<i>Sex. Age.</i>	<i>Disease.</i>	<i>Sinuses Involved.</i>
M. —	Acute mercurial poisoning	R. sphenoid. cont. polypoid tissue; L. mid. ear and mastoid cells cont. blood.
F. 21	Septic endometritis, salpingitis, and peritonitis	All sinuses healthy, with the exception of the L. frontal, which cont. a small polypus about the size of a split pea.
M. 31	Enteric fever and lobar pneumonia	The bone over and around both middle ears was hyperæmic. The rest of sinuses all healthy.

[Dr. Jamieson, Director of the Pathological Department in the Sydney Hospital, has kindly allowed me to use the above information.]

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President: ALEXANDER HODGKINSON, M.B.

A DISCUSSION ON THE ULTIMATE RESULTS OF SURGICAL OPERATIONS UPON THE FRONTAL SINUS AND MAXILLARY ANTRUM.

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THE disproportion between the extent of the subject that has been allotted to me to discuss before you and the short time placed at my disposal by the rules of the British Medical Association compel me to limit myself to stating the conclusions arrived at, and I will refer those hearers who may wish to verify my statements to the discussions and observations contained in my report, and which will be published *in extenso*.¹

If the radical operations on sinuses have as yet not secured all rhinologists as adherents the cause is as follows:

1. That certain surgeons are in too great a hurry to interfere surgically without having previously tried the conservative treatment.

2. That occasionally the results of operations are published prematurely, without allowing sufficient time for the confirmation of the cure.

¹ *Annales des Maladies de l'Oreille et du Larynx.*

At this point I will mention the indications for radical operations before proceeding to criticise their results. We must, above all, ask ourselves two questions:

I.—*Are Frontal and Maxillary Sinusitides sufficiently serious to warrant Radical Surgical Treatment?*—Yes, because: (1) They threaten the brain, frontal sinusitis especially, induce meningitis and cerebral abscesses, more and more numerous as they are more fully recognised. (2) They threaten the orbit and the eye. Maxillary sinusitis, in particular, causes orbital abscess; it also endangers the lachrymal ducts, and causes lesions of the uveal tract. (3) They endanger the respiratory passages, cause descending laryngitis, and even pseudo-pulmonary tuberculosis (Moure and Brindel). (4) They affect the general health.

II.—*Cannot Frontal and Maxillary Sinusitides Heal Spontaneously?*—Acute sinusitis may heal in this fashion; nevertheless, this is not always the case, for out of forty-two cases of chronic sinusitis which I published in 1898, twelve had commenced in an acute manner. On the other hand, chronic sinusitis never recovers without interference. Observations of this kind are teeming with errors.

Therefore, inasmuch as inflammations of sinuses are serious and cannot heal spontaneously, their radical cure must be effected at all costs.

In this connection I shall allude exclusively to the personal statistics of 112 cases of sinusitis, relying only on those cases which my assistants—Messrs. Laurens and Mahu—or I were able to keep under observation from the commencement to the end. These cases were as follows:

Isolated maxillary sinusitis	...	...	...	76
Isolated frontal sinusitis	...	...	...	4
Fronto-maxillary sinusitis	...	...	...	30
Fronto-ethmoidal sinusitis	...	...	...	2

These cases of sinusitis vary clinically in their behaviour, so that one uniform treatment is not suitable to all. The following classification appears to me to be most convenient for therapeutical purposes.

The cases of sinusitis are either (*a*) isolated, or (*b*) combined. Each of these two classes must be subdivided into simple sinusitis, in which the suppuration is confined to the diseased cavity, and complicated sinusitis, in which the neighbouring parts are affected.

I. ISOLATED FRONTAL SINUSITIS.

Isolated frontal sinusitis is rare (four out of thirty-six of my statistics). It is usually associated with maxillary sinusitis. Moreover, every frontal sinusitis is anatomically combined with a limited anterior ethmoiditis. The isolated frontal sinusitis is always a nasal affection. Its sole cause is retention of pus in consequence of the narrowness of the naso-frontal canal. This consideration governs the entire treatment.

A. *Simple Form.*

At its commencement frontal sinusitis is acute. It should be treated conservatively; this method always results in cure. Since 1898 I have adopted a treatment which has proved to be almost a specific for this ailment, and which consists in very frequent and prolonged inhalations of steam of menthol water, assisted, if necessary, by the process of negative politzerization, as indicated by Seifert. This method relieves the most acute pains in twenty-four hours. All the acute cases of frontal sinusitis, even the most violent, which I treated in this manner have been cured, on an average, in between two and six days.

Endonasal Treatment.—In case of failure one should, in the second place, try syringing the sinus by catheterizing its natural orifice. Theoretically, the catheterization is only possible in one case of every four (Sieur and Jacob). Clinically, the osseous lesions permit it to be used somewhat more frequently; in all cases, however, it is absolutely harmless. On the other hand, Schaeffer's method—the direct passing of a probe through an artificial passage—is a very dangerous proceeding, which should be entirely eschewed, as it has already caused several cases of meningitis.

