old who had tuberculosis of the ankle. The child's father was in Denver, suffering from pulmonary tuberculosis. There are many similar instances, and they show a transmission of the disease, perhaps not directly, but through its tendency or diathesis.

DR. CHARLES C. BROWNING, Highland, Cal., called attention to the fact that isolating a child from its tubercular mother is, among the poorer class, impracticable. Parents are not able to put their children out; in many instances, they are unwilling to do so; we can not compel them to and Dr. Browning said that he was not sure that it would be right if we could. Recently, in looking up this subject, which is a vital one in southern California, he found that in a series of autopsies held previous to the first month of life, less than 0.1 per cent. of the deaths were due to tuberculosis. The percentage of deaths from tuberculosis increased rapidly from the third month until about the eighteenth month, then rapidly declined. The manner of infection of those children, he believes, is largely due to the tubercle bacilli being inhaled and admitted through the mouth during the time children are creeping about the floors. The decrease in tuberculosis begins with the period of walking and the increase of independent existence of the child. We can teach parents to keep the floors clean.

DR. R. B. GILBERT, Louisville, asked Dr. Fischer if he agreed with Dr. Koch that tuberculosis is not transmissible through cow's milk. He said that when Dr. Jacobi made the statement that tuberculosis is not directly communicable by the mother's milk, it came to him as a sort of revelation. He thought that such a method of infection was possible, and has always strongly advised against tubercular mothers nursing their children.

DR. A. JACOBI, New York City, said that he meant to say that the transmission of tuberculosis from a tubercular mother was less due to her milk than to the inhalation of her sputum. He certainly did not exclude the possibility or even the probability of the milk being directly injurious. Children have been taken away from tuberculous parents, put into public institutions and have remained well, while on the other hand, healthy children have been placed in tuberculous families and became infected, simply from their surroundings.

DR. C. F. WAHRER, Fort Madison, Iowa, gave it as his opinion that if a child born of two healthy parents was exchanged for a child born of one or two diseased parents, so that the healthy parents were to take care of the child born of diseased parents, and the diseased parents were to care for the child born of healthy parents, the child that is reared by the healthy parents will have a far better chance of life, notwithstanding its inheritance, than the child that was born of healthy parents but reared in unhealthy environment. Every mother should be instructed how to feed her child intelligently, not by food prepared in the chemical workshops, according to the latest fads, but by using common sense methods as agreed on by the best pediatricists. Few mothers will consent to give up a child, and in many instances it is well-nigh impossible. No one knows whether mother's milk will transmit tuberculosis or not. It is not heredity that we must teach people to fear so much as the constant exposure of the child to the infection from its diseased parents.

DR. PAULUS A. IRVING, Richmond, Va., gave a striking illustration of the possibility of bovine infection. In his city there is an infant asylum accommodating about 30 infants. A public-spirited citizen gave it what he thought was a very fine cow, whose milk was sufficient for the entire need of the institution. Soon after the cow was received, it was noticed that the infants began to droop and pine away, and in less than a year only one infant survived. The cause of this high mortality was vainly sought for. Finally, the milk from the cow was suspected. A veterinarian examined the cow and found that she was tubercular. When the animal was killed unmistakable evidences of the disease were found. Such an example furnishes very strong evidence of the transmission of bovine tuberculosis to the human family.

DR. LOUIS FISCHER thinks that the tubercular mother should not only be isolated from her healthy child, but also from her husband and from everyone else who is receptive to tuberculosis. Among 5,000 cases taken at random he found that 1,700 suffered from adenoids, pharyngeal disease and catarrh of the nasopharyngeal tract, 59 showed evidence of pulmonary tuberculosis, and 5 had Pott's disease in addition to the pulmonary manifestations. Of these 59 tuberculous cases, only 2 were breast fed; the rest were bottle fed, the food consisting of grocer's milk, condensed milk and modified cow's milk. The great immunity of breast-fed children from tuberculosis is certainly worth noting. He thinks that condensed milk furnishes the poorest foundation for the child. It is deficient in proteids, contains a great deal of sugar and develops fat in place of muscle. It consists largely of cane sugar, which is put in to preserve it. Many of the children fed on condensed milk suffer from constipation, which is often an early manifestation of rickets. It is largely used by the poorer people, because it is cheap and sold in a convenient form for use. It is this poor form of infant feeding, added to insanitary living apartments without sunshine and fresh air that devitalizes and invites tuberculous infection. There are two usual modes of entrance of the tubercle bacillus: (a) By inhalation. (b) By food. In inhalation tuberculosis the tubercle bacillus is carried into the nose, throat, bronchi and lungs by means of dust or dried sputum from a tubercular patient.

