

BUCK (A.H.)
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OF

TREATMENT OF AURAL DISEASES

IN

THEIR EARLY STAGES,

ESPECIALLY WHEN ARISING FROM THE EXANTHEMATA.

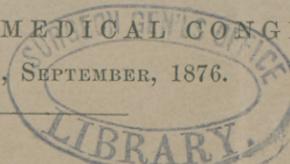
BY

ALBERT H. BUCK, M.D.,

INSTRUCTOR IN OTOLOGY IN THE COLLEGE OF PHYSICIANS AND SURGEONS, NEW YORK;
ONE OF THE AURAL SURGEONS TO THE NEW YORK EYE AND EAR INFIRMARY.



EXTRACTED FROM THE TRANSACTIONS OF THE
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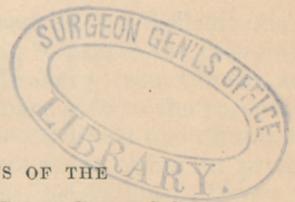
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ALBERT M. HILL, M.D.

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THE IMPORTANCE OF TREATMENT OF AURAL DISEASES IN THEIR EARLY STAGES, ESPECIALLY WHEN ARISING FROM THE EXANTHEMATA.

THE object of selecting the subject of this paper for discussion by a body of men interested in otology, must be, not to draw out the different opinions of otologists on the subject (for there can certainly be but one opinion), but to have the attention of the profession at large directed to the importance of early treatment in aural diseases. The pleading of a single individual would perhaps fail to carry conviction to the minds of many members of the profession, while the same statements, made by the same individual acting as the mouth-piece of such a body of skilled men as is here gathered together, may be likely to receive the thoughtful consideration which the subject demands.

In discussing this subject, I shall take into consideration chiefly the acute, purulent affections of the middle ear, as it is in these that judicious treatment proves so beneficial, and the want of it at times so disastrous. In catarrhal affections it might also be shown that treatment in the early stages of the trouble was in general productive of very satisfactory and marked results, while in the later stages it rarely proved of any benefit whatever. It will be sufficient, however, for my present purpose, to make use only of those acute affections of the middle ear which naturally end in the formation of pus, and which very often become chronic.

The question of the frequency of chronic otorrhœa, is a difficult one to determine with any degree of accuracy. Owing in part to the prevailing popular belief that it is dangerous to arrest a discharge from the ear, and in part to the answer which very many physicians give to the parents of such patients—"your child will outgrow it"—hundreds upon hundreds of individuals never present themselves for treatment either in private (aural) practice or in the clinics of our public institutions. Hence we have no means of finding out accurately how large a percentage of the population of any given community is afflicted with this morbid condition. We know, however, that these cases constitute from twenty to thirty per cent. of all cases of ear disease that come under the aurist's care, either in hospital or in private practice. We also know that among our acquaintances a certain number are troubled, and have been perhaps for years, with a discharge from one or both ears. Again, if we inquire how the disease originated, we find that, in a large proportion of the cases, it is referred back to an attack of scarlet fever, or measles, or nasal catarrh. In this way we get hold of two important facts: first, that chronic discharge from the ear is a common disease; and, second, that taking cold, and the exanthematous diseases, are the chief sources from which it originates. Two questions here present themselves: (1) Is a chronic dis-

charge from the ear a sufficiently serious affection for either the physician or the patient to give much thought to it? and (2), admitting the serious nature of the disease, can anything be done to diminish the prevalence of such chronic otorrhœas?

Satisfactory answers to these two questions will furnish the best elucidation of the title which stands at the head of this paper.

I. *Is Chronic Discharge from the Ear a serious Affection?*—I answer unhesitatingly, yes. In the first place, it is annoying to the patient and disgusting to those who associate with him. In the next place, it is an indication of the existence of a process which may at any time seriously threaten the patient's life. Here, again, statistical proof of the correctness of my statement is not easy to furnish. Medical literature contains numerous accounts of cases of chronic otorrhœa that have terminated fatally. Almost every practitioner, too, has met with one or even several such cases in the course of his practice. Many also have seen such cases terminate fatally under the form of meningitis, and have never once thought of the part played in the disease by the chronic otorrhœa. These are well-known facts, and admitted, I think, by all. But how does an inflammation of the ear pass into the condition of a chronic otorrhœa, and how may the latter cause the death of the patient? To render this clear, let me narrate to you the probable history of such a case.