The sole endonasal surgical interference that is warranted is the clearance of the median meatus (the removal of the head of the middle turbinated bone and the curetting of the polypi), which allows of a freer passage of the secretions from the frontal sinus, and at the same time eases pain (Hajek).

When all these methods have been unsuccessfully tried only two alternatives are left to the patient: the neglect of his sinus, which may lead to disaster, or his submission to a radical cure by an external operation.

RADICAL OPERATIONS.—The chief difficulty to be overcome in operations of this nature is the disfigurement of the face, which must be avoided. There are numerous methods. Putting on

one side the too simple methods of ancient surgeons, who only succeeded in creating fistulas, I can only for lack of time mention two methods, those of Luc and Kuhnt, as amongst those best known.

I. *Method of Luc (or of Ogston-Luc).*—This operation is conducted as follows: (1) The sinus is opened from the exterior; (2) its cavity is curetted; (3) drainage through the nose insured by enlarging the fronto-nasal canal; (4) the frontal wound is at once closed. The two characteristics of this operation are the preservation of the cavity of the sinus and the nasal drainage. The advantages of this process are as follows: (1) It avoids any disfigurement; (2) it insures the immediate junction of the wound; (3) it systematically opens up the anterior ethmoid. The inconveniences of the procedure are as follows: (1) It is very liable to relapses, which are more serious than the first attack; these relapses are due to inefficient curetting, or the undiscovered presence of disease of the opposite frontal sinus, or of a corresponding maxillary sinusitis; (2) it renders the patient liable to suppuration of the scalp; (3) it renders him liable to an opposite frontal sinusitis; (4) cerebral complications may ensue. This method in the hands of skilled operators (8:8, Lubet-Barbon) has sometimes had admirable results, but it cannot be denied that it is attended by considerable risks. Of 36 cases of frontal sinusitis in my statistics 17 were operated on according to Luc's method, 9 healed by first intention, 8 relapsed. Of these, 5 were subsequently cured by Kuhnt's method, 1 by repetition of Luc's method, 2 died (meningitis—slow septicæmia).

II. *Method of Kuhnt.*—This method has for its purpose to destroy the frontal sinus completely, and it absolutely guarantees the patient against any relapse. Kuhnt resects the entire anterior wall of the sinus, and sometimes a portion of its inferior wall. He then practises careful curetting. He is careful not to widen the naso-frontal canal for fear of establishing a communication of the wound with the nasal fossa. He therefore drains by the external route, the wound being left partly unsutured. The cure is completed in from three to six weeks, and the benefits of the procedure are recovery, assured and unattended by risks.

Its inconveniences are as follows: (1) It necessitates external drainage, with the consequent annoyance of prolonged dressings; (2) it does not open the anterior ethmoidal partitions; (3) it leaves a pronounced disfigurement; (4) it frequently gives rise to diplopia.

An example might be taken from Tilley, and that which is good

might be taken from each of these two methods, and an almost ideal operation formulated therefrom, an operation called Kuhnt-Luc. It is towards this goal that most operators in France have been instinctively turning by degrees.

Process of Kuhnt-Luc.—From Kuhnt's method there may be borrowed the curative perforation, the knowledge that total excision of the anterior wall of the frontal sinus permits of perfect curetting, and the suppression of the diseased cavity. From Luc's method one may borrow its elegance, the knowledge of fronto-nasal drainage, which opens the anterior ethmoid wide and allows of the wound being immediately closed.

Two inconveniences have still to be dealt with :

1. The frontal disfigurement, which is greater in proportion as the sinus is larger. It is probable that this may be remedied by raising the skin with injections of paraffin.

2. The diplopia. This is due to the interference with the action of the superior oblique muscle, the pulley of which has been injured during the operation ; this complication, which it is impossible to foresee by reason of the varying situation of this pulley (Stancu-léanu) may be rectified by a complementary operation, consisting in stretching the inferior rectus muscle of the affected side (Landolt).

The excellence of the Kuhnt-Luc process is demonstrated by statistics. Whereas I succeeded in securing only 9 cures from a total of 17 operations of Luc, I obtained 11 cures in 11 operations undertaken by the Kuhnt-Luc method. Besides, in 6 cases which had been operated on by Luc's method, and had relapsed, the Kuhnt-Luc operation, undertaken subsequently, yielded definite results. This cure is obtained very rapidly ; from the second week dressings are discarded, the patient can resume his occupation, and only intranasal dressing has to be continued for some time longer.

I conclude by recommending the method of Kuhnt-Luc, systematically and at the onset, in all cases of uncomplicated frontal sinusitis in which conservative treatment has proved unavailing.

B. *Complicated Form.*

1. *Frontal Sinusitis complicated with Orbital Fistula.*—If the fistulous tract can be dissected out, and the necrotic bony partition be excised entirely, the immediate reunion of the frontal wound may be essayed by the Kuhnt-Luc method.

2. *Frontal Sinusitis complicated with Abscess of the Soft Parts over it.*—In such cases the deeper surfaces of the soft parts being affected, it would be very dangerous to encourage the wound to close at once.

