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OF THE  
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PROCEEDINGS OF SECTIONS.

SECTION OF LARYNGOLOGY AND  
OTOLOGY.

GREVILLE MACDONALD, M.D., President.

RECENT PROGRESS IN THE SURGICAL TREAT-  
MENT OF MALIGNANT DISEASE OF  
THE LARYNX.

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In the past two years several important papers and at least one extensive work upon malignant disease of the larynx have been published. These articles give not only the personal results of distinguished operators, but two of them at least, the Lettsomian Lectures of Mr. Watson Cheyne and the elaborate treatise of Sendziak, are most important additions to the general knowledge of the disease. The description of the operation and the after-history of the case reported by Dr. J. Solis Cohen, of Philadelphia—in which the free end of the trachea was brought out at the wound in the neck and there attached, all communication between the trachea and the pharynx being thereby cut off, the man now alive more than five years after the operation, possessed of a good voice and without artificial aid either in breathing or speaking—marks an era in the history of laryngectomy, and constitutes a brilliant addition to the resources of conservative surgery. The reports of cases operated upon by Mr. Butlin and Sir F. Semon, of London, show that by the diligent care which they have bestowed upon their patients, the fertility of their invention in suggesting new devices or adapting old ones to their necessities, and the keen perception with which they have obtained the earliest possible diagnosis in doubtful cases, they are fully justified in the brilliant results which have been their well-deserved reward. Another valuable contribution is the excellent report of cases of thyrotomy by Professor Clinton Wagner, of New York. In the latest publication on the subject Schmiegelow, of Copenhagen, gives a valuable *résumé* of the diagnosis and treatment of laryngeal cancer, and reports twelve radical operations for its cure. Kocher is continuing his skilful work in this direction in Germany, while in the United States as elsewhere the influence of the improved methods and ideas which have come to us is gradually being felt and appreciated.

Turning now to the statistics of major operations performed upon the larynx for malignant disease there is evidence of a marked improvement, as, even during the past six years, the mortality from them has been greatly diminished. Thus, "up to 1880, according to Holmer, the mortality was 42 per cent. Tauber reports between 1886 and 1890 a rate of 60 per cent. Between 1880 and 1888 Shier found that the rate had fallen to 34 per cent.; since 1890 the same observer finds that the rate for that period has been reduced to 22 per cent." Schmiegelow himself, carrying the reports up to the present time, finds that the percentage of cures since 1890 has been 13.5 per cent., and of immediate mortality 13.7 per cent. The most successful series of cases yet published is that of Butlin and Semon, who report a rate of cures of 63.6 per cent. It would be most gratifying if the flattering statements as to the improved statistics of this class of operations could be accepted as actually representing their true position at the present time. Undoubtedly in the cases of certain individual operators who, like Hann, Butlin, Schmiegelow and some others, have faithfully and without reserve reported all of their cases, good and bad alike, we are able to gain from their reports deductions of genuine value. It is both discredit-

able and unfortunate, however, that many operators have failed to publish their unsuccessful cases, and have only reported such as have resulted well.

Time and again the operation has been attempted under unfavourable conditions, and by unskilled but venturesome men, whose rashness has quickly robbed the patient of what little hope belonged to him, and who, having nothing favourable to report, have avoided publicity. If the whole story were to be told, it is likely that the completed statistics would be discouragingly bad, not because the methods of treatment have not been vastly improved, but for the reason that in the hands of some operators the work has been so unskilfully done. This being the case in the surgical world at large, it cannot be insisted upon too urgently that carcinomatous cases requiring laryngectomy are desperate at the best, both as to immediate and as to ultimate results, and that with our present comparatively limited knowledge of the subject no amount of caution, however great, will avail in preventing a high percentage of failures. With the sources of danger so numerous, constant, and subtle it is impossible that too great foresight or experience be brought to bear against them, or that the urgency of this demand be overstated. Doubtless the best preparation for the work on the part of the surgeon would be a thorough knowledge of operations upon the tongue, neck, and lower jaw in general. In the after-care of the patient also it is not by any means enough that the watchers should be ordinarily qualified in the care of severe surgical cases. Nothing short of special fitness in the department of this particular class of cases, both on the part of surgeon and attendants, will yield the best results.

Turning now to the methods of operating which have of late appeared to meet the best success, we find that they may be divided into three groups:

1. Thyrotomy, with or without partial laryngectomy.
2. Complete laryngectomy by the method adopted in Solis Cohen's case.
3. Complete laryngectomy in cases of extensive laryngeal disease with glandular involvement.

Examples of all three are beginning to multiply to such an extent that it will not be long before we shall have a collection of details sufficient to afford fairly positive knowledge of their real value, together with a fund of technical information relating to the subject which cannot fail to be of material aid for future guidance.

A short consideration of these methods would not be without interest did time permit. Full and complete descriptions of them have already been given to you, however, and may readily be found in the columns of the *JOURNAL* of this Association, in the *Transactions* of the American Laryngological Association, and in the *London Lancet*. If there should be anyone who contemplates operating upon a patient suffering from malignant laryngeal disease it will be well for him, however experienced he may otherwise be, to study the writings of Butlin and Semon, of Solis Cohen, and of Watson Cheyne with diligent care. Let it be said, further, that such operations are too dangerous to be entrusted to any but the most careful and experienced hands.

In the diagnosis of malignant disease of the larynx the past year has brought little that is new. Indeed, investigation has of late succeeded not so much in developing a knowledge of new diagnostic points as in proving the unreliability of several which have hitherto been regarded as useful. Thus, the microscope has not succeeded in enabling us to differentiate between a simple growth of the papillomatous variety and one which in its earlier stages resembles a papilloma and fails to give the distinctive marks of malignancy, but which is in reality, or at least becomes, malignant. True, the clinical evidence in a given case may aid the histologist in arriving at a correct interpretation of doubtful microscopic appearances, and, on the other hand, he must not be held to too great accountability for errors or uncertainties arising from faulty specimens—that is, from specimens of insufficient size or not inclusive of the full thickness of the growth. The practical difficulties in the way of utilising the microscope to advantage in the earliest stages of the growth are very great. What is needed is some unerring sign or unmistakable reaction which will prove that there is a difference between cases which now appear identical.

[1926]

In looking for an early sign of laryngeal cancer some have thought that the position of the growth was more or less diagnostic. Thus, a suspicious papilloma originating upon the anterior half of a vocal band was probably benign, while a similar appearance upon the posterior half of the band or in the posterior commissure was malignant. While the latter proposition may often be the case, the same cannot be said of the former, as has been the experience of the writer in more than one instance.

When the growth originates well forward in the larynx there is often the loss of another sign, namely, the restriction or abolition of the natural movement of the larynx in inspiration due to infiltration of the neighbouring muscles. The writer has lately seen a patient in whom, with well-marked epithelioma of the anterior half of one side of the larynx, the laryngeal movements were complete and absolutely symmetrical. Finally, hoarseness of the voice, the earliest and most constant sign in most cases of cancer, is also present in nearly every other disease which affects the interior of the larynx. Even if the true cause of it were to be surmised, the difficulty of proving the actual nature of the case so early in its course would make it impossible to apply surgical means for the attempted eradication of the disease on such slender grounds.

It has seemed for some time past that, while much progress was being made in the technique of laryngeal operations in general, and in the care of the patient and of the local wound after operation, the subject of tracheotomy preliminary to extensive laryngeal operation had never been satisfactorily considered. Thus, most writers upon the subject treat of it in combination with operations upon the parts above, not always appearing to realise that the conditions as between excision of the jaw and laryngectomy may greatly differ and that what might be true for the one class of cases would not necessarily follow for the other.

#### PRELIMINARY TRACHEOTOMY.

We will consider two principal propositions regarding it:

1. Is preliminary tracheotomy a necessary measure in the surgical treatment of laryngeal cancer?
2. If required, at what time with relation to the major operation should it be performed?

The necessity for a preliminary tracheotomy is generally conceded, and there are few surgeons who would attempt to operate under existing methods without resorting to it.

Murray in a recent article on the subject,<sup>1</sup> advocates its use on the well-known grounds that it prevents the entrance of blood and septic matter into the trachea during the operation, and at the same time admits of the continuous and convenient administration of the anæsthetic, thus permitting a complete and satisfactory operation. The possibility of the entrance of considerable blood into the trachea is a danger peculiar to these cases, and calls for every precaution on the part of the surgeon to avoid its occurrence. Should such an accident happen, sudden death by asphyxia may follow, or, if the patient be rescued by prompt tracheotomy, he may later succumb to septic pneumonia. While the degree of danger no doubt depends upon the quantity of blood which may gain access to the trachea, still it is not impossible that the entrance of even a small amount may be very disastrous. The liability of the aspiration of blood is increased in operations requiring considerable time, and where complete anæsthesia, together with a recumbent position of the patient, is of advantage, and it is in this class of cases that the preliminary measure is of the greatest value. Of equal importance is the prevention of the entrance of septic matter. These, with other considerations which will be dealt with later on, prove without doubt that preliminary tracheotomy is a necessary adjunct to extensive operations performed upon the larynx.

More important than the subject just discussed, because less understood and appreciated, is the vital question as to when with relation to the major operation the preliminary tracheotomy should be performed. Some excellent surgeons, among them Mr. Watson Cheyne, advocate the insertion of the cannula immediately prior to the main operation, on the ground that the patient is thus saved the anxiety and shock of two separate procedures, and because, as is claimed, that no special advantage is likely to be derived from its earlier application.

In the case of operations upon the tongue, the jaws, or the pharynx, this may possibly be true. In operations upon the larynx requiring tracheotomy, however, there is no doubt that many of the conditions are essentially different from those present in the procedures mentioned above, and that, for special and important reasons, the plan of operating must be so conducted as best to meet them. The conditions referred to affect not alone the convenience of the operator nor the mere comfort of the patient. They are based upon reasons physiological, pathological, and surgical. Upon the intelligent and skillful treatment of them will often depend the success of the case, and even the life of the patient. It is necessary to understand, therefore, what they are and how they may best be met.

Of the physiological conditions which distinguish extensive operations upon the larynx from those performed higher up in the air passages, the most important is the close proximity of the pneumogastric nerve to the site of the operation. Just how much influence upon the successful progress of the case may be exerted by injury to this important trunk during operation or by irritation to it afterwards from some of the various accidents of inflammation which may follow is difficult to say. Doubtless, if the history of past cases of laryngotomy could be fully understood, much interesting and valuable information on this point would be brought to light. As a field for study it is yet a comparatively open one. There are many cases, however, in which the symptoms of phrenic irritation seem to have been distinct, and not a few others in which obscure symptoms would very probably have found their explanation in it.

With regard to the insertion of the cannula, it is certain that the irritation of this and other neighbouring parts is apt to be more severe immediately after operation, and that with the lapse of a few days the tolerance of the patient to the presence of the tube is greatly increased.

More important even than the above are the changes which the tracheal tube necessitates in the physiology of respiration. The sudden elimination from the process of breathing of almost the whole of the upper air tract, with all which that implies; the exposure of the trachea and bronchi to air thus deprived of suitable preparation for its reception to the lungs, and, finally, the sudden increase in the amount of oxygen admitted in cases where pre-existing stenosis of the larynx has been severe—all tend to disturb the general equilibrium of the patient, and to cause locally a greater or less amount of annoying, or even dangerous, irritation. It is desirable, therefore, that at the time of the major operation and afterwards the patient should be relieved of as many of these complicating matters as possible.

Another consideration of interest in this connection is that in performing an early tracheotomy the changed conditions of respiration are assumed at a time when the patient is in a quiescent state, and when being mentally and physically less disturbed than it is likely that he could be after the major operation, he can, with the least physiological irritation, and the maximum of convenience to himself, acquire a sufficient knowledge of the mechanism of the tube, the peculiar management which it requires, and the effect of its use upon himself. The value of this preliminary experience has often been underestimated. Indeed, with a patient of fair intelligence, it is a good plan to fully instruct him beforehand in the different points upon which he should be informed. Thus, after operation, the patient will be able to receive with intelligence and with far less difficulty the directions which may be given to him, and his physical comfort and mental quietude be thereby greatly increased.

The performance of an early tracheotomy is thought by some to subject the patient, after the major operation, to the danger of septic infection from the tracheal wound. While it must be admitted that this is not impossible where the cannula is inserted within a few days before laryngectomy, it does not follow that it will take place if the tracheotomy is performed at a time sufficiently long before the former to allow the wound to be tolerably well healed. Septic infection or pneumonia, if they were to develop, could hardly be due to the influence of the tracheal wound if the latter had passed the stage in which infection is likely to occur. Again, the general condition of the patient suffering from progressive laryngeal stenosis is invariably less favourable than



when normal respiration is possible. The restoration of a sufficient supply of oxygen to the system is sure to be followed by improvement, especially in the anæmia, malnutrition, and depression which are generally present. In this respect, therefore, the early operation is of great value as preparatory to the successful issue of the later one.

The effect of laryngeal stenosis upon the bronchial mucous membrane is of course irritating, and, especially in cases where the dyspnoea has existed for some time, bronchitis is often present. This will be materially benefited by the free admission of air to the lungs and by the generally improved tone of the system which follows tracheotomy. Finally, there is one consideration which seems to have escaped general attention. In all cases of serious inflammatory disease of the larynx the severity of the symptoms is increased by the physiological use of the organ. The state of quietude which follows tracheotomy, from the consequent abolition of the respiratory movement of the larynx, is almost always accompanied by a marked amelioration in the local condition, which may continue to advance for several weeks. The advantages of this at the time of the main operation are obviously many and important, and in cases where the congestion is such as to make it difficult to distinguish between diseased and healthy parts are sufficient in themselves to fully warrant the sacrifice of a few days' time. Where the diagnosis of a small and unirritated intralaryngeal growth has been made early, and where in consequence there is no great amount of congestion, and therefore little prospect of improvement after tracheotomy, the above remarks do not apply. Cases are not unknown, however, where they are found to be of distinct value. It is hoped that they will be accorded the consideration which they deserve.

Several of the surgical advantages claimed for early tracheotomy have been generally recognised. Thus:

Much valuable time is saved at the performance of the later operation; the patient is spared a certain amount of shock, and possibly of hæmorrhage, and the undivided attention of the operator can be concentrated upon the difficult task which confronts him in the removal of the larynx.

Again, the administration of the anæsthetic through the cannula is rendered easier both for the anæsthetist and the patient than when given in the usual way.