A strong, healthy boy, ten years old, is taken ill with scarlet fever. The disease runs a moderately severe course, and bids fair to subside without any serious after-effects. The tonsils are red and swollen, and the entire naso-pharyngeal region is evidently in a markedly inflamed condition. While in this state—say in the second or third week of the disease—the boy begins to complain of an earache. The first night, warmth is applied to the ear, and in this way the boy gets some temporary relief. The next day, however, the pain continues, and the family physician, who perhaps by this time has discontinued his daily visits, is consulted as to what shall be done to relieve the boy of his earache. Laudanum is prescribed; a drop or two of it to be instilled into the ear, and a piece of cotton-wool saturated with the remedy to be inserted into the outer canal. This too, perhaps deadens the pain a little, but still the boy passes a second night in suffering, and the third day finds him steadily growing worse. By this time the earache proper has become merged in a painful and throbbing sensation, involving not only the ear itself, but also the entire side of the head, and especially the mastoid and occipital regions. The instillation of laudanum is repeated, and perhaps sweet oil is added. The third night is passed in miserable suffering, the boy obtaining a few snatches of sleep by the aid of opium administered internally. On the fourth day—a large blister in the mean time having been applied behind the ear, only to add to the boy's discomfort—a slight discharge makes its appearance at the outer orifice. As this discharge becomes more copious, the pain subsides, and in the course of a few days the patient finds himself able again to eat, sleep, and move about as when he was well. For a year or more afterwards he remains free from serious pain in the ear; the discharge, however, persists, and at times there is a sense of discomfort in the ear, perhaps not amounting to actual pain, but still sufficient to indicate the existence of a tolerably active inflammatory process. Finally, the patient some day contracts a bad "cold;" the otorrhœa ceases, the pain in the ear and corresponding side of the head becomes intense, the parts behind the ear become very painful and

tender, there is fever—in a word, the inflammation of the tympanum has spread to the adjacent bony structures and to the meninges of the brain, and death soon follows. Death may also follow in other ways, but for our present purpose it is not necessary to describe other modes of fatal termination.

Now, to appreciate clearly how dangerous a disease an inflammation of the middle ear may become, and to understand fully the *rationale* of a successful treatment, it is necessary that one should possess a tolerably clear idea of the anatomical relations of the middle ear. These are, in brief, the following:—

The middle ear (or tympanum) is a small cavity about five-eighths of an inch in length, half an inch in height, and from an eighth to a quarter of an inch in breadth. The drum-head, or *membrana tympani*, constitutes the greater part of one of the sides of this cavity—the outer one—but at all other points (with some unimportant exceptions) its walls are of bone, covered by an exceedingly thin, vascular mucous membrane. In health, this cavity possesses an outlet (the Eustachian tube), but when its lining mucous membrane becomes inflamed, this outlet undoubtedly closes, and we then have to deal with an inflammation occurring in a closed cavity, the walls of which are everywhere of bone, except at one spot, and here the resistance of a strong fibrous membrane must first be overcome before the fluid can escape, and before the conditions of a closed cavity can be done away with.

Now let us suppose that inflammation has attacked this cavity. What takes place? The vessels of the mucous membrane become gorged with blood, the mucous membrane itself becomes swollen and oedematous, and the valve-like tympanic orifice of the Eustachian tube becomes closed to all secretions that might otherwise find an escape through this channel. This is the *first stage* of the trouble, and it may last only a few hours, or it may be prolonged for even three or four days. This is the stage in which the application of a few leeches in the neighborhood of the ear may suffice to check the entire trouble. But, if the inflammation continue, stasis will occur in the capillaries and veins, and serum will be forced by arterial (cardiac) pressure through the walls of the bloodvessels, through the surrounding tissues, and finally into the cavity of the tympanum. After the cavity has become filled with the exudation, each succeeding portion of fluid exuded must find room for itself by forcing the *membrana tympani* outwards. The disease has now reached its *second stage*. The tympanum is filled with serum, in which pus corpuscles are rapidly increasing in number, the *membrana tympani* is bulged outwards and pulsates, capillary and venous stasis is general, and great pressure is being exerted upon all the soft parts contained not only within the tympanum proper, but also within the communicating system of bony cavities, the antrum and mastoid cells. If now the *membrana tympani* be not abnormally resistant, the pressure will soon cause a thinning, and eventually a rupture, of the membrane at some particular spot. The pressure, which is the chief source of the pain, then ceases, the exuded fluid becomes more decidedly purulent in character, and escapes through the perforation, and the parts in due time return to a natural condition. In a large minority of cases, however, the termination is not so favorable. Owing probably to the great resisting power of the *membrana tympani*, the intra-tympanic pressure continues for a much longer period—perhaps even for several days—before a perforation is finally established. In these cases, it must be remembered that the

