adenoids after removal, or she had mere overcrowding of the air passages, and five of the operations were worse than useless. I am inclined to hold the latter theory. For I see every week at hospital children who present the whole and perfect picture of adenoids, yet have none, or nothing more than a trace.

Forgive me if I just touch, to finish with, one or two elementary rules of routine treatment. What can we do to alleviate or cut short an earache? In some cases we may cut it short by the timely use of Politzer's bag; it may be painful at the moment, but the cases where it hurts are just the cases where it helps. As for the use of drops, what is the good of laudanum? The opium in a few drops of laudanum is a very small fraction of a grain; it cannot act as a local sedative, much less as a general sedative. The spirit in the laudanum is a mere irritant; it can only do harm. The laudanum must be put in its proper place, where it is of inestimable value, and that is in the child's stomach, not in its ear. But cocaine drops are often useful; they have a direct sedative action, and a direct constricting action on the blood vessels of the congested membrane. Hot fomentations may be applied over them; and with these four methods—Poltzer's bag, cocaine drops, incessant fomentations, and a dose of laudanum—we can often cut short an earache and avert puncture or perforation of the membrane.

Next, take an ordinary case of otorrhoea—one in which there is no immediate reason to advise an operation. For the thorough cleansing of the discharging ear, there is nothing better than a solution of hydrogen peroxide; the patient must lie flat, with the ear looking straight upward, and the whole ear must be filled, like a test tube, with a drachm or more of the lotion, and must be kept filled, for five minutes or more, till all the frothing has come to an end; and then, after the peroxide has been washed away with boracic lotion, the ear must not be left sopping, but must be very carefully dried with twisted tufts of wool, and this must be done till the tufts of wool come back as dry as they went in. What one does next will depend on what one finds, and I will only suggest that a solution of boric powder in spirits of wine will penetrate further into the unhealthy recesses of the ear than the same powder in a solid state, and that the use of powders is seldom successful in cases where there is granulation tissue.

Finally, let us always be careful to take a general all-round view of these throat and ear cases. It is a great mistake, in our dealings with them, to overlook the patient's inheritance, family history, habits, occupation, and surroundings, his mental temperament, his personal worries, his previous illnesses. One, or more than one, of these influences is sure to be at work on every case, helping to turn the course of it this or that way.

THE INDICATIONS FOR OPERATION IN CHRONIC SUPPURATIVE DISEASE OF THE MIDDLE EAR.*

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THERE is probably no condition in which we are so handicapped by the opinion of the lay public as in this of chronic ear discharge. Only a discharging ear, and it has gone on for so long without any harm coming of it, there can be no danger! Indeed, there are many people going about with this disease who look upon it as of such little importance that they will not trouble to mention it to their medical man, even when he may be already attending them for some other illness. Not so many years ago, too, this was the attitude of mind taken up by the majority of the profession itself; and yet to-day a noted surgeon, who has done pioneer work in this subject, declares that the man who has a chronic otorrhoea has, metaphorically, a charge of dynamite in his head which may explode at any time with disastrous results. At first glance this no doubt appears painted in somewhat lurid colours, but, even without making allowances for the zeal of the missionary, if we ponder for a moment on the eventualities

that may occur, we can hardly call the simile inapt. Taking such a strong line, this surgeon, and others with him, to the question, "When is operation called for?" would answer, "In every case"; and if that were the opinion of the author of the present paper, my communication would be most commendably brief.

Such, however, is not the opinion of the majority of those more directly engaged in the treatment of aural affections. We find that in many cases—indeed, in probably the larger proportion—of this disease, cure, or cessation of the discharge, as in some instances it may be more correctly described, is effected by what is known as the ordinary antiseptic treatment. My further remarks, however, will be found to qualify this statement. My aim, therefore, is to draw your attention to those indications, both objective and subjective, which would, on the one hand, give us reasonable hope of cure by the milder antiseptic procedure; or, on the other hand, would suggest to us the advisability, amounting in some cases to the absolute necessity, of resort to operation.

ANATOMY.