The tubercle bacillus can also enter the system by means of the lymph channel if inhaled and so enter the circulation.

In food tuberculosis, when infected milk or meat or any article of food containing tubercle bacilli enters the body an infection takes place primarily in the intestine, and enters the circulation by means of the lymph channels.

Dr. Fischer does not believe that we can prove to-day that milk alone is a causative factor of tuberculosis. He believes that there are other conditions which predispose to infection and that there are thousands of people who have tubercle bacilli in their throats, together with all sorts of pathogenic bacteria, and still remain unaffected because their bodies are not in a receptive condition. When, for some reason or other, they get into a subnormal condition, then they are receptive to anything under the sun. He believes that we must await further evidence before we can say that milk alone is a factor that transmits tubercle bacilli to the baby, as it is difficult to trace the bacilli into the body. We have no other theory at the present day than to associate the bacilli in the cow's milk with their effect on the infantile respiratory and digestive tract.

THE PRESENT STATUS OF THE TREATMENT FOR DEAFNESS DUE TO CHRONIC CATARRHAL OTITIS MEDIA.*

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NEW YORK CITY.

In responding to your committee's invitation to prepare a paper on this particular subject, my first impulse was to decline the task as presenting too many difficulties. The subject is manifestly too broad to be adequately outlined in a single paper. I hope, however, that my paper may serve the purpose of inducing a larger and more useful discussion by others.

Chronic catarrhal otitis media is an elastic term, rather indefinitely applied to a variety of tympanic conditions, which are, perhaps, best considered under the following headings:

* Read at the Fifty-fifth Annual Session of the American Medical Association, in the Section on Laryngology and Otolaryngology, and approved for publication by the Executive Committee: Drs. G. Hudson Makuen, George L. Richards and John F. Barnhill.

1. Chronic tubal catarrh, without marked tympanic changes other than those due to retraction of the membrana tympani.

2. Chronic hypertrophic otitis media.

3. Chronic hyperplastic otitis media; dry middle ear catarrh; otosclerosis.

Obviously no classification is of practical value which divides these cases into groups which can not be recognized clinically. The differential diagnosis is not easily reduced to any system of rules. In the early stages the functional reactions do not greatly aid us, serving merely to locate the lesion in some part of the conducting apparatus. Nor do the physical appearances of the drum membrane, considered alone, afford as reliable data as might be expected. Thus marked retraction of the drum membrane may be found either in simple tubal catarrh, chronic hypertrophic otitis media, or in cases of sclerosis secondary to hypertrophic otitis media. Calcareous deposits may occur in either the hypertrophic or hyperplastic form of otitis.

DIFFERENTIAL DIAGNOSIS.

The differential diagnosis should take into account, therefore, not only the type and duration of the deafness, and the physical defects of the drum membrane and tubes, but also the history of the patient, and, perhaps, most important of all, the manner in which the deafness responds to treatment.

Previous History.—With deafness of one or more years' duration, the patient should be interrogated as to the following predisposing conditions:

(a) A history of a preceding obstructive lesion within the nose or nasopharynx is somewhat suggestive of the hypertrophic form of chronic otitis media.

(b) Frequently recurring attacks of acute otitis media, whether of mild or severe type, predispose markedly to the development of chronic hypertrophic otitis media.

(c) Rheumatism is said not infrequently to be accompanied by local manifestations within the ear. Obviously such lesions, especially in recurrent attacks, might act as a predisposing cause of chronic hypertrophic otitis.

(d) Gout, on the other hand, is said to frequently co-exist with sclerotic changes within the ear, and to this extent the gouty diathesis should be considered in arriving at a diagnosis.