Kuhnt's process is the only one justifiable, the external drainage being the safeguard of the patient.

3. *Frontal Sinusitis complicated with Cerebral Complications.*—Operate immediately, even in the most recent cases, make extensive incisions, and make room by wide excisions; in fact, perform an atypical operation while exercising the usual rules of general surgery.

II. ISOLATED MAXILLARY SINUSITIS.

In contradistinction to frontal sinusitis, maxillary implication is most frequently isolated. Of the 106 affected maxillary sinuses mentioned in my statistics, 76 were isolated.

The frequency of disease in the maxillary sinus is owing to the duality of its etiology.

1. *Nasal Type.*—The same pathology as in the frontal sinus. It is caused by the retention of the secretions, favoured by the high situation of the orifice.

2. *Odontogenous Type* is caused by neglected dental lesions. In this connection it must be remarked that the infective teeth belong to three different clinical types: open carious teeth, stopped teeth incompletely disinfected, closed dead teeth. In all these cases the infection passes from the mouth to the sinus exclusively by the dental canal.

The dental origin is more frequent than the nasal origin (see the statistics).

In the nasal forms it is the result of a true sinusitis.

In the dental forms there is first simple empyema of the sinus, in consequence of the sudden rupture of a radiculo-dental periapical abscess into the cavity of the sinus; it is only subsequently that the empyema is transformed into a chronic sinusitis.

The principal point in the history of suppurations of the maxillary sinus is to establish firmly the difference between real sinusitis and empyema, in which the healthy cavity contains pus that it has not itself formed. It is in consequence of misunderstanding this fundamental distinction that certain authors—especially dentists—come to conclusions which cause confusion as to the treatment of maxillary suppurations.

A. *Simple Forms.*

Conservative treatment, which should always be first tried, has for its object: (1) To cause the retention to cease; (2) to suppress the cause. In acute nasal sinusitis of nasal origin inhalations of the steam of menthol water are indicated. Hajek gives a term of from three to six weeks as the period of this form treated by ordinary means. In all the cases I have treated with menthol the time was eight days.

In the empyema of recent dental origin the cause must, above all, be suppressed by removing the suspected teeth, open or closed, incising the gingival abscesses, removing the alveolar sequestrum. But, above all, one must avoid the custom of dentists of making the alveolus communicate with the sinus, and placing a metal tube in this track through which the patient is to be syringed with various more or less indefinite remedies.

It is, on the contrary, necessary to perform dental extractions gently, so as not to create any dental alveolar communication, if such do not already exist. This done, two conditions are exhibited: (a) Either the sinus communicates with the mouth, when advantage must be taken of this passage for using evacuatory syringes, but without enlarging it and without drainage; or (b) this communication does not exist, and we must be careful not to establish it, and the pus of the empyema must then be evacuated by syringing through the nose.

At the same time the cicatrization of the open alveolus must be encouraged, always bearing in mind that no intervention can cure a maxillary sinusitis if the teeth are not sound and if the gums are not healthy.

If these means have not proved successful should we propose surgical interference? Not yet. The conservative treatment is passed through a second time; the syringing of the sinus through the nose should be repeated. These syringes can be used either through an artificial orifice or through the natural aperture.

1. *Syringing through the Natural Orifice: Catheterization of the Sinus.*—This process, for the following reasons, is unreliable:

(a) The approach through this orifice is difficult on account of its situation and the polypi which protect the borders.

(b) Syringing by this passage is insufficient, because the sinus is not approached from its lower part, and also because there is no opposite opening to permit a good exit for fluids.

The existence of an accessory orifice would facilitate the matter, but this peculiarity only exists eight times in a hundred.

2. *Syringing by an Artificial Orifice: Puncture of the Inferior Meatus.*—The thinnest partition of the sinus is in the vicinity of the internal surface of the middle meatus; but at this level there is danger of the trocar penetrating the orbit; on the other hand, the puncture at the level of the inferior meatus is absolutely harmless. Approaching the sinus as it does at its lower part, it is but slightly painful; it yields excellent results, and it should, without exception, be patiently tried in all the chronic, non-complicated cases of maxillary sinusitis.

Of thirty real chronically suppurating sinuses of my statistics thirteen were radically cured by this treatment—that is, 43 per cent. As a rule, from three to twelve syringings are necessary to obtain this result. It matters not how old the lesions may be. Twice I succeeded in curing maxillary suppurations of a year's standing with one single syringing. The cure thus obtained in about two or three weeks is absolute, with the complete return of the transparency of the sinus.

3. *The Alveolar Perforation of the Maxillary Sinus: Drainage by the Mouth.*—When a chronic maxillary sinusitis resists the preceding treatments one may be tempted, prior to suggesting a radical interference to the patient, to propose a treatment to him which is only surgical in name, so slight is the operation required, and which consists in perforating the wall of the sinus either at the level of the alveolus or at the level of the canine fossa, so as to insure a constant downward drainage, and to enable the patient himself to incessantly wash out his fistulous cavity himself. This treatment was in vogue ten years ago, when neither the usefulness of mentholized inhalations nor the efficacy of syringing by the inferior meatus were known, and before the surgeon had provided us with curative and rapid and certain operations.