Lastly, a point of great practical importance has lately come to my notice in connection with the method of laryngectomy practised by Dr. J. Solis-Cohen. In that operation the larynx is entirely removed and the severed end of the trachea is turned forward and fastened to the edges of the external incision in the neck. In a case of this kind orally reported to me several months ago there had been no early tracheotomy, and, in consequence, there was no cicatricial adhesion of the parts, and when the edges of the trachea were stitched to the cervical wound there was free movement of the former with every effort of respiration, and the sutures entirely failed to keep the parts properly together. Thus union could not take place, the operation was a failure, and the patient died.

With an early preliminary tracheotomy considerable cicatricial adhesion takes place between the walls of the trachea and the wound in the neck, and while this is attended with no special disadvantage to the patient, it becomes a matter of vital importance when he must submit to Cohen's method of extirpation of the larynx. For the larynx having been removed and the severed end of the trachea brought out at the opening of the neck, the soft parts of the neck are already sufficiently adherent to the trachea by means of the cicatricial tissue to hold the united surfaces in steady apposition, and thus, with the aid of the proper sutures, secure satisfactory union. The value of this is obvious and therefore need not be dwelt upon.

The truth of the above statements being admitted, there can be no doubt that early tracheotomy possesses advantages which should insure its employment in all suitable cases. It would also appear that the greater the interval of time within reasonable limits between the preliminary operation and the major one, the better, at least ten days being a desirable minimum. Of course, if the disease within the larynx is making evident progress and the speedy removal of the disease is imperatively necessary, the surgeon must be guided by the best judgment at his command. In most cases, how-

ever, the delay of a few days will be more than compensated for by the advantages which I have tried to describe.

REFERENCE.  
1 *Annals of Surgery*, May, 1897.

## DISCUSSION ON THE ULTIMATE RESULTS OF OPERATIONS ON THE MASTOID.

I.—F. BULLER, M.D.,

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### GENERAL INTRODUCTION.

THE pathological conditions which necessitate operations for the removal of inflammatory products pent up in the bony spaces of the mastoid region may be considered under two headings:

1. Those in which the bone is inflamed and softened, with or without purulent infiltration, or more circumscribed collections of pus, but in which there is no actual caries of the bony structure.

2. Those in which actual death of the bone has occurred more or less extensively, either in the form of caries or necrosis or both.

In the first class decomposition of the inflammatory exudation or of the tissues involved has not taken place, there is no fetid or ichorous pus. I am not prepared to say that fetid pus may not occur in this class of cases, but I have not seen it. As a distinct type of mastoid disease we meet with these cases during or shortly after acute purulent disease of the middle ear, and more often in adults than in children.

The second class occurs in the more chronic forms of middle-ear suppuration, and more often in children than in adults, though by no means rarely in the latter. In these cases the carious bone may not be confined to the mastoid, but often involves other parts, such as the walls of the external auditory canal, the tympanic cavity, and, in fact, any part of the temporal bone adjacent to the mastoid or tympanum. It is obvious that this class of mastoid disease is far more serious than the former, and the results of operative treatment are correspondingly uncertain, the cure more difficult, and often less complete.

I cannot at short notice give a definite statement, sustained by recorded facts, as to the final results of the many operations I have performed in both varieties of mastoid disease; but of this I am certain, that in the first class I have never seen an unfavourable result when the bone was opened before the occurrence of intracranial complications. All such cases recover perfectly in a few weeks after operation, even to the extent of regaining perfect, or almost perfect, hearing, and I have never known this form of mastoid disease to recur on the operated side, though I have seen many of these cases ten, fifteen, and twenty years after the operation. In other words, the cure is always permanent.

The results may be very different when there has been extensive caries of the bone, or perhaps only a limited caries, in an inaccessible position. When an operation is to be done under these circumstances no definite rules can be followed; the operator is simply obliged to follow, trace out, and remove diseased bone and inflammatory debris as he goes along, only staying his hand when he has removed all the diseased bone, etc., that can be reached, or when in his judgment prudence dictates that he should go no further. There is no particular reason to dread penetrating the lateral sinus, but the facial nerve is the structure which gives the operator greatest anxiety. He may find extensive destruction of the tympanic walls, the walls of the sinus, or adjacent cranial cavity. If such be the condition of things found, it is not to be expected that healing will always promptly ensue, that the discharging ear will at once become healthy, that hearing will be restored to any considerable extent.

Although most of these cases do ultimately recover—or, at least, do not terminate fatally, a certain proportion succumb to intracranial complications, others only get well after prolonged suppuration from the middle ear, or from fistulous tracts leading to deep-seated residual diseased bone, often with great impairment, or sometimes total loss of hearing in the diseased ear.

The worst and most tedious cases of this kind are those in which there is obviously a strumous diathesis; but even

here the prognosis is not altogether hopeless, and much may be accomplished by prolonged and careful treatment, both local and general. Diseased bone, which could not at first be safely removed, may in time loosen and come away of itself or be removed by means of secondary operations. My experience of operations for the relief of intracranial complications is so limited that I do not feel justified in making any positive statement as to the results attainable in such cases. I have only seen one case in which an abscess in the temporo-sphenoidal lobe was reached, after opening the mastoid by trephining the skull, and successfully evacuated, though I have seen several in which brain abscess might have been evacuated had a positive diagnosis been made soon enough.

I do not believe that the gravity and importance of mastoid disease is as yet fully appreciated by general surgeons. The writer of a well-known work on operative surgery speaks of the operation: "This little operation may be performed so-and-so." He evidently imagines the surgeon has done all that can be expected of him when he has succeeded in boring a hole through the outer table of that part of the skull. We otologists may be excused for thinking differently; we have learned that the more thoroughly we remove the diseased tissue the better will be our patient's chance of recovery. We know that the operation may be easy, simple, and safe; but also that it may be most tedious, difficult, and dangerous.

We never know exactly what we are going to meet with until we have begun the operation, and we never meet with two cases that are exactly alike in every detail. For individuality, mastoid disease bears the palm against all surgical conditions, hence the increasing respect it commands from all experienced otologists.

[Dr. Buller also reported the following case, and observed that, although some notes of the case had appeared in previously published hospital reports, it had never been recorded from an otological point of view; the following notes had been made in order that the case might go on record as illustrating the course and progress to recovery of a very severe sequel to suppurating middle-ear disease. For the report he was largely indebted to Dr. H. S. Shaw, late House Surgeon in the Royal Victoria Hospital, and formerly his assistant there.]

#### MASTOID DISEASE WITH SINUS THROMBOSIS: EVACUATION OF SINUS AND LIGATURE OF INTERNAL JUGULAR VEIN: RECOVERY.

D. K., aged 10 years, was admitted to the wards of the Royal Victoria Hospital on May 18th, 1894, complaining of severe frontal headache and pain over the left mastoid process.

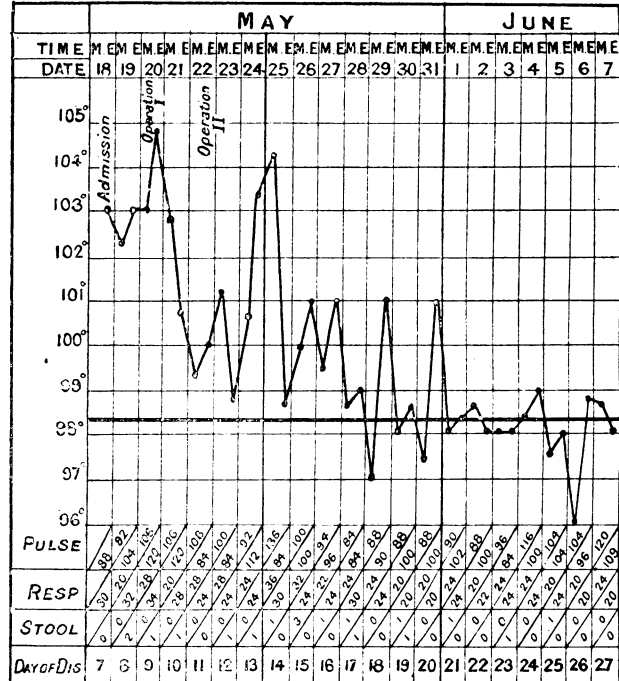
*History.*—Five years before admission, after a severe cold and sore throat, the patient's ears began to discharge, and have been discharging intermittently since then, and there has been marked deafness. On May 12th he was feverish, felt dizzy on standing up, and complained of frontal headache and pain over the mastoid region. The pain continued to increase, so that the patient got no rest by night or day. There was no history of rigors, but occasionally vomiting occurred before his admission to hospital.

*Condition on Admission.*—The patient was a well-nourished boy, rather dull of comprehension, but evidently suffering greatly. The temperature was 103°, pulse 88, respiration 30. The annexed chart shows the subsequent excessive fluctuations. There was chronic suppurative otitis media of both ears; on the left a comparatively recent exacerbation with pain. The left mastoid presented no external abnormality except tenderness over the surface and posterior border, but without a trace of swelling. There was, however, moderate swelling and tenderness in the neck immediately below the ear, beneath and anterior to the sterno-mastoid muscle. The left auditory canal contained a small quantity of very fetid secretion, which when syringed out was found to consist of epithelial debris and fetid purulent matter. The floor of the canal was occupied by a polypoid excrescence, about half filling the lumen. The state of hearing could not be determined certainly, but by Politzer's inflation there was found to be perforation of each tympanic membrane. Other organs were normal.

*Treatment.*—On the day after admission, the patient's condition being unimproved, Dr. Buller cut down on the mastoid. The surface of the bone showed numerous enlarged emissary veins behind the meatus, and the bone, easily penetrated by a cutting scoop, was soft and porous. At a depth of a few millimetres the softened bone was found carious and infiltrated with pus; following this an opening was soon made into a large cavity, evidently the sigmoid sinus, which was found filled with fetid debris. After removing all the discoverable diseased bone and cleansing out the sinus, the wound was packed with iodoform gauze.

*Ligation of Internal Jugular.*—Two days later, May 21st, as the temperature had not subsided, it was deemed advisable to ligate the internal jugular vein. Under chloroform Dr. Bull cut down over the course of the vein and came upon the sheath of the vessels, which formed a firm mass of infiltrated tissue, in which it was found very difficult to distinguish the structures. For the purpose of getting at the sheath more readily the omo-hyoid muscle was divided and the jugular vein found empty at this part, which added to the difficulty of dissecting it out from the

cedematous tissue. The jugular was divided between two ligatures. The plugging was removed from the mastoid wound, and a considerable quantity of grey sloughy tissue removed with a gouge. After thoroughly cleansing the interior of the sinus, the membranous outer wall was pushed backward and inward, and the cavity packed with iodoform gauze. Subsequently the patient made an almost uninterrupted recovery, and left the hospital on July 4th with directions to return for treatment of his otorrhœa.



*Present Condition.*—On August 30th, 1897, the wounds in the neck and over the mastoid are marked by small scars. He has no pain or trouble in or about the ears except that both ears are still discharging. The right ear has very fetid pus coming from a perforation in Shrapnell's membrane surrounded by granulations. The left auditory canal is filled with a polypoid growth but the discharge is not offensive. The watch is heard on contact in front of and behind the left ear but not over the meatus, and on contact in the right ear. The case is now one of ordinary suppurative otitis media, which could be much improved by treatment, but is entirely neglected in his present surroundings.

II.—ALBERT H. BUCK, M.D.,  
New York.

#### ACUTE AND CHRONIC CASES.

In considering the question before us I shall follow the example of Dr. Buller and limit my remarks to those cases in which the disease is more or less strictly confined to the mastoid region and middle ear. For our present purposes these cases may be considered in two separate groups—the acute and the chronic. In cases belonging to the former group the operation is almost always successful; and if, in course of time, it be found that operative interference has not arrested or entirely cured the disease, the inference is warranted that our methods of procedure have been in some respects defective. In the chronic cases an equally favourable result may be expected from a thorough removal of all bone tissue that is diseased. There, however, the interference required is apt to be much more extensive than in the acute cases. It is not always an easy matter to decide, from inspection and from the degree of firmness which the bone manifests, whether we may safely allow it to remain. A high degree of vascularity, as shown by the colour and by the persistent and copious character of the bleeding from the cut surface, and especially any evidences of an established stasis in some of the vessels, should be accepted as indications that the bone so involved is not likely to return to a condition of health, and consequently should be removed. The mere presence of granulation tissue in the pneumatic cells (without any recognisable amount of pus) is also a good indication that the bony framework in their vicinity should be entirely cut away. The grosser indications of disease will



scarcely escape detection, provided the field of operation is made large enough to bring all the suspected parts into view.

III.—HUGH E. JONES, L.R.C.P., M.R.C.S.,  
Assistant-Surgeon, Liverpool Eye and Ear Infirmary.

#### RISKS AND COMPLICATIONS.

I WILL limit my remarks to cases of chronic suppurative middle-ear diseases which have presented no acute symptoms—at any rate within the few weeks or months preceding the operation; that is to say, cases in which the operation has been one of expediency rather than of urgent necessity. Within these limits, my experience has extended to about thirty cases.

The operation I have performed in the cases under discussion is the radical one known as the Stacke-Schwartz, or Panse-Körner operation. This is now so well known that it requires no description. The possible objections based upon results are:

1. *The Possibility of a Fatal Result.*—No fatal result has occurred in my cases. I have had two deaths in cases which do not come within the limits prescribed above. A baby (probably syphilitic) aged 3 months, with a large mastoid abscess, died from convulsions a few hours after a simple operation (incision and opening of the antrum). A man with extensive necrosis of the mastoid died of diabetic coma five days after the operation. The necropsy revealed no intracranial extension of the septic process.

