

has gradually worked its way toward the edge of the membrane, exposing a part or the whole of the perforation, while little or no moisture is present. A second disc, sterilized in the same manner, should now be placed over the opening, leaving the primary one undisturbed, and partially overlapping it. Usually two or three such applications serve, in a large proportion of the cases, completely to stop the discharge and close the opening. The protection given by the disc no doubt hastens the favorable changes which take place in the pathological mucous membrane of the middle ear.

To improve the hearing, after we have cured the discharge, is the next step in the treatment of this disease. When a large part of the tympanic membrane has been destroyed and the ossicles are bound down by adhesions, we usually find that the hearing is markedly diminished. However, by dividing the existing adhesions—a procedure which can be quite easily carried out after the discharge has ceased—we often succeed in effecting a decided improvement in the hearing. On the other hand, some of the cases thus operated upon show no improvement. Nevertheless, as those whose hearing is improved by the operation constitute a majority, we should not fail to give this part of the treatment a fair trial. Personally, I have seen only two cases out of a total of twenty-four that did not improve under this procedure.

It is usual, in an ordinary case, in which the greater part of the tympanic membrane remains, for the hearing to improve slightly when the discharge ceases, and under these circumstances we may use, as an aid to restoring the function of hearing, the ordinary method of inflation and vaporization of the middle ear, as it prevents the excessive formation of adhesions, and tends, furthermore, when these adhesions have already taken place, to stretch them, as well as to stretch and make more pliable that portion of the drum membrane which is still intact. This method of treatment should, if possible, be carried out three times a week at first, and as improvement begins to take place, the frequency should be diminished, according to the indications present in each case. In many of these cases, during convalescence, and after the discharge has ceased, complaint will be made of a most distressing tinnitus, one which does not yield even though the frequent inflations spoken of have been practised. In these cases the internal administration of small and gradually increasing doses of the potassium iodide will be followed by a marked relief in a large number of instances. At the beginning the doses should be five grains three times a day, but afterward it should gradually be increased until the desired relief is secured. Usually, when the patient has taken about ten grains three times a day for several days, this symptom will gradually diminish, and, in a fair number of cases, will disappear altogether. This effect, no doubt, is due to the stimulating properties of the remedy, which causes an absorption of a small amount of exudate or recently formed deposit within the middle ear.

If any decided labyrinthine involvement is already present, then, of course, the severing of the adhesions mentioned above is contraindicated, for the operation is not likely to be followed by any improvement.

Excision of the ossicles, and operative procedures for the relief of intratympanic caries will receive full consideration in another article of this series.

In all cases that come under our observation for treatment, we should never lose sight of the fact that we are practitioners of medicine first, and specialists second; and all cases, in which the indications demand it, should have general building-up and tonic treatment in order that the local condition may improve the more rapidly, as it must when the patients receive a surplus of nutrition through the medium of the general system. There are many chronic cases which, if they had been subjected to the building-up process when they were first attacked by the local disease, would never have reached the chronic stage at which they afterward presented themselves for treatment.

James F. McKernon.

EAR DISEASES: FOREIGN BODIES IN THE EXTERNAL AUDITORY CANAL AND MIDDLE EAR.—

I. AUDITORY CANAL.—Although the position of the ear is not such as to favor the entrance of foreign bodies into the external auditory canal, it not unfrequently happens that they find lodgment there. Children are much given to thrusting into their ears such bodies as glass beads, pebbles, coffee grains, and the like; adults "lose" plugs of cotton in their ears or break off in the canal part of a match or toothpick with which they have been scratching an itching meatus or endeavoring to remove cerumen; while insects occasionally enter the ear by accident, and sometimes by design, being attracted, perhaps, by the odor of an offensive discharge. Flies, attracted in this way, now and then deposit their eggs in the ear; and, unless the discharge be sufficiently profuse to wash them out, they quickly develop into maggots, which soon make their presence known by the great irritation they create. Foreign substances are sometimes put into the ear with criminal intent; but, popular belief to the contrary, the auditory canal furnishes a most indifferent avenue for the introduction of poisons into the system, since its dermal lining does not permit of their ready absorption.

