Opening address to the students attending the Aural Clinique in the Glasgow Western Infirmary, delivered November 30th, 1878 / by Thomas Barr, M.D.

OPENING ADDRESS

TO THE STUDENTS ATTENDING THE

AURAL CLINIQUE

IN THE

GLASGOW WESTERN INFIRMARY.

DELIVERED NOVEMBER 30TH, 1878.

BY

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ADDRESS.

GENTLEMEN,—Before beginning the practical work of the Aural Clinique, I propose to invite your attention to some points illustrative of the progress of aural surgery during the last twenty-five years. During that period the various branches of our profession have been advancing with rapid strides, in harmony with the spirit of progress which has vivified the whole realm of science. The inductive method of investigation, which Bacon gave to the world, has been yielding plentiful fruit in the field of medical science, and its effects on the practice of the healing art have been both astounding and beneficent. Renowned and earnest workers in our profession have been laying under contribution all departments of science, incited by the noble desire of bringing the facts thus acquired to bear upon our knowledge of the nature of the healthy functions, and of the diseased processes in the human body; they have tried in this way to perfect the methods by which we interpret the Protean symptoms of morbid processes, and to further our efforts for the successful treatment and the effective prevention of disease.

The investigation of the disorders of the organ of hearing has, in a very special manner, participated in the activity and progress which have distinguished all the other departments of our profession. Medical men have been gradually aroused from that strange apathy which they had so long manifested towards the diseases of one of the most important organs of the body, and conscientious and able surgeons, in all parts of the civilized world, have at length come forward, and rescued this branch of the healing art from the hands of quacks and charlatans. The otological literature of England, Germany, France, and America, during the last twenty-five years, bears testimony to the great industry and persistent labours put forth in cultivating this special department. At the present time every important city in Europe and America enjoys the advantage of having the diseases of this important organ treated properly in a public hospital or in a special institution, and we can now say that the management of these disorders is as satisfactory as the treatment of the diseases affecting most of the other regions of the body.

Until recently there was probably no part of the body which received so little attention from the student or the general practitioner of medicine as the organ of hearing. This neglect is all the more surprising when we consider the baneful effects of disease of the ears upon social intercourse, upon intellectual development, upon worldly prospects, upon the general health, and even upon life itself. The prevalence of aural diseases at all periods

of life might have aroused attention; in childhood the frequency of the occurrence of discharges from the ear and of earache is well known, while von Tröltsch calculates that, among persons from twenty to fifty years of age, one in three has abnormal hearing, and that almost all persons above fifty years of age have an impairment of hearing to some extent in one or both sides. Nor need we be surprised at this prevalence of ear-disease if we bear in mind its frequent association with measles, scarlet fever, small-pox, hooping-cough, typhus fever, tuberculosis, scrofula, syphilis, and ordinary colds and sore throats. Our surprise, indeed, is that ear-disease should have been so long neglected.

The result of this neglect by the student of medicine is painfully visible in the very limited range of remedies used by the general practitioner in treating affections of the ear. To syringe the ear with warm water, to pour oleaginous or spirituous substances into the external auditory canal, and, as a last resort, to apply a cantharides plaster to the surface behind the auricle, constitute the sum of aural therapeutics at the command of the average general practitioner. Even these limited appliances have often been fruitful of mischief, and they should not be employed until, by proper examination, the condition of the parts is known. I think it is reasonable to suggest that no one should enter upon the practice of the medical profession without possessing at least sufficient knowledge to enable him to say when the ear-syringe should be

used. The practice has prevailed too long of squirting water diligently into the canal of the ear, with the notion that perchance there *may* be something to wash out, while in the great majority of cases the liquid is simply forced against the sensitive tympanic membrane; this practice, which is really discreditable to rational medicine, ought surely, at this time of day, to be given up. By such crude methods of treatment much more injury than benefit has been done to patients.