I note in my tables that this method has been used forty times and yielded seventeen cures—that is, 45 per cent.

This proportion is about the same as that yielded by syringing through the inferior meatus. Nevertheless, and in spite of this, the buccal drainage impresses me as inferior to the syringing by the meatus for the following reasons:

1. The cure is very slow, demanding not merely weeks, but often one or two years.

2. The cure is uncertain. In half of my cured cases the transparency of the cheek did not return.

3. The patient who is not cured is an invalid, condemned to always wear a tube, and to take care of and attend to it.

4. The infection of the frontal sinus is a danger to the patient

in consequence of the violent syringings that the patient may accidentally give himself (see observations). In conclusion, this process serves to set up a communication between the mouth and the maxillary sinus, antiphysiological anastomoses, opposed to the biological conditions of the maxillary sinus.

I conclude by rejecting the procedure, and by advising the wide radical cure of maxillary sinuses which have not yielded to syringing by the nasal tract.

RADICAL OPERATIONS.—Of the various operations advised for the radical cure of maxillary sinuses, two only are worthy of recognition—the method of Desault and the method of Luc.

I. *Desault's Method.*—His principle is very simple. At the level of the canine fossa he makes a wide permanent orifice, the object of which is: (1) To allow the passage of instruments for curetting the diseased mucous membrane; (2) to drain the sinus during the term of its treatment.

Theoretically this process is perfect, as it allows us to watch the process of healing. Practically the results are deplorable.

1. The dressings are very painful and are repeated indefinitely.

2. During the intervals the patients are condemned to eat all their food with “iodoformed flavour” (Luc).

3. Long-lasting infirmity follows the cure, the maxillary sinus becoming an abnormal diverticulum of the oral cavity. A radical cure, even at this price, is by no means assured. Notwithstanding the guarded silence of statisticians on this point, cure is effected in less than half of the cases (16 : 37, Hajek). The length of treatment required is on an average from one to two years.

II. *Luc's Method (or Caldwell-Luc's Method).*—At the level of the canine fossa he makes a temporary orifice, which allows of the inspection and curetting of the mucous membrane, and the transient existence of which is computed by the duration of the operation alone. He makes a communication between the sinus and the nose—a permanent communication—which insures the drainage of the cavity. His originality consists in associating solely that which is good—the buccal tract for the convenience of the operator, the nasal passage for the safety of the drainage and the advantage to the patient. The sequences are very simple. On the eighth day the buccal wound has united, and the patient can resume his occupation. It is sufficient for him to come for some time to have his nose examined. Compared with Desault's method, this operation possesses the following advantages:

1. The dressings are painless, and only consist in a few syringings through the nose.

2. The position of the patient, apart from the intervals for dressings, is the same as if he had not been operated on.

3. The restoration of the integrity of the nose follows the cure. The healed sinus, as in the past, only discharges by the nose.

The excellence of this method is confirmed by the certainty and rapidity with which radical cure is effected.

My statistics comprise forty-six operations of Luc, with forty cures by first intention. They relate to obstinate chronic sinuses, which had resisted a great number of syringings undertaken either by the inferior meatus or alveolar drainage. Lubet-Barbon and Furot, Moure and Liaret have also had good results. These combined statistics yield a percentage of 85 per cent. of healing by first intention.

The rapidity of the cure is not less remarkable. In my forty cases the average time was five weeks, and several times only a fortnight—a striking contrast to the two years which Desault's method requires. The details of my observations still further emphasize this comparison. Luc's operation should succeed in all simple suppurations in the maxillary sinuses; and the failures are nearly always due to the method having been applied to cases of complicated sinusitis, which, as we shall see presently, require other methods.

Certain German authors, such as Killian, rejected this method, because it does not permit them to survey the course of reparation. But, as Hajek justly remarked a short time ago, it is exactly this condition that forms the advantage of the method by closing the mucous membranes on the way to heal from all untimely interference.

In my complete work I report two very curious cases undertaken by me which were definitely cured by Luc's operation in less than two months of chronic maxillary sinusitis, and both of which had for years been unsuccessfully treated by the first German rhinologists.

B. *Complicated Forms.*

1. *External Maxillary Sinusitis.*—If abscess of the cheek or orbit exists, it is said that one should attack this collection according to the usual rules of surgery. In pursuance of this course a wide incision should be made to permit the curetting of the sinus. Such is the classical treatment, which runs the risk of the sinus suppurating permanently and of leaving a disfiguring cicatrix. The following procedure is better: Allow the phlegm to mature, assisting it by ordinary local treatment. Then later on freeze the site,

and operate according to Luc. The fistula will cicatrize as soon as the sinus has finished suppurating.

2. *Maxillary Sinusitis Complicated with Alveolar Ostitis*.—In order to effect a cure it is necessary to excise all the particles of diseased bone. It may happen that one is obliged to remove the entire floor of the maxillary sinus. In this case, and this case only, Luc's operation must give way to Desault's operation. Luc's operation must not be attempted, for it would be an error to establish a wide naso-sinusal communication in a patient fated to retain a definite anastomosis of his sinus with the mouth.