The presence of a foreign body in the ear does not necessarily give rise to serious consequences. If the substance introduced possess irritant or caustic properties, inflammation will quickly supervene, the drumhead may be destroyed, and not only the integrity of the hearing, but life itself, may be jeopardized. And, also, when living insects invade the ear, they usually cause—especially when their wings or claws come in contact with the tympanic membrane—great suffering, and, perhaps, severe inflammation of the membrane and the cutaneous lining of the meatus. But, on the other hand, such innocuous bodies as beads, cherry stones, coffee beans, etc., unless they be tightly wedged in the canal, or be so placed as to press rudely upon the drumhead, may scarcely make their presence felt, or induce even a transient earache.

The prevalent belief is that the entrance of a foreign body into the auditory canal is a serious accident, and that, however harmless in itself the foreign substance may be, dire consequences will ensue unless it be quickly gotten out. As a rule, it is doubtless judicious to remove without unnecessary delay any body which has found its way into the external ear, because its presence may excite inflammation, or, as sometimes happens, troublesome reflex irritation,* and because, moreover, we shall scarcely be able, without doing so, to allay the alarm of the patient or the anxiety of his friends. But, on the other hand, as in most instances no immediate ill consequences need be apprehended, we should not be too eager to undertake this oftentimes delicate operation, imperfectly equipped, perhaps, for its performance, and under conditions which render doubtful its successful completion; for, if the operation fail of its purpose, the injury resulting from the repeated efforts to extract the foreign body will probably leave the auditory canal inflamed and swollen, and the ear in much worse condition than before. Indeed, the difficult cases which the specialist has to deal with are almost always those in which, through previous unskillful manipulation, the delicate walls of the meatus have been lacerated and bruised, and the foreign body tightly impacted in the bottom of the canal.

Before attempting to remove a foreign body from the ear the operator, by careful inspection, should first assure himself that one is present. This it is not always possible to do without the aid of an ear mirror and speculum. If these are not at command, and there be doubt as to the presence of a foreign body (for it is to be borne in mind that patients frequently imagine that something has entered the ear when such is not the case), it is per-

* Among the reflex phenomena which have been observed in consequence of the irritation produced by the presence of a foreign body in the ear may be mentioned, cough, vomiting, excessive salivary secretion, hemicrania, facial paralysis, and epileptic convulsions (Poulet). The writer also has reported a case (Trans. Am. Otolological Society, vol. v., p. 508) in which inability to swallow food was caused by the presence of a plug of cerumen in the ear.

missible to attempt to solve the doubt by the use of warm water and the syringe; but, under such circumstances, to grope blindly in the ear, with any sort of instrument, is a practice fraught with great danger and utterly unjustifiable. It may be well to mention that the glistening surface of the tympanic membrane is sometimes mistaken for a foreign body by those unaccustomed to examining the ear; and, as such a mistake is apt to lead to serious consequences, the possibility of it should be borne in mind in order that it may be avoided.

Treatment.—The question of how to deal with a foreign body lodged in the ear depends upon a variety of circumstances: In the first place, upon the nature of the intruding body, whether it be an animate or an inanimate object; and, if the latter, whether it be an irritant or an innocuous substance, and what its shape and size. In the second place, upon the manner of its lodgment, whether it be tightly wedged or lying loose in the canal, and whether resting near its orifice or beyond its constricted middle third, in the neighborhood of the tympanic membrane. In the third place, upon the skill and experience of the operator; for what would be a judicious and safe method of procedure for one accustomed to operating upon the ear, might be an extremely unwise and hazardous one for a tyro in this department of surgery to undertake. Generally speaking, it may be said that unless the foreign body be near the external orifice of the ear, and be of such shape that it may be readily grasped by suitable forceps, in the absence of special skill upon the part of the operator, the syringe is the safest and best instrument with which to undertake its removal. In most cases this plan will prove successful, and, when it does not, at least no harm will have been done by the attempt. If it cannot be removed in this way, resort must be had to the forceps, or to the blunt hook devised for this purpose. Neither of these instruments, however, can be used with safety, or to good purpose, unless the meatus be illuminated, so that the foreign body may be kept in view and every movement of the instrument watched. If the intruding body be lying near the external orifice of the canal, it is possible to obtain a satisfactory illumination by turning the ear toward a window or a bright artificial light; but, if it be lodged near its inner extremity, a concave ear mirror attached to a head band, by means of which either diffuse sunlight or artificial light may be concentrated and reflected into the ear, and in most instances an aural speculum, must be employed. Unless, however, the operator be used to this method of examining the ear, he will find that he cannot accomplish much in this way; and, under such circumstances, supposing that the syringe has been tried without avail, he will serve his own interest and his patient's welfare, if without more ado he refer the case (if it be in his power to do so) to some one having more skill in this particular direction than himself; for farther instrumental effort upon his part is little likely to be successful, and may result in serious damage to the ear.

