continued, and was distinctly pus. There were many granulations on the outer wall, at the anterior boundary of the meatus.

The pus seemed to come from a point higher than the antral orifice. However, in puncturing the alveolus, a fair quantity of pus was removed through the nose, and the nasal discharge reduced a good half.

Now, the pus can be seen to come from a point high up and behind

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

the situation of the aperture from the frontal sinus. A probe goes up four inches from the nostril, and impinges upon bare bone. There are a good many granulations to be seen. The region has been carefully curetted on several occasions, and an attempt made to enlarge the openings into the sinuses.

The question is, how far may we safely go in these cases? Again, can these cases be dealt with from the outside?

Case 4. *Nasal Polypi; Chronic Suppuration of Ethmoidal Sinuses.*—A girl of twenty-three attended as out-patient at Guy's Hospital in March, 1894, with polypi in the left nostril. There was in addition a purulent discharge, passing chiefly into the throat. The polypi were removed, when the pus was seen to come from the middle meatus. The anterior part of the middle turbinated was removed, and the pus was then seen to issue from a point higher up. On passing a probe, it entered amongst soft vascular granulations, and impinged upon bare bone. These granulations, together with small portions of bone, were removed with the double curette.

When last seen (July, 1894) there was still a fair amount of pus, and she complained of pain over and about the eye.

I may say that some time ago the antrum was explored with a negative result.

This seems a suitable case for exploration of the frontal sinus, and I intend to propose the operation to the patient.

Case 5. *Nasal Polypi; Chronic Suppuration of Ethmoidal Sinuses.*—Henry S., aged twenty-six, came to Guy's Hospital with nasal polypi in both sides. There was a purulent discharge as well, and all the polypi were high up and small. After removal, the pus still flowed from the middle meatus. The right middle turbinated looked pale and polypoid. Its anterior extremity was removed with punch forceps, and found to be soft, pulpy, and composed largely of polypoid tissue. Then a good deal of similar material was curetted away. Later the antrum was explored with a negative result. A tube was retained for a few weeks, without diminishing the discharge.

An attempt was made to open wider into the ethmoid cells, and from time to time granulations are removed. But still the pus continues to secrete, and though the anterior half of the middle turbinated has been removed, and the curette has been passed high up, the condition remains unrelieved. On the left side a similar condition of things exists. This patient has no pain, no sign of retention of discharge.

What is his future? One thinks of the end of Dr. W. (case 7). In treatment the object, so far as I can see, is to keep under the granulations, open a free channel for discharge, and have the part syringed out daily.

The treatment in these cases has been to remove, by means of the double curette, the granulations, together with portions of the middle turbinated; occasionally to apply chromic acid. The aim has been to open up the sinuses and allow free drainage. The cautery has not been used.

It is in this class of case especially that one asks for the experience of others. I feel myself that most benefit results from the use of the

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

curette chiefly, and of chromic acid occasionally, and, above all, the establishment of free drainage. The daily dressing with pledgets of boracic or other antiseptic wool is almost essential for anything like a rapid result.

Can the sinuses be reached from outside? I will record presently two cases, in which the pus escaped through the upper eyelid, at the inner corner of the orbit. This is, as we know, the track commonly taken when the suppuration extends towards the orbit. Through such an opening I have entered the ethmoidal and frontal sinuses, and Mr. Stewart recorded, during the last session of the Laryngological Society, a case in which, through a similar opening, he was enabled by the use of the curette and drainage to bring about a complete recovery, without interference with the eye.

I am not aware that the ethmoidal sinuses have been attacked, from the outside, along a line suggested by the above facts. Provided it can be done without injury to the globe, it seems to offer the best and speediest means of relief. I also think that it is wise to give these patients periods of rest from operative treatment, instructing them to use irrigation only. Active treatment may do harm, and if the cautery be used freely I feel almost sure it may do harm. I have no facts bearing upon the possible tubercular nature of some of these cases, nor have I seen any caseous material.

Finally, I come to two fatal cases. In both the disease was primarily in the ethmoidal sinus. In both there was extension to the orbit—in one with a spontaneous escape of pus through the upper lid; in the other an incision was made. In both there was an abscess in the frontal lobe. In one of the cases the frontal sinuses were involved.

