AN ANALYSIS OF OVER FIVE HUNDRED CASES OF PROGRESSIVE DEAFNESS.*

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My intense interest in the diagnosis, treatment and general welfare of patients who have consulted me privately because of defects of hearing has led me to study very carefully the histories of those patients whom I have treated within the past five years in order to find out whether an analysis of these histories might not lead me to some more definite conclusions as to the present status of our treatment of these cases so that I might therefore be able to be more honest with myself as to the promises I could make this class of patients. It is a source of satisfaction to me to feel that otologists in general are more interested in the subject of progressive deafness and that they are getting away from the old empiric methods of treatment which often did more harm than good.

What a change has taken place during the past ten years since we have been able to make more exact interpretations of conditions because of our more accurate methods of diagnosis! I refer particularly to the more careful inspection of the nasopharynx, especially the regions of the eustachian tubes, brought about by the invention of that clever instrument, the Holmes nasopharyngoscope. One need no longer conjecture. A little time and patience is all that is necessary to give a definite concept of the picture that is present. Again the use of the electric otoscope, to which can be attached a massage apparatus, forms a valuable adjunct to our armamentarium, for by its means one is able to tell the exact condition of the membrana tympani, how much of the drum is rigid or relaxed, how much actual limitation of excursions of the drum there is, which may be accountable for a further progression of the symptoms.

For purposes of actual analysis, this paper should be statistical in nature, but statistics are dry, inaccurate and often mis-

leading. The general conclusions at which I have arrived I feel will prove of interest. Having been able to follow many of these cases for a number of years, I feel that I am in a position to make more positive statements than if the patients had not been private ones.

Etiologic Factors.—A careful inquiry had been made in most cases as to other members of the family having had any trouble with their ears. We speak of hereditary deafness, but such a term is misapplied in any case in which deafmutism is not directly traceable through a family for generations. But that there is a hereditary predisposition to a weakness of the ear mechanism cannot be doubted, although it is not present as often as is generally supposed. In the cases under consideration, very few of the patients knew of others in the family who were hard of hearing. In a small percentage, more than one member of the family was under treatment at the same time, and in a few instances three or more members of the immediate family were deaf. It is my opinion that we should not consider the hereditary tendency of the disease as of much value in the majority of cases but that where we do find a number of members of one family suffering from this same trouble, we must advise strongly that there is great possibility that future members of the same family will have to be extremely careful of their ears.

That the diseases of childhood play a great part in altering the mechanism of the middle ear and eventually causing a progressive deafness has been forcibly brought to my mind by an analysis of these cases. There are two classes of cases which deserve particular attention—patients who have had exanthematous diseases and those who have had the recurrent colds which are so often associated with diseased tonsils and adenoids. The chief exanthematous diseases are measles and scarlet fever. If one makes careful inquiry he will find that the majority of cases of progressive deafness, which belong to what one might call the hopeless class, have had one or both of these diseases, and that frequently there was ear trouble at that time. This brings up an important point which has been emphasized by Kerr Love and others, that few of these patients have had any attention paid to their ears after the acute symptoms of the

disease or the ear discharges have subsided. Inquiry among these patients shows that, at the time of the scarlet fever, for example, the ears were well taken care of, if there had been any inflammatory reaction present or if there had been any suppuration. But seldom were the ears examined after they went to school again, even if the family had noticed that their hearing was not as perfect as it had been before. Oftentimes the deficiency of hearing was not sufficient to cause any apprehension, either on the part of the patient or on the part of the parents, until, perhaps, the age of puberty. There is no doubt in my mind that an insidious process had been going on for many years and that if proper examinations had been made it would have been possible to correct the condition. From the data that we have in hand, from these cases and from the assertions that have been made by others, one is forcibly impressed with the fact that the most important treatment of progressive deafness is preventive treatment. I am of the opinion, more than ever, that most deafness is preventable and that it is the duty of the otologist to impress this fact upon the public.