tympanic mucous membrane is also functionally a periosteum. Hence the continued pressure is apt to result in superficial death of the underlying bone in one or more places. But there are also other points that should be remembered: the bloodvessels of the tympanic mucous membrane communicate freely with those of the adjacent dura mater, which is separated from the mucous membrane by only a thin septum of bone, and the mastoid veins empty directly into the lateral sinus.

If all these points be borne in mind—the anatomical and pathological conditions, and the impotent or even harmful treatment pursued—should any one be surprised at the terrible results that often follow inflammation of the ear, or wonder any longer at the large percentage of individuals in every community who go through life with an offensive discharge from this organ?

II. This brings us to our second question: *Can anything be done to diminish the prevalence of such Chronic Otorrhœas?*—In answering this question we shall confine ourselves, in accordance with the spirit of our subject, to the consideration of those measures which tend to prevent the inflammation from reaching what might be termed a *third stage*, one that is characterized by inflammation of neighboring organs, by proliferation of the soft tissues, and by carious processes in the subjacent bone. In a few cases, in the early part of the attack, warm applications and leeches are sufficient to prevent the inflammation from reaching the higher, second stage. In the majority of cases, however, we are unable to prevent this increase, and are consequently brought face to face with a middle ear in the condition of inflammation to which I have given the name of second stage. This is the time when paracentesis of the membrana tympani produces such beneficial effects, and the earlier it is performed, in this stage, the greater its efficacy. In this one slight operation, which in itself is neither dangerous nor very painful, lies the power to prevent the whole train of disagreeable and dangerous symptoms to which I have alluded so fully above. It is not far from the truth to say that every fatal case of purulent inflammation of the middle ear must, at some time in its course, have passed through a stage in which, by a resort to this operation, the progress of the disease might have been arrested, and the tendency of its course changed from an unfavorable to a favorable one.

In illustration of the speedy relief from pain which often follows the operation, especially in children, let me narrate briefly the following case:—

A child, three years old, had been complaining of earache in the right ear during the greater part of the day. (For several days previous to this, she had been suffering from a marked nasal catarrh.) The pain in the ear was paroxysmal in character, and the child evidently had a high fever, though no measurement of the temperature was made with the thermometer. As night came on, the pain became more severe, and the intervals between the paroxysms shorter. Toward morning I was sent for, as the pain had become constant, and the child was in great suffering. An examination with the speculum and reflected light showed an œdematous and bulging membrana tympani (posterior half), the neighboring parts being very red, though as yet but little swollen. In the most prominent portion of the membrane I made an incision scarcely three millimetres in length, and involving simply the different layers of the membrana tympani. This was almost immediately followed by a watery discharge (without the aid of inflation), which ran down over the child's cheek. At the end of three or four minutes the child had ceased crying, and in less than a quarter of an hour she was fast asleep. At first the discharge was very

abundant, and mainly watery in character, but it steadily diminished in quantity and became thicker, until finally on the fourth day it ceased altogether. On the tenth day the most careful examination of the ear could not detect any trace of either the inflammation or the artificial opening.