Case 6. *Chronic Suppuration of Ethmoidal Sinuses; Extension to the Orbit; Cerebral Abscess; Death.*—James F., aged sixty-two, came on August 28th to Mr. Brailey as an out-patient at Guy's Hospital with the left eye somewhat proptosed and displaced downward and outward; no paralysis. Between the upper orbital ridge and the displaced eyeball was an elastic swelling, which was thought to be due to an abscess beneath the periosteum of the orbit. The diagnosis made was obstruction of the exit of the frontal sinus, with the formation of pus. An exploratory incision was made, and bare bone found in the roof of the orbit. A very small quantity of pus was evacuated, but the globe did not regain its position. The patient was discharged on the 4th of September, the sinus being still unhealed. On the 16th, in the out-patient department, bare bone was still felt, and there was a free discharge of pus through the drainage tube. On the 30th two small pieces of bone came away. October 7th, the flow of pus ceased. On the 15th he was readmitted, when there was orbital cellulitis, with swelling of the parts around the eye. The next day the wound was opened up under chloroform, and bare bone felt in the roof of the orbit and on the inner wall. On the 21st the temperature was 103·5°. On the 24th the patient had convulsive seizures.

I was then requested by Mr. Brailey to see the patient in consultation. I found him practically comatose, with a high temperature, breathing deeply and rapidly, like a case of meningitis from suppurative otitis.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

Through the sinus, at the inner angle of the orbit, bare bone could be felt. I concluded that there was probably diffuse meningitis, and that operative interference would give no relief. On October 26th my colleague Mr. Davis-Colley saw the patient, and, as a last resort, opened the frontal sinus, which was found healthy. He then explored the dura mater and brain without finding any pus. The fits continued; the temperature ranged between 102° and 105°. On the 27th the man died. The *post-mortem* report by Dr. Perry is as follows:—"There was no pus "about the wound. The brain was rather wasted, and, on removal, "showed a couple of abscesses on the under surface of the left frontal "lobe. The more posterior one seemed to be the older, and the pus in it "smelt foully, and its walls were greenish and sloughy-looking. Neither "abscess opened the lateral ventricle. The dura mater beneath the "frontal lobe was adherent to the brain, and there was just a little lymph "outside it, between it and the bone, at the front of the frontal lobe. In "other respects the brain and membranes were healthy, and there was "no general meningitis. On opening up the ethmoidal sinuses on the "left, after chipping away the cribriform plate, they were found to be full "of greenish pus. There was caries or necrosis of the inner wall of the "orbit, and it appeared as if the pus from the nasal fossæ had raised the "periosteum of the orbit, and so presented as an orbital abscess. No "cause for the proptosis of the eyeball was discovered except inflammatory "œdema, and at the autopsy little or no proptosis remained. In the "lungs there was diffuse broncho-pneumonia."

Case 7. *Chronic Suppuration of the Ethmoidal and Frontal Sinuses; Abscess of the Left Frontal Lobe; Operation; Death.*—Dr. W., aged sixty-five, was first seen in consultation with Mr. Blatherwick, of Dulwich, September 30th, 1893. The patient gave a history of nasal discharge, dating from the latter part of the previous year, and following an attack of influenza. For this, in January, 1893, he consulted Mr. Stoker, who has been good enough to furnish me with notes of this period of the case.

The nasal discharge appeared of a simple kind at first, and under treatment greatly abated. It returned again, and in April, after severe pain, an abscess opened through the upper lid at the inner corner of the right eye. Mr. Higgens saw him at this period, as the case seemed to be an orbital abscess. The nasal discharge and that from the orbit continued. In the summer he went to Scotland, and while there had what he thought was a severe cold, with sore throat. On his return Mr. Reynolds Ray saw him, and found profuse nasal discharge, with some redness and swelling of the pharynx and fauces.

When seen on September 30th, 1893, the patient was up and about; he was bright and conversational, though rather deaf. There was a profuse unpleasant-smelling discharge from both nostrils. It poured away and never ceased. At times the discharge was excessive, as if some cavity had emptied itself. Through a fistulous opening in the right upper lid pus escaped freely, and on inserting a probe bare bone was felt on the inner orbital wall. The eyeball was slightly displaced outwards and downwards. On examining the throat the pharynx was covered with thick pus, and on introducing the finger the posterior surface of the soft

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

palate was rough, as was the pharyngeal wall. The sensation communicated to the finger was that of an ulcerated surface. The septum was thickened, and on the left side was an irregular mass, resembling a new growth. Of late Mr. Blatherwick had thought the patient dull, and he had been observed to twitch more than once, and to doze in the day. There was no lack of intelligence, no paralysis of any kind, and the patient was particularly bright and kind.