Constitutional syphilis, either congenital or acquired, is regarded by German otologists as one of the causes of otosclerosis.

As the time at our disposal is limited, it may be well to bring together briefly the characteristic or distinguishing features—so far as we are able to recognize them—of the three classes of cases under discussion.

In chronic tubal catarrh, the deafness is of tympanic type,¹ and usually of several months' or a year's duration. The past history may be negative or may include an account of chronic nasal catarrh or recurrent attacks of acute rhinitis. The degree of deafness is variable, sometimes clearing up for days or weeks, only to return with a fresh attack or exacerbation of nasopharyngeal catarrh.

Physical Examination.—This usually shows the nose or pharynx to be more or less inflamed. The drum membrane is markedly retracted, but may be otherwise normal. The otoscope during inflation usually gives characteristic signs of tubal congestion or narrowing.

If, after inflation, the drum membrane is seen to have resumed in part its normal position, and the hearing is markedly improved, the diagnosis would seem to be complete.

In chronic hypertrophic otitis media, the impairment of hearing may have been noticeable to the patient during several months or as many years. The deafness is of the same character as in tubal catarrh, but is less subject to variations in degree. There may be a previous history of nasal obstruction of long standing; of rheumatic attacks of the usual articular type, or occurring as recurrent attacks of acute tonsillitis. The ear may have been the seat of prolonged suppuration in childhood, or of repeated attacks of acute catarrhal otitis.

Examination.—Inspection usually reveals considerable retraction of the drum membrane, which may exhibit uniform thickening, localized calcareous deposits or the cicatrices resulting from old perforations. It may, on the other hand, be nearly normal in appearance. Evidences of tubal narrowing or obstruction are invariably present.

In such cases inflation should result in moderate but appreciable improvement in hearing, which would confirm the diagnosis of chronic hypertrophic otitis media.

In chronic hyperplastic otitis media the progress of the deafness is often slow and insidious, it being in many cases difficult to obtain from the patient a reliable statement as to its duration. The previous history may include gout or constitutional syphilis, or may be absolutely negative. The eustachian tubes are patent and may be abnormally wide. The physical signs of the drum membrane may be absolutely normal, or may show calcareous deposits. But slight functional gain, if any, results from inflation. Excluding a primary labyrinthine lesion, the above picture would justify the diagnosis of chronic hyperplastic otitis media.

From the above notes, it will be seen that in all these cases the immediate effect of inflation on the deafness is regarded as an important test.

FUNCTIONAL REACTIONS AND THEIR BEARING ON PROGNOSIS.

I would like also to be allowed a word as to the value of certain functional reactions as affecting prognosis.

The deductions to be drawn from the tone limits—i. e., relative impairment of hearing for the upper or lower tones of the musical scale—do not appear to be as reliable as they were formerly thought to be. While loss of hearing for the upper tones undoubtedly points in a general way to labyrinthine disturbance, such impairment may be greatly increased by an obstructive lesion within the tympanum. In certain depressed conditions of the general nervous system, and also with advancing years, the auditory nerves become less responsive to sound waves of every description, and most notably in the two extremes of the range of normal hearing. When such a patient develops an obstructive tympanic lesion, it is not surprising that the range of audition may be curtailed in the upper as well as the lower limit. It is only on the above hypothesis that one is able to explain certain cases in which considerable loss of hearing for the higher tones is found side by side with normal or perhaps slightly increased bone conduction. With such reactions to functional tests, it has not been unusual in my experience to obtain a considerable improvement in the upper tone limit as a result of simple measures directed against a tympanic lesion. Obviously in such a case the change in the upper tone

1. Presenting functional reactions characteristic of disease of the conducting apparatus.

limit is not to be regarded as an evidence of grave labyrinthine disease, and should not of itself be made the basis of an unfavorable prognosis.