It would have served my purpose better, had I been able to offer in illustration a parallel case of acute, purulent inflammation following scarlet fever or measles; but unfortunately I cannot find in my records a single such case which came under observation as early as the second or third day after aural symptoms had manifested themselves. The morbid process, however, is practically the same in both cases, and the benefit to be obtained by early surgical interference cannot be materially less in cases following scarlet fever than in those following an acute nasal catarrh. The tendency to desquamation, and the enfeebled state of health following a moderately severe attack of scarlet fever, may, it is true, prolong the subsequent subacute stage of the aural inflammation for a few weeks, but the prospect of ultimate complete *restitutio ad integrum* is almost as certainly secured by timely interference in the one case as it is in the other. No harm can come from perforating the membrane too early, but months or even years of annoyance and suffering may be entailed upon the patient by resorting to the incision after the mischief has already been done. It then often fails to relieve even the pain.

In calling special attention to this operation, I do not wish to be understood as advocating it as the *only* means of treatment in such cases; I simply choose it because it is the *most important* one, and because its wonderful efficacy is susceptible of proof.

This is perhaps the best place to comment upon the view held by the late Mr. James Hinton, of London, respecting the efficacy of paracentesis of the membrana tympani in acute affections of the middle ear. In his work on "The Questions of Aural Surgery" (pp. 130 and 131), I find the following: "Since the real relief of the symptoms depends upon the escape of the matter through the membrane, it would seem an obvious inference that the membrane should be, at the earliest possible period, incised. And this is recommended by almost every writer; but experience of this method has left a doubt upon my mind. In the few cases in which I have had recourse to it during the acute stage of an inflammation, I have not found the results very satisfactory, and in two instances in which the inflammation existed on both sides, and I incised one membrane only, the progress of recovery seemed retarded rather than expedited; I must, therefore, hold an undetermined position on this question." Such an opinion, coming from one whose authority in otological matters is so weighty, is calculated to prevent many from resorting to the operation, and that, too, notwithstanding the fact that in another part of the same work (p. 133) he says: "But whatever may be the best method of treatment in simple, acute catarrh¹ of the tympanum, there seems to be no doubt that immense evil might be prevented by free incisions of the membrane in very many of the cases in which it becomes inflamed during the course of the exanthemata." The example which

¹ Mr. Hinton's "simple, acute catarrh" is nothing more nor less than an acute inflammation of the middle ear, going on to the formation of pus, and to the exertion of a pressure equally great with that which takes place in the acute inflammation following the exanthemata. While, perhaps, the ultimate results are not quite as disastrous in the cases which develop in the course of a simple nasal catarrh as in those which accompany the exanthematous diseases, there is not a sufficient difference to justify any material difference in the course of treatment that should be pursued in the two classes of cases.

Mr. Hinton cites, in evidence of the doubtful efficacy of paracentesis, furnishes at the same time a satisfactory explanation of the reasons why the incision failed to afford relief. In the first place, the incision consisted of a mere "prick with a cataract knife," and, in the second place, it was not made until the eighth day of the attack, or, in other words, late in what I have described as the second stage. Under such circumstances it is certainly not to be wondered at that the paracentesis failed to afford the desired relief.

My own experience leads me to recommend the operation *unhesitatingly*; in fact, without it, I believe the physician will be able to do comparatively little toward preventing those disastrous results to the hearing, to the general health, and even to life, of which I have already spoken more than once in this paper.

On looking over my records of cases (in hospital and private practice), I find that I have had occasion to perform this operation seventy-six times, on fifty-eight persons, for the relief of pain. In each of these cases the membrana tympani was either "red and swollen," or "bulged outwards," from the pressure of the fluid in the middle ear. In seven cases the paracentesis was performed on the 2d day of the disease, in four on the 3d day, in seven on the 4th day, in five on the 5th day, in four on the 6th day, in two on the 7th day, in ten on the 8th day, in two on the 10th day, in six between the 11th and 15th days, in one on the 20th day, in two between the 21st and 25th days, in one on the 30th day, in three between the 31st and 55th days, and in four at unknown periods. In twenty-nine cases, permanent relief from the pain was afforded within a few minutes or hours; in six other cases immediate relief was afforded, but the pain returned, either the next day or on some subsequent day; in eight others, the pain did not subside until the 2d, 3d, or 4th day after the incision; in four others, the operation afforded no appreciable relief; and finally, in eleven instances, the patients did not return to report the result of the operation.¹ Of the twenty-nine cases in which the operation proved quickly successful in relieving the pain, six had reached the 2d day of the disease, three the 3d, four the 4th, four the 5th, two the 6th, two the 7th, four the 8th, one each the 12th, 14th, and 15th days, and one an unknown stage of the disease. In other words, the operation may be said to have been quickly successful in cases chiefly of recent date. On the other hand, of the eighteen cases in which the pain returned, or in which there was little or no relief from the incision, five were subsequently relieved by incision of the mastoid integuments, eight by subsequent incision (or incisions) of the drum-head, and two by leeches. In twenty-five out of the fifty-eight cases, the day (of the disease) on which the discharge ceased was noted; in the remaining cases, either no note was made regarding this point, or the patients did not return to report their condition. In regard to the twenty-five, the facts are as follows: in six cases the discharge ceased on or before the 8th day of the disease, in seven between the 9th and 15th days, in two between the 16th and 22d days, in five between the 23d and 40th days, and in five between the 41st and 65th days. As far as the incomplete records go, therefore, in not a single case did there remain a permanent chronic otorrhœa with perforated membrana tympani.