It did not appear that the case demanded just then any further treatment than the use of persistent irrigation, though subsequent events led me to regret that more active measures were not at once undertaken. Mr. Blatherwick had already given perchloride of mercury, on the supposition that it might be a syphilitic process, and in view of the mass felt behind the palate I concurred in this plan. That peculiar form of epithelioma known as "boring epithelioma," in which there is extensive suppuration, seemed the other possibility. On October 5th I was again sent for, and visiting him at eight a.m. on Friday, October 6th, found his condition serious. Dr. Blatherwick told me the drowsiness had increased, and he was now in bed. The patient recognized me, shook hands, and replied distinctly, though he was very deaf indeed. He relapsed at once into a drowsy state. The temperature was not raised. The nasal discharge was profuse, and again was said to vary. Fortunately Mr. Stoker arrived, and joined in the consultation; and as he had brought some instruments, I proceeded at once to enlarge the sinus leading into the orbit. The turbinated bone was soft, and easily broke away. A large opening was then made into the nose. Then the frontal sinus on this side was freely opened and was found lined with thick pus. Through an existing opening in the septum the left side was entered, and both freely irrigated, and a large tube introduced. He was relieved to some extent, but personally I felt very strongly that there was either a subdural or a cerebral collection. Further exploration for the time was postponed. The next two days, Saturday and Sunday, he seemed better; there was less torpidity, and he took food well. On Monday, however, he was not so well, and as the pus continued to flow freely, we decided to operate again. On Tuesday, the 10th, the right frontal sinus was opened by removing the anterior wall. The bone covering the posterior appeared normal, and was not discoloured. I, however, thought well to remove the bone and expose the dura mater. There was no sign of pus. Then the left frontal sinus was opened and found lined with pus. On removing it and searching the posterior wall, I discovered a very minute black spot (the size of a comma, as Mr. Stoker remarked). This seemed a guide, and on removing the bone with a gouge, black and softened dura mater was exposed, and foul pus escaped from an abscess in the frontal lobe. It was not possible accurately to estimate the size of the abscess, for it was partly empty, and appeared to be discharging through the nose. The patient had now been some time under the operation—which was performed with the use of very little chloroform—and, after inserting a good-sized tube, the parts were dressed. He did not long survive the operation, dying in a few hours.

The centre of disease appears to have been in the ethmoid bone. On

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

the right side the morbid process spread outwards into the orbit, on the left side it spread into the cranial cavity, upwards from the ethmoid cells. The abscess was opened through the posterior wall of the frontal sinus. I approached it from this route to avoid injury to the eye. The cerebral infection arose from the ethmoid and not the frontal sinus.

The disease here being bilateral, there was no guide as to the site of the abscess. From the fact of the right orbit having been invaded, one naturally searched that side, and yet the pus was found in the opposite lobe.

The spontaneous discharge of pus through the orbit in these cases illustrates the course usually taken when the disease of the ethmoid extends inwards. Both cases also illustrate the most serious complication, that of extension upwards to the dura mater and brain.

When a sinus exists, as in these cases, there is no difficulty in enlarging it and reaching the disease from outside with every prospect of success, provided the malady is unilateral. To reach the ethmoid by external incision must, it seems to me, be our aim when the disease has resisted treatment through the nose. As in suppurative otitis, the danger of long-continued suppuration in the ethmoid cells is extension to meninges and brain. Unfortunately, it is not so readily treated. The bone is more deeply seated, we cannot reach the disease without some risk to the integrity of the movements of the globe, and lastly the operation area cannot be so satisfactorily asepticized. These conditions put a check to exploration, yet when we learn in what proportion of cases cerebral complications arise, we may be more disposed to undertake the proceeding.

In conclusion, let me ask for information on the following points :—

The cause of suppuration in the ethmoid sinuses.

The termination of such cases when left untreated.

The frequency of meningitis and cerebral abscess.

The best and safest mode of treatment through the nose, and

The dangers attending it.

Lastly, as to the practicability of treating the disease from the outside.

On the Diagnosis and Treatment of Empyema of the Nasal Accessory Sinuses. By GREVILLE MACDONALD, M.D. (London).