Of much greater prognostic value are marked changes in the perception of sound by bone conduction which, when considered in their relation to other functional tests, furnish our best guides as to what may be expected from treatment. Thus in any case of chronic deafness marked diminution in bone conduction must be regarded as an unfavorable prognostic sign. With this condition the upper tone limit is often considerably lowered, and in this connection the latter is an important sign as further pointing to serious labyrinthine involvement. Marked increase of bone conduction, i. e., increase to the point where a fork of 256 D. V. is heard longer by bone conduction than by air conduction, is also an unfavorable sign to the extent that it usually indicates an advanced tympanic lesion in which the hearing may be considerably improved, but will not be restored to the normal standard. On the other hand, moderate increase of bone conduction is often in cases of slight deafness a sign of good omen as indicating a stage of tympanic disease, for which local measures should be followed by good results.

Before taking up, briefly, the subject of treatment, I wish to state very frankly my belief that there are comparatively few therapeutic measures which have any value in these cases; and that our success in any case will depend on our skill and judgment in the use of these, rather than a resort to many remedies of less known value.

CHRONIC TUBAL CATARRH.

Obviously a catarrhal condition of the tubes may exist for a considerable period without producing ear symptoms. Only those cases, therefore, are of interest to the otologist in which the caliber of the tubes is so reduced as to interfere with the passage of air to the tympanum. The result of such occlusion is always mechanically the same, viz., absorption or rarefaction of the air within the tympanum, with consequent retraction of the drum membrane. The deafness, then, is a mechanical one, and due, not to pathologic changes within the middle ear, but to partial fixation of the membrane and ossicles by atmospheric pressure from without.

Under chronic tubal catarrh, it is, perhaps, admissible for therapeutic purposes to recognize three conditions causing retraction of the drum membrane, viz.: (a) Nasal obstruction; (b) tubal congestion; (c) tubal constriction or stenosis.

Nasal Obstruction.—There are certain cases in which, as a result of an obstructive nasal lesion, the air in the nasopharynx is more or less rarefied with each inspiration. In consequence of this the air pressure within the tympanum becomes constantly negative.

The history is usually that of deafness characterized by periods of amelioration. Interrogation elicits the fact that the patient is at times a mouth breather. On physical examination the drum membrane is found markedly retracted. The physical evidences of nasal obstruction are more or less pronounced. Inflation per catheter, however, results in a fairly good current of air to the tympanum, partial or complete replacement of the drum membrane and prompt relief of the subjective symptoms. The relief thus afforded may last a few hours or several days, when the deafness returns. Closer observation of the patient may now disclose a faulty method of breathing. While not a typical mouth

breather, the mouth is frequently opened to compensate the nasal difficulty. Obviously in such a case no amount of treatment by sprays, inflations, pneumatic massage or what not will be of any permanent value until the nasal lesion has received attention.

Chronic Tubal Congestion.—Belonging more properly to this group are those cases in which the tubal mucous membrane is the seat of a chronic venous congestion. These patients present symptoms and physical signs almost identical with those just described. Inflation, however, gives unmistakable signs of obstruction due to congestion, the sounds through the otoscope being at first muffled, rasping or accompanied by râles, then becoming clearer as air enters the tympanum in greater volume. Inflation results in marked temporary relief of the symptoms, and the rapid improvement in the auscultatory signs shows more or less clearly that the lesion is chiefly one of chronic venous congestion.

TREATMENT.

These cases usually respond readily to proper treatment. This should include correction of any condition within the nose or nasopharynx which may act as an exciting cause of tubal catarrh; application of astringents to the inflamed pharyngeal mouth of the tube; regular inflation of the middle ear, at first on alternate days and then at longer intervals.

For adult patients, inflation per catheter possesses the following advantages over the Politzer method: It enables one by means of the clearer otoscopic sounds and the force required in propelling air to the tympanum, to determine with greater accuracy the condition of the tube; to regulate the force of the current of air, and to inflate only the diseased ear. It eliminates the danger—where one ear only is diseased—of producing undue relaxation of the opposite drum membrane.

Many of these cases require no other treatment than regular inflations, with appropriate measures to relieve congestion within the nose or pharynx.