First, if you will allow me, I should like to briefly rehearse the anatomy of the region with which we are dealing. Its leading feature is the number of important structures which are crowded together into a very limited space. Not only so, but the exact relations of these structures the one to the other vary greatly in different individuals. Taking the tympanic cavity as the centre, we have externally the membrana tympani and the external wall of the attic, as the upper part of the tympanic cavity is called, separating it from the external meatus. The inner wall separates the middle from the inner ear and is bony, except at the two windows, the fenestra ovalis being closed by the footpiece of the stapes and its membrane and the fenestra rotunda by its own membrane. Above the oval window, and extending in a circling manner to the posterior wall and along its base, is the Fallopian canal for the passage of the facial nerve. This canal is frequently imperfect, and this applies especially to children. Beneath the floor lies the internal carotid artery in the carotid canal. The roof is thin and separates the cavity from the dura lining the middle fossa of the skull and so from the temporo-sphenoidal lobe. It is known as the tegmen tympani and along its external border runs the petro-squamosal fissure which is occasionally patent in the earlier years of life, in which case there may be got a process of the dura mater continuous with the lining of the middle ear. Through the posterior wall the attic communicates by the aditus with the antral cavity, which is of prime importance in connexion with the subject under consideration. Immediately beneath the inner wall of the aditus and posterior to the bend of the Fallopian canal lies the external semicircular canal. The antrum itself communicates with the cellular spaces, the vertical cells of the mastoid process. Posterior to it and usually more superficial is the sigmoid bend of the lateral sinus and beyond this the lateral lobe of the cerebellum. The tegmen antri is continuous with the tegmen of the tympanum. The inner surface of the mastoid process is of importance in that an erosion in its surface may allow pus to infect the cellular tissues of the neck. The antrum has small openings in its walls for the passage of veins and lymphatics, the former passing to the lateral sinus and the latter to the subdural space. In children there is often a small canal running from the antrum through the petrous bone to its inner surface. Finally, we must bear in mind the internal auditory meatus connecting the inner ear with the posterior fossa and subdural space.

ACUTE AND CHRONIC MIDDLE-EAR SUPPURATION.

Except that I am sorry to tire you with these details I do not apologize for this recapitulation, for the dangers of middle-ear suppuration are to a great extent dependent on the anatomy of the region, and with a mind-picture of this it is easy to understand what these dangers are likely to be. Just a few words as to the distinction between acute and chronic middle-ear suppuration. Without entering into debatable questions—which is outside the scope of this paper—we may take it that acute suppuration arises from an ordinary catarrh, the exudation becoming purulent. The membrane is perforated either by the tension of the tympanic contents or operatively, and the discharge continues for a fortnight

* Prepared for communication to a meeting of the Border Counties Branch of the British Medical Association.

or so, when it ceases, and the membrane heals. This is the usual course, and if any complication does arise it is usually in the vertical or superficial cells from blocking of their narrow openings and consequent retention under tension of the inflammatory products. An empyema is formed, which is opened by a mastoidectomy. As a very general rule, acute suppurative disease of the middle ear does not lead to serious destruction of bone and severe complications, though this cannot be taken as absolute, as one's own experience, like that of others, shows. However, in the great majority, it holds good that in the acute disease there is no affection of the bone itself. It is only when the disease has become chronic that we get the lining membrane of the various cavities becoming disorganized and the bone becoming involved. It is this which suggests the first inquiry in dealing with chronic middle-ear suppuration: What risk is there of the carious process extending to and in the walls of the tympanic cavity and its accessory spaces, and thus exposing to the possibility of serious damage the important structures in the vicinity? Though this represents the main danger, we cannot overlook those cases in which infection is spread through the venous or lymphatic channels to the structures within the skull, there to cause brain abscess, purulent meningitis, or septic sinus thrombosis. One such case has come under my own observation. In such cases, on operation or *post-mortem* examination, the bone is found intact—at any rate, in the region of the intracranial affection. In the same way a general septic absorption may arise, but though this has been described it is much rarer as a source of septicæmia than one might be inclined to expect.