III. COMBINED SINUSES.

It is frequently the case that one patient has two or more sinuses affected. Given the number of sinuses, the possible combinations of these sinuses rise mathematically to 1,023. I shall only mention some of the most frequent types.

1. *Fronto-Maxillary Type*.—This combination may be affected in three fashions: (1) The two sinuses may have been simultaneously contaminated from the nasal tract; (2) the maxillary sinus, primarily contaminated—most frequently by dental tracts—secondarily infects the frontal sinus. Such is the ordinary pathology of this double sinus disease. Lubet-Barbon has demonstrated that sometimes (see observations) there may be but one frontal empyema, and that the single treatment of the maxillary sinus suffices for the cure; (3) finally, the frontal sinus, which at first was alone affected, may secondarily affect the maxillary sinus. Here, again, the maxillary suppuration may only be a simple empyema which an operation, limited to the frontal sinus, may cure (two cases of Furet; two of my own cases; see the report *in extenso*). These remarkable observations throw a new light on our conception of sinusal associations. Conservative treatment may be essayed for the fronto-maxillary sinuses (spraying through the nose and amputation of the head of the middle turbinal bone), but without much chance of success. Surgical treatment, on the other hand, insures a rapid cure, even more certain than in cases of isolated maxillary sinusitis, as it appears (see Lubet-Barbon's cases) that the failure of Luc's operation may frequently be due to the non-recognition of a communicating frontal sinus. The process is as follows: First, operate on the maxillary sinus by Luc's method as far as and including curetting, then apply a provisional hæmostatic plug. Secondly, having cleansed the hands in the same manner as if about to operate on another patient, and

using different instruments, operate on the frontal sinus according to the Kuhnt-Luc method. Thirdly, return to the maxillary sinus, again examine its cavity, and close the buccal wound.

2. *Double Maxillary Type*.—The simultaneous presence of disease of two maxillary sinuses by no means affects the prognosis. It is not uncommon for these two sinus suppurations to be of a different age, and one may be easily healed by conservative treatment, whereas the other one necessitates the radical cure.

3. *Double Frontal Type*.—The radical cure by a double operation, by the Kuhnt-Luc method, should be undertaken at the same sitting, and particular care should be exercised to totally destroy the intersinusal partition. The disfigurement will be extensive, but perhaps less unsightly because symmetrical (Luc).

4. *Double Fronto-Maxillary Type*.—If the patient's general condition does not allow the quadruple operation to be performed at one sitting, it will be necessary at one time to operate on the two frontal and one single maxillary sinus, provided that the area of infection from one side to the other of the maxillary sinuses is not to be feared.

5. *Pan-sinusitis*.—There is pan-sinusitis when an infection of the ethmoid and sphenoid bones is combined with the fronto-maxillary suppuration. The lesions of the ethmoid and sphenoid bones, being less accessible, render the prognosis a grave one, and it is with these lesions that the treatment must grapple. I shall not touch on this subject; I leave it to the care of Dr. Grünwald and Dr. Lambert Lack, who have been deputed to open the discussion on this point at the meeting of the British Medical Association.

I must once more tender my excuses that the limited time placed at my disposal has only allowed me to present a sort of incomplete analysis of the work I have written on this subject, a work to which I beg to refer my colleagues who may ask for the proofs of my conclusions.

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ACUTE, and, more particularly, chronic inflammatory conditions of the frontal and maxillary sinuses are those which most frequently call for radical surgical treatment, and in the limited time at my disposal this morning, I can only briefly recount the results to which my own experience has led me, and to formulate certain general principles which may help to guide us in the management of these cases.

In our treatment of the inflammations to which these bony cavities are liable our aim will be :

1. To discover, and if possible to remove, the source of inflammation.
2. To hasten the return of the mucous membrane to its normal condition.
3. Failing these, it may be necessary to obliterate the cavity.

The *causes* of inflammation in the nasal accessory sinuses being inadmissible for this discussion, we pass to the second point, and in our endeavour to restore the mucous membrane to its normal condition, the great essential in treatment, and without which all other measures will be practically valueless, is free, unhindered, spontaneous drainage. These last words should be written in capitals in the minds of those who propose to deal with the inflammatory affections of the accessory nasal sinuses, for I would anticipate by saying that certainly my own failures, and probably the recorded and unrecorded disasters of others, have been due to some neglect of this important detail.

The *source* of inflammation having been removed as far as is possible, and free drainage having been secured, then irrigation by suitable antiseptic lotions, conjoined with attention to the general health and habits of the patient, will greatly assist in promoting the return of the lining mucous membrane to its normal condition.

It will now be convenient to discuss the operations on the frontal sinus and maxillary antrum separately.

Frontal Sinus—Acute Suppuration.—In the treatment of the milder cases the inhalation of mentholized steam¹ and the application of cocaine or suprarenal extract to the swollen mucosa of the middle meatal region may sometimes be sufficient to promote spontaneous discharge from the sinus. Failing with these, it might be wise to remove the anterior end of the middle turbinal with scissors and cold wire snare.