Tubal Constriction.—There is still another class of tubal cases in which the obstruction depends not only on chronic venous congestion, but also to some extent on the formation of new connective tissue. The hyperplasia may occur as a uniform thickening of the tubal mucosa, or as localized deposits having a tendency to contract. During inflation the sounds through the otoscope are insufficient, high-pitched or whistling, clearly indicating the reduced caliber of the tube. With such a lesion we are justified in classifying under tubal catarrh those cases of moderate deafness which show sufficient improvement after inflation to exclude serious lesions elsewhere.

The indications for treatment include those already described under tubal congestion, plus active measures for the restoration of the tube to its normal caliber. While considerable improvement often results from inflation, it usually becomes necessary to resort to some form of mechanical dilatation to overcome the constriction within the tube.

THE EUSTACHIAN BOUGIE.

The technic of introducing the eustachian bougie begins with the proper placing of the catheter within the pharyngeal mouth of the tube. Beyond this there are, in my opinion, two points of major importance in this method of dilatation, viz.: First, the selection of a small rather than a large bougie; and second, that it be al-

lowed to find its own way through the stricture or constriction, rather than be made the subject of force.

When the tube is not actually stenosed, it is probably the contact of the bougie with the diseased mucous membrane rather than its action as a forcible dilator which is of value in overcoming the obstruction. Only in this way can be explained the improvement which sometimes follows the introduction of a small bougie which has met with no appreciable resistance. The eustachian tube is not, like the urethra, a distensible canal. Surrounded in its narrowest part by firm unyielding walls, attempts at forcible dilatation can result only in compression of its mucosa between the dilating instrument and the osseous walls of the canal. When the bougie meets with obstinate resistance at the isthmus, it must be explained on one of three hypotheses, viz.: Either that (1) the bougie is not exactly following the direction of the tube; that (2) the caliber of the bony tube is too small for the bougie; or that (3) a firm fibrous stricture exists at this point. Even in the latter instance the application of force might result in serious injury.

The points which I wish to emphasize are: The danger of attempting to force a large bougie through a small and rigid channel lined with mucous membrane; and the importance of avoiding force in its manipulation.

In my opinion a bougie, the terminal bulb of which measures not more than one mm. in diameter, is as large as should be used in the great majority of cases. The particular style of bougie that should be used is largely a matter of personal choice. Those of whalebone or celluloid are most satisfactory.

DILATATION BY ELECTROLYSIS.

No discussion of this subject would be complete without mention of the electrolytic method of dilatation devised by Dr. Duel of New York. In hospital practice this method has been thoroughly tested by Drs. Brandegee and Kenefick, in the New York Eye and Ear Infirmary; and their reports would seem to leave little doubt as to its value in properly selected cases. In my experience there have been many cases of tubal narrowing or stenosis which have yielded more readily and favorably to treatment by this method than by any other.

When, in a case of simple tubal catarrh, the obstruction has been overcome and a satisfactory gain in hearing attained, the end of local treatment should be considered accomplished.

CHRONIC HYPERTROPHIC OTITIS MEDIA.

Pathologically, these cases are characterized by morbid changes within the eustachian tubes and also within the tympanum. They resemble those described under the last heading in that tubes are usually abnormally narrow and may be practically closed. The middle ear is the seat of a productive inflammation involving primarily the tympanic mucosa. The new connective tissue may be evenly distributed throughout the tympanum, may be massed chiefly in the region of the labyrinthine windows, or may occur as fibrous bands passing between the ossicles and adjacent structures.

Obviously the deafness is dependent on two distinct lesions, either of which alone might cause impairment of hearing, viz., chronic tubal catarrh, with consequent retraction of the drum membrane, and the hypertrophic changes within the tympanum.

TREATMENT.

The indications for treatment are: (1) To re-establish

the normal patency of the tubes; and (2) to restore as nearly as may be a normal condition within the middle ear.