It is the recognition of this possibility of serious mischief within the cranial cavity arising by lymphatic or venous extension from the middle ear spaces which gives to chronic otorrhoea its greatest anxiety, and which has impressed on many surgeons, as I have previously stated, the advisability of operation in all cases. Moreover, it is impossible to say what is the probability of its occurrence in any given case, so that one may almost be forgiven a feeling of panic by its contemplation. Happily it is rare, but that it does occur must be taken into account in forming a prognosis. On the other hand, there are certain objective signs and subjective symptoms by which we may foresee the probable advent of disorganization of the bony walls and the danger of serious complications by direct infection or injury.

INTRACRANIAL COMPLICATIONS.

Here it would be well to inquire, In what proportion of cases of the disease we are considering do serious complications occur? It is very evident that this has a distinct bearing on the question of operative interference. Unfortunately, it is difficult, for various reasons, to arrive at a trustworthy answer to this query; and this especially applies to the secondary implication of the contents of the cranial cavity leading to purulent meningitis, septic sinus thrombosis, gangrene, and abscess of the temporo-sphenoidal lobe and of the cerebellum, and, it may be, of other parts of the brain. Many patients suffering from middle-ear suppuration who have been attending at a special hospital, and who develop any of these complications, are taken to a general hospital, or, on account of the very acute cerebral condition, remain at home. In either case it comes about that the statistics of a hospital devoted to the treatment of aural affections are misleading, and, without doubt, understate the proportion of secondary intracranial disease. Moreover, the diagnosis of these complications is in many cases very difficult, and as the history of past otorrhoea, or of otorrhoea which the patient and his friends believe to be past, is frequently withheld, not wilfully, but in ignorance of its significance, it is by no means uncommon to have such cases diagnosed as typhoid fever or some other condition. In a case of this kind which came under my observation, operation revealed purulent meningitis secondary to suppuration in the mastoid antrum. There are cases, too, in which the patient or his friends are quite unaware of any ear disease. Such a one was sent to me by his medical attendant because of the development of a swelling over the mastoid. Questioned with reference to discharge from the ear, the father of the child stated that there had never been any, and it was only by careful aural examination that a small quantity of thick, foul-smelling pus,

evidently due to disease of some duration, was found coming from the middle ear. On operation the bone was found extensively necrosed and the dura exposed to a large extent. One cannot help thinking that, in such a case, had the mastoid swelling not appeared, meningitis or some other complication might easily have developed, whose nature or whose connexion with the ear, it is no reflection on one's diagnostic ability to say, might not have been established. In rare instances middle-ear suppuration proceeds without rupturing the membrane and without, indeed, any aural symptoms, and *post-mortem* intracranial disease has been found secondary to such cases. From all of which it will be clear that it is extremely difficult to arrive at anything like an accurate idea of the proportion of cases of intracranial disease arising as a result of chronic middle-ear suppuration. In fact, very few authorities attempt to give such statistics. From the records of the New York Eye and Ear Hospital, Dench places the proportion at 1 in 83. In the Glasgow Ear, Nose, and Throat Hospital during 1903 there were 680 cases of this disease, with 6 cases of serious secondary intracranial affection. In the *Archives Internationales de Laryngologie, d'Otologie et de Rhinologie* for May-June, 1905, Chavasse and Toubert give a full account of the operations performed by them on soldiers under their care affected with ear disease. All the operations were performed for more or less urgent symptoms. Out of 1,163 soldiers affected with suppuration of the middle ear, acute or chronic, operative procedure was found necessary in 78, and in 9 of these severe complications—to wit, meningitis, brain abscess, sinus infection—and in 4 others extensive destruction of the bone, were found as a result of the chronic variety. Unfortunately, the acute and chronic of all the cases seen are not differentiated, and even if they were they would not, from the fact that they were all men of about the same age and living under special conditions, be of much value for arriving at percentages for the purposes of this paper.

Apart from proportional statistics there have been reported very many cases of intracranial disease following chronic otorrhoea. For example, in the March-April number of the review just quoted, Schmiegelow of Copenhagen gives details of 13 cases of brain abscess with or without meningeal and sinus affection arising as a result of this disease. But it is unnecessary at this time of day to multiply examples of this connexion.