Mr. President and Gentlemen,—When I was first honoured by a request from our distinguished secretaries to open a discussion on suppuration in the accessory cavities of the nose, the magnitude of the subject made it appear impossible to enter upon anything like a complete *résumé* of the subject, so I have concluded not to attempt this, especially as such work would be so much better done by other workers in the same line; and, if you will bear with me, I shall hope to do no more than introduce the subject, telling you briefly how these cases have impressed me—more especially from their clinical aspect, and from their analogy to certain other surgical diseases. I shall incidentally mention certain lines of treatment that have appeared serviceable in my cases, which, so far as I am aware, have not been generally practised, and I shall conclude by

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

suggesting certain points that need clearing up, and from the discussion of which I believe we may mutually increase our knowledge.

Many of the worst cases with which we have to contend begin with suppurative inflammation of one or more ethmoidal cell, either during an attack of general rhinitis or independently. The usual story is an attack of sharp supra-orbital neuralgia, lasting for two or three days, and then relieved by a flow of pus from the nose, continuing from one to twelve or more hours, often ceasing, either not to appear again, or recurring after a longer or shorter interval after fresh cold-taking, and in only too many cases becoming chronic. In this case the mischief spreads, other cells become involved from infection, and granulation tissue springs up from a bed of ulcerating bone. The bony dissepiments are absorbed in the process, the granulation tissue and the accompanying suppuration extend in various directions, more especially through the thin party-walls between the ethmoidal attics and the roof of the large chamber in the superior maxilla—indeed, the walls in this locality often consist solely of mucous membrane, and sometimes natural openings may be found. In this way we may have empyema of the antrum arising in association with suppuration of the ethmoidal cells. But more than this, the inner wall of the infundibulum may become similarly absorbed, the passage into the frontal sinus may become blocked with granulations, and septic inflammation may pass upwards into this important accessory cavity. Indeed, the whole history of these cases may be very accurately compared to the course of similar disease in the tympanum: the initial abscess with earache, relieved as soon as the pus gains an exit through the tympanic membrane, the cicatrization of the latter and liability to repetition, in the course of time leading to chronic otorrhœa and proliferation of granulation tissue: while, further, the extension of the mischief into the accessory cavities of the ear completes the analogy. A great practical difference exists, however, in the dangers attending the ear disease, owing to the neighbourhood of large vessels and their becoming involved in the septic process, as well as in the fact that in this region the surgery is comparatively easy and attended with the happiest results; while, in the case of the nose, the danger of the mischief extending beyond its usual limits is comparatively slight, and the surgery is extremely difficult and often unsatisfactory. Yet in both ear and nose there is probably equal danger of the mischief extending to the cranial cavity and the meninges of the brain.

The association of polypus with suppuration is precisely the same in each case, the so-called polypi being no more than more or less organized granulation tissue, over which the epithelium has, or has not, spread to a greater or less extent, the new tissue in the meantime becoming œdematous, and more or less fibrous in character. In the nose, the supply of mucus being more free, the tendency is greater for the growths to absorb water by a process of endosmosis, and to become consequently more translucent and colourless.

In points of diagnosis, all I would insist upon is the importance of realizing the fact that where we have suppuration in the nose together with granulation tissue or polypi in the middle meatus, we can seldom, at

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

first sight, be sure of the full extent of the disease, and must, therefore, be guarded in our prognosis. I have not infrequently seen cases where suppuration in the antrum was supposed to comprise the whole disease, and the patient promised a cure upon its evacuation, whereas the anterior ethmoidal cells, and possibly also the frontal sinus, were quite as much at fault; or, on the other hand, cases which had long been under a course of treatment for the so-called necrosing ethmoiditis, where the antrum had been overlooked, although the prime source of the profuse suppuration.

I am not going to trouble you, sir, with any remarks upon empyema of the antrum, for I believe the subject has been well thrashed out, and any one of us specialists would write an almost identical paper on the subject, but I cannot refrain from remarking that much of the disagreement among us as to the etiology of the disease arises from the fact that we do not all recognize the frequent coexistence of ethmoidal disease and caries of the middle meatus with pus in the antrum.