The treatment of tubal catarrh has already been described and need not be repeated. Since the tympanic disease is usually secondary to the tubal lesion, the importance of fully meeting the first indication hardly requires argument. The restoration of the balance in air pressure on both sides of the drum membrane is almost invariably followed by a very considerable increase in hearing power. From this point the improvement is usually slow, and will depend on the gradual restoration of the intratympanic structures to their normal condition. To this end nothing is more important than the automatic ventilation of the tympanum through the eustachian tube. Occasional gentle inflation may serve to relieve congestion, to free the ear of accumulations of mucus, and to maintain the drum membrane in its normal position. The employment of stimulating vapors, e. g., of iodine, chloroform, menthol, etc., thrown into the middle ear through the eustachian catheter, seems often to add to the patient's comfort, and may have a restorative influence on the diseased mucosa. Occasional pneumatic massage is of advantage in certain cases. It should be practiced only with the drum membrane under direct observation and with an apparatus producing the smallest excursions of the membrane that the eye can appreciate. These measures should at first be tried tentatively, and continued only so long as continuous improvement in function can be demonstrated.

So much for the plan of local treatment which, in a general way, may be applicable to any case of chronic catarrhal otitis media. There are certain conditions, however, which should be noted as calling for some modification of this routine. The drum membrane, for instance, may be held in an abnormal position by intratympanic adhesions. During pneumatic massage by means of the Siegel otoscope, the excursions of the membrane are seen to be exceedingly limited, and without influence on the hammer handle, the lower end of which may remain in apparent contact with the promontory. In such cases it is evident that inflation will not result in replacement of the drum membrane; and that unless practiced with gentleness and judgment, it may result in further alterations of tension, very seriously influencing the patient's hearing.

Atony of the drum membrane is another condition which should not pass unnoticed. The drum membrane may appear slightly thickened or fairly normal in texture. During pneumatic massage, however, the posterior segment is seen to make unusually wide excursions, clearly indicating a condition of undue relaxation. As a result of this loss of tension, sound waves expend themselves on the relaxed posterior segment, and are not adequately communicated to the ossicular chain.

The practice of making multiple incisions through the relaxed drum membrane has not generally given good results, its failure depending on the fact that the resulting cicatricial tissue eventually weakens the membrane, rather than adding to its tone. Application of paper discs to the relaxed posterior segment increases the hearing power in certain cases. More often no functional gain results. Occasional application of contractile collodion to the posterior segment will sometimes result in a considerable gain in hearing. Its efficacy may be enhanced by inflating the ear immediately before the collodion is applied. Even where no immediate functional gain results from this procedure,

it is sometimes of service in preventing further relaxation of the drum membrane during inflation or pneumatic massage.

ATROPHY OF THE DRUM MEMBRANE.

There are other cases in which the membrane has undergone extreme atrophy, having somewhat the appearance of thin tissue paper. In two cases coming under my observation during the past two years, the drum membrane was so attenuated as to be easily ruptured by inflation under ordinary pressure. It is difficult to suggest any rational treatment for the relief of such patients. They have seemed to me most favorable cases, if any there be, in which to perform the operation of ossiculectomy for the improvement of function.

Fortunately, a fair degree of hearing is not incompatible with marked changes within the tympanum. In the treatment of all these cases the point of first importance is the recognition—when it exists—of a tubal stricture or constriction, and the employment of adequate measures for its correction.

Other than tonics, drugs have no value in this disease, except as they influence some constitutional condition or diathesis.

CHRONIC HYPERPLASTIC OTITIS MEDIA.

Dry middle ear catarrh; otosclerosis.

Under this group the following lesions have been recognized:

1. In typical cases there is a productive inflammation which originates within the tympanum, and in which congestion at no time plays a prominent part. It is, therefore, subacute or chronic from the start. There is an abundant deposition of new connective tissue within the substance of the tympanic mucosa, which is converted into a thickened, dry, sclerotic membrane, closely adherent to underlying structures. This hyperplasia is often most marked in the region of the oval window. The same changes occurring within the eustachian tubes, these passages are often unusually wide. The drum membrane is, therefore, not retracted.

2. There are other cases in which, independently of or in addition to the above changes, a true osseous ankylosis exists. There is a proliferation of new bone in the vicinity of the oval window resulting in osseous union between its margins and the foot plate of the stapes. The hyperostosis may spring from the promontory, from the margin of the oval window, or may be confined to the labyrinthine surfaces of this region. In the latter case, proliferative changes are not uncommon in contiguous portions of the membranous labyrinth.