OTHER COMPLICATIONS.

There are, however, other conditions besides intracranial which develop as a result of chronic middle-ear suppuration. Perhaps next in importance is infection of the internal ear. Indeed, in many cases the disease travels by way of the labyrinth and internal auditory meatus to the cranial cavity. Short of this the middle-ear affection may cause changes in or destruction of the various parts of the internal ear whereby its function is much impaired or actually destroyed. This is a subject which has received much attention during the past two or three years and formed one of the subjects for discussion at the recent International Otological Congress, when the opinion was generally expressed that labyrinthine infection leading on to intracranial involvement was a more frequent result of chronic middle-ear suppuration than had previously been thought. A very interesting communication by Whitehead of Leeds on this subject appeared in the *Journal of Laryngology, Rhinology and Otology* for May, 1904. Drawing his observations from a large number of operations for mastoid disease he puts the proportion of cases of labyrinthine secondary infection at 4 per cent. and of these nearly half proved fatal. Facial paralysis is another distressing complication. In the Glasgow Ear Hospital during 1903 there were 7 cases of this affection secondary to middle-ear suppuration. The Fallopian canal, too, has been suspected as the channel by which in some cases infection has passed to the brain.

It is only necessary to mention, as other complications which have arisen in the course of chronic middle-ear suppuration, extensive caries of the mastoid, hæmorrhage from the carotid and abscess of the neck.

THE RADICAL MASTOID OPERATION.

An examination of the conditions found in a certain number of cases of the radical mastoid operation will give an idea of the dangers attending the disease under review.

For this purpose let me take a series of 30 cases on whom I have performed this operation. The ages of the patients ranged from 1 to 52 years. I give in tabular form the conditions found:

No.	Sex.	Age.	Condition Found at Operation.
1	M.	24 years	Caries of external wall of antrum.
2	F.	12 "	Extensive caries of external and posterior walls of antrum with exposure of sinus.
3	M.	20 "	Abnormal position of lateral sinus, antrum practically absent (already reported).
4	M.	6 "	Caries of external, superior, and posterior walls of antrum, exposure of dura and sinus.
5	M.	16 "	Superior wall of antrum carious, exposure of dura.
6	F.	2 "	Caries of external and superior walls of antrum, dura exposed.
*7	M.	1 year 8 months	Cervical abscess, caries in floor of tympanum and meatus and in region of Fallopian canal.
8	M.	1 year 8 months	Caries of external and superior walls of antrum and of mastoid process, and of internal wall of tympanum above Fallopian canal, dura exposed.
*9	M.	2 years	Suppuration of antral cavity without caries of bone.
10	M.	3½ "	Extensive caries of superior and posterior walls of antrum, dura and sinus exposed.
11	F.	11 "	Caries of external and superior walls of antrum, dura exposed.
12	M.	20 "	Excavation of whole of mastoid process, with growth of granulations.
13	M.	6 "	Caries of external wall of antrum and mastoid process.
14	M.	10 "	Caries of external wall and extensive caries of posterior wall of antrum, cavity filled with cholesteatoma, sinus exposed.
15	F.	26 "	Suppuration of antral cavity without caries.
16	F.	48 "	Extensive caries of inner and posterior walls of antrum, sinus exposed.
17	M.	52 "	Stenosis of meatus, suppuration of antrum, without caries.
18	M.	9 "	Caries of external wall of mastoid, extensive destruction of posterior wall of antrum and of mastoid process with exposure of sinus and jugular bulb. Caries in region of facial spur.
19	M.	30 "	Caries of external and superior walls of antrum and in region of external semicircular canal, dura exposed.
20	M.	32 "	Suppuration of antral cavity without caries.
*21	F.	51 "	Stenosis of meatus. Caries of inner end of posterior meatal wall and in region of external semicircular canal.
22	F.	34 "	Suppuration of antrum with granulations, but without marked caries.
23	F.	6 "	Caries of external, posterior and superior walls of antrum, sinus and dura exposed.
24	M.	50 "	Caries in region of Fallopian canal over the external semicircular canal and in the superior wall of antrum, dura exposed.
25	F.	34 "	Caries in region of external semicircular canal.
26	F.	9 "	Caries of external wall of mastoid with large perimastoid abscess.
27	M.	9 "	Caries of external wall of mastoid.
28	F.	16 "	Suppuration of antral cavity without caries.
29	F.	13 "	Caries of external and superior walls of antrum and in region of facial spur, dura exposed.
30	F.	10 "	Caries of external wall of antrum.