In skilful hands a traction hook, such as is represented in the woodcut, is the most generally useful instrument for the removal of foreign bodies from the ear.* It is especially useful when the foreign body is spheroidal in shape, or is so large as to be wedged tightly in the canal. Under such circumstances forceps are worse than useless; for it is almost impossible to open them wide enough to grasp the foreign body, and each unsuccessful attempt to catch hold of it tends to force it more deeply into the meatus. With the hook, however, which can be gently insinuated between the foreign body and the walls of the canal, and, when it has been gotten beyond it, can be turned so as to catch the body, and, upon its withdrawal, either roll or drag it toward the external orifice of the meatus, any body which has found its way into the ear

* The writer employs a hook, the shank of which is 6.5 cm. in length and forms an angle of about 100° with the handle. The hook at the extremity of the shank, as represented in the cut, is bent over not too abruptly, and is serrated upon its under surface. In his opinion the angular form is preferable to the straight traction hook which some aurists employ, as with it the operator's hands are less likely to interfere with the illumination of the meatus.

may be extracted—unless, indeed, it has become greatly enlarged (as sometimes happens from the imbibition of moisture), or the calibre of the canal has been considerably lessened by inflammatory swelling. When such an instrument is not at command, a silver probe suitably bent near its extremity may be used in its stead; or an

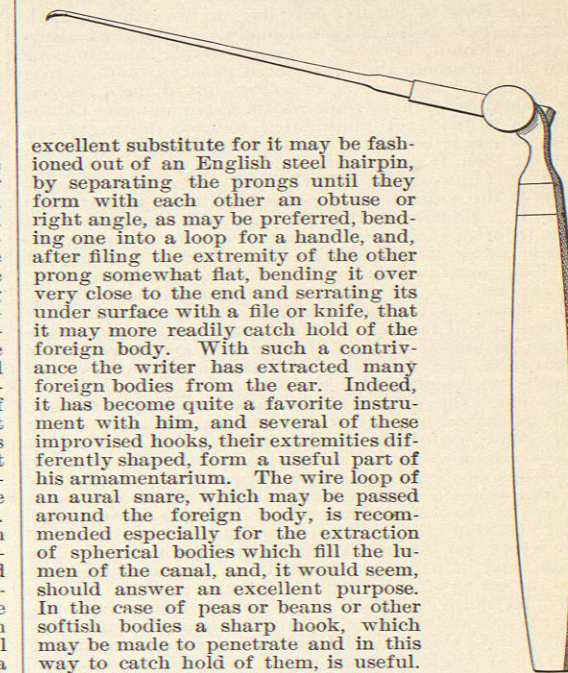


Fig. 1779.—Traction Hook for Removing Foreign Bodies from the External Auditory Canal. (From author's drawing.)

When a corrosive substance finds its way into the ear, it should be syringed out as quickly as possible with tepid water, without loss of time in searching for something which may neutralize it chemically. If such an agent be at hand—as for instance a weak acid, such as vinegar, in the case of an alkaline caustic, or carbonate of soda or potassa, if the corrosive substance be acid,—it should be added to the water with which the ear is syringed.

When animate objects invade the ear they usually cause much suffering. Insects, by the rapid movements of their wings and feet, not only excite severe pain, but create an uproar which renders nearly frantic the unfortunate individual into whose ear they have penetrated. Their movements may be arrested, and their lives put an end to, by pouring into the meatus any bland oil, such as olive or almond oil, or melted lard when these are not obtainable. Their bodies may then be removed by means of the syringe or forceps. The writer met with a case some years since in which a physician, possessed of some originality, succeeded in arresting very promptly the distressing movements of a small insect which had entered the ear, by pouring into the meatus a quantity of melted cerate. Unfortunately, however, upon parting with its heat the cerate became hard, and moulded itself firmly in the canal. The remedy, as may be imagined, was worse than the disease, for the discomfort it caused was almost as great, and the difficulty of getting rid of it ten times greater.