Probably, however, the saddest results of the lack of proper attention to aural diseases are to be found in the dire effects which have sometimes followed the attempts to remove foreign bodies from the ear, by means of instruments, when the operators were not familiar with the modes of examination now employed by aurists. Cases are even related of foreign bodies being supposed to be in the ear, although the application of the most elementary knowledge of the methods of examination would have demonstrated their absence, and these imaginary foreign bodies have been known to call forth the most vigorous instrumental treatment, so that death or great danger to life has ensued as a consequence. Such mistakes would be impossible if every medical man possessed a proper reflecting mirror and suitable ear specula, and knew how to use them for the thorough illumination and inspection of the external auditory canal, and the outer surface of the tympanic membrane; and he ought surely to have as much practice in their

use as to enable him to examine intelligently the *membrana tympani* of every patient who comes to him complaining of his ears. We must never forget that, in interfering with the interior of the ear, we are in the neighbourhood of structures the injury of which imperils life, and that it is our serious duty to abstain from all instrumental interference until we have acquired the art of illuminating those concealed parts, so that we may see distinctly every step in our procedure. The progress of aural surgery will be much stimulated, and incurable deafness will be a much less common condition among the people, when even such elementary knowledge is in the possession of every practitioner of medicine.

Not only have medical men failed, as a rule, to give proper attention to the diseases of the organ of hearing, but the patients themselves have also tolerated such maladies with singular indifference. This strange apathy on the part of patients is due, in great measure, to the fact that lesions of the ear are nearly always concealed from view, and that pain is absent in the great majority of cases. If an inflamed tympanic membrane were exposed to view like an inflamed conjunctiva, if a perforation or an opacity of the membrane were as visible as an ulcerated cornea or an opaque lens, or if unsightly granulations and polypoid growths obtruded themselves on the gaze of everyone, this indifference to aural ailments would not have existed. Moreover, the belief in

the humoral pathology, which still lingers in the minds of the people, is probably responsible for the too prevalent fallacy that "running ears" (although often a symptom of grave aural mischief) should not be meddled with. The widespread belief entertained, until recently, that medicine and surgery are almost powerless in dealing with aural diseases, has also contributed to the carelessness of patients, and this has only been too much justified by the ordinary attitude of medical men towards such cases.

In view of the wide range of your anatomical studies, I cannot presume that your recollection of the somewhat complicated structure of the ear can be perfectly fresh and exact. I will therefore refresh your memory by recapitulating shortly the chief anatomical features of this organ, especially as they bear on its pathology. There are the two well-defined parts—the conducting part, and the sentient part, a division which is alike physiological and anatomical. With reference to the sentient portion of the organ, unfortunately practical otology has not hitherto been able to exert much influence upon its morbid states. Just as the functions of the labyrinth, or as it is called, the sentient apparatus, are even now very imperfectly understood by physiologists, so the nature and treatment of its diseases are still, for the most part, beyond the reach of medical science and art. Your interest must be confined chiefly, in the meantime, to those parts of the organ of hearing which are usually

collectively called the conducting apparatus, and are anatomically described under the headings of external and middle ear. By the conducting part of the auditory apparatus the invisible movements of the air, excited by a body in a state of sonorous vibration, are received into that part of our organism designed for the purpose; these waves of sound are transmitted partly by aeriform, and partly by solid media, to the fluid of the labyrinth, which is in direct contact with the ultimate filaments of the auditory nerve. The impressions received by these terminal fibrils of the auditory nerve are conveyed by the trunk of the nerve to the brain, and we then become conscious of what we call sound.

The waves of sound passing through the external canal of the ear impinge upon a membrane which is stretched across the inner end of the passage at a distance of about one inch from the outer orifice. This membrane is named the 'tympanic membrane,' the 'drum membrane,' or the 'drum-head,' but is often incorrectly called the tympanum by those indifferently acquainted with anatomy. This membrane is thrown into vibrations by the waves of sound passing down the external auditory canal, and it has a direct communication with the fluid of the labyrinth and through this with the terminations of the nerve; this communication is effected by means of a jointed series or chain of bones, the *malleus*, *incus*, and *stapes:* at the outer end, the chain is firmly attached to the tympanic membrane, and the inner