Surely this record justifies me in recommending unhesitatingly the operation of paracentesis of the tympanic membrane. I am sorry to

¹ These eleven cases all occurred in hospital practice.

say that I have never had the opportunity of testing the value of this operation in those very cases in which we have every reason for believing that it would prove of the greatest value, namely, in those which occur in the course of the exanthematous diseases. Hinton, however, as we have seen, speaks in strong terms in its favor under these circumstances, and I believe that all or nearly all the authorities hold the same opinion.

Having shown how serious are the results which often follow an unchecked, or improperly treated, acute inflammation of the middle ear, and having also shown, as far as it is possible to demonstrate such a fact, that we are in possession of at least one means of preventing (in the great majority of cases, if not in all) these disastrous results, what more can I say to impress upon the profession "the importance of treatment of aural diseases in their early stages, especially when arising from the exanthemata?" The opinion expressed by Prof. Edward Clarke,¹ of Boston, in 1858, and reiterated by Von Tröltzsch and Hinton—that a physician who treated a case of exanthematous fever without inquiring into the condition of the ear, was guilty of great neglect (or words to that effect)—might be uttered with as much appropriateness to-day. I would go still further, and say that a general practitioner who is unable to obtain a view of the external auditory canal and membrana tympani by means of the speculum and reflected light, is not properly fitted to practise medicine. While it may not be necessary for him to study otology, or to become skilled in aural manipulations, it is very necessary, if he wish to fulfil his duty toward his patient, that he should be able to determine by actual examination, whether or not the membrana tympani is being pushed forcibly outwards by the products of inflammation within the tympanum. If he be able to determine this point, and an hour's schooling will put him in possession of the necessary technical knowledge, I am sure that, where it is indicated, he will not be slow in taking successfully the second step, namely, the incision of the membrana tympani.

Medical students are taught very thoroughly how to amputate a leg, and their knowledge of the relations, distribution, etc., of arteries and nerves, will be found, at their examination for the degree of Doctor of Medicine, to be quite perfect; but has the new graduate the slightest practical knowledge of how he should deal with an acute inflammation of the ear? Upon the medical schools, then, rests the chief responsibility for the prevailing indifference and ignorance among practitioners regarding these matters, and to the schools, therefore, the profession must look for assistance in bringing about a reform.

In conclusion, let me recapitulate briefly the main points which a consideration of the subject suggests:—

I. Chronic otorrhœa is at the present time a very common disease, due, in most cases, to the want of proper treatment during the acute stage of the affection.

II. It is by no means a harmless affection.

III. It may be fairly classed as a preventable disease, at least among those who possess a healthy constitution.

IV. Paracentesis of the membrana tympani, if resorted to during the first few days of the acute attack, and if not carried out too timidly, *i. e.*, if a free incision be made and not a mere prick, is almost a sure preventive of the subsequent, chronic disease.

¹ American Journal of the Medical Sciences, 1858.

V. The Profession at large, and especially the medical schools, should give this subject more earnest thought than they have in the past.