Maggots are not only difficult to remove from the ear, but cause very great suffering, because, as Blake has pointed out, they attach themselves, by an apparatus provided for the purpose, to the walls of the meatus, and feed upon the inflamed integument. It is frequently necessary to seize and extract them with forceps, as the syringe will not always bring them out.* They survive for some time in oil, live only five or ten minutes in alcohol, and are killed instantaneously by chloroform (Burnett). Alcohol, however, is not a desirable thing to pour into an inflamed and excoriated meatus, and to use chloroform in this way is, of course, out of the question. Dr. Roosa recommends chloroform vapor and also Labarraque's solution of chlorinated soda to destroy them with, when it becomes necessary to do this before removing them from the ear.

In the removal of foreign bodies from the ear, especially if the walls of the meatus have been lacerated or there is a probability that the tympanic membrane has been injured, antiseptic precautions should be employed. Sterile water should be used in syringing the ear; all the instruments used should be sterilized, preferably by boiling, and the hands of the operator should be surgically clean. After the intruding substance has been removed, it will be well to syringe the ear gently with a sterile, saturated solution of boric acid, and, as a further precaution, to close the orifice of the meatus, but not too tightly, with a plug of sterile cotton.

To relieve the pain and inflammation caused by a foreign body in the ear, or by the efforts to remove it, the writer has found useful the French anodyne oil, known as *oleum compositum* or *baume tranquille*,† of which eight or ten drops may be warmed and dropped into the ear three or four times a day. Perhaps, a still more efficacious remedy is the solution of atropine and cocaine (atropine alk., gr. i.; cocaine alk., gr. ij.; ol. amygd. dulc., ʒ ij.) which the writer has recommended in the treatment of otitis media, and of which six or eight drops may be poured into the ear as often as may be thought desirable.

To facilitate the removal of foreign bodies from the ear the anesthetic action of cocaine (ten-per-cent. solution) or holocaine (two-per-cent. solution) may be availed of; but, as might be anticipated, the effect obtained is not very satisfactory. With nervous children, it is necessary, in many cases, to administer a general anesthetic, not so much to lessen the pain of the operation (which in uncomplicated cases should not be considerable), but to overcome the fear and quiet the resistance of the patient.

II. TYMPANUM.—Foreign bodies occasionally find lodgment in the tympanic cavity. They commonly enter through the external auditory canal, but exceptionally reach the cavity by way of the Eustachian tube. When the tympanic membrane has been destroyed by pre-existent disease, a foreign body which has entered the auditory meatus may easily find its way into the tympanum. Usually, this happens, however, in consequence of awkward efforts to extract it. When the ear previous to the entrance of the foreign body is in normal condition, rupture of the drumhead must, of course, take place before it can pass into the cavity beyond. This, again, happens commonly through persistent and unskilful attempts to remove the body from its original point of lodgment. It may occur also when the foreign body has entered the ear with such force as to drive it at once through the membrane, as, for example, might happen with small shot fired from a gun. Again, the destruction of the membrane and the passage of the body beyond it may be due to the caustic action of the latter, or to its being so lodged as to cause continuous pressure upon the membrane, leading in time to ulceration.

*The writer once removed from the ear of a woman a live tick, which had been there for about a fortnight. It was firmly attached to the wall of the meatus, and when it was seized with forceps considerable traction was required to break its hold. A black granular material (its excrement) had been coming from the ear for some days, at times a sound "like broiling" had been heard, and pain was beginning to be experienced.

†For formula see French Codex, and National Dispensatory, 5th edition, 1894, p. 854.

As might be supposed, by the other route of entrance—the Eustachian tube—substances other than fluids very rarely find their way into the tympanum. Still, instances of this character have occurred. Urbantschitsch has reported a case in which a fragment of an oat stalk entered the tympanum in this way, and another case is on record in which a broken bit of a hard-rubber syringe passed from the nose into the drum cavity by way of the Eustachian tube. Ascarides have also been known to enter the tympanum in this manner. (Cf. also p. 591.)

The passage of irritant fluids from the nasal cavity into the middle ear is a misadventure of comparatively frequent occurrence, and often gives rise to unfortunate results. It usually happens as a consequence of employing a nasal douche, and formerly, when this practice was more in vogue than it is at present, severe cases of otitis media brought about in this way were constantly coming into the hands of the aural surgeon.