extremity of the chain is connected, by means of the *stapes* or 'stirrup bone,' with the outer surface of the membrane which closes the *fenestra ovalis*, or opening into the vestibular part of the labyrinth. The vibrations of the tympanic membrane are thus propagated along the chain of small bones to the membrane of the *fenestra ovalis*, and thence to the endolymph and terminal fibres of the auditory nerve. The space across which the chain of bones is placed is called the *tympanum*. This is an air-filled chamber occupying the narrow space between the tympanic membrane outside and the wall of the labyrinth inside; at its narrowest part it is about $\frac{1}{12}$ of an inch across, while at its widest part it measures about $\frac{1}{8}$ of an inch. It communicates in front by means of a canal an inch and a half in length—the Eustachian tube—with the upper part of the pharynx from which it receives its supply of air; while, behind, it is in free communication with the mastoid cells which are also filled with air. The contents of the *tympanum* are the chain of bones, the muscles which act upon them, and the *chorda tympani* nerve. The walls of the *tympanum*, the Eustachian tube, and the mastoid cells, as well as the chain of ossicles, are lined with a mucous membrane continued from the throat: this lining is subject to the morbid conditions which may affect any mucous surface; we may thus have hyperæmia, swelling, increased secretion, or morbid products, such as mucus, serum, or pus. The fact that the *tympanum* is lined by

a mucous membrane subject to the same morbid processes to which all other mucous membranes are liable, if kept in view by the student, would (as Dr. Dalby mentions in his book) simplify the understanding of the diseases of that cavity. The vibrations of the tympanic membrane are also propagated in part through the air contained in the *tympanum* to the membrane which closes the *fenestra rotunda* or opening into the cochlear part of the labyrinth, and there is no doubt that, in cases of complete loss of the ossicles, sonorous undulations may be conveyed to the labyrinth through this membrane alone.

For the proper performance of the function of hearing, the tympanic membrane must have a definite tension and mobility; the three bones which form the connecting rod must likewise be freely moveable on one another by their articular surfaces; and, further, the *stapes* which is in connection with the membrane of the *fenestra ovalis*, must be freely moveable along with that membrane, as it communicates in this way the vibrations to the *endolymph*, while by advancing and retiring it modifies the tension of the fluid contents of the labyrinth. The vibratile properties of the ossicles are much favoured by the presence of air surrounding them, while they are interfered with if an undue amount of pressure be exercised upon the outer end of the chain, tending to force them inwards and press them on one another. It is a well ascertained fact that if the normal tension

upon the tympanic structures be interfered with (as by undue pressure on the tympanic membrane, on the ossicular chain and on the membranes which close the two *fenestræ*) impaired hearing and other derangements of the organ are produced. Nothing contributes so much to the preservation of the proper amount of tension in these parts as the presence of the proper amount or balance of air in the *tympanum*. A natural condition of the mucous membrane is also essential to the due fulfilment of the functions of the organ. In its normal state it is very delicate, but under the influence of catarrh or inflammation, it becomes more or less thickened and where it covers the tympanic membrane, the ossicles, and the *fenestræ*, this thickening exercises a very injurious influence upon the functions of these parts.

In a very large proportion of those who suffer from impaired hearing, more particularly if only of a few weeks' or months' continuance, we have two pathological conditions which you must clearly understand ;—the first is a closure, or some form of obstruction, of the Eustachian tubes shutting off the supply of air to the *tympanum ;* the second is the presence in the *tympanum* of exudation from its lining membrane of varying degrees of consistence : this exudation may be of a purulent or non-purulent nature. Hence, there are two modes of treatment which are now very often resorted to and which are of paramount importance, namely, the restoration of the per-

meability of the Eustachian canals, and the removal of exuded matters from the cavity of the *tympanum* by means of incision of the *membrana tympani*. I desire, therefore, gentlemen, in my remaining observations, to draw your attention shortly to these two procedures as they have been improved and extended during the past quarter of a century, for they afford illustrations of the decided progress which our department of medical science has made during that time, a progress which, I think, can compare favourably with any of the other branches of our art.

Of all the operative measures, or modes of treatment, practised in diseases of the ear, the forcing of air through the Eustachian tubes into the *tympanum* is probably the most important on the whole, and the one most frequently employed. These tubes provide for the admission of atmospheric air to the *tympanum*, and they form channels for carrying away excess of secretion from that space. If in consequence of swelling of the mucous membrane of a Eustachian tube, or the presence of accumulated mucus, the permeability of the canal be destroyed and the supply of air to the *tympanum* consequently cut off, the air contained in that cavity soon becomes rarified by the process of absorption, and thus the pressure of the atmosphere upon the outer surface of the tympanic membrane is no longer balanced by the air within. As might be expected, the membrane is forced inwards by the atmospheric pressure, until, in severe forms, it is even brought into contact

with the inner or opposite wall of the *tympanum*, and this same pressure from the outside acting on the chain of ossicles impels them inwards also. Not only is their vibrating power impaired in this way, but the base of the *stapes* also being unduly forced into the *fenestra ovalis*, increased tension of the fluid in the labyrinth is produced. A greater or less degree of deafness and various abnormal sensations, such as singing in the ears, ringing of bells, &c., are frequent consequences of this increased inward pressure of the *stapes*.