As some may be interested to ascertain further details regarding the cases referred to above, I append in a tabulated form the main points of interest in each of the fifty-eight cases, as far at least as my imperfect records furnish this information. And here I may say that it is not unfair to assume that the great majority of the patients in whom the result of the incision was not ascertained, failed to report their condition simply because they had been relieved of their sufferings, and did not feel the necessity of visiting the hospital again.

Tabular View of Fifty-eight Cases of Paracentesis of the Membrana Tympani.

| No. | Age | Cause. | Condition of membrana tympani. | Condition of mastoid region. | Day of disease on which paracentesis was performed. | Relief from pain. | Day of disease (approx.) on which perf. healed and otorrhea ceased. | Remarks. |
|-----|-----|-----------------------------|--------------------------------------------------------------------|------------------------------|-----------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | 17 | Exposure. | Red and bulging. | Tender | 7th | Speedy. | 28th | |
| 2 | 21 | Not stated. | Bulging, but not very red. | Normal | 2d | Immediate. | Not stated. | |
| 3 | 32 | "Cold in the head." | Edematous and bulging; neighboring parts red. | Tender | 6th | Entirely free from pain at end of 6 hours. | 10th or 11th | Paracentesis repeated twice (with equal benefit) in same ear during following two years. |
| 4 | 6 | Not stated. | Posterior half bulging, red. | Not stated. | 2d | Speedy. | Not stated. | |
| 5 | 40 | Sitting in a drau't of air. | Post. half red and bulging; small perf. in the ant. inf. quadrant. | Tender | 14th | Relieved in 12 hours. | Not stated. | Three leeches also applied at same time. |
| 6 | 40 | Not stated. | Membrane bulging both anteriorly and posteriorly. | Not stated. | 8th | Immediate. | Not stated. | Subsequent fresh attack. Incision repeated. Result not stated. |
| 7 | 23 | Not stated. | Red, bulging, and pulsating. | Tender | 12th | Relieved in a few hours. | Not stated. | |
| 8 | 25 | Not stated. | Red and swollen. | Not stated. | 11th | No marked relief till 4 days later. | 26th | |
| 9 | 32 | Caught cold. | Post. half swollen and red; small perf. anteriorly. | Not stated. | 8th | Pain gradually subsided. | Not stated. | |
| 10 | 6 | Not stated. | Red and swollen. | Not stated. | 6th | Not known. | Not known. | Patient did not return to the Infirmary. |
| 11 | 24 | Caught cold. | Red and swollen. | Not stated. | About 21st | Not known. | Not known. | Patient did not return to the Infirmary. |
| 12 | 33 | Not stated. | Red and bulging. | Not stated. | 3d | Pain gradually subsided; slight recurrence. | 14th | Leeches also applied at the same time. |
| 13 | 30 | "Run over by a wagon." | "Much inflamed." | Not stated. | 8th | Pain gradually subsided; no return. | Not stated. | |
| 14 | 21 | River bathing | Post. half red and bulging. | Not stated. | 4th | Only temporary relief. | Not stated. | On the seventh day, two incisions in the membrana tympani, one anteriorly, one posteriorly; also leeches. On the thirty-seventh day opened a large abscess behind the ear. |
| 15 | 14 | River bathing | Post. half red and bulging. | Not stated. | 5th | Pain soon subsided entirely. | Not stated. | |
| 16 | 27 | Not stated. | Red and bulging. | Tender | 8th | Almost immediate relief. | Not stated. | |
| 17 | 47 | "Severe cold in the head." | Bulging. | Slightly tender. | End of 1st | Within two hours. | In the course of a few days. | Leeches also applied at the same time. Two days later the other ear became similarly inflamed, and at end of first day I incised membrana tympani in two places, affording escape, as in the case of the first ear, to bloody serum. Leeches also applied. Immediate relief followed. |
| 18 | 8 | Not stated. | Bulging. | Not stated. | 2d | At the end of a few minutes. | 7th | On the fourth day the other ear became painful. The following day incised the membrane and afforded immediate relief from pain, as in the case of the first ear. |
| 19 | 49 | Not stated. | Diffusely red background; landmarks not recognizable. | Very tender. | 3d or 4th of decided pain; 21st of disease. | Very slight if any relief. | Not stated. | Relief obtained only by an incision of the mastoid integuments. |
| 20 | 8 | Not stated. | Membrane bulging. | Tender | Not stated. | Not known. | Not known. | Patient did not return to the Infirmary. |
| 21 | 34 | Not stated. | Bulging and red. | Not stated. | Not stated. | Not known. | Not known. | Patient did not return to the Infirmary. |
| 22 | 28 | "Took cold." | Edematous, and bulging posteriorly. | Not stated. | Not stated. | Almost immediate relief. | Not stated. | |