3. A third class of cases belonging to this group are those in which sclerotic changes occur as a final stage of chronic hypertrophic otitis media.

TREATMENT.

The results of treatment are not encouraging. The prediction of Politzer that the deafness occurring in advanced stages of the disease will remain forever beyond the ability of the otologist to cure, is one which few at the present time will care to contradict.

Inasmuch as it is impossible clinically to exclude osseous changes in the stapelial region local treatment is to be entered on tentatively. Were the diagnosis made early there is probably no class of cases in which constitutional treatment would give better results. The patient should be placed in the best possible hygienic surroundings. Tobacco and alcoholic drinks should be used in the greatest moderation, or not at all. Constitutional syphilis should receive thorough and

persistent treatment. Gout or rheumatism, or in fact any constitutional diathesis, should receive due attention. Occasional exhibition of potassium iodid is thought by many to be helpful in these cases, and is made a part of the general routine.

LOCAL TREATMENT.

In the early stages benefit may result from simple measures aiming to prevent ossicular fixation. To this end occasional pneumatic massage may be employed. Forceful inflation at long intervals may also be of service. Local medication in the form of stimulating vapors may be used to increase the local blood supply, a result favoring the restoration of the mucous membrane to its normal condition. Obviously these measures can have no beneficial influence in those cases complicated by osseous changes at the oval window.

There is a later stage of the disease in which the drum membrane, malleus and incus, instead of aiding in the conduction of sound, seem to act rather as a barrier to the passage of sound waves to the inner ear. Palliative measures are powerless to relieve this condition.

SURGICAL MEASURES FOR THE IMPROVEMENT OF HEARING.

Various operative procedures have from time to time been proposed for the relief of deafness due to intratympanic adhesions. Division of the posterior fold; of the tensor tympani tendon; of the stapedius; severance of adhesions between the umbo and promontory; any of these measures, plus division of adhesions between the crura of the stapes and the walls of the oval niche, are among the operations which have been performed for the improvement of function. The fact that they are now seldom discussed in otologic literature is perhaps a sufficient commentary on their value.

The operation of ossiculectomy, i. e., removal of the drum membrane, malleus and incus—is practically the only surgical measure which is now considered for the improvement of hearing. As the results of this operation have been subjected to the crucial test of time, the number of its advocates have diminished.

Among recent expressions of opinion as to its value, we find the following:

Politzer¹ says "the results of this operation were so unsatisfactory that it is hardly spoken of at the present time." He states that he has seen cases in which the operation was "followed by great loss of hearing, ending in deafness."

A. H. Cheatle² of London, considers the operation justifiable, the patient being made to understand that it is more or less of an experimental nature.

Dench³ records favorable results and considers the operation a useful one for appropriate cases.

The operation is based on the hypothesis that the drum membrane, malleus and incus are no longer of value in the conduction of sound, and proposes their removal in order that the stapes acting alone may be permitted to take up sound waves from without and transmit them to the inner ear.

Unfortunately the subsequent effective mobilization of the stapes is often difficult or impossible. This difficulty and the tendency of adhesions to reform between stapes and adjacent structures, have led many to condemn the operation *in toto*.

The good results reported by Dr. Dench are presuma-

1. Politzer: Diseases of Ear, p. 325.

2. Wright: Diseases of Ear, pp. 1191-3.

3. Dench: Medical News, February, 1903.

bly explainable by a very happy and fortunate selection of cases.

In considering the uncertainties of the operation it must be remembered that in the class of cases for which it is proposed, the condition so far as the hearing is concerned is usually a desperate one.

58 West Fifty-sixth Street.

THE HOT-WATER DOUCHE IN TREATMENT OF CHRONIC CATARRHAL DEAFNESS.*

GUSTAVUS P. HEAD, M.D.

CHICAGO.

So many factors enter into the causation of the deafness accompanying chronic middle ear catarrh that any treatment looking to the relief of the condition must be directed along several different lines. For this reason when any new treatment is presented it is, as a rule, mentioned that it is to be used in connection with the usually practiced measures. Therefore, in presenting the method I shall suggest, it is to be understood that the treatment of nasal and nasopharyngeal disease and of tubal disease will be carried out as seems necessary in each case.