Should symptoms of pus-retention increase in severity, the external operation will be called for. The opening of the sinus should be carried out on the same lines as those to be referred to when discussing chronic empyema. Having evacuated the pus and restored the patency of the fronto-nasal duct by means of a probe, the sinus should be lightly packed with gauze, and a few subsequent dressings will generally suffice to restore the mucous lining to a healthy condition, when the external wound may be allowed to close.

¹ Mentholized steam may be prepared by adding 10 to 15 drops of a 50 per cent. alcoholic solution of menthol to a pint of water.

Acute cases nearly always do well. They give rise to little anxiety, and after a few months the scar caused by the operation will scarcely be noticeable.

Chronic Suppuration.—When this has existed for many months or years, we are confronted with the difficult problem of how best to deal with a bony cavity, the extent of which we do not know—a cavity which is not infrequently almost completely divided by bony septa into smaller chambers or narrow recesses, the whole being lined by a pyogenic, degenerated mucous membrane of a coarsely villous or even polypoid nature. Generally, the anterior group of ethmoidal cells present pathological changes similar to those met with in the sinus, their thin bony walls having undergone various degrees of destruction by rarefying osteitis, while œdematous granulations, from the size of a buckshot to that of a broad-bean, fill and obstruct the middle meatal region. We may do much to improve the condition of the lining mucous membrane by improved drainage and irrigation, but should these means fail we shall be driven to some form of external operation.

Improved drainage into the nose may be secured by removal of the anterior half of the middle turbinal, and any polypi or obstructing ethmoidal cells which block the lower end of the fronto-nasal canal. It will then be generally possible to pass a suitably curved cannula into the sinus, and irrigate it with some antiseptic fluid.

The fact that at least three deaths have resulted from the use of instruments in the upper regions of the nose shows what caution is necessary when such manipulations are being carried out. Cutting or punching forceps are preferable to instruments which exert a dragging force, and when a curette is used it should be passed to its farthest limit before force is applied in drawing it downwards and forwards in the removal of diseased bone. In this connection the Röntgen rays may, in the near future, be more frequently used to ascertain the exact position of instruments within the nose.

To be of any value irrigation of the sinus must be carried out daily by the surgeon, and for at least fourteen to twenty times, a consideration which obviously demonstrates one of the chief difficulties connected with this method. I adopted irrigation three or four times a week in seven of my private patients for two reasons: first, because the patients objected to any external operation and the loss of time which it would involve; and, secondly, because they were so satisfied with the relief produced that (in view of the rarity of fatal complications arising from freely draining

empyemata of the frontal sinus) I saw no reason for advising external or more radical procedure.

The fluids used for irrigation were boracic lotion, carbolic lotion (1 in 60), formalin (1 in 2,000), potassium permanganate (grs. v.-x. ad ʒi.), hydrogen peroxide (10-volume solution), and iodoform emulsion.

In all cases relief of symptoms was marked, but no instance of cure (*i.e.*, absolute cessation of purulent discharge) has ever come under my notice, and when we bear in mind the complicated shape of the sinuses and the pathological features of the mucous membrane lining them, it is incredible that irrigation, however frequently and skilfully carried out, can effect a cure. As a means of procuring relief, the method is of value, and, furthermore, it is of paramount importance that it should be carried out as a preliminary in all cases where the external operation is contemplated, in order to insure more satisfactory drainage from the sinus and to remove a possible source of re-infection from suppurating ethmoidal cells.

To sum up, it may be said that intranasal treatment may give relief to all symptoms, and that the improvement may be such as to render external operation unnecessary. Finally, it is a necessary preliminary to any external operation upon the sinus.

Under what circumstances, then, should the external operation be advised?

1. When symptoms, such as severe headache or profuse discharge, continue in spite of intranasal treatment.
2. When a suppurating external fistula is present.
3. When the purulent discharge seriously affects the general health of the patient, or causes local changes by its irritating effects upon the mucosa of the nose, pharynx, or larynx.
4. In cases where patients are going abroad, or to situations where skilled help is unattainable in the event of drainage from the sinus becoming obstructed.

Such general indications would seem clear enough, but yet when we come to the actual details of the operation in the individual case I know of no surgical question the satisfactory solution of which is hedged around with so many difficulties. The loss of time which the treatment may involve, the uncertainty of absolute cure, the amount of deformity or size of the resulting scar, all depend mainly upon the size of the sinus, and this cannot be ascertained with any certainty until the cavity be opened from the outside.

Generally speaking, we may say that if the sinus be a small

one, or a shallow one of average size, it should be obliterated, for by so doing a rapid cure with little deformity will be produced.

If it be a large and deep one, obliteration will be out of the question, because of the resulting deformity, and the best result will be attained by curetting away the diseased mucous membrane, providing free drainage into the nose, and when, the sinus is lined with healthy granulation tissue, allowing the external wound to close.