But the association of suppuration of the frontal sinus with ethmoidal and antral disease is a point that I think may well repay discussion, so difficult is the diagnosis—except, of course, in cases of acute abscess and retention. In all the cases that I have seen, or in which I have suspected the frontal sinus to be involved, there has been coexisting suppuration of both the ethmoidal region and the antrum, and practically I may assert that I have never been able to diagnose positively the condition until the discharge of pus has been arrested, or at any rate greatly modified, by treatment of the coexisting sources of the suppuration. The diagnosis is indeed the more difficult in that the very symptom upon which we most rely as proof of the presence of pus in the antrum, viz., the augmented flow on bending the head forwards, may be presented, even to a striking degree, in empyema of the frontal sinus, and even after the antrum has been proved to be free of any pus whatever. And I must confess to a strong suspicion that in these complicated cases where the suppurative mischief is not confined to any one region, the frontal sinus may be far more frequently involved than we have as yet means of ascertaining.

In speaking of the treatment of these affections, I am always careful to impress upon my students the fact that there is little to be said beyond the inculcation of ordinary surgical principles. In the first place, we aim at securing free drainage, which in the case of the antrum is easily enough provided for, but in the case of the ethmoidal region may prove exceedingly tedious to ensure. All polypi and granulation tissue must be removed as impediments to free drainage; while it may prove necessary to remove a greater or less portion of the middle turbinated body. As a destructive agent in these cases, I prefer chemical caustics to the incandescent wire, seeing that the presence of a large quantity of pus and mucus, in which the granulations are so generally imbedded, is apt to induce scalding of more or less extensive areas, owing to the generation of steam. Thorough irrigation with antiseptic lotions, frequently and forcibly applied, is of essential service. Lately I have used, with enough success to warrant further experiment, a twenty-five per cent. solution of peroxide of hydrogen, made by Messrs. McKesson and Robbins, of New York, and called by them *pyrozone*. It is said to be caustic, although it

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

produces no destruction of granulations ; but it destroys with marvellous manifestations all pus, and probably its putrefactive accompaniments. It is applied in small quantities on a mop of cotton-wool tightly wrapped round a probe, and can be as safely thrust deeply into the all-suppurating sinuses and cells, with the production of a violent ebullition of oxygen, which rapidly fills the fossæ with a tenacious froth. If applied in too large a quantity at a time, the sudden liberation of gas may produce enough tension to give pain ; but used cautiously, and with cocaine, it is absolutely free from objection, and certainly has some, if not considerable, power in reducing the quantity of pus.

There is one other point in the treatment of suppuration confined to the ethmoidal region to which I wish to draw your attention, and with which I have had some success. By allowing the head to hang backwards over the end of a couch, so as to assume an inverted position, it is possible to fill up completely the nasal cavities with fluid. By using a non-irritating antiseptic lotion, such as a five per cent. solution of boroglycerine, and pouring it into the anterior nares while the head is thus inverted, we can insure the summit of the nasal cavities being thoroughly irrigated, and thus washed of their retained secretion. After a little practice a patient will be able to keep his head in this position for fifteen or twenty minutes at a time, although it always entails more or less headache afterwards. In one case, at least, it has completely arrested suppuration of some fifteen or more years' duration, which had defied more ordinary lines of treatment ; and in another I believe the results have been quite as striking. But it is a mode of treatment that should not be attempted except while the patient is closely under observation. I have known it induce very severe neuralgia, and in one case the temperature rose immediately afterwards to 103 F., the patient suffering very acutely. But although we did not venture a repetition of the process in this patient, the single attempt produced such striking amelioration of the symptoms that he declared himself cured.

There is yet one point in the treatment of these affections which will, I think, be well worth eliciting the opinions of our *confrères* in this special department. It is implied in the questions as to how far we may venture to leave alone ethmoidal and frontal suppuration, provided there is fairly free drainage ; or, on the other hand, as to how far it is incumbent on us to urge upon our patient the necessity of a course of treatment full of inconvenience to himself, necessarily extending over a very considerable length of time, and not absolutely certain in its results. What is the actual danger in leaving the disease untreated? Exactly how great is the risk of meningitis? Is surgical treatment, say of the cribriform plate, in itself devoid of risks, and may we not in our anxiety to attack the malady actually induce that which we seek to forestall? These seem to me questions of vital importance which each of us has to ask himself before undertaking any case. For my part, I am inclined to think that rather than put before our patient the actual risks which he is incurring by leaving the catarrh, as he calls it, untreated—which risks are apparently not great, and which we cannot in every case be certain of our ability to eradicate—I am inclined to think, I say, that rather than fill his mind with fears, which

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

might never become substantiated, it were perhaps wiser, in his interests, to leave the disease to take its course, contenting ourselves with draining and irrigating so as to reduce the dangers to a minimum.