The frequent repetition of colds in childhood is intimately associated with the question of the removal of tonsils and adenoids. Most of the cases under consideration had had their tonsils and adenoids removed at an early age. In many cases the operation was imperfectly performed, and in a number of instances had to be done over again in adult life. Most of these patients give a history of repeated earaches in childhood which must be seriously taken into consideration. But I believe that it is wrong to make a definite assertion that the removal of the tonsils and adenoids alone will be sufficient to clear up any tendency to ear troubles later on in life. An analysis of these cases shows plainly that there are many other factors, among which may be mentioned intercurrent diseases which bring about a devitalized condition of the child so that it is prone to a chronic inflammatory condition of the mucosa of the nose and throat. Much as we feel that the proper elimination of tonsils and adenoids will bring about the results we desire, there are too many instances in which we find that their removal has not influenced the ear condition at all. One then has to consider that the puny child who

is constantly suffering from an inflamed condition of the nose and throat with diminished hearing, needs to be gone over thoroughly to discover whether, for example, there is not some trouble in the endocrine system or perhaps in the gastrointestinal tract. It is extremely hard to get at these definite factors. Moreover, it has only been during the past few years that we have had them definitely called to mind. But I am able to pick out isolated instances in the series, in which I am sure that the persistent inflammatory condition in the nose, throat and ear has been due to some defect in the general system. Moreover, I am so sure of this that in the more careful histories we are taking today and in the more careful treatment we are giving children, we are paying more attention to general treatment and its effect locally than we are to local treatment by itself.

Mention has been made of the fact that complaints of marked defects in hearing are not made until after the age of puberty. In the cases under consideration, although a definite history could be obtained of scarlet fever or some other predisposing factor, it was seldom that the hearing was bad enough to be noticed and to demand treatment until after the fourteenth year. Whatever treatment that was begun then was given in a perfunctory manner and did little good. It has been my experience that children of this age cannot be made to appreciate the seriousness of their condition and will use every subterfuge to get out of treatment. Most of my adult patients have candidly admitted that they either did not have any treatment at this time or else that they were taken to otologists once or twice and then were told to return at regular intervals which they never did. This puts the blame for future trouble on the patient himself, although it is hard to make him see it from that point of view.

By far the majority of patients in this series have had some nose or throat abnormality and, at an earlier date, I collected a series of fifty of these cases to show the intimate relationship of pathologic conditions of the nose to chronic catarrhal otitis media. Since that time I have become more conservative and have felt that it was impossible to say, for example, that a deviation of the septum was responsible for the ear condition. It is a fact that almost all these patients have some

abnormality in the nose or throat or had such an abnormality which was corrected at an earlier date. But I regret to say that the correction of the nose and throat trouble has not by any means improved the hearing. For some years I hoped that this would be so, but a proper analysis has shown me that oftentimes the damage has been done so completely before the patient came to me that no amount of operative interference could correct it. In looking over these histories I find that there is a deviation of the septum or a sinus condition or some disease of the tonsils or some adenoid tissue. And if such a condition is directly connected with some pathologic condition of the eustachian tube, which seems to me to be continued because of the nose and throat abnormality, I advise that an operation should be performed; if, on the contrary, I can see no connection, I do not hesitate to advise that no operation should be performed. It is my opinion that most of these patients have suffered from too many operations upon the nose and throat, and that they have just cause for the feeling that their condition has been made worse because of too much meddling.

Symptoms.—Naturally, the symptoms that most of these patients have complained of is deafness in one or both ears. In the majority of cases they have felt that one ear is worse than the other, but careful tests have shown that the hearing is often worse in the ear of which they complain the less. About 50 per cent of the patients have complained of tinnitus, which varies in character and degree. In the more advanced cases the complaint of the tinnitus has been more than the complaint of the deafness. It is difficult to determine when this tinnitus has first come on, but as a rule it is the forerunner of the complaint of deafness. But this does not mean that it has preceded the deafness. It is only that the deafness has not been of sufficient degree to be noticeable until after the tinnitus has made itself evident. It is my firm belief that if the majority of these patients had been properly treated at the time that they first noticed the tinnitus a great deal could have been done to prevent further trouble. Paracusis has only been present in the more advanced cases, usually in patients who have been treated by a number of physicians over a long period of years. It has been my experience that patients who have a

paracusis Willisii will not respond to any treatment which we have at our command at the present time. In all probability the paracusis is due to a fixity of the ligament of the oval window which it is difficult if not impossible to overcome. Dizziness and nystagmus have seldom been noted except in those cases which demonstrate some trouble more deeply located beyond the middle ear.