Until the year 1863, catheterization of the Eustachian canals was the sole means by which air could be forced into the tympanic cavity, but although the Eustachian catheter will always continue an indispensable instrument in the treatment of diseases of the ear, it is quite inadmissible in a vast number of cases. For example, in children and many nervous adults its use is in general an impossibility, and in certain abnormal formations of the nasal passages its introduction is impracticable, while in acute catarrh of the naso-pharyngeal mucous lining the beak of the catheter is very likely to aggravate the disease by irritating the neighbourhood of the Eustachian orifice. Moreover, the great practice necessary for acquiring the requisite dexterity in the use of the instrument is not within the reach of every practitioner. What is termed the "Valsalva method" of inflating the middle ear was also known and practised before that time. It consists in making a forced expiration, with the lips closed, while the

nostrils are tightly compressed with the fingers. When no obstruction exists in the tubes many people are able in this way to inflate their *tympana*, but it is quite worthless for the purpose of overcoming any obstruction.

Gentlemen, there is no period of human life during which it is a matter of so great importance that acute hearing should be enjoyed, as the time of childhood. In the case of a child, the ideas formed of the outer world are the results, to a great extent, of the impressions received through the ear, and the clearer these impressions are, the clearer and the more definite are the ideas formed. By the exercise of the sense of hearing in the course of the second and third years of life, language, "the true stamp of man," is acquired; while by its loss or decided impairment before the age of eight years, the power of speech is also lost, and the education of the child is apt to be brought to a stand-still. The mental faculties become damaged, and, although hearing should return after some years, the baneful effects upon the mental development of the child of having been partially or wholly shut out from sound at the most valuable educational period of life can never be thoroughly repaired. The results of impaired hearing in youth upon the adult are thus described by von Tröltsch:—"Men, who in early youth have suffered from impaired hearing, have, in many cases as a consequence, something unstable, confused, or undecided, in their disposition and character. They are undecided and faltering in action, illogical and changeable in thought and speech,

their answers often not being to the point. An experienced observing physician can thus, in many cases, after a short conversation, even from the speech and manner of a patient, discover that most probably he had in youth defective hearing." Even blindness at this period of life is not a more dire misfortune than the loss of hearing, with the attendant loss of speech. There is a very important and numerous class of cases in which children suffer from a condition of chronic catarrh of the nasal and pharyngeal mucous membranes, with thickening and increased secretion. By continuity of surface, this condition extends along the course of the Eustachian tubes leading to their closure, and generally the mucous membrane of the *tympanum* also shares in the catarrhal process. Previous to the date mentioned, such children remained untreated in the majority of cases, as the Eustachian catheter was an instrument which few children could tolerate. They continued deaf at an age when acute hearing is indispensable to a healthy mental development. Now, by the brilliant discovery of Adam Politzer of Vienna, in 1863, all this has been changed. By a method tolerated even by the youngest children, the Eustachian tubes and the *tympana* can be most effectually inflated. This proceeding, which is practised every day by those engaged in the treatment of ear diseases, consists in this:—After the patient has taken a small quantity of water into his mouth, the nasal piece of a tube connected with an air bag is placed about one-third part of an inch into the nose; the nasal passage being

completely closed in front by compressing the nostrils firmly with the thumb and index finger of the left hand, the bag of air is then grasped by the right hand ; the act of swallowing the water is performed by the patient at the command of the operator, and, at the same moment, the bag of air is forcibly compressed, and suddenly emptied into the closed nasal cavity. The closure of the nasal cavity behind is effected in the act of swallowing by the elevation of the soft palate and its apposition to the posterior wall of the pharynx ; the sudden increase of density in the air contained in the shut nasal cavity, produced by emptying the air bag, overcomes the resistance in the Eustachian tubes, and air passes freely into the *tympana*.