These conclusions and any observations on the operative procedures involved in the treatment of chronic suppuration of the frontal sinuses are the result of a study of some thirty cases, twenty-two of which have occurred in my own practice.

Operation.—Having previously removed the anterior end of the middle turbinal and any suppurating anterior ethmoidal cells, and the skin and hair of the eyebrow having been rendered aseptic, an incision should be made commencing $\frac{1}{4}$ inch above the internal palpebral ligament, and curving upwards and outwards in the lower edge of the eyebrow to the junction of the inner and middle third of the latter. It may be extended outwards if necessary. The soft parts and periosteum having been retracted from the bone, a small piece of the latter situated vertically above the internal canthus and corresponding to the junction of the anterior wall with the floor of the sinus should be removed by gouge and mallet. After exploring the extent of the sinus with a probe, the redundant mucous membrane should be gently removed by a blunt curette, but it is not necessary, and may be unwise, to entirely lay bare the bony walls of the sinus. Hemorrhage may be checked by pressure of dry strips of gauze, or the same wrung out of a solution of hydrogen peroxide or suprarenal extract.

If the sinus be a small one or shallow one of average size, as much as possible of the anterior wall should be removed in order to allow the soft parts to fall in and aid in the obliteration of the cavity. The opening into the nose should next be enlarged, and any suppurating anterior ethmoidal cells removed, and not merely crushed aside, as Thelwall Thomas has recently recommended. This can be best carried out by means of graduated burrs assisted by a ring curette passed up from the nose. The cells may be destroyed if necessary until the os planum is reached, the junction of diseased and healthy bone being evidenced by the firmer texture of the latter. It is no exaggeration to say that the ultimate success of the operation and the freedom from grave complications greatly depend on the patency of the opening into the nose and the removal of any suppurating ethmoidal cells adjacent to the floor of the sinus.

The rapidity with which the fronto-nasal canal becomes blocked by granulations is remarkable, and hence the need of patency or "free unhindered spontaneous drainage" is to be secured.

In the light of recent experience I would impress the necessity of a careful search for narrow extensions of the main sinus, or extensions of ethmoidal cells which often run outwards below the main cavity and over the roof of the orbit. The internal opening of such secondary sinuses is frequently small, and may easily pass unnoticed. A patient upon whose right frontal sinus I operated two years ago returned to hospital with obvious symptoms of pus retained in that cavity two months ago. The sinus was immediately explored, but was seen to be obliterated by scar tissue, and only after careful examination was the pus found to be issuing from a long narrow extension behind and below the main cavity. These were thrown into one by breaking down the partition wall, when a second extension was seen behind that last mentioned, and which was likewise thrown into the common cavity. By this time the posterior part of the roof of the orbit had nearly been reached. The large cleft was eventually filled by granulation tissue, and the whole sinus is now obliterated. Since then a similar condition was fortunately discovered in one of my patients at the primary operation, and more recently still, while assisting a friend to ascertain the cause of recurrent suppuration and septic bone inflammation in a case under his care, an identical state of things was found—namely, a large suppurating cavity behind and below the main sinus and extending over the whole roof of the orbit. It is interesting to note that in six patients where these extensions were found, five of them were females.

Having carried out the foregoing details, the sinus should be rendered aseptic, lightly packed with iodoform gauze in its outer half, and a rubber plug or drainage-tube passed from above downwards into the nose, in order to keep patent the fronto-nasal canal and insure free drainage into the nose. A single fine superficial stitch may be used to bring together the outer third of the wound, the remainder of which should be left open. A light external dressing may then be applied, which should be removed in forty-eight hours' time, and substituted by small pads of iced boracic lint. At the first dressing the loose packing and tubing should be removed from the wound and the sinus syringed out with warm boracic lotion. The tubing may be replaced by Lack's rubber plug, shaped like a tracheotomy tube, the lower end of which reaches into the upper part of the nose.

No repacking of the sinus will be necessary, but it should be

irrigated three times daily with boracic lotion by means of which any exudation will freely escape into the nose. Granulations spring up within the sinus and uniting with those growing from the soft parts, and projecting through the bony aperture, eventually obliterate the sinus. This process may be hastened by the application of firm pressure to the soft parts overlying the sinus. The rubber plug, which has kept the passage into the nose patent, may be removed only when the suppuration from the sinus has ceased, and then a permanent cure will result with little or no conspicuous deformity.

Formerly, for the purpose of keeping the fronto-nasal canal open, I used a piece of thick silver wire, bent upon itself and suitably curved, but I am inclined to think that the rubber plug already referred to is preferable because of its ready adaptability to the canal.

If the sinus be a large and deep one, and obliteration be out of the question, our efforts will be limited to insuring free drainage into the nose and promoting a healthy condition of the lining mucous membrane or its substitute. The general steps of the operation will be identical with those already described, and irrigation must be continued till suppuration from the sinus has entirely ceased when the rubber plug or drainage-tube may be removed and the external wound allowed to close. The treatment may occupy some four to eight weeks, but after about ten days or a fortnight an intelligent patient can carry out the treatment at home if occasionally seen by the surgeon.