2. *Facial Paralysis.*—This is undoubtedly a most distressing result when it does occur, but I think the operator suffers a great deal more than the patient. I have had two cases of temporary and two of permanent facial paralysis following operation. They all occurred in my first dozen cases. I think those who prefer the risk of intracranial complications to the risks of facial paralysis underrate the magnitude of the former and overrate the disadvantages of (partial) permanent facial paralysis—I say partial, because in my experience the paralysis has never been quite complete. One patient, a good-looking young schoolmistress, told me four years after the operation that she had not regretted the operation, because the relief from pain and discomfort had more than counterbalanced the disfigurement of the facial paralysis. The operation was done chiefly to relieve persistent pain in a densely sclerosed mastoid. Both the otorrhœa and pain had ceased entirely. In order to avoid injuring the facial nerve it is imperative that the operator should see well into the depths of the cavity he is making. The difficulties in the way of this are the trickling of blood into the cavity and the unmanageableness of the partially detached auricle and the soft parts of the meatus. I have tried all sorts of metal retractors and guides without being entirely satisfied, and have resorted to a very simple plan which seems to me to meet the difficulty. A simple strip of linen 10 inches long, 2 or 3 inches wide at one end and tapering to a point at the other, is used as a retractor in the following way: After the auricle has been partially detached and drawn forwards and the soft parts separated from the meatus, the narrow end of the linen strip is pushed down to the bottom of the cavity so made; the blades of a pair of sinus forceps are then introduced into the meatus proper and the end of the linen strip caught and drawn through until the wide middle part covers the cut surface of the auricle; the ends are then given to an assistant, who pulls both forward together until the auricle and soft parts of the meatus are well out of the operator's line of sight. The pressure exerted on the cut surface stops the oozing of blood very quickly. I have had a similar instrument made out of india-rubber, with bands for fixing it in position without the aid of an assistant, but I prefer the simple linen strip. This can be cut at a moment's notice from a linen or calico bandage, can be boiled, is never used twice, and costs nothing.

3. *Giddiness and Vomiting* never lasted more than twenty-four hours, and caused much distress in one case only.

4. *Tinnitus.*—I have had no complaints of tinnitus as a result of the operation.

5. *Increased Deafness.*—Two cases of obstinate progressive deafness continued to get worse after operation.

6. *Failure to Improve Hearing.*—The great majority of my

cases were definitely and several greatly improved. At least two cases improved from watch 2" or 3" to watch 18" or 20". This improvement has, however, not been maintained. As cicatrisation proceeds the hearing becomes worse again until watch 3" or 4" is reached. With the exceptions of the cases under the last heading, I am not aware that any case has ultimately been worse than before operation. Including the above exceptions, I can remember five which did not improve after operation.

7. *Failure to Relieve Pain.*—I can recall 5 cases operated on chiefly on account of pain. They have all been very much freer, and some entirely free from pain since the operation.

8. *Failure to Completely and Permanently Arrest the Discharge.*—This is perhaps the objection most frequently heard, and as the operation is in the majority of cases performed with the principal object of stopping an intractable suppuration, it is an objection which requires very careful and fair consideration. I am not prepared to quote accurate statistics, but relying largely on my memory, I give what I hope is a fair account of my results. Of cases which have passed from observation from three to six months after operation, the great majority had ceased to have any discharge, though in some a little mucus could generally be detected lying in the fundus of the tympanum. Of those who have continued to come up for inspection at intervals, about half have dry tympana with slight accumulation of wax. Four or five others have kept well for several months at a time, and then have had mild attacks of muco-purulent catarrh. The remaining 4 or 5 have never been perfectly free from a slight inodorous discharge of a mucus or muco-serous nature. Not one has, so far as my knowledge goes, had persistent offensive or blood-stained discharge. I have been able to compare with these cases concurrent ones of a similar nature in which operation had been declined. I have no hesitation in saying that the comparison has nearly always resulted in favour of the cases which have been operated upon.

At first sight this statement may not appear to be a very favourable one, but if the following points are taken into consideration the reverse will be the case. The operation has only been done after all other means of stopping the discharge have been thoroughly applied. What does an intractable offensive discharge mean? To me it means a diseased area which cannot be effectually reached by remedies applied through the meatus. The operation under discussion, if properly performed, brings the whole of the diseased area within reach of effective treatment. In a fair proportion of cases it also disposes, for the time at any rate, of the whole of the diseased tissue, but whether it does or does not then and there, or ultimately, stop all discharge of any kind whatsoever does not appear to me to be a question which affects the position of the operation as a sound surgical procedure. In the first place, the operation provides free drainage and brings the whole area of disease within the range of subsequent treatment; consequently I have never known it to fail in leading either to cessation of the discharge or to a complete alteration in its character. In the next place, recurrence of inflammatory attacks in any organ exposed to the action of germs introduced from without cannot be entertained as an objection to an operation which makes those attacks comparatively harmless.

Again, as I have pointed out elsewhere, it is absurd to expect any cavity lined with mucous membrane to be entirely free from moisture. An absolutely dry tympanum is no more a healthy organ than a dry mouth, and for my part I am better pleased with the cases which continue to have a little mucus secreted in the tympanum than with those in which, owing to complete destruction of the mucous tissue, absolute dryness results.

IV.—CLARENCE J. BLAKE, M.D.,

Boston, Massachusetts;

Aural Surgeon to the Massachusetts Eye and Ear Infirmary.

#### SELECTION OF AN OPERATION: BACTERIOLOGY.

The purpose of this communication is to present a series of 36 cases of mastoid operation occurring consecutively in my last three months' service in the aural department of the Massachusetts Charitable Eye and Ear Infirmary; they serve to illustrate certain important points, and include both the

simple and uncomplicated, and the more serious and complicated forms of mastoid disease. They may be classified as, first, cases of acute inflammation of the mastoid, originating in acute inflammation of the middle ear confined to the contents of the mastoid process, and in which thorough evacuation of the mastoid contents and establishment of free communication with the middle ear through the mastoid antrum, followed by filling of the operative cavity with blood and closure of the external wound, resulted in what was practically a healing by first intention.

Secondly, cases of mastoid disease in which the mastoid cortex had become more or less involved in the destructive process, and the operative procedure consisted not only in the evacuation of the mastoid contents, but also in the removal of portions of the surrounding wall without attempt at primary healing.

Thirdly, cases in which, in addition to the disease already mentioned, there was implication of structures surrounding the mastoid process, and invasion either of the cranial cavity or extrusion of the suppurative mastoid contents posteriorly towards the occiput or downward into the muscles of the neck.

Since it is possible to determine by examination of the outer contour of the mastoid process the corresponding contour of its inner wall, and, within certain limits, the depths to which the sinus wall projects into the lumen of the mastoid process, a tactile examination of the mastoid process before operation, or, if the contour of the mastoid is obscured by swelling of the soft tissues, a tactile examination of the mastoid of the opposite side is often of considerable service. Examination of a large number of crania has shown that marked deformity and asymmetry of the mastoid processes occurs in about only 8 per cent., and that as a rule the narrow, small, and pointed mastoid has a deep groove for the sinus, and a consequently small operative triangle, while, on the contrary, the broad, blunt, and rounded mastoid process is deeper posteriorly, and has an operative triangle of correspondingly greater size.

At the meeting of the British Medical Association in Leeds, Professor Macewen made the statement that American aurists were "afraid of the lateral sinus." This statement was perfectly just, and is more true than it should be to-day, after the splendid lessons which he has taught.

Of the 35 cases of mastoid disease requiring radical operation, and occurring in the term of service above mentioned, one required a secondary operation, and another required operation upon both mastoids, making 37 operations in all. These 35 cases may be classed under five heads:

In Class 1 were 5 cases, all occurring in adults, all acute, but with caries of the mastoid cell walls, redundant granulations, and pus in the mastoid. In these cases, after the usual opening through the outer cortex, the diseased contents were thoroughly removed by means of the curette, the healthy cortical wall being left untouched. This cavity was then allowed to fill with blood, the edges of the wound in the soft tissues were united by sutures, and an aseptic gauze dressing was applied. One of these cases was discharged well in seven days after the operation, one on the eighth day, two on the tenth day, and one on the twelfth day. These 5 cases were kept under observation in the out-patient department for two or more months, and remained solidly healed, without symptoms of the recurrence of mastoid trouble. One of these cases three weeks after his discharge from the infirmary reported in the out-patient department with an acute inflammation of the middle ear on the operated side. The ear rapidly improved after a free paracentesis of the drum head, and the patient was discharged well at the end of ten days, having had in the interval no mastoid pain or tenderness whatever, and the discharge from the ear remaining serous during that time. Attempts to obtain primary healing were also made in 12 other cases, making a total of 17. This experiment was made in continuance of that of previous years in order to determine the class of cases to which this procedure might be more especially applicable. Of the 17 cases in question, 11 were acute and 6 chronic. The attempt at primary healing failed in all the chronic cases, but was successful in 5 out of the 11 acute cases. This observation confirms that previously made and first reported to the American Otological Society in 1891, and would seem therefore to justify the use of

this method in all acute and uncomplicated cases of mastoid disease. No possible harm can result from it, since if the blood clot breaks down the sutures can be easily removed, and the wound allowed to heal by granulation.

Class 2 included 18 cases (10 acute and 8 chronic) in which primary healing was not attempted, and in which it was not necessary to remove any portion of the mastoid cortex. Of the acute cases, all did well with the exception of 1, for which a secondary operation was necessary, and this case, therefore, comes under Class 3. Of the other acute cases, 8 were discharged well at the end of periods varying from six to eight weeks after operation; the remaining case, a diabetic, is still under treatment, three months after operation. Of the chronic cases, 5 had been operated upon previously, and had been very slow in recovering, 1 required a secondary operation, 2 were well three months after operation, and the remaining 4 are still under treatment.

Class 3 includes those cases in which, in addition to thorough evacuation of the mastoid, portions of the cortex were removed and the dura exposed. There were 9 cases, 6 acute and 3 chronic; of the acute cases, 1 died of septic cerebro-spinal meningitis ten days after operation; 1, with a convalescent mastoid, was transferred to the south department of the Boston City Hospital on account of measles, and died there two weeks later; 1 was discharged well in three weeks, 1 at the end of five weeks, and 2 are at present convalescent in the out-patient department. Three chronic cases are still under treatment in the out-patient department, and are slowly improving. In these 9 cases pus was found in contact with the dura; in 5 the sinus wall was exposed during the operation, and in 2 accidentally opened with resultant hæmorrhage.

Class 4 includes 3 cases, all acute. All did well, and in all the abscess was very nearly in the same situation, namely, between the dura and the posterior superior angle of the mastoid. There were granulations on the dura, and in 2 cases the sinus was exposed for an inch or more by the operation; all of these cases were discharged well within six weeks after operation. In one of these cases the inner wall and the tip was removed from both mastoids, and the pus was followed back into the jugular fossa, and the contiguous bony wall thoroughly curetted with good results.

Class 5 includes 1 acute and 1 chronic case.

In the acute case there was a small abscess in the brain over the mastoid antrum. The bony structure of the mastoid was very much diseased, and it was necessary to expose the dura over a large area, both superiorly and posteriorly. The patient had had for a few days before operation a characteristic septic temperature; this still continued, and the blood count showed marked leucocytosis, and there was also commencing retinitis on the affected side. Through an opening in the dura there projected a small hernia of the brain 1.5 cm. in diameter. This was at first supported by a firm packing in the wound, but gradually became covered with granulations. The wound is now completely healed and the patient well.

The second case was that of a poorly-nourished Italian child, aged 5 years, who had had a suppurative discharge from the ear for four years. For two weeks before admission into the infirmary there had been marked swelling behind the ear and daily chills and fever, and at the time of admission there was a fluctuating area above and behind the ear, 3 inches in diameter antero-posteriorly and 2 inches in diameter vertically, its centre being just over the spine of the meatus. Pressure upon this swelling caused an outflow of thick offensive pus from the canal. The patient had marked general *malaise*, the temperature was 105°, the pulse rapid and weak, and there was marked stupor. Examination of the eyes showed beginning retinitis, and the blood count a leucocytosis of 35,000. The case was immediately operated upon, the large abscess cavity being first freely opened and curetted. The mastoid was extensively diseased, and the bone, including the cortex, was easily removed by means of the sharp spoon, and the dura exposed over an area an inch and a half in diameter posteriorly and superiorly. The opening in the bone being then extended a distance of an inch above the mastoid limit, the sloughing dura was removed and a large abscess found in the cerebellum from which 3 or 4 drachms of pus were evacuated; the walls of the cavity were thoroughly curetted, and the wound carefully washed out and packed with aseptic gauze, and subsequently cleansed with peroxide of hydrogen and dressed with boric acid. Cultures from the pus showed numerous staphylococci.

During the two weeks following operation the patient had daily chills followed by sudden rise of temperature to 106° or 105° F. This rise in temperature was followed by great prostration, with a thready and tremulous pulse and a condition requiring vigorous stimulation. The examination of the blood for the malaria plasmodium gave negative results. Ten days after the first operation signs suggesting presence of a pus focus were so marked that under ether a thorough examination with an aspirating needle was made, but no pus found. The temperature, however, gradually decreased, the chills ceased, and at the end of three weeks after operation the temperature had become normal. At the present time the brain hernia is about the size of a pullet's egg, pulsates synchronously with the heart, is very sensitive to the touch, and is being



gradually covered by granulation tissue. The patient is speedily gaining in strength, and is evidently making a good recovery.

The fatal case of septic cerebro-spinal meningitis also presents some points which are of interest.

The patient was a woman 21 years of age, neurotic, and in poor general condition. She had acute inflammation of the left middle ear with mastoid tenderness four weeks before admission to the infirmary, and the first night before the mastoid operation had a chill, followed by a rise of temperature of 104° F. The mastoid cortex was found to be very thick, and the mastoid cavity divided into numerous compartments by bridges of very hard bone, which, however, broke down under forcible curetting, revealing small cavities filled with pus under considerable pressure. The softened and carious bone was thoroughly removed by curetting and the wound syringed, the water passing freely through the antrum and middle ear. The dura was not exposed, the cortex being apparently sound. A simple aseptic gauze dressing was used. Cultures from the pus showed streptococci and diplococci. The wound did well, and the patient was discharged to the out-patient department three weeks after the operation. During the last week in the infirmary, however, she had complained of severe frontal headache, and there was also occasional slight elevation of temperature. Examination of the eyes showed an error of refraction which was supposed to be sufficient to account for the pain. After leaving the infirmary the headache grew rapidly worse, and the patient was urged to re-enter the house two days after her discharge; this, however, she refused to do, and did not return until a week later. As pain had in the meantime considerably increased a further operation was decided upon. The ear was perfectly dry, no bare bone could be felt in the mastoid wound, nor was there any tenderness; even upon deep pressure about the mastoid. The temperature, however, was 103° F.; a blood count gave leucocytosis of 20,000, and there was also a suggestion of retinitis. The next day the pain grew worse, the patient became delirious, and the pulse dropped from 120 to 48 within an hour. The mastoid wound was immediately reopened and enlarged, all the remaining cancellous structure as well as the tegmen and the posterior wall were removed, and the opening thus made exposed to view the dura to the whole depth of the mastoid and the sinus for over an inch; no pus was found, and the bone was only moderately softened. The sinus was accidentally opened and bled very freely, requiring plugging. The pulse became much improved, and at the close of the operation was 60. The patient passed a restless night, was still unconscious, and had a morning temperature of 105° F.; the head was slightly retracted, the neck rigid, the pupils uneven and responding to light very slowly, the reflexes were nearly normal.