There is a certain class of cases which demand our attention and which have not been differentially classified. I refer to patients who suffer from what I have termed "intermittent deafness." Such patients will state that their hearing is better at one time or another, is better in one climate or another. Any change in the weather seems to make a great difference in their hearing acuity. Any change in their physical condition seems to make a great difference in their hearing acuity. Over half the patients in this series, under thirty years of age, have what I call intermittent deafness. One should pay careful attention to this fact, because it indicates that the ear condition is not so bad but what it can be arrested or improved, provided one is able to get the factor which makes the change in the hearing acuity. A careful examination of these cases shows that in almost all cases the reason for the change in hearing is because the mucosa of the eustachian tube becomes inflamed at times, while at other times this inflammation subsides and the tube again becomes patent. In other words, the cause of the trouble must be found in the nasopharynx. Many of these patients have diseased tonsils which set up an irritation in the nasopharynx, as explained by Emerson. Others have adhesions in the fossa of Rosenmüller which are continually interfering with proper muscular action of the eustachian tubes. Others have definite abnormalities in the nose, particularly hyperplastic or suppurative conditions of the nasal sinuses. But by far the majority of them have a polypoid condition of the posterior tips of the inferior turbinates which act directly on the tubal orifice. Some of these polyps are small but hang directly into the tube itself, while others are so large that they block off the nasopharynx completely. Since the examination with the nasopharyngoscope has become a routine procedure in our office we have been surprised to find that polypoid tips of the inferior turbinate are present in nearly

75 per cent of the adults who come to us complaining of deafness, particularly of the intermittent type. I cannot too strongly emphasize this point. Moreover, as will be shown later on, it is surprising in how many cases the hearing has been improved after these tips have been properly attended to.

After trying numerous classifications of cases, we have decided that a clinicopathologic classification is the best. By this I mean that the clinical evidence of the condition, as evidenced by tuning fork tests and symptoms, is joined to the pathologic evidence as shown in the middle ear and nasopharynx. In former years, the general term O. M. C. C., was used, which meant nothing. Today it is necessary to differentiate the various types of progressive deafness with which we commonly come in contact. We have found it satisfactory to place our patients in one of the groups about to be mentioned.

1. Retracted drum with stenosed tube.
2. Retracted drum with open tube.
3. Slightly retracted drum with a tube which intermittently opens and closes.
4. Slightly retracted drum which, on vibratory massage, shows only slight loss in motion.
5. The relaxed ear drum, associated or unassociated with a retracted drum.
6. Rare cases, such as otosclerosis and nerve deafness.

1. Retracted Drum With Stenosed Tube.—A large percentage of cases come in the first class. At no time is the tube open unless it is forced open by the passage of applicators or bougies. These cases cannot be Politzerized and seldom can be benefited by catheterization.

2. Retracted Drum With Open Tube.—A small percentage of cases belong to this class. The deafness is associated with an atrophic condition of the mucosa of the nose and throat, which extends up through the eustachian tubes into the ears. The retraction, in parts, may be associated with a relaxation of the drum. In other cases the drum is held rigid, due to the marked infiltration with connective tissue and the ankylosis between the articular joints.

3. Slightly Retracted Drum With a Tube Which Intermittently Opens and Closes.—By far the majority of patients

under thirty years of age belong to this class and can be benefited by proper treatment. The amount of retraction is due to the negative air pressure in the middle ear and is most often secondary to some condition in the nasopharynx. When this is overcome and the tube dilated, the drum can be readily massaged and the excursions are about normal. One has to watch these cases carefully, because any acute inflammatory condition of the nose and throat immediately shows its effects on the hearing acuity.