You may observe in the treatment of such cases in my clinique here, that I often practise a modification of Politzer's method, which is still more easily employed with children than the original plan of Politzer. It is a method introduced by Joseph Gruber of Vienna (whose practice I had the great pleasure and advantage of witnessing), and its peculiarity consists in this, that the act of swallowing is dispensed with, and the pronunciation of a particular syllable substituted for it. Lucæ, of Berlin, first discovered that the phonation of certain vowel sounds was attended by the apposition of the posterior edge of the soft palate to the posterior wall of the upper pharynx. He found that the vowel sound "*ah*" was convenient and sufficient for effectually shutting off the

upper from the lower pharynx. Gruber, however, discovered, as the result of a series of experiments, that while in some cases the phonation of "*ah*" was sufficient to close the naso-pharyngeal cavity behind, it often failed, especially in adults, to complete the closure in such a way as to offer sufficient resistance to the condensed air. After many trials, Professor Gruber decided that the pronunciation of the syllables, "*hick*," "*hack*," "*hock*," or "*huck*," (pronounced "*hook*") pronounced with emphasis on the two final letters, closed the posterior nasal cavity in the great majority of cases, and that this was as effectual as the movement of swallowing. The syllable "*huck*" (hook) is the one which Gruber usually uses. From an extensive experience of this method of Gruber, I believe it to be a most valuable one. It has the advantage of being more simple, and of taking less time than the original method. A child learns easily and quickly to pronounce the word "*hook*," while the explanations necessary in teaching the method which requires the swallowing of water, and the considerable time usually required by the child in learning to swallow at the proper moment, are important considerations, especially in a large public dispensary. Again, the act of swallowing being quite momentary, a repetition of the process is often necessary before we are assured of its success in inflating the *tympanum*, while the act of pronouncing the word may be prolonged, so as to render less doubtful the success of the inflation. In very young children the

simplicity of the process is still further increased by substituting a simple india-rubber tube, with a mouth-piece for the operator and a nasal piece for the child, for the rather formidable-looking air bag; and, while the little patient pronounces "hook," the manipulator blows through the tube, and thus generally succeeds in forcing air through the Eustachian tubes into the *tympana*. This is a plan which can be both conveniently and safely practised by the parent of the child in the intervals between the visits.

With respect to the value of Politzer's method of inflation, or of Gruber's modification of it, I will venture to say that, supposing this were the sole remedial measure known in treating deafness, we would be in a position to do a great deal of good. It forms a most valuable weapon in combating the advance of many diseases of the organ of hearing, and if employed in every case of deafness of recent origin, its good effects would be inestimable. As has been said by an American writer, "If a man were to take this air bag, and travel through the country, advertising himself as an aurist, and blow up all the ears indiscriminately that were brought to him, he would be a very successful quack." The catarrhs of the middle ear in children, and also in those of adults of short duration, are treated by this proceeding, in conjunction with treatment applied to the naso-pharyngeal mucous membrane, with most gratifying results. By the repeated ventilation of the *tympana*, the sense of hearing is mean-

while improved, and the escape of the catarrhal or inflammatory exudations is facilitated by the pervious condition of the Eustachian tubes, and the process of absorption of such morbid secretion is much assisted by the presence of air in the *tympana*. The injurious pressure of the *stapes* on the fluid of the labyrinth is relieved, and the impediment to the proper swinging of the chain of ossicles removed by restoring the *membrana tympani* to its natural position, and thus ensuring the proper distance between this membrane and the *fenestra ovalis*. The tendency to the formation of bands of adhesions between the tympanic membrane and the inner wall of the *tympanum*, between the ossicles and the walls of the *tympanum*, or between the individual bones of the chain, is likewise much diminished. Lastly, the occurrence of shortening of the *tensor tympani* muscle is prevented. This contraction of the muscle is brought about by long continued indrawing of the handle of the *malleus*, and often leads in time to the most distressing subjective symptoms, such as noises or ringing in the ears, &c. Now, although these disorders, when recent, may usually be prevented by the timely application of Politzer's bag, yet, if they are confirmed by time and the neglect of treatment, they ultimately produce those gradual pathological changes in the tympanic structures which are apt to culminate in incurable and almost total deafness—sad examples of which you will often witness when attending the practice of the aural clinique in this hospital.