Dr. J. J. Putnam saw the case in consultation, and performed lumbar puncture, withdrawing about 15 c.cm. of a turbid fluid. The sediment was examined and found to contain streptococci, which were later obtained in pure cultures. The blood was examined daily, but with negative results, but the variations of the leucocytosis were very interesting. Before operation the count gave 20,000, as the disease progressed it went up to 40,000 on the seventh day, and then gradually declined to about 12,000. Slight facial paralysis was noted on the sixth day, and an eruption along the course of the facial nerve. The wound showed no signs of healing, was dressed daily, and the sinus bled quite freely when the packing was removed after the first three dressings; it then became closed with a firm blood clot. The exposure of so much surface of dura permitted observations similar to those previously made in like cases in children as to the effect of lumbar puncture on the cerebral tension; this seemed to be much decreased after the withdrawal of 30 c.cm. of spinal fluid, and the respiration dropped from 56 to 32 within a period of five minutes, and to 26 within an hour; this decrease lasted several hours. The lumbar puncture was repeated daily for a week, the fluid became more and more turbid, and the sediment from the last puncture constituted half the bulk of the fluid. As pure cultures of streptococci were obtained from all these punctures the house officer, Dr. White, to whom I am indebted for the summary of the cases here presented, wished to try the antistreptococcus serum. Beginning with the fourth day after the mastoid operation, it was therefore given in quantities of from 30 to 60 c.cm. daily without, however, any apparent effect on the temperature, respiration, pulse, or general condition. The patient developed septic broncho-pneumonia on the eighth day and died on the tenth, but in the meantime the meningeal symptoms had decreased, and the dura was more normal in appearance. No necropsy was permitted.

It is interesting to note in the brief review of these cases that all of the cases of acute mastoid disease did well in the sense of speedy recovery, with two exceptions, and that the same may be said of 50 per cent. of the chronic cases. The other 50 per cent. of the chronic cases were either very slow in healing or required secondary operations. Six of the chronic cases had been previously treated, but 3 did well in the sense of rapid recovery. It is interesting to note also that the mastoid was found to be diploëtic in 22 cases, pneumatic in 14, and sclerotic in 1. In pursuance of the purpose to determine both the character and course of the infection, cultures were carefully made in all cases. In 23 but one germ was found, in 12 there was a mixed infection, and from 2 no growths were obtained.

	was found pure in	12 cases
Streptococcus	"	5
Staphylococcus	"	6
Diplococcus	"	5
Streptococcus and diplococcus	"	3
Streptococcus and bacillus fetidus	"	1
Streptococcus and bacillus pyocyaneus	"	1
Streptococcus and diplococcus	"	1
Streptococcus, staphylococcus, and diplococcus	"	2

The streptococcus cases were by far the most serious, although one healed by first intention. An interesting fact

was noted in the series of cultures in regard to the infection of the mastoid from the middle ear; as a rule the same germ was obtained by paracentesis as was later found in the mastoid. In one case cultures from paracentesis gave staphylococcus and diplococcus, while from the mastoid a pure culture of diplococcus was obtained, thus showing that the germ in the middle ear to commence with was diplococcus, which infected the mastoid, and that later on the middle ear was infected with streptococcus.

The results obtained from blood counts were also very satisfactory; wherever pus was in contact with the dura leucocytosis was found, while with the mastoid cortex intact, even though the mastoid was filled with pus, no leucocytosis was observed.

In conclusion, it may be said that this series of cases emphasises the conclusions drawn from previous experience that all diseased bone, cortical or otherwise, should be removed and the pus followed to its ultimate extension; that where possible, after thorough surgical cleansing by the operative procedure, healing by first intention should be favoured, and that, in case of hæmorrhage from the lateral sinus or from meningeal arteries, by rapidly enlarging the opening in the bony wall of the cranial cavity the normal brain pressure may be utilised to plug the vessels, and the operation continued without other interruption.

V.—H. LEE MORSE, M.D.

POINTS IN ANATOMY WHICH HAVE A PRACTICAL BEARING UPON OPERATIONS ON THE TEMPORAL BONE IN DISEASE OF THE EAR.

I WISH to call attention to the position of the field of operation in Schwartze's and the Stacke's operations, and to the comparative danger, in the two operations, of injury to the lateral sinus, the facial nerve, the tendon of the stapedius muscle, the stapes, and the horizontal semicircular canal.

Diagram and bone preparations are exhibited in illustration of the points discussed. Two of the diagrams show, in connection with Schwartze's operation, the point where the lateral sinus approaches most nearly to the field of operation. The thickness of the bony wall which separates these two cavities at that point is 6 millimetres. If the distances of the field of operation from each of these dangerous points were noticed, it would be seen that in each case there is a reasonable space. In other diagrams showing Stacke's operation the sinus is laid bare. The field of operation, if carried inward to the inner bony wall, is seen to strike the horizontal semicircular canal. It strikes also the Fallopian canal in which lies the facial nerve. It comes close to, and almost touches, the tendon of the stapedius muscle.

We are told in the description of the operation (Politzer) to be careful not to penetrate too deeply on account of these dangers, and measurements are given to guide us, but the bones vary in dimensions so that no absolute depth can be laid down, and it is difficult in a deep operation in so confined a space to tell just how deep the tip of the curette has penetrated, and therefore it is not surprising that sometimes the facial nerve is cut, with consequent facial paralysis, especially when we consider that the nerve sometimes has no bony covering, or its covering has been softened or partially destroyed by disease of the middle ear.

The chorda tympani nerve is almost of necessity cut, as it lies directly in the track of the operation. The wall of the semicircular canal, on account of its ivory-like character, is not very likely to be softened by disease, but it is possible that we might find it so, especially in children.

The tendon of the stapedius muscle and the stapes itself lie so close to the field of operation that, in our endeavours to scrape out granulation tissue or softened bone, the tendon would be very easily cut, the stapes dislocated, and the way laid open into the inner ear, by a slight variation in the direction given to the curette. All these considerations lead one to choose, whenever the choice is possible, the Schwartze operation.

The preparations I exhibit of the two temporal bones from the skull of a child show that the thickness of the bone separating the field of operation from the sinus is the same in both operations, half a millimetre in each case; but all the other distances, namely, from the field of operation to the

facial nerve, tendon of stapedius muscle, stapes, and horizontal semicircular canal are sharply contrasted, and speak strongly in favour of the Schwartz operation.

In another preparation the chorda tympani is again seen cut by the operation. These preparations bring out another point worth mentioning, which is that most of us are in the habit of using in children curettes which are too large and too clumsy. When one sees how small the spaces are in which he can operate safely, and how thin and soft all the bones are, it seems wonderful that so few accidents occur. Another preparation serves to emphasise the safety of the Schwartz operation, and the abundance of room in which to operate that may exist in a favourable bone, while another preparation shows in addition unusually well the chorda tympani, as it is given off from the facial nerve and passes through the tympanic cavity. This was a diseased ear during life. The membrana tympani has two calcareous deposits in it. The malleus and incus are gone, but were very likely removed in the dissecting room before the bone came into my possession, as the tegmen tympani was already gone when I got the bone. The stapes, however, is intact and was movable, while the specimen was still moist.

In a second specimen from a diseased ear, the malleus has adhesions on it, the membrana tympani was partially destroyed before I made the section through the bone, which tore it still further, and the incus is gone. This preparation is an unusually good specimen of an eburnised (sclerosed) temporal bone. There is no cancellated structure and no mastoid cells; it is ivory-like bone throughout.

I have tried up to this point to show why, in cases in which there is a choice, it is better for anatomical reasons to choose Schwartz's operation; but we sometimes come upon temporal bones where, also for anatomical reasons, Schwartz's operation is impossible. This is shown in another preparation from a diseased ear; it is an example of one form of these abnormal temporal bones. There is a large perforation in the thickened membrana tympani; all the ossicles are embedded in a firm mass of epithelium (cholesteatomatous mass) which would have been very difficult of removal in life through the meatus, and which must have impaired the hearing very materially. This is also an example of a sclerosed bone, but the most important point is that the sinus comes so far forward that there is absolutely no mastoid antrum to be found, and any attempt to perform Schwartz's operation must have laid bare the sinus as soon as the cortex of the mastoid was penetrated. In such cases as this, Stacke's or some similar operation, such as that of Hartmann, Küster, von Bergmann, and others, is the only operation possible.

In cases like the above, or those in which complications in the meatus, the tympanic cavity, or the mastoid antrum (the results of disease of the ear) make a Stacke's operation advisable, what guides, if any, do these preparations give us to the direction in which we should aim to operate? Examination of the bones seems to me to lead one to direct the opening in the posterior superior wall of the inner end of the external auditory canal strongly upward, and as soon as the bone has been penetrated to indicate the gentle use of a small bent curette still in an upward direction. By so doing, injury to the facial nerve, the stapes, and semicircular canal is most likely to be avoided, and the mastoid antrum and attic of the tympanic cavity more surely to be reached. We have as our chief danger injury to the roof of the mastoid antrum and tympanic cavity. At these points the bone is usually thin, and is sometimes partially absent, but they are further away from the point of the instrument used to clear out the diseased tissues than the other dangerous points, and are usually so much higher that they are less likely to be injured.

In conclusion I would repeat that, wherever there is a reasonable chance, the Schwartz operation will give a satisfactory result, and where the situation of the sinus, as determined during the course of the operation, does not prevent it, Schwartz's operation rather than a Stacke's should be done; where the latter is called for the operation, when removing the posterior superior portion of the inner end of the external canal should be directed sharply upward, and the probe and curette used gently, still in an upward direction, when the bone has been cut through.

In operating the smallness of the spaces in which opera-

tion can be undertaken with safety must be remembered, and small and delicate curettes used with very little force.

#### VI.—GORHAM BACON, M.D., New York.

DR. BACON said, with reference to Dr. Blake's observations of fluctuation in the temperature in one of his cases, that he had noticed the same condition in several cases operated upon last winter at the New York Eye and Ear Infirmary. In these the temperature varied from day to day, suggesting the advisability of further operation. Several consultations were held, but, after waiting a few days in each case, the patients recovered. He believed that in such cases the rise in temperature was due to absorption of pus; and that a sudden fall in temperature should not be expected in all cases immediately after operation. When Professor Macewen was in America in 1896 Dr. Bacon asked how it was that he had so many operations on the cranial cavity following mastoid disease, and Professor Macewen had replied that as many would be found in New York if they were looked for. Since then he had seen 20 cases of operation for brain complications due to ear disease, of which 15 were successful, and the speaker felt sure that such cases were much more frequent than was usually supposed. He concurred in what had been said in regard to the importance of exposing the lateral sinus. It was imperative in operations on the mastoid to make a very free incision through the soft parts so as to enable the surgeon to lay bare and remove in a most thorough manner all the diseased bone. According to his experience, there was very little danger if aseptic principles were carried out in exposing the sinus and thoroughly investigating it, as well as the cranial cavity, if necessary. He had much more dread of injuring the facial nerve in such operations.

#### VII.—J. WARD COUSINS, M.D.Lond., F.R.C.S., Senior Surgeon to the Royal Portsmouth Hospital.

##### MASTOID DISEASE.

DR. WARD COUSINS considered that generally acute symptoms occurring in the course of chronic disease required surgical treatment, and that in every case it was desirable to test the hearing power before the operation. The great purpose of the operation was to remove all the necrotic tissues and establish drainage, and often the removal of a large portion of the external wall of the mastoid was an excellent proceeding. In cases in which the tympanum was opened he used a small vulcanite flesh-coloured tube which the patient wore for a variable time, regulated by the favourable course of the disorder. He never operated in a case in which he considered it desirable to close the mastoid wound immediately, and after many of his operations the hearing power had considerably improved.

##### REPLIES.

DR. CLARENCE J. BLAKE said that the general surgical rule of removal of all inflamed tissue, presumably incapable of recovery or of tissue already diseased, was as applicable in the mastoid region as elsewhere. He did not consider the procedure of thoroughly evacuating the mastoid, allowing the cavity to fill with blood and closing the external wound as at all experimental. If a pus focus remained and the blood clot broke down, the wound was reopened by a touch of the probe, and the case treated as ordinarily by packing and drainage; if not, there was the advantage of a speedy, and as had been shown by observation of a number of these cases, a complete recovery with but few exceptions.

DR. A. H. BUCK thought that it was not a good surgical lesson to promulgate—that surgical wounds might be shut up. He preferred to leave the wound open and to relieve all pressure.

#### CHRONIC ARYTENOID LARYNGITIS.

By PRICE BROWN, M.D.,  
Toronto.

IN saying a few words upon this subject, I use the above title, inasmuch as it directly indicates the extent and character of the disease referred to. I know that chronic laryngitis is not usually supposed to affect the arytoid commis-



sure, without also affecting to a more or less extent the surrounding mucosa, particularly of the ventricular bands, aryepiglottic folds, and the arytenoids. The experience, however, I have had in the treatment of a number of cases has satisfactorily demonstrated, to my own mind at least, that chronic laryngitis, of a persistent and severe character, confined to the commissure, does sometimes occur. This accords in some measure with Professor Chiari's third division of pachydermia laryngis; but as this term is by the profession usually confined to disease of the vocal processes, attended by the formation of nodes, I would request the members of this Section to tell me whether the cases I have the honour to report to-day are cases of pachydermia laryngis or not.

CASE I.—In September, 1894, Miss B., aged 39, applied for treatment. A brother, whom she had nursed for a long time, died eighteen months previously of phthisis. She had herself been affected with throat catarrh and hoarseness for years, attended by cough and expectoration. On examination, no indications of lung disease were found. Vocal cords were coated with slightly-coloured catarrhal secretion. In abduction a film would stretch across the opening of the glottis, which would only give way when abduction was made complete by deep breathing. Ventricular bands and arytenoids seemed normal; but the interarytenoid commissure was grey, thickened, and corrugated, the enlargement extending to the vocal cords and preventing their complete closure during phonation.