* In these three cases facial paralysis was present before the operation.

Summary.

The carious process affected the external wall of the mastoid in 15, the walls of the antrum with exposure of the dura mater in 11, with exposure of the lateral sinus in 6 (in one of which the jugular bulb was also exposed), the region of the Fallopian canal in 7, the region of the external semicircular canal in 5, and the floor of the meatus in 1. In 3 there was facial paralysis.

CASE 16.—This patient suffered from well-marked vertigo of two weeks' duration, accompanied, a week before she was sent to me, by vomiting. Her medical man gave a history that three years previously she had had severe rigors, with temperature up to 106°, which, however, were not thought to have any connexion with her aural condition. At the operation the destruction of bone was found to have extended from the external semicircular canal to the posterior wall, which was also to a great extent destroyed. The sinus was exposed and easily palpable. It appeared shrunken and cord-like, making one form the opinion, taking the history into consideration, that she had previously had secondary thrombosis of this sinus, which had undergone spontaneous cure.

Looking to these various conditions found during the course of the operation we cannot, it seems to me, escape from the conclusion that some at least of them must have developed secondary intracranial disease, the dura, at first thickened, becoming softened by constant contact with necrotic and purulent debris, and thus permitting the infection of the meninges, brain substance, or venous channels. In one of my cases (No. 8) the commencement of this softening was distinctly seen.

It would be well here to consider the operative procedure likely to be indicated in this disease, chronic middle-ear suppuration. As a rule, this means the performance of what is called the radical mastoid operation, as distinct from the milder measure of mastoidectomy, which is now reserved for those cases of mastoid empyema arising in the course of acute suppuration. In a small proportion of cases where the disease appears to be confined to the ossicles or attic, we may recommend removal of the ossicles or external attic wall, or both as a rule, with curettage of the tympanic cavity, always, however, with the expressed reservation that it is a tentative measure, which may require to be followed, after all, by the radical proceeding. Still, I am bound to say, a more extended experience makes me inclined to believe that with greater care in the exact diagnosis of the conditions present in the middle ear this milder operation of ossiculectomy, with removal of the external attic wall and careful curettage, early performed, will be found valuable in preventing a larger number of cases of the disease we are considering from going on to the complete radical proceeding. But that's by the way.

In all cases the nose and throat should be examined for such conditions as adenoids, turbinal hypertrophy, etc., which by the chronic congestion and muco-purulent discharge they give rise to are no doubt sources of constant reinfection of the tympanic cavity. Treatment of such by appropriate measures is often followed by beneficial results as regards the middle-ear suppuration. But, as I have said, usually it is the question of the radical mastoid operation which has to be considered. This in its various modifications aims at the eradication of the disease, and the turning of the tympanum, accessory spaces, and external meatus into one cavity lined in the completed condition by epithelium. It is not the province of this communication to enter into detail as to the methods by which this is attained nor as to the dangers to be kept in view during its performance. What these are will be evident from a contemplation of the anatomy of the part. The ultimate results are on the whole satisfactory. In 71 per cent. the suppuration is cured. This is according to Dench, and my own experience would certainly not put the proportion lower. In those in which suppuration remains it is of small amount, and as all the cavities are open to inspection there is not the same anxiety. As regards the hearing, in some cases it is improved, as a rule it remains practically the same, rarely it is made worse. Temporary facial paralysis, as a direct result of the operation or due to subsequent inflammation of the neurilemma, may occur. It recovers after a variable time. Permanent facial paralysis is decidedly rare. If it is possible for any operation to have no mortality, one might say it of this.