The second mode of treatment practised in disease of the ear at the present time, to which I desire your attention to-day, consists in the artificial perforation of the tympanic membrane. This operation of paracentesis has of late years received great attention both in Europe and in America. Professor Politzer, whose opinion is worthy of very great respect, says, in his recently published book, that from his very extensive experience of this operation he must set it down as one of the most important and valuable in its results. It is not a new procedure, having been suggested and probably practised at different times within the last 200 years. Sir Astley Cooper, however, was the first, at the beginning of this century, to perform the operation in a considerable number of cases, and to awaken the interest of the profession in this mode of treatment. It was suggested to Sir Astley by the circumstance that some cases had come under his notice of impaired hearing in both ears, with perforation of the tympanic membrane on one side, in which he found that the hearing was better on the perforated side. As the result of the publication of an essay which he read before the Royal Society of London, where he describes the particulars of four cases in which he had perforated the tympanic membrane with good results, deaf people flocked to him from all quarters in order to have this new mode of treatment tried upon them. Unfortunately, however, his further experience of the operation did not prove so encouraging as these

four cases; and, indeed, the results of other forty operations were of such a negative character that he determined to abandon aural work lest his reputation as a general surgeon might suffer, and he declined to see any more deaf patients. For many years after this, puncturing of the membrane of the drum was the fashion of the time both in France and Germany. Every patient who complained of deafness, and who was willing to undergo the process, was treated by incision of the membrane without consideration of the various anatomical changes and conditions in the middle ear which are present in such cases; and, as was to be expected, such unscientific procedure had very unsatisfactory results. Impermeability of the Eustachian tubes was the only indication recognized by Sir Astley Cooper for its performance. With the exception of Saunders, who recommended it for giving exit to pus contained in the *tympanum* in the course of acute suppurative inflammation of the middle ear, the operation was performed in a purely empirical fashion until revived by Schwartze of Halle in 1868, and indeed for many years previous to that date it had fallen into almost complete disuse.

Schwartze, in again introducing paracentesis of the *tympanum*, was able to place the operation on a basis founded on the greatly improved knowledge of the pathology of the middle ear. This more accurate knowledge of the proper indications for its use was mainly

derived from the improved method of illuminating the external auditory canal and the tympanic membrane, introduced into general use by von Tröltsch of Würtzburg, than whom there does not exist a man who has done more to establish otology on a sound scientific basis. The very inefficient methods of examining the interior of the ear practised by the early operators, prevented them from appreciating those changes in the tympanic membrane which are now so easily recognised, such as modified curvature, the shape and size of the cone of light, the variations in the polish, the shades of colour, and, especially, the characteristic appearances which indicate the presence of mucous or serous exudation in the cavity of the tympanum: for the recognition of these we were indebted first to Politzer, and very shortly after to Schwartze. The old method of illumination consisted in introducing a badly-shaped speculum into the meatus, and, after turning that side of the patient's head to the window, trying to look into the speculum; this was very difficult, for the head of the examiner was constantly in the way of the light passing into the speculum. This method could not be practised in other than clear weather. Von Tröltsch's plan consists in reflecting light (either artificial or solar) from a concave mirror, perforated in the centre, into a speculum, such as Gruber's or Politzer's, properly introduced into the meatus. This mirror, when used for the purpose of examination, is held in the hand by a stem

attached to the mirror, but for operative purposes it is usually secured on the forehead by means of a head-band. Those of you who join in the work of the clinique here will have ample opportunity of making yourselves practically acquainted with this method.

There is no doubt that the greatest value of the operation of puncturing the tympanic membrane is in the means which it gives us of removing thoroughly catarrhal or inflammatory products from the cavity of the *tympanum*, such as mucus, serum, or pus. The wonderful researches of Toynbee, who has given us the results of 750 careful dissections of the middle ear of patients who had suffered from deafness, have proved that exudation of mucus into the small chamber of the *tympanum* will often become inspissated, then organized, and may ultimately lead to the formation of adhesion, or to the other permanent changes in the tympanic structures to which we have already referred, and which are so often associated with incurable deafness. What a valuable improvement in aural practice during the past few years is it, that we are now able with certainty to recognise the presence of these secretions in the *tympanum*, fraught with such danger to the function of the part, while by a simple and safe operation we can remove them thoroughly! It is true that by the repeated use of Politzer's method, we can often, in time, bring about the removal of the exudations, either by absorption or assisting their passage through the Eustachian