| No. | Age | Cause. | Condition of membrana tympani. | Condition of mastoid region. | Day of disease on which paracentesis was performed. | Relief from pain. | Day of disease (approx.) on which pain ceased and otorrhea ceased. | Remarks. |
|-----|-----|-------------------------------------------------|-----------------------------------------------------|---------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23 | 17 | River bathing | Red and bulging. | Not stated. | 3d | Relieved soon. | 18th | Two days later (fifth day) membrane again bulging and parts painful. Incision repeated. No return of pain afterward. |
| 24 | 70 | Not stated. | Posteriorly and superiorly, red and bulging. | Not stated. | About 42d | Pain mitigated, but not entirely relieved. | About 60th | Permanent relief not obtained until after incision of mastoid integuments on about the fifty-second day. |
| 25 | 3 | Not stated. | Post. half red and bulging. | Not stated. | 7th | Relieved soon. | About 28th | |
| 26 | 25 | Syphilitic naso-pharyngitis. | Membrane red and swollen; small perf. anteriorly. | Tender | About 8th | No material relief. | About 20th | Relief obtained permanently only by an incision of the mastoid integuments on about the fifteenth day. |
| 27 | 29 | Not stated. | Membrane red and swollen. | Tender | 2d of acute exacerbation (about 53d since first attack). | Gradual subsidence with no return. | About 65th | |
| 28 | 19 | Not stated. | Membrane red and swollen. | Not stated. | 4th | Gradual subsidence with no return. | 39th | |
| 29 | 57 | Not stated. | Red and bulging. | Not stated. | 10th | Immediate relief, but pain returned later, though not so violently | Not stated. | |
| 30 | 22 | River bathing | Posterior half bulging and red. | Not stated. | 5th | Soon afterwards. | 12th | |
| 31 | 49 | Not stated. | Post. half bulging and red; small perf. anteriorly. | Not stated. | 5th or 6th of actual pain. | But little if any relief. | Not stated. | Poor health (syphilitic). Acute exacerbation of an otitis med. pur. of two months' standing. Four days after first incision, which in the mean time had healed, pain again became severe. Made a second and very free incision through posterior half of membrane. During following ten days, three more incisions, each one affording only temporary relief. Permanent relief was finally obtained after an incision had been made through the mastoid integuments, and, still later, one through the skin lining the external auditory canal. Patient did not return. |
| 32 | 5 | Not stated. | Red and swollen. | Not stated. | 14th | Not known. | Not stated. | |
| 33 | 40 | Not stated. | Red, parched, and slightly bulging. | Tender | 3d | Immediate. | 36th | Two days later pain returned, though with less severity than before. On seventh day of attack made a second incision. Relief from pain lasted twelve days, when the perforation having nearly healed, the pain returned. It was not severe, however, and may have been due to a furuncle in the meatus. After this, rapid and complete recovery. |
| 34 | 7 | "Cold in the head." | Bulging posteriorly. | Not stated. | 2d | Speedy. | Not stated. | |
| 35 | 30 | Not clear. | Red and swollen. | No tenderness. | 4th | Relief in 1 or 2 hours. | 5th | |
| 36 | 4½ | From use of post. nasal syringe and salt water. | Red and bulging. | No tenderness. | 3d (a mere prick). | Only slight relief. | Not stated. | On fourth day, I made a free incision through the posterior half of membrana tympani. Entire relief in a few hours. |
| 37 | 11 | Not clear. | Red and swollen. | No tenderness over mastoid but some over occiput. | 20th | Very little until after 48 hours. | Not stated. | |