Finally, sir, I would suggest as points specially worthy of discussion :

1. The diagnosis of suppuration in the frontal sinus, when associated with antral and ethmoidal disease, excluding, of course, acute abscess and retention of pus ;

2. The treatment of ethmoidal suppuration ; and

3. The question I have last raised, viz., the necessity of treating chronic frontal and ethmoidal suppuration.

Discussion on Dr. Macdonald's Paper.

Dr. Milligan (Manchester) thought that, in cases of unilateral empyema of the maxillary sinus, pus was usually to be seen, during intra-nasal examination, flowing from under the middle turbinated body. This flow was markedly increased by the patient lowering the head, and more especially by the patient both lowering the head and turning it slightly, so that the affected side became uppermost. The flow was intermittent ; was generally worse in the morning, when it was frequently found to have travelled backwards to the post-nasal space, and the patient was painfully conscious both of a disagreeable smell and of a disagreeable taste in the mouth. Percussion over the antral area he had not found of much value in chronic cases, but in one acute case recently under his care, percussion elicited marked pain. He was in the habit of examining every suspected case of antral disease with Voltolini's electric lamp placed in the mouth. In all the cases in which the antral area had been opaque, in which there was no light-zone immediately under the lower eyelid, and in which the corresponding pupil had not shown a red and luminous reflection, pus had subsequently been found when the cavity was opened.

In several cases, however, with well-marked opacity he had been surprised to find but a small quantity of pus, and was consequently inclined to think that the opacity might in certain cases be caused not so much by the presence of pus as by the presence of a thick pyogenic membrane, the result of the constant presence of a purulent exudation in an almost closed cavity. He believed that the absence of a red glow in the pupillary region was a very important diagnostic sign of the presence of antral suppuration. He thought it would be desirable that a lamp of definite illuminating power should be used in such cases, as with lamps of varying strength he had seen somewhat differing results. The age of the patient, the height of the alveolar margin, and the formation of the palate, should all be borne in mind during the time of the examination. He was in the habit in all cases (seeing that absolute positive evidence could not be obtained from the use of the electric lamp) of puncturing the outer wall of the nose with a fine Lichtwitz's trocar as a routine method, and as a means of diagnosis only. The puncture could be made almost painlessly if the nasal mucous membrane were previously anæsthetized with a ten per cent. solution of cocaine. He employed no nasal speculum during this manipulation, thrusting the trocar well upwards and out-

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

wards at a selected spot between the middle and inferior turbinated bodies. Through the accompanying canula he syringed either a warm solution of weak boracic acid or of hydrogen peroxide, keeping the patient's head well bent forward during the proceeding, and watching closely for the escape of pus from the anterior naris of the same side. In no case had he seen any harm result from this manipulation, which he regarded as the most valuable of all methods for accurately diagnosing the presence of antral suppuration. Over the small wound in the nasal mucous membrane, caused by the trocar puncture, he insufflated a small quantity of aristol, which had the double advantage of hastening repair, and of checking hæmorrhage. He had had no experience of irrigating the antrum through the natural opening in the middle fossa of the nose.

Regarding the method of opening the antrum, he thought that that method should be chosen which would afford the best possible drainage. An opening in the most dependent portion of the sinus would afford this, and as in his experience the great majority of cases were secondary to dental irritation, the diseased tooth should be drawn, and an opening made through the alveolar margin. This opening he made (the patient being fully anæsthetized, and with the head thrown well backwards) by means of a small trephine, worked by a dental engine. After having made the opening, and after having syringed all pus out, he was careful to examine with a bent probe for the presence either of a highly granular state of the mucous membrane, or of eroded bone, and if present to curette the parts thoroughly. He considered the after treatment the real *crux* of the question, and largely from this fact—that it was somewhat difficult to get the patient to thoroughly cleanse the cavity. For some time past he had used the accompanying small irrigating canula in the following way :—The opening in the alveolus was made just large enough to hold comfortably the gold-plated antrum tube, and the rectangular silver canula was made to fit exactly into the antrum tube, and long enough to project into the antrum, so that the stream of fluid subsequently injected might be readily scattered within the cavity itself. The rectangular silver canula was provided with a movable platform carrying a rubber washer which, when pushed up against the alveolus, completely closed the opening, and prevented any regurgitation of fluid.