There is another point in connexion with this operation which requires consideration, and that is the length of time during which the patient will be incapacitated. This naturally applies to adult patients. It is beside the mark to say it should not enter into the question. It does; the patient brings it in, and where there is no urgent symptom demanding surgical interference he will carefully consider the loss of time from his work or pleasure. In the majority of uncomplicated cases this period may be put at one month. The lining of the cavity by epithelium will not be completed by the end of that time, but he will then be able to get about his usual occupation. Many modifications of the operation have been devised to hasten the completion of epithelialization.

INDICATIONS FOR OPERATION.

Now that we have considered—though owing to the exigencies of time not so fully as I should have liked—the pathological changes which may follow chronic suppuration of the middle ear and the dangers and consequences thereof, and have, moreover, dwelt, though cursorily, on the results of its surgical treatment, we may proceed to inquire in some detail into those points which may be elicited by objective and subjective examination, and which would lead us to impress upon the patient or his friends the advisability of operative interference.

First let me state those objective signs which I look upon as indications for operation.

1. Pain on pressure over the mastoid, or more particularly over the antrum, that is, immediately behind the postero-superior angle of the meatus. This may be accom-

panied or not by post-auricular swelling, and points to the supervention of an acute mastoiditis, or more often to caries affecting the external wall of the mastoid process or of the antrum. There is a possibility of error with reference to this sign which to recognize will be to avoid. Furunculus of the meatus, which may occur with as well as without chronic otorrhoea, is frequently attended by a temporary painful swelling behind the auricle. The absence of sagging of the postero-superior wall of the meatus, which is commonly got in mastoid empyema as a result of acute middle-ear suppuration, will point rather to caries of the external antral or mastoid wall.

2. A sinus behind the ear leading to an erosion in the bone. This is self-evident.

3. Caries of the petrous bone as disclosed by examination with the speculum and probe. The examination should be conducted methodically, the different parts of the ear being sounded with the probe to discover early carious foci. It may be that the caries is isolated in a small part of the inner wall of the tympanum, and is accessible to treatment through the meatus, or the ossicles alone may be the seat of the disease. On the other hand, it may be found in the upper and posterior part of the tympanic cavity, when one fears that the destructive process may also have extended to the antrum, or to the wall of the Fallopian canal, and so on. The probing should, of course, be done with great care for fear of wounding an exposed facial nerve, of making an opening through the dura if the tegmen should happen to be destroyed, or of falling into other dangers which a consideration of the anatomy of the part will make apparent.

4. An extensive or recurring growth of granulation tissue, pointing to invasion of the bone. Its place of origin should be carefully sought for, and the remarks as to the significance of caries with respect to operation will apply also to this. There is no doubt that the forcible removal of an aural polypus without consideration of its site of origin deserves condemnation, as, from tearing of the dura from which it may spring, this proceeding may be fraught with dire consequences. For the same reason I look upon recurrence of the growth of granulation tissue in the middle ear as a decided indication for operation.

5. Facial paralysis. Whatever may be said of the significance of paralysis of the facial nerve in acute middle-ear suppuration there is no doubt about it in the chronic condition, as it points almost always to the invasion of the walls of the Fallopian canal by the destructive process.

6. The presence of thick cheesy masses in the tympanic cavity, the inference being that the same condition exists in the antrum, accompanied as it usually is by very great destruction of bone. Cases are reported where the greater part of the petrous bone has been slowly and painlessly destroyed in this condition, and ultimately a large mass of cholesteatoma has been found pressing on the dura. In these cases the tympanic membrane frequently shows a peripheral perforation in the upper part of the membrane, through which the thick mass may be felt with a probe.

7. Very foul-smelling discharge. This is often the result of extensive involvement of the bone, and may not be of large amount.

8. Stenosis of the meatus, either membranous or bony, both of which may be due to the irritation caused by the purulent discharge. It is easy to understand how this condition may accelerate the disorganization of the bone both by the increased pressure and by the stagnation of the discharge permitting of bacterial growth. It is not sufficient to relieve the stenosis; that recurs: the radical operation is called for.