Spray treatment relieved the catarrhal condition, but had no perceptible effect upon the commissure. I then tried brushing with a 10 per cent. solution of menthol in alcohol. This was used daily for some time without perceptible effect. I next tried 10 per cent. sol. arg. nit. on alternate days, the throat being daily cleansed first with a spray of Dobel's sol. followed by a spray of menthol in alcohol. The nitrate of silver, although always preceded by an application of cocaine, seemed to produce soreness and hyperæmia of the larynx, without reducing the pachydermic appearance. So after continuing its use for some time, I substituted 33 per cent. sol. of lactic acid in its stead, brushing the commissure with it every third or fourth day. This drug gave marked relief, and was more easily borne. After using it three or four times, the strength of the acid was increased to 50 per cent. The improvement was steady, and in a few weeks the chronic inflammatory thickening had entirely disappeared. The soreness had passed away, and the voice resumed its normal tone. Since that time, now nearly three years, the patient has continued quite well.

CASE II.—In August, 1895, Mrs. B., aged 34, presented herself for treatment. She had been troubled with soreness of throat and harshness nearly all her life. Never had indications of specific disease. No tuberculous symptoms in herself nor any members of her family. With the exception of her throat, always healthy. On examination no intranasal lesion, no adenoids, no catarrh of naso-pharynx. The tonsils, however, were hyperplastic. Within the larynx there was no inflammatory or catarrhal condition except in the interarytenoid commissure. Here there was decided thickening. The mucosa had lost its natural pink colour, was corrugated and grey in appearance, and was fissured in different directions. The enlarged, hypertrophied tissue extended down between the vocal cords, and prevented complete closure during use of the voice. There was no swelling of the arytenoids, and no tendency to the formation of nodes.

In the treatment of this case I removed the tonsils by galvano-cautery, leaving smooth surfaces between the pillars. Spray treatment was tried for some time, but ineffectually. I then resorted to brushing the larynx regularly on alternate days with 50 per cent. solution of lactic acid. The beneficial effect was marked but very slow. One remarkable thing was the tolerance of the larynx to the drug. It produced neither pain nor spasm, although applied without the previous application of cocaine. One month after commencing treatment with the hope of more rapid improvement, I curetted the commissure. This was followed by hæmorrhage, but it did not quicken the cure. For a whole year there was little change in the treatment, except that the intervals between applications were lengthened. Two or three times I substituted 10 per cent. arg. nit. sol.; but it was not borne so well as the lactic acid. During the second year the intervals between treatment lengthened to one, and then to two weeks. The improvement was constant, and four months ago the last of the thickened mucosa disappeared, and the commissure resumed its normal appearance and pink colour. The vocal cords adduct fully in phonation, and the voice is restored.

CASE III.—Mr. A. A. C., aged 40, came first for treatment four years ago. For a long time he had been a frequent sufferer from naso-pharyngeal catarrh. Some time during that period an over-zealous physician, either by accident or design, had removed the whole of his uvula. Whether from this cause or not his larynx, upon any sudden lowering of atmospheric temperature, would be attacked by soreness. Every winter he would have hoarseness, with hawking and expectoration upon any sudden change occurring. Menthol and thymol sprays would usually relieve the symptoms, but gradually the interarytenoid commissure thickened, and in October, 1896, his condition became alarming. He had just returned from deer hunting in Montana, a thousand miles away, and having caught cold while travelling in a sleeper, had an attack of acute laryngitis as a consequence. This confined him to bed for a number of weeks. The subsidence of the acute symptoms left behind an enormously thickened commissure; it was grey, spongy, and fissured. Dr. Shurly, of Detroit, kindly saw the case in consultation with me. Having been successful with lactic acid treatment in the former 2 cases, I tried it in this. I applied a 33 per cent. solution at intervals of a couple of days a number of times; it was not borne well, however; it seemed to irritate the larynx, and no apparent progress was made. This was followed by the application of glycerol-tannin pigment at similar intervals, with little if any better result. At last, under cocaine, I brushed the commissure with arg. nit. sol. 10 per cent., at intervals of three or four days, for a number of times. After the first treatment the thickening commenced to become

less, and in a few weeks it had almost entirely disappeared; the only thing that could be observed being a relaxed and stretched condition of the commissure. By the end of January he was well enough to leave for California for his health. He returned in May looking and feeling well, but on examining the larynx I found there was still a little central pachydermia, and I fear that with the return of winter there will be a recurrence of the disease.

CASE IV.—Mrs. W. L., aged 35, soprano vocalist. Seven years ago she came for treatment for chronic hoarseness, believing that she would have to resign her position as leading singer in one of our city churches on account of it. Under treatment she recovered and retained her position. Off and on from then until now she has frequently required throat treatment, but she always retained her voice. Among other things she had hypertrophied pharyngeal tonsil. Two or three years ago, after applying cocaine, I removed a portion of it. The pain was more than she anticipated, and she has persistently declined to have the rest removed without I would have chloroform administered, which, so far, I have refrained from consenting to.

For nearly a year a slight commissural thickening has been forming, but this did not affect her materially until March last, when it culminated in soreness with muffled voice but without hoarseness. On examination I found the symptoms much the same as in the other cases. The commissural membrane was grey, and swollen, and corrugated, but did not extend far enough down to interfere with the adductor muscles. The one-sided adenoid enlargement did not appear to interfere with nasal respiration, but how far it might have contributed to the condition in the larynx I could not say.

As in the other cases, sprays alone had no effect in diminishing the hypertrophy. Lactic acid 50 per cent. solution, also at intervals of several days, was rubbed into the commissure, but had no visible effect. Then, after applying cocaine, I resorted to brushing with 10 per cent. arg. nit. sol. This had a good result. The outside epithelium quickly peeled off, and a few applications at intervals of several days, resulted in the entire disappearance of the commissural thickening, and of the symptoms arising from it.

In concluding this brief record of cases, I may say that microscopical sections of none of them are made; but microscopically the appearances of all were almost identical in character. The ventricular bands, the arytenoids, the epiglottis, in each were free from apparent disease. The vocal cords in the first were more catarrhal than in the others. This was the only visible distinction, as the commissural appearance in all four varied only in degree. Yet two succumbed to nitrate of silver, lactic acid being in effect useless, while the other two yielded to lactic acid, the nitrate being out of place.

I would ask the question, Were these four cases pathologically alike? If so, Why the difference in amenability to treatment? Or was the first case tuberculous? And lastly, Should they be classed as instances of pachydermia laryngis?

Dr. PERMEWAN was familiar with the class of case, but doubted whether they were all of one character. Some were tuberculous and some could be classed as pachydermia laryngis. He had found lactic acid the most useful astringent in these cases, whatever their nature.

Dr. DELAVAN also made some observations, and exhibited a electrolytic needle for use in these cases.

Dr. PRICE BROWN, in reply, thought that Dr. Delavan's suggestion of the use of the electric needle might be of excellent service, judging from its efficiency in the reduction of naso-pharyngeal fibroids. The anatomical fact that the region of the commissure was supplied more freely with muscles and glands than any other part of the larynx, and also that it was the roadway over which the ciliated epithelium carried the secretions from the larynx over into the œsophagus, must be the reason why this region was so liable to thickening.

## PHOSPHORUS-NECROSIS OF THE TEMPORAL BONE.

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PHOSPHORUS-NECROSIS is described as a characteristic maxillary bone disease commencing after several years' contact with phosphoric fumes, occurring especially among workmen in match factories, affecting 11 to 12 per cent. of those exposed to the fumes.<sup>5</sup> It very rarely affects persons with sound teeth, but occurs mainly in those whose teeth are carious; where the teeth have been extracted and the alveolar process exposed exceptionally predisposes to the disease. The earliest case was reported<sup>5,6</sup> in 1845, being noticed in 1839, about

eleven years after the opening of match factories in Vienna. It is much less prevalent now than formerly, on account of better hygienic surroundings in the factories, improved artificial ventilation, the vaporisation of turpentine,<sup>6</sup> and the rigid inspection to which the workmen are subjected. The red amorphous phosphorus is comparatively harmless, and is now generally used. The first symptoms are toothache, followed by pain in the jaw, swelling and tenderness of the gums, and formation of abscesses discharging fetid pus through the cheek, roof of mouth, or even the aural cavity,<sup>2</sup> leaving fistulous openings. The patient acquires a peculiar pasty appearance of the face and puffiness of the cheeks.

The usual complications are chronic bronchial catarrh, chronic gastro-enteritis, and constipation. The patients rapidly deteriorate in general health. The most rare complication is pointing of abscesses or continuation of the otitis to the bones of the external auditory canal, which, as far as I can find, is described by only one author.<sup>2</sup> After subsidence of the acute symptoms the bone is found to be necrosed. The disease is always chronic, and almost imperceptibly slow in the upper jaw, but in the lower is sometimes acute and attended by high fever. The lower jaw is most frequently attacked. The disease begins in the periosteum, is due to local irritation, and ends in the death of the bone. The sequestrum adheres firmly to the underlying bone, becoming encrusted with a pumice stone-like material.<sup>1,3,4</sup> The disease may affect only small parts of the jaw or even the whole bone.

The treatment advised by all authors is dietary, hygienic, and stimulant, together with tonics, antiseptic washes, and removal of the sequestrum by operation. Operations for removal of dead bone are generally very successful. Billroth cured 20 out of 23 cases.<sup>6</sup> Of neglected cases, 35 to 38 per cent. die of complications and of sepsis.<sup>6</sup> I beg to submit the history of the following case, in which the aural complication has proven to be the principal factor.

January 6th, 1896. J. W., aged 58, American, employed in one of the principal match factories in the United States, first as a fireman in the boiler room for fourteen months, then as watchman for two years, and then as a melter of phosphoric composition and a roller for six weeks. His father died of apoplexy at 78; mother of epidemic influenza at 69; brother and sister in good health. Two sisters and one brother died in infancy. Claimed to have always been in good health, except diphtheria at the age of 23 and epidemic influenza five years ago. Three years ago he had painful left upper jaw, having two teeth extracted, and later had all of them removed, after which he wore a plate. He was kept from work for five weeks, felt very good, but after this noticed pain in the ear which was referred to the mastoid region. About January 1st, 1895, he had pain in the ear, which was referred to the mastoid region. About January 1st, 1895, he had pain in the ear, and foul muco-pus discharged. The patient lost decidedly in flesh. About this time he was struck on the left side of the head by a match composition which covered the side of his face and filled his ear. His mouth was so sore at times that the plate could not be worn. In May, 1895, a sequestrum from the upper maxilla was removed by a dentist, after which he was little troubled.

January 1st, 1896, he was sent to me for treatment of his ear. His condition was the following: Weight about 130 lbs., tall and angular, face of pasty appearance; the left alveolar process swollen and puffy, there being two fistulous openings on the buccal side and one in the roof of the mouth; examination with probe showed roughened denuded bone. The left external auditory canal was full of fetid pus. There was decided periostitis, swelling, and tenderness over the mastoid region. The posterior wall of the canal was reddened and swollen, being painful to touch of probe. There were granulations at the lower portion of the membrana ilaccida which covered a small perforation, the membrana tympani being apparently intact, but a perforation whistle was heard on inflation. In the right ear the membrana tympani was retracted and thickened. The temperature was 101°, and patient apparently very weak. During the week before he had had several chills, considerable headache, and had been confined to bed. The patient would not submit to immediate operation, and left my office and returned in two days, when he had a temperature of 103° and apparent septicæmia, so he was immediately sent to the hospital.

*Operation.*—Under ether narcosis, the mastoid cells and antrum were opened, the posterior and superior wall of the canal removed, the bone of the last two places being found necrosed. The mastoid cells were apparently healthy, although the antrum was filled with foul greenish pus. The wound was packed with iodoform gauze, and dressings made every second day. By the operation the mastoid, antrum, the cells, the attic of the tympanum and the external auditory canal were converted into a large cavity.

When he returned home (January 25th) he had gained about 10 lbs. under diet and tonics. He was treated at his native city under my directions by a physician, but returned to me on June 1st, 1896, having lost flesh, being reduced to 128 lbs. He had recurrence of chills and temperature; a loose sequestrum was found in the sinus back of the ear. So under narcosis, the antrum was again opened, the dead bone removed and tube inserted for drainage, which was free from the sinus through the middle ear and auditory canal. This time he remained for several months until the sinus at the back of the ear was allowed to close. He

gained nearly 40 lbs. under hospital diet and tonics. There was rapid replacement of the posterior wall of the canal by a new growth of bone, so great that its lumen was almost closed. The company dentist at this time scraped the carious upper jaw, after which he was again able to wear his artificial teeth.

April 22nd, 1897, he returned for treatment, stating that he had worked for several months, but that he had great pain in the ear and head. The ear had been occasionally treated by antiseptic washes, but there was now a slight fetid discharge. It was found that the growth of the posterior wall of the canal had sclerosed and shrunken so that the canal was now nearly of normal size. The sinus back of the ear had healed, and the discharge seemed to come from granulations near the osseous ring by the tympanic attic. There was a large perforation, and injections were easily made from the canal through the Eustachian tube. The granulations were removed, and the patient treated by antiseptic injections. Patient remained here two months, again gaining in weight nearly 40 lbs., and when he returned home there had been no discharge from the ear for several weeks.

August 20th, 1897. After this report had been prepared for the Association meeting the patient unexpectedly returned, stating that he had worked for two weeks after leaving my care, but since that time he had been again failing in general health and lost in weight. For about six weeks there had been purulent discharge from the ear, concerning which he had written me and had been ordered to treat the same by injections of boric acid solution. After two weeks he had considerable pain at the back of the ear and had but little sleep. On examination there was found purulent discharge from the middle ear, the walls of the external meatus, particularly the posterior, being swollen and tender. Dizziness was experienced from mopping out of the ear. The patient weighed but 135 lbs., had acquired a waxy appearance of his face, and complained greatly of his symptoms. There was no periostitis over the mastoid or other symptoms except tenderness upon pressure. The patient, being suspected of malingering, was sent to the hospital and carefully watched for four days. The temperature during this time was normal. Largely on account of the patient's complaints I concluded to again open up the mastoid antrum and cells, the operation being deemed warrantable on account of the chronic suppurative disease.

*Operation.* August 24th, under ether anaesthesia at the Milwaukee Hospital: The mastoid was chiselled and drilled open, the external layer being found hard and cancellous, under which there was found a pasty mass of necrosed bone from which exuded greenish fetid pus. The posterior wall of the canal was soft and friable and readily removed by the spoon. It was found that the superior wall had been largely reproduced, and thereupon the triangular piece of bone between the attic and the tympanum was removed and granulations taken away from the tympanic attic. Since that time the wound has been dressed twice, being apparently free from pus. The patient will be expected to make a good recovery.