| No. | Age | Cause. | Condition of membrana tympani. | Condition of mastoid region. | Day of disease on which paracentesis was performed. | Relief from pain. | Day of disease at which pain had ceased and otorrhea ceased. | Remarks. |
|-----|-----|---------------------------|-----------------------------------------------|------------------------------|-----------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 38 | 7 | Not known. | Red and swollen. | No tenderness. | 3d or 4th | Not ascertained. | Not ascertained. | Patient did not return to the Infirmary. |
| 39 | 42 | Not known. | Red and swollen. | No tenderness. | 14th | Not ascertained. | Not ascertained. | Patient did not return to the Infirmary. |
| 40 | 24 | Not known. | Post. half bulging; small perf. in ant. half. | No tenderness. | 15th | Speedy relief. | Not stated. | |
| 41 | 5 | Not known. | Inflamed and swollen. | Not stated. | Not ascertained | Not ascertained. | Not ascertained. | Patient did not return to the Infirmary. |
| 42 | 54 | Blow on the ear. | Post. half red and bulging. | Tender on pressure. | About 30th | Not ascertained. | Not ascertained. | Patient did not return to the Infirmary. |
| 43 | 14 | River bathing | Much inflamed. | Not stated. | 5th | Not ascertained. | Not ascertained. | Patient did not return to the Infirmary. |
| 44 | 24 | River bathing | Congested and uneven. | Not stated. | About 25th | Very little relief until 2 days later. | About 48th | Second incision on fortieth day, the pain having returned. |
| 45 | 47 | "A cold." | Red and bulging; small perf. anteriorly. | Tender on pressure. | 8th | Almost immediate relief. | Not ascertained. | Pain returned next day, and on the eleventh day, the membrana tympani being again in a bulging condition, I made a second and free incision. Leeches applied at same time to mastoid region. Patient did not return to the Infirmary. |
| 46 | 16 | Not stated. | Red and swollen. | Not stated. | 8th | Pain soon subsided. | 14th | Pain returned on the eleventh day, and was relieved by leeches. It returned again on the thirteenth day, and was again relieved by leeches. Rapid recovery afterwards. |
| 47 | 22 | Not stated. | Red and swollen. | Not stated. | 5th | Relief in a few hours. | In the course of a few days. | |
| 48 | 38 | Caught cold. | Red and bulging, especially posteriorly. | Not stated. | 5th | Relief in a few hours. | 13th | |
| 49 | 3 | Acute nasal catarrh | Red and bulging. | No tenderness. | 2d | Relief in a few minutes | 4th | A year later the incision was repeated in the same ear, under the same circumstances, and with equally beneficial and speedy results. |
| 50 | 6 | Not stated. | Red and bulging. | No tenderness. | 8th | No relief until 24 hours later, when a discharge appeared. | Not stated. | High fever, apparently total deafness, and symptoms of general meningitis at time of making the incision. The other ear also involved. |
| 51 | 25 | Not stated. | Red, diffusely swollen, and oedematous. | No tenderness. | 8th (leech's having failed to give relief) | Entire relief in a few hours. | 14th | |
| 52 | 34 | From use of nasal douche. | Oedematous and slightly bulging. | No tenderness. | 2d | Relief in a few hours. | 3d | |
| 53 | 35 | Not stated. | Red and bulging. | No tenderness. | 3d | Relief in less than an hour. | 15th | Leeches failed to give relief on second day. |
| 54 | 63 | Not stated. | Red and bulging posteriorly. | Tender on pressure. | 4th | Marked relief in a few minutes. | About 65th | |
| 55 | 50 | Unknown. | Red and bulging; perforation anteriorly. | Not stated. | 10th | Not ascertained. | Not ascertained. | Leeches also applied. Patient did not return to the Infirmary. |
| 56 | 21 | River bathing | Diffusely swollen. | Not stated. | About 50th | No decided relief until 48 hours later. | About 64th | Abscess formed behind the ear and was opened by an incision. By the sixty-eighth day, the abscess had also healed. |
| 57 | 20 | Not stated. | Not stated. | Not stated. | 8th | But little relief. | Not ascertained. | Second incision on the eleventh day. Patient did not return afterwards to the Infirmary. |
| 58 | 22 | Not stated. | Not stated. | Not stated. | 6th | Marked relief in a short time. | Not ascertained. | Second incision on the ninth day, the pain having returned, and the discharge having ceased. Patient did not return afterwards to the Infirmary. |