When in use the canula was run up into the gold-plated antrum tube, the platform was raised until the rubber washer completely closed the alveolar opening, and the whole apparatus was kept *in sitû* by means of the patient closing the jaws upon the instrument.

In order to irrigate the cavity a long rubber tube was attached to the canula (see photo), and a syphon action established. In this way thorough irrigation could be obtained with very little trouble to the patient, and with very satisfactory results. The gold-plated canula was attached to a dental plate, and kept closed by means of a small screw plug.

In the treatment of suppuration of both anterior and posterior ethmoidal cells, of which he had seen a few cases, the diagnosis had been established by carefully watching the flow of pus, while, at the same time, disease of the frontal sinus and of the antrum could be excluded. The reatment had consisted in breaking down the cells with a small Volk-

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

mann's spoon, converting the whole into one large cavity, and packing loosely with iodoform gauze.

Dr. WILLIAM HILL alluded to three cases which had been under his care, and which he had transferred to his colleague, Mr. Ernest Lane, who had opened the antrum and cleared out morbid contents by a large opening in the canine fossa, making a counter-opening in the nose in the middle fossa. In two of these three cases the result had been satisfactory; in the third case, in which both antra were opened, the symptoms were only relieved on one side, and the surmise was that the ethmoidal cells on that side required further operative treatment. Dr. Hill had had two cases of ethmoidal cell disease, in one of which polypoid hypertrophy was found.

Mr. RICHARDSON CROSS: My experience is confined to cases where the orbital cavity has been the seat of extension of disease. In the "Ophthalmic Review," 1892, I published a paper on empyema of the frontal sinus. In one of the cases the pus cavity occupied also the ethmoidal and sphenoidal sinuses, and death resulted from inflammation of the brain meninges, though *post-mortem* examination revealed no direct communication between the skull cavity and the abscess sac.

Where a continuous purulent discharge from the nose is complicated with frontal headache, and where occasional cessation of the discharge is associated with increase in the headache, and particularly with swellings or evidence of inflammation over any surface of the frontal sinus, empyema of this cavity is certain, and operation for its relief should not be delayed—alternating relief or exacerbation of the symptoms may without interference result, but cure will not follow without surgical interference. This should aim at relief towards the nasal cavity through the natural channel, the infundibulum; this can, I think, be found by a probe, after trephining either through the frontal eminence, or by selection at a point I have defined in the paper alluded to, which opens the sinus at the spot most nearly available to the upper end of the infundibulum.

The operation should be done early; if not, there is a risk of the ethmoidal and sphenoidal sinuses becoming implicated in the disease, thus rendering brain complications more probable. I should have no hesitation, when the os planum of the ethmoid is forced towards the orbit, in freely incising the upper lid, and when necessary also the teudo oculi over the lower lid, so as to freely open the ethmoidal bone and to give exit to the accumulated fluid towards the nose. If this cures the empyema the eyeball and contents of the orbit will replace themselves, whilst among other dangers that follow the progress of the disease is inflammation and atrophy of the optic nerve, almost as serious for the patient as the loss of his eyeball.

Dr. H. KNAPP: I beg to say a few words about the differential diagnosis of empyema of the accessory sinuses of the nose. We have to distinguish empyema from exostosis and sarcoma of these cavities. These three diseases may be very occult in their beginning. They then produce an inflammatory, more frequently a non-inflammatory, swelling at the walls of the orbit, and feel hard and bony. The diagnosis is made either

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

by a puncture or by the initial step of any operation—the incision. The progress of the operation will then be guided by the diagnosis. But even on the *post-mortem* table it will not always be easy to distinguish between empyema producing hard, lardaceous-looking granulation tissue, or an original sarcoma producing corrosion of the walls of the sinuses and subsequent suppuration.