It may be questioned whether the temporal bone disease is of phosphoric origin. It has been shown<sup>2</sup> that abscesses of the upper jaw may discharge through sinuses in the external auditory canal or middle ear, and this may have been the starting point for the phosphorus-necrosis. The character of the maxillary disease and the patient's occupation leave no room for doubt in my mind but that the necrosis of the jaw had its origin in phosphoric absorption. Another possibility of the middle ear and mastoid affection is the fact that a mass of the phosphorus paste was by accident thrown into his ear and was probably insufficiently removed, after which it discharged and perforation of the drumhead occurred. The character of the middle ear and mastoid disease was similar to that of the upper jaw, very chronic in its course, and yielding but slowly and incompletely to treatment, presenting a contrast to other mastoid cases.

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## A CASE OF FOREIGN BODY (METALLIC SHOE-HOOK) REMOVED FROM THE LARYNX BY THYROTOMY.

By CHAS. H. KNIGHT, M.D.,  
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FOREIGN bodies in the larynx owe their importance in the first instance to their individual size and shape; and secondarily to the position they may happen to assume in the laryngeal cavity. The dimensions of a foreign body are of immediate interest as regards the respiratory function of the larynx; its shape has an important practical bearing upon the method to be employed for its extraction, as well as upon the phonatory function of the larynx. An object so small as to slip through the chink of the glottis and fall into a bronchus may be quite as serious in its ultimate results, as one so large as to fill the larynx and necessitate a rapid tracheotomy. A smooth round object of moderate size is apt to find its way



below the vocal bands, or may be disposed of by an expulsive cough. A rough or sharp-pointed body is very likely to engage itself in one of the recesses of the glottis, or to become embedded in a projecting fold. Its removal under such circumstances is much more difficult, and is attended by greater risk of damage to the structures of the larynx.

In the management of a case of foreign body in the larynx we have to consider the age of the patient, his temperament, and the degree of local irritability. In a nervous individual, with an intolerant pharynx, the necessary manipulations are to be accomplished, if at all, with the greatest difficulty. Young children are notoriously intractable, especially when the fright associated with the accidental inspiration of a foreign body is aggravated by the view of preparations for attempting its removal. If we have time, a patient of reasonable age may be reassured, and perhaps trained to submit to the introduction of instruments into the larynx.

In some cases cocaine is of great service, not only as an anæsthetic, but in reducing congestion and swelling, and thus facilitating the dislodgment of an impacted body. My impression is that the value as well as the dangers of cocaine have been overestimated. Its effects seem to be limited to the site of application: moreover, they are sometimes annoyingly transient and variable, even in the same patient on different occasions. On the other hand, it is surprising how the exercise of patience and tact will at times establish a condition of tolerance even in a most unpromising subject. Cocaine toxæmia in my experience is extremely rare, although I use the drug with the utmost freedom. In former times a patient would occasionally become faint from surgical shock of an operation, or even from nervous excitement during an examination. Nowadays similar cases are erroneously attributed to cocaine. I do not wish to be understood as recommending its unrestricted use, or entrusting it to patients. The latter practice seems to me especially reprehensible. In a certain proportion of cases cocaine fails to abolish sensation, and general anæsthesia may be required. The difficulties and dangers of endolaryngeal manipulations are vastly increased in the latter condition.

The catalogue of articles which have found their way into the upper air passages at various times is extremely voluminous. The hero of my history selected a somewhat unusual one. His case is also remarkable for the comparatively trifling disturbance the invader caused, and for the ultimately favourable result of operative interference.

A boy, 7 years of age, was brought to me in February, 1897, with aphonia, said to be due to the presence in his larynx of a metallic shoe-hook or fastener. The lad was in excellent general condition, and no other symptoms of any kind were presented. The father stated that the boy inhaled the foreign body five weeks previously. Immediately there was a violent attack of coughing and dyspnoea, which subsided in a few moments. With the exception of loss of voice and whistling respiration during sleep there was nothing to suggest that the hook had entered the larynx. A week was spent in attempts to restore the voice by means of the electric current, when the patient came under the care of Dr. J. F. Pratt, of Binghamton, New York, who promptly discovered the foreign body in the right ventricle of the larynx, near the anterior commissure. At that time an enlarged tonsil interfered very much with manipulations, and it was excised. Numerous attempts at removal, both with and without ether, as well as by means of the so-called "autoscope" of Kirstein, were unsuccessful. It became apparent that an external operation would be required, and the boy was accordingly sent to New York. A very few trials convinced me that extraction through the mouth would be impracticable; therefore, on February 13th, six weeks after the accident, ether was given preparatory to opening the larynx. Before proceeding I made a final trial of Kirstein's instrument, but without success. It would not be fair to hold the instrument responsible for my failure, which was attributable rather to my own clumsiness and lack of familiarity with it and to a somewhat imperfect light at my disposal. Subsequent experiments with the "autoscope" have persuaded me of its value in some cases, but have not seemed to me to substantiate the claim of its inventor. The removal of the hook was accomplished without noteworthy incident. The incision included the second ring of the trachea and the lower half of the thyroid cartilage. The foreign body could be plainly felt, and finally seen through the tracheal wound quite firmly incarcerated in the swollen tissues of the right ventricle close to the anterior commissure. It was gently loosened by means of pressure with the finger tip, care being taken to avoid unnecessary damage. The parts were replaced and held with three deep silk sutures, a trachea-tube being left at the lower angle of the wound for thirty-six hours. The wound healed within two weeks, and the patient was discharged still aphonic, but breathing naturally and in good general condition. At this time the larynx was still hyperæmic. The vocal bands did not come together well on phonation, partly at least in consequence of the presence of a nodule of granulation tissue at the site of the laryngeal wound. The bands were intact. Several weeks passed without any improvement in the voice, and the parents became so anxious that they were tempted to adopt a course of local treatment which had been suggested. Fortunately, I believe, they concluded to follow the advice I had given them from the first "not to meddle," and

in about ten weeks after the operation the lad surprised himself by making a loud noise. He was so delighted that he kept on using his larynx, and in a very few days he regained absolute control of the organ.

This case may be looked upon as a striking demonstration of the value of expert use of the laryngoscope. Until the mirror was employed the presence of the foreign body in the larynx was not proved. Had there been any need the situation of the object undoubtedly might have been shown by means of the fluoroscope. The result of the operation is instructive and encouraging as an illustration of the comparative superiority of partial laryngo-fissure. My attention was first drawn to the advantage of this method by an article by D. N. Knox in the *Glasgow Medical Journal*, April, 1883. The upper segment of the thyroid cartilage not being disturbed, exact reposition of the parts is feasible. Hence, provided the mechanism of the larynx has not been irreparably damaged, there is much more favourable chance for recovery of the voice than after complete division of the cartilage. In watching the progress of this case the question often recurred, How far is it judicious to prolong efforts at removal by the natural passages? The two objects we had in view—first, to remove the foreign body, and, second, to preserve the voice—were accomplished, and the final result would seem to justify the course pursued under the circumstances, although it is possible that early intelligent attempts at extraction through the mouth might have been successful.

#### ACUTE SYPHILITIC STENOSIS OF THE LARYNX: INTUBATION: RECOVERY.

By J. O'DWYER, M.D.,  
New York.

THERE is still much difference of opinion regarding the value of intubation in the various forms of acute stenosis of the larynx in adults. Several causes contribute to this, the most importance of which is inexperience. Cases of this nature are comparatively rare, and for this reason, the manipulative skill necessary to intubate rapidly is seldom acquired. The operation is also much more difficult in adults than in children, and asphyxia is more liable to occur, from prolonged attempts at introduction, in the former than in the latter. The disastrous results following the use of children's tubes in adults, many cases of which have been reported, have also served to bring discredit on the operation in this class of cases.

The following case illustrates the relief which may be given by a tube of suitable dimensions:

On April 11th, 1897, I received an urgent call from Dr. L. W. Zwishohn to intubate a woman, aged 40, who was reported to be in imminent danger of suffocation from obstruction in the larynx. I found the patient suffering from severe dyspnoea, and immediately inserted a hard rubber adult tube of medium size with complete relief. The first symptom of disease of the larynx had begun only three days previously with hoarseness, croupy cough, and painful deglutition; on the second day the voice was lost, dyspnoea was beginning, and there was complete inability to swallow anything. The patient spent the night preceding my visit sitting up in bed, and obtained no sleep owing to the severity of the dyspnoea. A deep tertiary ulcer was discovered on the posterior wall of the pharynx, and several old cicatrices existed in the same region. Severe nocturnal headaches had also been complained of for several months. Some hours after intubation Dr. W. K. Simpson made a careful laryngoscopic examination, and reported intense swelling and redness of the arytenoids, aryepiglottic folds, and epiglottis, without any evidence of ulceration in the parts that were visible. The swollen tissues partially overlapped the head of the tube, and secondary dyspnoea from this cause was anticipated. It occurred twenty hours after intubation, and the attendant, as instructed, removed the tube by pulling on the string which was left attached for that purpose. One hour and a-half later I inserted a larger tube, which gave complete relief. This tube was allowed to remain in position for ten days, after which there was no return of the obstruction.

Owing to the patient's complete inability to swallow even a drop of water, feeding by the stomach tube was resorted to before intubation, and was continued afterwards, with the addition of 15 grains of the iodide to each feeding; under this treatment the severe headaches promptly disappeared. One month after the removal of the tube there was still complete aphonia, and the vocal cords were found to be fixed in the semi-abducted position, arytenoids swollen and red. At the present writing, over four months from the first intubation, the patient is in perfect health, with only slight impairment of the voice remaining.

The transverse diameter of the head of the tube used in the first instance was three-quarters of an inch, that of the other a little less than seven-eighths of an inch. In other words, less than one-eighth of an inch in the size of the head of the tube made all the difference between urgent dyspnoea and complete relief. Had no larger tube been at hand, tracheotomy would have been required in less than twenty-four hours from the first intubation.

Intubation will relieve dyspnoea due to any form of acute stenosis of the larynx in adults as certainly and as promptly

as it does in children, provided a tube of proper size and construction can be introduced. But this is not always possible. For instance, in certain forms of phlegmonous inflammation of the throat, including the larynx, the mouth cannot be opened widely enough to permit the guiding finger to reach the epiglottis, in which case intubation should not be attempted. In very stout persons with prominent cheeks the same difficulty of reaching the epiglottis may occur, but in the latter the mirror could be used as a guide, while it would be useless in the former.

### EUCAINE AS A LOCAL ANÆSTHETIC IN THE SURGERY OF THE THROAT, NOSE, AND EAR.

BY  
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In a preliminary communication upon this subject, published in the BRITISH MEDICAL JOURNAL of January 16th, 1897, we described our experiences with eucaine hydrochloride in relation to the surgery of the throat, nose, and ear. The number of cases then recorded was 32, and, although that number was small, the results obtained and the debatable ground opened up were sufficiently encouraging to justify further research, and we now offer to the meeting of the British Medical Association the conclusions to which the investigation has so far led us. In order to do so we have taken from our notes the first hundred consecutive occasions upon which the drug was used, deeming that number sufficient to illustrate our remarks.

Before describing our further experiences, however, it will be well to recall those forming our earlier communication. After a summary of the work of Vinci, Liebreich, Berger, Charteris, Deneffe, Foster, and others, we indicated that the points on which attention should be directed were: (1) The strength of solution required; (2) the rapidity, intensity, and extent of the anæsthesia; (3) the general and local action upon the circulatory system; (4) the after-effects. In investigating these, other points presented themselves: the amount of hæmorrhage following operations done under its influence; the question of hyperæmia or ischæmia as a result of its application to the turbinate bodies; and the occurrence of increased salivation from its use. These new points required further consideration, and we have paid particular attention to them, side by side with what may be called our four cardinal points, in our endeavour to decide upon the utility of eucaine.

As regards the strength of the solutions, those used were 2, 5, and 8 per cent., applied by instillation (ear), swabbing (throat), and on pledgets of cotton wool (nose). These methods of application being in our opinion satisfactory, we have not altered them. The anæsthesia we found as efficient as that of cocaine. In speaking of the action of eucaine upon the circulation, we stated that our investigations were not conclusive. In 3 cases unpleasant after-effects were noticed; these could be fully explained by other factors present. The effects upon the pulse appeared to be *nil*, or very slight. Other observers had remarked upon the drug causing hyperæmia of the turbinate bodies, and we were consequently somewhat surprised to find it caused ischæmia, although an ischæmia not comparable to that of cocaine. We noted, also, that hæmorrhage following operations under its influence was less than that after cocaine, and never excessive. We pointed out, also, the effect of eucaine upon the salivary secretion, as a phenomenon likely to detract from its usefulness in operations upon the oral cavity, but one requiring further investigation.

With the exception of the three cases already referred to, we had not noted a single instance of what might be called a toxic effect of the drug, and we found that patients who had experienced the after-effects of cocaine did better under eucaine and preferred it to the former drug.

Before passing to our further experiences we wish to refer to the work of Hobday<sup>1</sup> in the clinic of the Veterinary

College, which has appeared since our first communication. This observer used eucaine in 40 cases, and some of his conclusions are as follows: The toxic dose of eucaine is larger than that of cocaine; for operations upon the cornea it compares very favourably with cocaine, although anæsthesia is less rapidly produced; injected subcutaneously, or applied locally to parts other than the eye, it is not by any means so good as cocaine; a mixture of cocaine and eucaine possesses the better anæsthetic properties of cocaine, and can be tolerated in larger doses than cocaine alone. As regards the safety limit of the subcutaneous dose of eucaine he found that in the case of the cat or dog it was about one-fifth of a grain to each pound of body weight. Four grains of eucaine produced toxic symptoms in a dog of 12 lbs. weight, but the animal eventually recovered, whereas such a dose of cocaine would certainly have caused death. In a cat in which local anæsthesia was attempted by one grain of eucaine in solution no toxic symptoms followed, but by a mistake a couple of days later a grain of cocaine produced in the same animal toxic symptoms and death. The toxic symptoms are not noticeable so rapidly as those of cocaine; hyperæsthesia is present but not to such an extent; the rectal temperature rises, salivation takes place, but not so thin and watery as with cocaine, and gulping movements are not so well marked. Similar clonic involuntary spasms take place as with cocaine, but at much longer intervals, and the animal becomes prostrate; respiration is accelerated; in the cat the pupil certainly becomes widely dilated; consciousness is not lost until shortly before death, and there is not the same peculiar quietness and absence of moaning which is so characteristic of cocaine. In one case death appeared from cardiac failure as there were a few distinct respiratory efforts after the heart had ceased.