4. Slightly Retracted Drum, Which, on Vibratory Massage, Shows Only Slight Loss in Motion.—In a goodly percentage of cases, examination with the otoscope, attached to a vibratory massage apparatus, will show almost normal excursions of the drum. There may be a few adhesions which hold the drum down in places, or there may be a slight thickening of the drum in certain parts. The ossicular joints seem to be freely movable. It is important to recognize this class of cases, for it is in them that vibratory massage, if done with intelligence, will do so much good. Almost always there is an associated condition of the eustachian tube which needs attention.

5. The Relaxed Ear Drum, Associated or Unassociated With a Retracted Drum.—In numerous papers in the past I have spoken of the relaxed ear drum, which gives rise to what I have popularly called pocket handkerchief deafness. This class of cases has a definite syndrome. With every act of blowing the nose the patient has been in the habit of inflating his ears. He has made himself deaf by overinflating his ears, and his ears are peculiarly sensitive to all vibrations, whether they be sound or not. A very large percentage of cases that were originally called O. M. C. C. belong in this class. They must be recognized, because they are the cases which should be left severely alone unless one feels that it is worth while to attempt to tighten up the ear drums. Sometimes the relaxation is in certain parts of the drum only and is accompanied by a retraction in other parts due to adhesions between the drum and the internal wall of the middle ear or between the ossicular joints. A definite diagnosis of this clinicopathologic entity can readily be made by means of the nasopharyngoscope and the otoscope.

6. Rare Cases, Such as Otosclerosis and Nerve Deafness. —No better evidence of the rarity of true nerve deafness can be given than by an analysis of these cases, which shows that there were only three cases of nerve deafness out of five hundred patients examined. All three were syphilitic in origin, or at least in all three cases there was a history of a previous syphilis. I do not wish to assert that all cases of nerve deafness are due to syphilis. There are other factors, such as meningitis and systemic infections. Yet, having heard so much about nerve deafness, I am rather surprised to find that there were only three cases in this series. And what is equally as surprising to you perhaps, I have not seen one case of otosclerosis that I could diagnose clinically. It is about time that we restricted the term otosclerosis. It is used too loosely and has become a byword in the mouths of the deaf with the result that a great many patients who are told that they have this condition give up in despair and become hopeless dependents. Not having seen a case of otosclerosis in over five hundred cases of deafness makes me feel that the condition is very rare, and this is further corroborated by the statements of investigators who declare that a very minimum percentage of cases of deafness examined pathologically after death show the lesions of otosclerosis.

Improved Methods of Examination.—Our conception of the pathologies of progressive deafness has expanded considerably since the introduction of more precise methods of examination. The cursory examination of the ear drum with an ordinary speculum and the examination of the nasopharynx with the small rhinoscopic mirror will not suffice. There are three new essential instruments with which the otologist cannot get along without—the Holmes nasopharyngoscope (a great improvement on my original instrument, the pharyngoscope), the electric otoscope with attachments for pneumomassage of the drum, and the various applicators, sounds and bougies, the best of which are patterned after Yankauer's instruments. In the earlier cases of this series we did not have these valuable instruments to aid us in diagnosis, but now that we use them as a routine procedure it is hard to believe that we ever got along without them. Direct inspection of the eustachian orifice is of most importance, and we

are amazed at the amount of information we derive from this examination. The otoscope allows us to ascertain the exact excursions of the ear drum, which is of equal importance. The determination of the character of the mucosa of the eustachian tube can only be properly determined by the passage of applicators, sounds and bougies through it. The information that can be derived from such a procedure I described in a paper read last year before our State society.

Value of Tuning Fork Tests.—Tests of hearing acuity by means of tuning forks as well as by the watch, whisper and spoken voice are a part of our usual procedure. But the more I have recourse to such examination, the less value I place upon it. Not for one moment would I give up these tests in order to differentiate the kind of deafness that is present or in order to make comparative observations, but the personal equation enters into the tests to a great extent. But what is of most importance, the amount of improvement which the patient derives from treatment cannot be measured by instruments but only by his own interpretation of the amount of improvement that has taken place. I am not as anxious to know whether my tuning forks show any improvement in my patient's hearing as I am in knowing whether he feels that he is hearing better in the practical everyday life that he leads. In analyzing this series I find that in many cases the patient thinks that he hears better, although my technical examination shows no improvement. A considerable number of these patients have stood by me for years, and they are content that I can keep them from getting worse. From my own personal point of view, I am not satisfied, but the patient is and that is what counts in the end. There is no instrument that I know which is an accurate test of hearing at the present time, unless we accept the audiometer, which Dean has written of in a recent issue of the *Laryngoscope*.