The consequences likely to ensue from the presence of a foreign body in the tympanum are, as might be supposed, usually more grave than when a similar body is lodged in the external auditory canal. If it has entered by way of the Eustachian tube, the irritation provoked by it will almost certainly lead to suppurative inflammation of the middle ear with perforation of the membrane. This, indeed, is nature's method of ridding itself of the offending body, and in most instances it is likely to succeed, the foreign body escaping, with the discharge, through the external ear. If the foreign substance has been forced through the drumhead from the external canal, or has passed into the tympanum through a previously existing perforation, inflammation, attended by severe pain and probably by symptoms of cerebral irritation, is likely to supervene quickly, and still more serious consequences may ensue, unless, by surgical interference, relief is obtained.

It should be stated, however, that some ears are very tolerant of the presence of a foreign body even in the tympanic cavity, and that such serious consequences as have just been described do not invariably follow. "As illustrative of the slight degree of disturbance which may be set up by the presence of a foreign body in the drum cavity," to quote from Dr. Huntington Richards' excellent article upon this subject in the first edition of the REFERENCE HANDBOOK (p. 359), "reference may be made to certain cases related by Voltolini (*Monatsschrift für Ohrenheilkunde*, 1876, No. 5) where a Politzer's eyelet, a small, smooth body made from hard rubber, lay within the drum cavity without exciting inflammation, and to a case reported by Bartscher and quoted by Gruber, where for nine months a corset ring lay impacted in the tympanum of a child previously affected with chronic otitis media purulenta, without giving rise to serious trouble."

Since nearly all that has been said in regard to dealing with foreign bodies lodged in the external ear applies to similar bodies in the tympanum, there remains but little to add as to the treatment of this class of cases. When the drumhead is intact it is difficult, and may be quite impossible, to assure one's self of the presence of a foreign body in the cavity beyond. The inflammation which is almost sure to supervene would of itself probably call for the making of a free incision in the membrane; so that, under such circumstances, one need not hesitate to resort to this measure to facilitate the escape of the body, because of uncertainty as to its presence. On the other hand, if symptoms of inflammation have not manifested themselves, such a step would hardly be warranted, though there might be no room for doubt as to the presence of the foreign substance. When the body has entered through a perforation in the tympanic membrane, or has been forced through the membrane, it will sometimes be necessary to enlarge the opening to facilitate its removal, whether this be attempted with the syringe, with slender forceps, with some form of traction instrument, or with a polypus snare, as von Troeltsch has recommended. The possibility of driving the foreign body from the tympanum by forcing air or a non-irritating, sterile liquid—such as normal salt solution—through the

Eustachian tube, by means of the air bag and catheter, should not be lost sight of. Finally, it may be added that if the operation of displacement of the auricle and cartilaginous meatus is ever indicated for the removal of a foreign body from the ear, it is in cases in which such body is impacted in the tympanic cavity. Among others who, under such circumstances, have resorted to this procedure with success may be mentioned Israel, Moldenhaur, Bezold, Huber, Politzer, Buck, Roosa, and Bishop.

Samuel Theobald.

EAR DISEASES: GENERAL THERAPEUTICS.—In writing upon general aural therapeutics a practical division of the subject has seemed to me one of the great difficulties. That previous writers have experienced the same difficulty seems shown by the fact that scarcely two of them have written along parallel lines. Almost every one has divided this chapter in a different manner from all the others. At first it seemed to me as if the rational plan would be to take general symptomatology as a basis; the objection to this, however, is the fact that each symptom is, or may be, produced by many of the individual diseases, and that general therapy along this line would resolve itself more or less into a consideration of what could be done for these individual diseases, which seems without the scope of such a chapter as this one.

Considerable deliberation on the subject has resulted in the determination to pursue the following line of thought: First. To consider briefly some prophylactic measures whereby those having sound ears may avoid and overcome conditions which are prone to originate ear diseases, and whereby those already the subject of such conditions, or already having some ear trouble, may take such precautions as will tend to prevent those conditions from growing worse.

Second. To take up the subject of local remedies, under which heading will be considered those procedures in more or less frequent use, such as blood-letting, heat, cold, inflation by the various methods, massage, electricity, etc., and to assign to them in a general way their various values and uses; and finally,

Third. To consider very briefly general remedies—*i. e.*, the treatment of the ear by means of constitutional measures.

I. PROPHYLAXIS.—"To prevent disease is better than to cure disease" has become a trite saying, and to-day, more than ever before, do we very properly follow out the principles of prophylaxis, both in general medicine and in our own limited specialty of otology. Much can be accomplished in many cases by the carrying out of simple, yet important, hygienic measures, in other cases through a practical and timely resort to medication or to operative procedures.