*Post-mortem* appearances show nothing very pathognomonic; if examination takes place within a short time after death the back of the pharynx, œsophagus, and in some cases the stomach as well are found full of frothy mucus, but if the *post-mortem* examination be delayed some hours even this will have disappeared.

Dr. J. Gibb, of Philadelphia, sums up in the *Philadelphia Polyclinic* of January 23rd, 1897, his observations upon the drug as follows: (1) Eucaine is equal to cocaine in its anæsthetic effects. (2) Eucaine is nearly, if not quite, as effective as cocaine in reducing engorged turbinates. (3) Eucaine is superior to cocaine in that it is much less likely to produce toxic symptoms. (4) Eucaine is superior to cocaine in that it produces far less unpleasant subjective symptoms, and especially is this true in the pharynx.

Following our previous classification, the first hundred consecutive occasions on which we have used the drug may be grouped as follows:—

A. Examinations:		
1. Ear	...	2
2. Laryngoscopy and posterior rhinoscopy	...	15
B. Operations:		
1. Ear.		
Myringotomy	...	5
Furuncle	...	1
Aural polypi	...	3
Curetting	...	3
Eustachian catheterisation	...	2
2. Nose.		
Galvano-cautery	...	20
Spurs	...	6
Polypi	...	7
Other growths	...	2
Turbinectomy	...	3
3. Throat.		
Tonsillotomy	...	20
Post-nasal growths	...	2
Galvano-cautery to granular pharyngitis	...	7
Endolaryngeal operations	...	2
		100

Not one of the several points we have investigated in endeavouring to ascertain the value of eucaine can be described as settled. The question must be one for time and experience; and the present communication does not attempt to do more than lay before the meeting further clinical evidence of what uses the drug can be put to in our special branch of medicine.

#### THE STRENGTH OF THE SOLUTION REQUIRED.

Pure eucaine is very little soluble in water, but the hydrochloride obtainable in the form of 5-grain solids is readily



soluble in water at room temperature to the extent of 10 per cent. At first the solubility of the solids presented some difficulty, but this has been completely overcome, and we now find the 5-grain solids of eucaine hydrochloride the most practical form in which to obtain the drug for the preparation of fresh solutions. One of these added to 110 minims, or approximately, 2 drachms of water at room temperature, will readily give a 5 per cent. solution, or two solids added to the same amount of water will yield a 10 per cent. solution.

Two solutions of these strengths will be found quite sufficient for the purposes we have tabulated. For the examinations referred to in the table, a 4 per cent. solution was used, and as we have already remarked in our preliminary communication, a 2 per cent. solution at times is sufficient. For operations, an 8 per cent. solution was found sufficient, and making allowance for the fact that the drug we then had in use did not remain in solution to the extent of more than 6 per cent., the solutions we used were hardly equivalent to 8 per cent.; a 10 per cent. solution freshly prepared in the way we have indicated will probably be found sufficient for the performance of the operations commonly done under a local anæsthetic.

Boiling we found to be in no way detrimental to the solution. It is not intended to discuss in this paper the merits of a mixture of eucaine and cocaine.

#### THE RAPIDITY, INTENSITY, AND EXTENT OF THE ANÆSTHESIA PRODUCED.

Before a drug can make good its claim to being an ideal local anæsthetic, it must fulfil three conditions; it must be the means of reducing the patient's pain to a minimum, of increasing the operator's facilities to a maximum, and it must cause no unpleasant effects during its application or afterwards. And before condemning a drug as not fulfilling these conditions it is as well to take into consideration the method of application, the temperament of the patient, and the skill of the operator.

Upon the method of application of the drug will largely depend the degree of anæsthesia produced, and consequently the degree of comfort afforded to the patient and the facilities to the operator. Eucaine has been described by some as not such a good anæsthetic as cocaine; it is possible that with experience we may incline to the view that proportionately as it is less toxic it is less powerful, but at present we have found it efficient, and as this may be due to the method of application it may not be amiss to enter into further detail on this point.

In the case of the ear a few drops instilled and kept in contact with the part to be operated upon by inclining the head is far more efficient than the insertion of a pledget of cotton wool saturated in even a stronger solution and placed in the meatus. It is important that the meatus should be as clean as possible: inspissated pus or dead epithelium prevents proper contact with the tissue to be anæsthetised.

Now, as can be readily understood, the reverse is more efficient in the case of the nose. A spray blindly used in the nares, or however skillfully played upon the part to be treated, will not produce so uniform an anæsthesia as a saturated pledget of cotton wool carefully adjusted. Speaking generally, a globular pledget introduced on forceps is not so efficacious as one spindle-shaped. A spindle-shaped pledget, an inch to an inch and a half in length, can be conveniently made by lightly wapping absorbent wool round the tapering end of a whale bone probe, which after being dipped in an 8 per cent. solution of eucaine can be slipped into the nose so as to lie parallel with the turbinate body in its entire length, the pledget being steadied with the points of forceps whilst the whalebone probe is withdrawn. We find that the anæsthesia thus produced is sufficient for the application of the galvano-cautery, or even to do a partial turbinectomy. To the tonsils, fauces, soft palate, or pharynx the drug is best applied by swabbing with pledgets of cotton wool. For endolaryngeal operations anæsthesia was obtained by dropping the drug on to the part to be treated from a curved syringe.

These different applications require more care, and perhaps more trouble than general haphazard spraying, but the trouble taken is amply repaid by the anæsthesia produced. Moreover, sprays involve a waste of the drug, and in the case

of cocaine are no doubt responsible for some of the toxic cases.

It will be noted that no mention is made of brushes. Brushes cannot be cleansed, and on that ground are to be condemned. By the temperament of the patient we mean that combination of mental and physical characteristics which may aid the operator or the reverse; and it must be within the experience of all of us to have met with patients developing toxic symptoms under cocaine which could not be entirely attributed to the drug. The different effects eucaine and cocaine may have on the same individual we shall have occasion to revert to in discussing the after-effects and the toxic properties.

#### ACTION UPON THE CIRCULATION.

*General.*—After making allowance for mental influence we found that the pulse was not materially affected in either rate or character by the solutions we had in use. So far we have not met with a case in which the drug *per se* influenced the cardiac action.

*Local.*—It has been stated that eucaine induces hyperæmia and on this account the drug is inferior to cocaine, which produces an ischæmia so serviceable in investigating diseases of the nose. Upon the application of a 5 or 10 per cent. solution of eucaine to the mucous membrane hyperæmia will occur as an immediate result; this is in the majority of cases but an initial blush, rapidly passes off, and gives place to an ischæmia, which, as seen in the nose, is generally less marked than that produced by cocaine. Upon a further application there is no recurrence of hyperæmia, and the ischæmia may be increased. In no case have we met with excessive or unexpected hæmorrhage following operations done under eucaine anæsthesia, such as is not uncommonly met with after the use of cocaine; this is no doubt accounted for by the action of eucaine upon the peripheral vessels already alluded to.

*Salivation.*—In our previous communication we noted the occurrence of increased salivation. We have further investigated this point, and have found that eucaine in the presence of an acutely-inflamed tissue (for example, acute tonsillitis or pharyngitis, active laryngeal tuberculosis, etc.) is followed by an increased flow of saliva; but in the presence of a diseased but not actually inflamed tissue, such as hypertrophied tonsils, etc., this effect has not been noticed. The increased flow of saliva is but initial after the first application; a further application can be made without leading to similar effects. In the absence of any better explanation it seems reasonable to associate the increased salivation with the initial hyperæmia. This conclusion receives further support from an experiment made upon one of ourselves whilst suffering from an attack of parotitis.

One parotid gland had become infected from the adjacent submaxillary, and after the swelling had reached its height and whilst the parotid was subsiding, a 10 per cent. solution of eucaine was applied to the tonsil and mucous membrane of the mouth on that side. This was immediately followed by throbbing and increased swelling of the inflamed gland; the tonsil was also enlarged and subacutely inflamed at the time. The throbbing and increased swelling gradually passed off, and, together with the increase of saliva, ceased by the time anæsthesia was established. This action of eucaine upon the salivary glands, with exceptional cases, need not be a bar to operating under eucaine anæsthesia.

#### AFTER-EFFECTS.

As regards the disturbances of sensation following the anæsthetic action of the drug, more particularly in the case of the pharynx, these are not only less unpleasant and less marked than those produced by cocaine, but more transient, and, speaking generally, after the lapse of an hour from the time of application, the subjective sensations may be described as normal. Those who have experienced the effects of both drugs have expressed a decided preference for eucaine.

Passing to a comparison of the toxic potentiality of the two drugs; we are able to supplement those cases in our preliminary paper, in which operations had to be abandoned on account of an idiosyncrasy for cocaine, but had been practical under eucaine, by quoting a case which came under our notice in a medical man:

A 10 per cent. solution of cocaine was applied to the right naris for a galvano-cautery operation. In two minutes the patient was much excited, gesticulating and talking loud and fast; three minutes later this gave place to great depression; the pulse became weak, slow, and slightly

irregular, and there was a feeling of oppression in the cardiac region. He gradually recovered on lying down, but complained of tingling and numbness in the calves of the legs, and a feeling of great weakness in the back which lasted the remainder of the day.

Four months later an 8 per cent. solution of eucaïne was used for a similar purpose. The pulse remained the same in rate and character throughout. Anæsthesia was sufficient for the galvanic cautery. The only after-effect noted was "a hot taste" at the right side of the pharynx lasting fifteen minutes.

Were eucaïne to be of no further service than to act as an efficient substitute in cases such as we have mentioned in which an idiosyncrasy for cocaine precluded an operation, even then this new local anæsthetic could not be regarded otherwise than of importance.

So far in our experience with eucaïne we have not met with a case in which a single symptom supervened in the least way suggestive of a toxic effect of the drug.

## REFERENCE.

<sup>1</sup> *Journ. of Com. Pathology and Therapeutics*, March 29th, 1897; BRITISH MEDICAL JOURNAL EPITOME, pp. 91, 92, June 5th, 1897.

## ON THE PHYSIOLOGICAL AND PATHOLOGICAL RELATIONS BETWEEN THE NOSE AND THE SEXUAL APPARATUS OF MAN.

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[ABSTRACT.]

## PHYSIOLOGICAL.

THAT an intimate physiological relationship exists between the sexual apparatus and the nose, and especially the intranasal erectile tissue, is sufficiently evident from the following facts:

## I.

1. In a certain proportion of women, whose nasal organs are healthy, engorgement of the nasal cavernous tissue occurs with unvarying regularity during the menstrual epoch, the swelling of the membrane subsiding with the cessation of the catamenial flow.

2. In some cases of irregular menstruation, in which the individual occasionally omits a menstrual period without external flow, at such times the nasal erectile bodies become swollen and turgid, as in the periods when all the external evidences of menstruation are present.

3. The monthly turgescence of the nasal corpora cavernosa may be bilateral or confined to one side, the swelling appearing first in one side and then in the other, the alternation varying with the epoch.

4. The periodical erection may be inconsiderable and give rise to little or no inconvenience, or, on the other hand, the swollen bodies may occlude the nostril and awaken phenomena of a so-called reflex nature, such as coughing, sneezing, etc.

5. In some cases there seems to be a direct relationship between this periodical engorgement of the nasal erectile bodies and the phenomena referable to the head that so often accompany the consummation of the menstrual act.

6. As a natural consequence of the phenomena above described the nasal mucous membrane becomes, at such periods, more susceptible to reflex-producing impressions, and is therefore more easily influenced by mechanical, electrical, thermic, and chemical irritation.

7. The conditions (engorgement and increased irritability of the nasal mucous membrane) indicated above, together with the phenomena that accompany them, are also found during pregnancy at periods corresponding to those of the menstrual flow. There is also reason to believe that similar phenomena occur during lactation and the menopause.

## II.

## THE PRESENCE OF VICARIOUS NASAL MENSTRUATION.

A. It is a familiar fact that women are occasionally found in whom the menstrual function is heralded or established by a discharge of blood from the nostrils. This hæmorrhage, which may be accompanied by other phenomena referable to the nose, such as sneezing, etc., may be replaced afterwards by the uterine flow, but sometimes continues throughout the menstrual life of the individual. In the latter case some malformation or derangement of the sexual apparatus seems

to be usually, though not always, responsible for the nasal flow.

B. Epistaxis also occurs, now and then, from the suppression of the normal flux. This was considered as a favourable sign by Hippocrates, and by Celsus, who followed closely in his footsteps.

C. Hæmorrhage from the nose may occur as the vicarious representative of menstruation during pregnancy; toward the close of menstrual life as the premature or normal herald of the menopause; or it may be observed as a recurring phenomenon after the establishment of the change of life, or after the removal of the uterus and its appendages.

D. These vicarious hæmorrhages are, moreover, not confined to women, but make their appearance not infrequently in boys at or near the age of puberty, or upon the full development of their sexual powers.

## III.

The well-known sympathy between the erectile portions of the generative tract and other erectile structures of the body must be remembered. There is no reason why the sexual excitement that leads to congestion and erection of these organs, as, for example, in the case of the nipple, may not, under similar circumstances, cause engorgement of the nasal erectile spaces.

## IV.

The occasional dependence of phenomena referable to the nose during sexual excitement (such as, for example, epistaxis, stoppage of the nostrils, sneezing, and other reflex acts), either from the operation of a physiological process (erythism), or during the consummation of the copulative act.

## V.

The reciprocal relationship between the genital organs and the nasal apparatus is furthermore illustrated by the occasional dependence of genito-urinary irritation upon affections of the nasal passages. Retarded sexual development, too, may possibly depend upon the coexistence of nasal defect.

## VI.

It is finally quite possible that irritation and congestion of the nasal mucous membrane precede, or are the excitants of the olfactory impression that forms the connecting link between the sense of smell and erethism of the reproductive organs exhibited in the lower animals, and in those individuals whose amorous propensities are aroused by certain odours that emanate from the person of the opposite sex.

These facts point conclusively to an intimate physiological association between the nasal and reproductive apparatus, which may be partially explicable on the theory of reflex or correlated action, partially by the bond of sympathy which exists between the various erectile structures of the body. That a relationship exists by virtue of which irritation of the one reacts upon the circulation and possibly nutrition of the other, is accordingly rendered highly probable by the evidence of clinical observation. If this excitement be carried beyond its physiological limits, then comes a time, sooner or later, when that which is a normal process becomes translated into a pathological state, according to a well-known law of the economy. Hence it is *a priori* conceivable and eminently probable, not only that stimulation of the generative organs, when carried to an excess, may become an etiological factor in the production of congestion and transient inflammation of the nasal passages, and especially of their cavernous tissue, but that repeated and prolonged abuse of the function of these organs may, by constant irritative influence on the turbinated tissue, become the starting point of chronic changes in that structure.