Prognosis.—The cases in this series divide themselves into two classes: patients who are moderately deaf and in whom there is some hope of improvement, and cases that are hopelessly deaf from the medical point of view. More of the latter class are consulting me year by year, perhaps because the otologists of the country are using me as a court of last resort. Mental reconstruction of the deafened is becoming

more and more the duty of the otologist, and this latter class can be handled only in that way. The prognosis, therefore, depends upon the type of case one is treating. I believe that the results I am beginning to attain in the mildly progressive type of case means a great deal for the future. I know that I am getting better results than I did as short a time as three years ago. I cannot help but feel that the future is full of promise if the otologists of the country will delve into this problem with the same thoroughness with which they have handled all other problems in their field. First of all, the prognostications of the future will depend on how much educational propaganda can be spread about so that the proper preventive measures in early childhood will be used. Secondly, otologists must be impressed with the fact that a proper clinicopathologic picture must be revealed before any attempt is made at treatment. Thirdly, we must get away from the time worn idea that inflation of the ears is the only treatment. The prognosis of the so-called hopeless cases will depend upon our ability to make these patients take up lip reading at the earliest opportunity. That is the salvation of these patients.

Treatment.—It will not be my purpose to outline any definite treatment as the result of my careful perusal of these cases. The most important thing to my mind is that I have become more and more convinced that the only hope of relief lies in the proper attention to pathologic conditions of the nasopharynx which exercises any influence on the eustachian tube. Tubal patency is of the utmost importance and must be permanently, not temporarily, established. Having assumed that everything of an ameliorative nature, be it operative or otherwise, has been attempted, there is often still a degree of inflammation at the orifice of the eustachian tube or in the tube itself which must be overcome. After having tried every kind of medicament we have come to the conclusion that the high frequency current, properly applied, does the most good. The ultraviolet ray may be applied by direct vacuum tubes, or one may use the modified nasopharyngoscope which I have recently had made, into which can be fitted a fine electrode for fulguration. The vacuum tubes are made on the same lines as a eustachian catheter, and are wound with silk ribbon which is coated with shellac so that if they break in the nose

no harm will be done. They are inserted into the orifice of the eustachian tube and the current is applied directly for from five to ten minutes. The results are very gratifying. After one to two treatments the tube remains open and stays open for a considerable length of time. We have treated about fifty patients in this way during the past six months, and in many instances the hearing has been markedly improved without making use of dilators in the tube of any kind. The fulguration treatment is of particular value in those cases in which polypoid tips of the inferior turbinates are overhanging the eustachian orifices and where there are evidences of glandular excrescences on the promontory of the tube, in the fossa of Rosenmüller or in the mouth of the tube itself. The current is applied in the same manner as when one desires to get rid of a growth in the bladder. As the fulguration is performed under direct inspection no harm can be done.

What conclusions can be arrived at as a result of an analysis of this large number of cases? Surely we must feel that the results are not very gratifying, as far as cures are concerned. But the future is full of promise. First and foremost, we must classify our cases in a different manner than we have in the past. A clinicopathologic classification must be established, as it seems almost hopeless to get at a pathologic classification by itself. Secondly, we must pay more attention to the etiologic factors in childhood and recognize the fact that most of the harm is done before it is discovered, and therefore be able to instruct parents and family physicians more carefully. Thirdly, we must separate those cases for whom something can be done medically from those for whom nothing can be done medically, and give these patients the benefit of our honest advice. It is a sad commentary on our treatment in the past that we have so many hopelessly deaf patients who have to resort to lip reading to overcome their handicap. Lastly, the newer and precise methods of diagnosis and direct treatment which we feared to use until a few years ago have become common knowledge and encourage us to feel that in the course of time we shall be able to treat these patients with intelligence and be able to give them honest encouragement.

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