In order to a wise prevention a moment's consideration must be given to the manner in which the ear becomes involved as a result of general or local disease elsewhere. We know that under normal conditions, and in perfect health, we carry about in our mouths a large number of pathogenic germs, whose possibilities for harm are beyond question. We remain in health so long as the normal protective factors retain their functional activity; but when they suffer injury, then these pathogenic factors become capable of harm to the health. One of the most important factors in protection—a factor which varies in efficiency according to the locality—is the unbroken continuity of the epithelial layer; another is the fact that some germs and their products are antagonistic to others.

Inflammatory processes in the ear may develop from within and also from without. By far the most frequent point of origin is the naso-pharynx. Given a "cold" or a surface chill, a congestion of the naso-pharyngeal mucous membrane is sure to develop, and soon thereafter there will be a decrease or cessation of the ciliary activity of the tubal epithelium; and with this will be associated an interference with the normal ventilation of the tympanic cavity, which is thereby rendered much more accessible to pathogenic germs.

From without arise injuries and inflammatory processes of the auricle and external canal which may extend from there to the parotid region, the side of the neck, or the mastoid process, or which may set up some general disease, *e. g.*, erysipelas, or may reach the tympanic cavity. These paths, or methods, of infection point the way for prophylaxis, or for treatment in the early stages.

Preventive measures should begin then with the naso-pharynx, and first of all may be mentioned some of the simple means that should be employed when a condition of health exists. An important matter is the hygiene of the mouth and naso-pharynx, where may at any time be found a list of germs that is already astoundingly large, but is still growing. The care of the teeth, even among those who give them care, is, as a rule, insufficient; they should at least be thoroughly cleansed on retiring and on rising; I believe, too, with Dio Lewis, in the proper use of the toothpick after each meal, and, if this is supplemented by a mouthful of water forced rapidly to and fro between the teeth to as far as possible wash out any remaining fragments of food, certainly the condition of most mouths would be much improved. Gargling may also, in my judgment, be made a more valuable cleansing means than is ordinarily the case. The noisy process with which we are most familiar accomplishes but little, the fluid employed not reaching as a rule beyond the anterior pillars.

The following procedure, described by Haug, is, I believe, much better: "Take a medium-sized mouthful of some good antiseptic mouth wash, throw the head partially, not too far, backward, allow the fluid to run by gravity slowly and quietly downward until the reflex irritation causes a contraction of the muscles of deglutition, when the head is thrown slightly forward, and the contents expelled through the mouth." By this means certainly the tonsils and much of the pharynx, possibly also some of the naso-pharynx, are influenced by the cleansing process.

In acute catarrhal inflammation of the naso-pharynx and nose, whether in the form of a simple angina or as a symptom of measles, scarlatina, etc., the middle ear is threatened; and here we may properly say a word or two in relation to the various procedures which may compress the air in the naso-pharynx, and as to which prophylaxis requires a warning. First of all, as regards blowing the nose—a homely subject, but one of decided importance. So far as is possible this should be avoided during the first few days of such an acute coryza, and, when it must be done, let it be done with both nostrils open, and as gently as possible; for, as a matter of fact, it accomplishes but little good, whereas the tendency is distinctly toward an increase of the congestion, which in turn increases the desire to again blow the nose. Again, snuffs which cause sneezing are, as a rule, irritating, and sneezing itself, especially if it be a person's habit more or less to suppress it, may forcibly open the Eustachian tubes with bad results. Adopting the same line of reasoning we should say a word against the use—certainly the general and indiscriminate use, without previous cleansing of the nose and naso-pharynx—of the various therapeutic measures (Valsalva, Politzer bag, and Eustachian catheter) which cause compression of the air in the naso-pharynx and tympanic cavity. This precaution is advisable, not only so long as the acute naso-pharyngeal irritation remains, but also during the continuance of pain and deafness in the ear, with exudate in the tympanic cavity. The danger to be feared is that fluid, and with it the agents of infection, may be forced back into the mastoid antrum and cells.

During many of the acute illnesses of infants and children, or even of adults, especially if attended by symptoms not easily accounted for,—*e. g.*, coma, gastro-intestinal disturbances, etc.—a daily inspection of the tympanic membranes may wisely be made, so that, if occasion arises, prompt incision may be made, and thereby certain dangers and unnecessary destruction of tissues be avoided.

In the case of people, whether children or adults, who are the subjects of frequently recurring or chronic colds