canals into the pharynx or nasal passage; but by paracentesis, combined with the use of the air bag, we can shorten the length of treatment very much, and can also more surely and thoroughly get rid of every part of the secretion. There is no doubt that the mode of treatment by Politzer's method alone will fail in some cases to effect the complete removal of the exudation, either in consequence of its large quantity, or its great viscidity. Moreover, paracentesis is also one of the safest of operations, and, after one has acquired familiarity with the examination of the tympanic membrane and with the use of the forehead mirror, it can be done with ease, and an almost total absence of risk to the patient. Dr. Politzer, in his work just published, says that in 1,500 cases of paracentesis which he has had in the course of his practice, only four of the operations were followed by inflammatory symptoms, and these were due to depraved constitutional conditions. We may, therefore, justly consider that this operation, when employed for removing these fluid catarrhal products from the *tympanum*, is highly satisfactory, and is based on as clear pathological principles as any other recognised surgical procedure.

I will say little just now regarding the propriety of incising the membrane to give exit to pus when the tympanic cavity is filled with purulent matter, an operation which was practised, as already mentioned, by Saunders, at the beginning of this century, but the

correct indications and the proper time for which have only been made clear since the improved modes of examination have been introduced. When we have a cavity filled with pus, especially such as the *tympanum*, whose walls consist partly of bone and partly of dense fibrous tissue, situated in the immediate neighbourhood of most important structures, a prompt and effectual opening with the knife is simply in accordance with the clearest surgical instincts, and is of vital importance not only to the future healthy function of the organ, but also to the safety of the patient's life. This is eminently true when, as is often the case in scarlet fever, the morbid secreting process is rapidly and constantly going on, and when utter destruction of essential parts of the organ of hearing may be completed in a very short time.

In recent times operations upon the tympanic membrane have been practised in many other circumstances besides the clearly defined conditions I have just spoken of, such as for the purpose of cutting the tendon of the *tensor tympani* muscle, or of dividing any adhesions binding the membrane to the inner wall of the *tympanum*, or for the purpose of injecting either by way of the external auditory canal or by the Eustachian tube certain solvent or stimulating fluids into the *tympanum*. Such modes of treatment must be reserved for detailed consideration at another time. I can also do nothing more than merely refer to the use of the galvanic

cautery of Voltolini of late years, for the purpose of maintaining permanent openings in the membrane in the numerous chronic cases where the mucus has been inspissated or organized, and where other changes in the tympanic structures have taken place, to which I have already referred: to this important subject I may return again. I am, in the meantime however, disposed to agree with Dr. Roosa, who considers that in those cases which are designated chronic non-suppurative inflammation, where the tissues of the middle ear are in a dried state, the value of artificial perforation of the tympanic membrane consists in the means it affords of applying solutions to the interior of the tympanum, which, by acting as stimulants or as solvents, or in both ways, may be reasonably expected to improve the hearing.

I think, Gentlemen, that even from this imperfect review of the subject you will see that, within recent times, operations on the *membrana tympani* have been based on a knowledge of the varied pathological changes in the middle ear, for an accurate knowledge of which we are so much indebted to Toynbee, whose gigantic labours helped to banish the irrational and empirical manner of treatment which so long disgraced the practice of aural surgery. While the removal of fluid exudations is the most brilliant result of the revival, by Schwartze, of paracentesis of the *tympanum*, the same operation, either by the knife or by the galvano-cautery for chronic neglected cases, has also been attended by some measure of success,

chiefly because the recognised principles of surgery have been applied to the diseases of the organ of hearing, and also because the perfection of the methods of examination have furnished indications for the operations which the crude methods in use twenty-five years ago failed to give.

In Europe and America able and eminent men are engaged in the further elucidation of this subject, and we may fairly hope that their labours will greatly enlarge our knowledge of the organ, and increase our power of dealing with the diseases affecting it. Indeed, we may reasonably look forward to the time when, through the knowledge of aural diseases possessed by the general practitioner, intractable cases will be much rarer than at present, because the period for successful treatment will not be allowed to pass into that chronic stage, when those structural changes have taken place which render a complete cure hopeless.

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