Recognizing the value of heat in causing the absorption of inflammatory exudates even when such exudates have become partially organized, there has been a persistent effort on the part of otologists to devise some practical method by which this active agent may be utilized in the treatment of diseases of the middle ear. With this object in view a number of instruments have been devised for the purpose of applying a stream of hot air either to the drum membrane through the external canal, or else to the middle ear through the eustachian tube.

There is no doubt of the possibility of applying a stream of hot air to the drum membrane through the external canal, but many who have tried the application through the eustachian catheter have expressed grave doubts as to the possibility of delivering a stream of air through the catheter so that it may reach the tympanic cavity hot enough to be of much value. With the various instruments used by me I have been unable to satisfy myself of any good results secured by the eustachian hot-air douche. Although practiced in a number of cases during a period of several years, it was invariably abandoned because of lack of results commensurate with the time and labor expended by the operator and the expense to the patient.

Considering that the tympanic cavity is the part which we usually desire to reach by the absorbent agents, and that this cavity is a shallow one, separated from the external canal by a thin membrane only, it would certainly seem that sufficient heat might be conducted to the cavity from the external canal without the necessity of resorting to the more difficult, doubtful and not always harmless expedient of forcing the heat through the eustachian tube. That the effect of the heat on the more or less occluded eustachian canal should be of benefit regardless of the effect in the tympanic cavity can not be denied, but that I have seen any individual case so benefited I am not able to assert.

In the use of the hot-air douche through the external canal, several difficulties present themselves: It is al-

most impossible to deliver a stream of air at an even temperature hot enough to be of value. The patient will either complain of the burning and draw away, or else the air soon ceases to be hot enough to be effective.

The treatment must remain wholly in the physician's hands. This means that it can not be used more than two or three times a week in the case of the average patient on account of the expense. It also means a great loss of time to the otologist. The douche should be in operation ten minutes for each ear, so that with other necessary treatment, preliminaries and delays, not less than thirty minutes will be required for each patient.

A trial of the hot-air treatment in which the heat is applied through a canvas tube attached to cover the ear, impressed me that this is a most clumsy way of reaching the part which we really desire to reach, and I was very uncertain as to how much heat reached the tympanic cavity. The same objections apply, though to a lesser degree, to this method as to the hot-air douche.

With the objections to the treatment in vogue and looking for a method whereby as good or better results might be attained in a more simple way, the use of hot water suggested itself.

In the course of a general practice, having so often seen the melting away of the exudates, inflammatory and non-inflammatory, from the pelvic cavity through the agency of the hot douche, it occurred to me that in the tympanic cavity we had a region far more easily reached by the douche and one in which the exudation lay much nearer the stream of hot water than in the pelvic cavity. Although the hot-water douche is in almost universal use in the acute inflammations of the tympanic cavity, I could find no literature on the use of this agent in chronic catarrhal conditions. When first experimenting with the use of hot water in the ear I invariably began the treatment in the worse ear, after having treated both ears sufficiently by the ordinary methods to ascertain about what rate of improvement might be expected.

In these cases the ear treated with the hot douche immediately showed a greater improvement than the other ear, and in no case was there any injury shown in the ear thus treated.

In the use of hot water the difficulties attending the hot-air treatment were not encountered. In the first place, this branch of the treatment is placed entirely in the patient's hands, thus allowing it to be used twice daily if so desired.

Secondly, the doctor is spared the necessity of devoting so great an amount of time to each treatment, the patient coming to the office only to have the usual treatment applied, and now with the stimulating effect of the heat on the contents of the tympanum and attic, the air or vapor douche through the eustachian tube or the external masseur becomes much more effective in loosening adhesions.

TECHNIC OF DOUCHE.

The patient readily adapts the heat of the water to his comfort. My instructions are to use the water as hot as can be borne without burning. A specially small tip is ordered, or a straight glass medicine dropper may be inserted into the tube of the fountain syringe, the patient being instructed just how to hold the tip and how deep to insert it. The fountain bag is hung from 18 to 24 inches above the ear, or just high enough that the water will be surely carried to the drum membrane.

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