## PATHOLOGICAL.

The following data, derived from personal clinical observation, may possibly throw some light upon the subject.

## I.

1. In a fair proportion of women suffering from nasal affections the disease is greatly aggravated during the menstrual epoch, or when under the influence of sexual excitement.

2. Cases are also met with in which congestion or inflammatory conditions of the nasal passages make their appearance only at the menstrual period, or, at least, are only



sufficiently annoying at that time to call for medical attention.

3. Occasionally the discharge from a nasal catarrh will become offensive at the menstrual epoch, losing its disagreeable odour during the decline of the ovarian disturbance. In many cases of ozæna the odour is much more pronounced at times corresponding to those of the menstrual flow.

4. Excessive indulgence in venery seems to have a tendency to initiate inflammation of the nasal mucous membrane, or to aggravate existing disease of that structure. There are those, for example, who suffer from coryza after a night's indulgence in venereal excesses, and the common catarrhal affections of the nose are sometimes undoubtedly exaggerated by repeated and unnatural coition.

5. The same is true in regard to the confirmed habit of masturbation. The victims of this vice in its latter stages are constantly subject to nose-bleed, watery or mucous discharge from the nostrils and perversion of the olfactory sense.

6. The co-existence of uterine or ovarian disease exerts sometimes an important influence on the clinical history of nasal disease. This fact has been shown in practice in cases in which the nasal affection has resisted stubbornly all treatment, and in which it has only been relieved upon the recognition and appropriate treatment of disease of the generative apparatus. The recent researches of Fliess seem to indicate that the converse of this proposition is true.

These observations, therefore, encourage the belief, if they do not establish the fact, that the natural stimulation of the reproductive apparatus, as in coitus, menstruation, etc., when carried beyond its normal physiological limits, or pathological states of the sexual apparatus, as in certain diseased conditions, or as the result of their overstimulation from venereal excess, masturbation, etc., are often the predisposing, and occasionally the exciting causes of nasal congestion and inflammation and perversion of the sense of olfaction. Whether this occurs through reflex action pure and simple, or as the sequel of an excitation in which several or all of the erectile structures of the body participate, the starting point of the nasal disease is in all probability the repeated stimulation and congestion of the turbinated erectile tissue of the nose. It is highly probable that this erectile area or organ, so sensitive to reflex-producing impressions, is the correlative of similar vascular areas in the reproductive tract, and that the phenomena observed may therefore be explained by the doctrine of what we may call, for want of a better name, reflex correlated action.

Mr. LENNOX BROWNE said that some courage was needed to bring forward such a subject with the thoroughness with which Dr. Mackenzie had treated it; and he felt sure that all would agree in congratulating the author. The interesting aural observations of Dr. Clarence Blake might be equally well applied to the larynx. Mr. Browne believed that irritation of the sexual organs was just as frequently—probably more so—a reflex from the nose as the converse, and he related a case in which masturbation in a child of only 4 years of age was promptly cured after removal of adenoids; somewhat analogous results had been freely reported by others in connection with nocturnal enuresis.

Dr. BRYSON DELAVAN had seen a case similar to the one reported by Mr. Lennox Browne, in which habitual masturbation in a girl, aged 6, was immediately permanently cured by the removal of an adenoid thickening at the vault of the pharynx.

Dr. CLARENCE J. BLAKE said that an illustration of the points made by Dr. Mackenzie was to be found also in the cases of slowly progressive impairment of hearing occurring in young and middle-aged women, and due to tissue changes in the region of the stapes, consequent upon a suspension of vasomotor inhibition, and resulting in a greater or less degree of stapes fixation, with corresponding deafness and circulatory tinnitus. The occurrence, in a large number of these cases, of a circumscribed congestion of the stapedal region in otherwise normal ears, at the menstrual period, and particularly in cases of dysmenorrhœa or under the influence of fatigue and nervous overstrain, justified the inference of reflex causation, and a reference of the cases to the gynecologist showed that in nearly 80 per cent. there was some form of

pelvic disturbance, usually a malposition of the uterus with erosion of the os.

### NON-OPERATIVE TREATMENT OF CHRONIC SUPPURATIVE DISEASE OF THE ANTRUM AND VAULT OF THE TYMPANUM.

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RECENT otological literature is full of treatises which deal with the subject of new operative methods for the cure of chronic suppurative processes in the vault of the tympanum and the mastoid antrum. Of these operations, ossiculectomy (for those cases in which the disease is limited to a small area within the tympanum) and the so-called Stacke's operation (for those in which the antrum is also involved) are the two representative types. Both of these operations have passed the probationary stage, and are now generally accepted by otologists as safe and effective surgical procedures for the cure of the pathological conditions referred to above. Conceding, therefore, as I do the value and the safety of these operations, I am nevertheless disposed to believe that they are resorted to in many cases in which the simpler cleansing methods would be found to be quite as effective in curing the disease.

I should perhaps qualify this remark by stating that it has reference mainly to cases which are seen in private practice. In the treatment of infirm patients it is not often possible, in large cities, to devote at least half an hour twice or three times a week to a single case; and, furthermore, our experience in New York has shown that infirm patients cannot be depended upon to attend the institution regularly for treatment. But, unless these cleansing procedures are carried out in a minute and painstaking fashion, and at rather frequent intervals (two or three times a week), at best only a temporary amelioration of the disease will be secured. I am satisfied, therefore, that in dealing with this class of patients the otologist is quite right in urging the operative rather than the non-operative mode of treatment.

In private practice, however, the conditions are quite different. The surgeon can give to this class of cases all the time that may be required, and the patients themselves can be depended upon to be regular in their attendance. Then, again, many private patients object strongly to being subjected to an operation which requires the use of ether or chloroform as an anæsthetic, and may keep them confined to the bed or to the house for several days.

It is not in every case, however, be it clearly understood, that we can safely offer this choice to a patient. Symptoms may have already developed which point to an extension of the disease to important neighbouring organs, and in that case we must recommend strongly the more radical plan of treatment by operation—either Stacke's or the regular mastoid operation. But in most, if not all, of the cases in which a simple ossiculectomy is performed, and in quite a large proportion of those operated upon by Stacke's method, no such threatening symptoms exist, and consequently we are at liberty to deal with the problem before us in a more leisurely manner. If, in such cases, the opening in the tympanic membrane through which the pus and other products of the disease escape into the external auditory canal is fairly large—say two or three millimetres in diameter—and particularly if it occupies a high position, there can be no question about the propriety of giving the cleansing method a fair trial. On the other hand, if the opening is small—perhaps not more than a millimetre in diameter—or if it occupies a low position, the simple cleansing method is more likely to fail. But even here a limited myringectomy may suffice to overcome this drawback, and so place these cases on a par with the others. If the pus, however, finds an outbreak through the membrana flaccida, it is better to proceed at once to an ossiculectomy (including, of course, a myringectomy). The necessity for the Stacke's operation (or for a mastoid operation) in this class of non-urgent cases, becomes clear when both the cleansing method and a simple ossiculectomy (including the anvil as well as the hammer) have proved successful in arresting the foul-smelling discharge.

As regards the details of the cleansing method, it is enough

to state here that it consists essentially of only two steps: (1) The removal, chiefly by mechanical means, of all granulation tissue, cast-off epithelium and detritus from the diseased tympanic cavity of antrum; and (2) the destruction, by chemical means, of all pathogenic germs. Injections of hydrogen dioxide, through variously curved glass tubes, play a very important part in the procedure, not simply on account of the germicidal action of this fluid, but largely because the active effervescence which at once takes place when it comes in contact with decomposing organic material, aids in dislodging the obstructing substances. When once the cavity has been cleared of all these and rendered aseptic, powdered iodoform or one of the more recent antiseptic powders (europhen, aristol, etc.) shall be introduced in liberal quantity and allowed to remain there indefinitely. This, in brief, is the mode of treatment which I have termed the cleansing method.

In conclusion, permit me to bear further testimony to the beneficial results which are obtained from the faithful and persistent employment of this method. I believe that I do not exaggerate when I say that in a decided majority of the cases treated in this manner the results have been successful; and I base this belief not simply upon my own personal experience, but also upon that of other otologists with whom I have had an opportunity to compare notes.

### FAVOURABLE RESULTS IN OBSTRUCTION OF THE TRACHEA BY DIPHTHERIAL MEMBRANE FROM THE INTRODUCTION OF CREASOTED OIL THROUGH THE TRACHEOTOMY TUBE.

BY

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The following case is of interest as an instance of recovery from a desperate condition, and it is of some importance as showing that we need not regard cases of tracheal and bronchial diphtheria as beyond the scope of active treatment even after tracheotomy has failed to relieve the obstruction. It may be of use to others in similar emergencies.

A. S., aged 2 years and 4 months, admitted on October 31st, 1897. Laryngeal stridor and dyspnoea since the middle of the night. Face dusky, lips bluish; temperature  $102^{\circ}$ ; tonsils and fauces red, but no membrane to be seen; nose free; much inspiratory recession of lower intercostal spaces. Tracheotomy was performed, low down, with instant relief; no membrane was coughed up or seen *in situ*; 4,000 units serum were injected.

November 1st. Temperature remained above  $101^{\circ}$ , pulse 160, respirations 52. Throughout the day the breathing was gradually getting worse, but no membrane was coughed up.

November 2nd. Temperature  $99^{\circ}$  in the morning,  $101.8^{\circ}$  in the evening. There was now some inspiratory recession of intercostal spaces. At 4.30 the breathing became very difficult; the tube was changed, an oiled feather passed into the trachea, and oxygen given to inhale, with much relief to the patient, whose colour was improved. Dr. Ewart, being informed of the child's dyspnoea, had prescribed creasoted oil (1 in 20) to be dropped into the trachea. Owing to an accident this was not supplied to the nurse, but olive oil was used instead, the oil being dropped from the feather used for clearing the tube. This supply of oil was kept up every half-hour from 4.30 P.M. Still, in spite of the oil, there was no effort at coughing and no membrane brought up. At 6.30 P.M. there was urgent dyspnoea, the face dark and sweating, the teeth clenched, and much inspiratory recession of lower spaces and ribs. Mr. Eames passed a silk catheter down the trachea twice through the outer tube; each time it was withdrawn covered with membrane; some coughing was set up, large quantities of membrane being expectorated through the tube. Brandy and oxygen administered. 8.30 P.M. 4,000 units antitoxin injected.

November 3rd. Had a fairly good night. At 2.30 A.M. a piece of membrane the size of a two-shilling piece was coughed up; this was the only piece coughed up since the catheterisation. At 9 A.M. the treatment by creasoted oil was begun; a large drop of the oil being introduced into the trachea through the tube every half hour. Each time this was done cough was set up, and membrane was expectorated freely.

November 4th. The temperature had dropped to normal after a good night. Three doses only of creasoted oil of two or three drops each were used during the night, with the same result. The treatment was continued during the day with much success, the membrane coming up easily; the total amount expectorated during the last two days being very large.

November 5th. Breathing easier. No membrane expectorated. At 12 noon the tube was plugged, with very little discomfort.

November 7th. Tube removed; voice returning; child much improved.

November 15th. Wound healed; child practically well. The child was treated internally with quinine, strychnine, and brandy.

## REMARKS BY DR. EWART.

Recovery in this case was due to the careful way in which the treatment was carried out, and to the timely and skilful catheterisation of the trachea. I had long made it a rule to introduce twice a day carbolised oil into the nostrils as part of the toilet of diphtheria during the acute stage and during convalescence; but the idea of the systematic use of oil first occurred to me whilst writing an article on Plastic Bronchitis for the forthcoming volume of Professor Clifford Allbutt's *System of Medicine*, and it happily came to mind again at the moment I heard of the child's danger. It happened that simple olive oil was used at first instead of the creasoted oil which has been prescribed. We gained experience from this accident which, owing to Mr. Eames's successful operation, did not affect the result. The effect of the olive oil was to facilitate the removal of the membrane by the catheter, when this was used; but the olive oil did not save the child's life, as it failed to set up spontaneous cough or expectoration of membrane, and cannot therefore be credited with having done more than assist the work of the catheter. The quantity of membrane which was discharged during the next two days showed that all danger had not ceased; enough remained or was freshly formed in the air tubes to have led to further obstruction or to pneumonia. The moment, however, the creasoted oil was substituted for the olive oil, cough was set up, and large pieces of membrane were expectorated with conspicuous ease. In this respect this treatment carries out the objects of the time-honoured treatment of croup by emetics, but in a more easily regulated fashion.

The direct access to the trachea rendered the introduction of the oil a simple matter, so that it could be entrusted to a trained nurse. Whatever the results may be in future cases, we are glad to think that in this instance there was not even a suspicion of any drawback. The satisfactory effects witnessed suggest that the usefulness of the treatment may not be limited to cases of urgent danger, and perhaps not to cases in which tracheotomy has been performed, and that when tracheotomy has shown that the membrane extends below the larynx its systematic employment might be begun early.

The application of creasoted oil might safely be tried in diphtheria of the fauces, and its action could then be watched with relative facility. Whether it may be possible or expedient to use it as an intralaryngeal injection is a question for future consideration. Our experience for the present is limited to the case narrated, and we shall have to feel our way with the details of the treatment. Dropping the oil into the trachea is clearly better than the sudden injection of a quantity of it. In this way we escape the danger of adding to the obstruction by the bulk of the oil. When creasoted oil of proper strength (1 in 20 in this case) is used this danger is much less likely to arise, since the effect of the remedy is to excite cough and clear the air passages. If due caution be exercised in respect of the strength and of the quantity of the oil used, the publication of the case may lead, it is hoped, to none but satisfactory results.

SANITARY STATE OF MADEIRA.—Medical men who were influenced last year by the unfavourable reports concerning typhoid fever and defective water supply at Madeira, will hear with interest of the large annual grant which has been voted in Lisbon for the amelioration of the island. Dr. M. Grabham announces that the district of Funchal is to receive a copious supply of pure water from the high, uninhabited mountains behind it, and the town is to be drained according to modern principles. When these plans, which are stated to be in a forward state of preparation, have been carried out, Madeira will doubtless become again as popular as ever, and will attract its full share of visitors from England, especially that class of invalids likely to be benefited by its moist, equable, warm, marine climate. The construction of good roads, which is likewise contemplated, will open up the scenery of the interior of the island.

THE Council of King's College, London, have received an anonymous donation of £15,000 towards the liquidation of the College debt.