Dr. GRANT attributed considerable value to transillumination, if only because it sometimes, in cases where antrum suppuration was suspected, showed such unmistakable translucency that empyema could be absolutely excluded and unnecessary operation avoided. In several suspicious cases he had forbidden the performance of perforation through the alveolus, relying upon evidence of this kind. For further exploration of the antrum he employed Lichtwitz's fine trocar, which could be passed into the antrum through the outer wall of the inferior meatus. Boric solution syringed through it would wash out any pus there might be in the antrum. In those cases in which there was no evidence of dental disease he thought it wrong to extract a tooth, and considered it desirable that treatment should, if possible, be carried out through the nose. Garel, of Lyons, urged that it was feasible in a large number of cases to irrigate the antrum through the natural opening in the middle meatus, and maintained that he had obtained a high percentage of cures by daily use of boric solution by this channel. He found that cases were of two classes—those that recover with very great rapidity, and those that were rebellious under all treatment. The former would probably be susceptible of cure by treatment through the nose, the latter only by free opening in the canine fossa. Dr. Grant thought that after the use of Krause's trocar through the inferior meatus, irrigation would be facilitated by the removal of the anterior portion of the inferior turbinated body. This could be done by means of scissors or of a punch-forceps.

In a case of his of frontal sinus suppuration in which antral disease was carefully excluded, the discharge persisted in spite of external operation; he found that suppuration in the antrum had supervened, and was only diminished by irrigation of that cavity. He thought sphenoidal disease was capable of being diagnosed in many cases. When pus ran down between the middle turbinated body and the septum it might be suspected, and a canula which he showed (devised by Lichtwitz) could be often passed into the natural orifice, so that muco-pus could be syringed out, and the diagnosis established, while the headache was relieved. Sometimes exposed bone could be felt in the region indicated. In a case under his care he had removed on repeated occasions a myxomatous growth of the middle turbinated body, but there always remained a portion posteriorly which he could not seize with a snare. One day there came away a mass of granulation tissue, attached to a thin plate of bone, obviously from the front of the sphenoid. He could then introduce a probe or a canula into the sphenoidal sinus with the greatest ease. Growths apparently arising from the middle turbinated body, which could not be caught in the snare, should therefore be suspected of originating from the front of the sphenoidal sinus.

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press

In case of inflammatory swelling set up by the discharge of pus from that cavity, the enlargement of the middle turbinal might easily occlude the orifice. We should therefore be prepared to remove, by means of a snare, the posterior part of that body when it produced such an effect. In a case of sphenoidal suppuration, producing intense headache and mental disturbance, this operation gave the greatest relief. To show how necessary it is to diagnose and treat sphenoidal suppuration, he would add to what Mr. Cross and Dr. Knapp had said by citing a case recently reported by Dr. Sandford, of Cork, in which he had had the opportunity of making a *post-mortem* examination of a lunatic who had become blind some time before death. There was enormous distension of the sphenoidal sinus, compressing both optic nerves, and extensive extra-dural suppuration.

Ethmoidal sinusitis was very troublesome, and was apt to give rise to one of the forms of atrophic rhinitis as a sequel to the suppuration. He believed that a number of cases of atrophic rhinitis arose from sinus disease, others from syphilis, and others without any discernible cause. In the case of a gentleman sent to him by Dr. Cartaz, of Paris, this stage had been reached, and the most distressing mental depression with asthenopia and dread of light accompanied it. He got considerable relief from irrigation of the ethmoidal cells, by means of suitable canulæ through the nose, the orifices being enlarged artificially as well as by the disease, and particularly from the use of the post-nasal douche. Chiari is reported to say that the ethmoidal cells are best opened by means of a perforation made in the bulla ethmoidalis. The anterior portion of the middle turbinated body may be previously removed.

An interesting case of ethmoidal disease occurred in the person of a medical friend. It caused proptosis, and several eminent surgeons diagnosed the case as one of sarcoma requiring operation, but offering little hope. The operation was commenced, and during the necessary dissection the swelling was punctured, and pus escaped. He is now perfectly well, and has no discomfort as long as he keeps the external orifice of the sinus from healing up by means of a small celluloid plug.

ELEVENTH INTERNATIONAL MEDICAL CONGRESS IN ROME.

ON THE OPERATION FOR ADENOID VEGETATIONS.

By Prof. OTTOKAR CHIARI (Vienna).

THE material from which I make this review extends itself over 233 cases in my private practice, and 152 in my hospital practice. The former were observed between the years 1885 and the middle of 1893, and were all taken from among 5173 cases of disease of the throat and nose, corresponding, therefore, to a percentage of 4½. The latter 152 cases were seen between 1889 and the middle of 1893, and they were derived

https://doi.org/10.1017/S1755146300155453 Published online by Cambridge University Press