9. Bacteriological examination of the discharge has hardly yet reached the stage of clinical importance. No doubt in time we shall be able to state what organisms are the most harmful, in which case bacteriological examination, combined with other details discovered by objective examination, will be helpful in prognosing the course of the disease, and thus in indicating or not the advisability of operation. At present it would appear that a pure streptococcal infection is more destructive than the usual mixture of staphylococcal and streptococcal, and of the specific organisms, the *B. coli communis* and the pneumococcus, which are sometimes found in chronic middle-ear disease, seem to exert a specially baneful influence.

10. Persistent discharge in spite of regular and thorough antiseptic treatment. This indication, of course, develops only after the case has been some time under observation. How long should operation be delayed in these cases, that is, where no other more urgent sign or symptom arises? My own practice is to recommend surgical intervention if after a period of two months these milder measures have not resulted in a cessation or, at any rate, a marked diminution of the purulent discharge. In young children I wait a much shorter period, as in them, owing to the much smaller meatus favouring the onset of stenosis, and consequent increased tympanic pressure, and owing to the greater risk of extensive necrosis, as well as to the frequent patency of certain parts of the bony walls, I look with more anxiety on the continuance of the suppurative process. Indeed, I am of opinion that as a rule aural surgeons delay operation too long in young subjects.

The Temperature.

It may be stated that as a general rule in adults the temperature shows no variation from the normal. Where it does rise there is some other sign indicating operation, such as post-auricular pain and swelling resulting from a secondary acute mastoiditis. There may be, and very generally is, destruction of a large part of the bony wall without the temperature suggesting it. In children, however, the temperature is certainly of more service, a rise of one or two degrees with remissions pointing to caries of the bone which may be in a part not accessible to aural examination.

It is hardly necessary to add that when it is feared that intracranial infection has already occurred the temperature may give very valuable information.

There now remain certain subjective phenomena to be considered with regard to the advisability of or the necessity for operation.

1. *Pain.*—This is a very variable quantity. Occasionally there are nocturnal pains, or sometimes patients speak of not severe pain radiating from the ear. But extensive destructive changes may be going on without causing the patient any pain. This is specially seen in connexion with the presence of the cheesy masses already referred to. When severe pain is complained of, unless there should be some apparent cause for it such as stenosis or acute mastoiditis, we should suspect the onset of meningeal involvement.

2. *Vertigo.*—It is not at all uncommon for the subjects of chronic middle-ear suppuration to experience mild degrees of vertigo. The most pronounced attacks point to the spread of the disease to the neighbourhood of the semicircular canals, usually the external, or it may be to cerebellar abscess. So that even without any other indication there can be no doubt of the clamant call of decided vertigo for operation.

3. *Change in the Hearing.*—Rapid deterioration in hearing, especially if combined with loss or marked diminution of bone conduction, I look upon as an imperative indication in itself for operation, not only to preserve as far as possible the function of the ear, but because it may be the result of carious processes which will go on to infection of the labyrinth with the subsequent risk of extension to the cranial cavity.

Finally, and as a matter of course, all symptoms such as severe headache, nausea, rigors, etc., which point to the impending onset or to the actual consummation of intracranial infection, though properly speaking these can hardly be included in the indications for the performance of the radical mastoid operation except as a preliminary to the surgical treatment of serious complications if these have actually occurred.

These, then, are the indications for operation in chronic suppuration of the middle ear, and one's first thought is, they make such a formidable array how can any escape? One's next is that with regard to some of these indications, for example, facial paralysis, extensive caries, the disease should never be allowed to develop to the stage at which these appear.

How can this be avoided? Some surgeons answer this by advising immediate operation. They are, one might say, radical in their view of this condition. If the rest of us rank rather as opportunists it is because we bring into the consideration not only the disease itself but also the circumstances of the patient and the fact that in many cases the ordinary antiseptic treatment effects a cure. The

Walsham describes congenital hernia as "a hernia into a patent funicular process which has remained open, and forms a sac with the tunica vaginalis testis," and does not refer to the possibility of a congenital funicular sac.