Any serous discharge from the granulations lining the sinus will now pass into the nose. In one case of this kind the left sinus practically excavated the left frontal bone, and was so large that I packed into it a double thickness of iodoform gauze 3 feet 10 inches long and 2 inches wide. The operation was done nearly two years ago, and three months ago the patient was quite well, without a drop of pus in the nose and very little external scar.

What is the ultimate nature of the lining of the frontal sinus in these cases? Obviously it cannot be a true mucous membrane, and presumably it is a thin film of cicatricial tissue formed by organized granulation tissue. However this may be, we know that if free drainage into the nose be secured it is quite unnecessary to carry out Kuhnt's or Jansen's operation—namely, complete removal of the whole anterior or interior and inferior wall of the sinus.

These operations, while obliterating the sinus and procuring a speedy radical cure, often leave the patient with very marked

deformity, and in one of my patients the depression is so unsightly that, in response to her requests, I am contemplating the treatment of this with subcutaneous injections of paraffin. When bilateral sinus suppuration is present, it will be preferable to treat each sinus cavity separately rather than to continue the incision across the lower part of the forehead, and this even when the cavities communicate through an opening in the sinus septum. By adopting this method the resulting scar will be much less noticeable than with the continuous incision.

To sum up, we may say that in the treatment of chronic suppuration of the frontal sinus obliteration of the cavity may be carried out if the sinus be small or of moderate size and shallow. Under such circumstances a cure may be expected in about four weeks, and the scar will be little noticeable. In the larger sinuses almost equally good results may be produced by removal of the diseased mucous membrane and the establishment of free and permanent drainage into the nose. In both cases the external wound will be allowed to close only when suppuration from the sinus has ceased.

One word must be said as to the danger of the operation, for it is unfortunately true that many fatalities have occurred, and some of these in the hands of skilled rhinologists who have given considerable attention to the surgery of the nasal accessory sinuses. While a temporary strabismus of a few days' duration may result from inflammatory exudation around the pulley of the superior oblique muscle, the chief danger arises from septic infection of the frontal bone, which usually sets in within ten days or so after the operation. I have made a careful study of my own two cases and those of others, some of which I had an opportunity of seeing, and I am quite certain that deficient drainage, conjoined with recurrent suppuration, has been the cause of failure in all of them.

Luc endeavoured to obviate the obstruction by the insertion of a funnel-shaped tube between the sinus and the nose, the wider end of the tube resting on the floor of the higher cavity, and he sutured the whole extent of the wound at the close of the operation. Like most facial wounds, it healed rapidly and soundly. I tried this method in five cases, one of which proved fatal, and have long since discarded it. In one patient it was almost impossible to irrigate the sinus after the lapse of a few days, and in a second the same difficulty was found to be due to blocking of the drainage-tube by a solid blood-clot. In four of the five cases removal of the tube was followed by free suppuration within the sinus, and in three of these the external wound became distended, necessitating

a reopening of the sinus. In the fatal cases, about the end of the first week, free suppuration from the external wound occurred, together with tenderness on pressure and œdema of the soft parts in the neighbourhood of the wound, more particularly above the sinus. Throbbing headache, malaise, and slight pyrexia were also present. The lower half of the frontal bone was laid bare, when well-marked purulent inflammation of the diploë was obvious. In spite of a very free removal of the greater part of the lower half of the left frontal bone, one patient succumbed to subdural abscess, with general septic intoxication, in about five weeks, and the other after nine months of suffering. At the post-mortem examination the neighbouring frontal, sphenoidal, and ethmoidal sinuses were found full of pus in each case.

It would seem that the diploë of the anterior wall of the sinus are very prone to septic infection and for this reason the sinus should never be tightly packed with gauze, even at the end of the operation. A light dressing to absorb the blood and keep open the external wound is all that will be necessary. The external wound should on no account be sutured, except for a single superficial stitch to be inserted at its outer part.

Drainage into the nose should be secured by a large opening, and maintained patent by means of a rubber tube or plug as already indicated.

If these precautions be observed, we shall hear little more of fatal cases, and the external operation may be undertaken with confidence by the surgeon, and will be gratifying in its results to the patient.

MAXILLARY ANTRUM.

It will be advisable to discuss first of all the treatment of a case of chronic empyema of the antrum when unassociated with similar disease of the neighbouring accessory cavities, and then when the latter are simultaneously diseased.

In chronic empyema of the maxillary sinus the pathological conditions with which we have to deal are almost identical with those met with in the frontal sinus, and again our efforts must be directed (1) to securing free drainage; (2) to promoting the return of the diseased mucous membrane to its normal condition.

In order to secure these ends, we may adopt any one of the following methods:

1. To make and keep patent an opening in the inferior meatus of the nose, and irrigate the antrum daily through this opening with suitable antiseptic washes.

2. To establish a communication through the canine fossa and keep it patent by a special tube or plug, which will be daily removed for irrigation of the antrum.

3. To extract a carious second bicuspid or first or second molar tooth, drill into the antrum through the empty socket, and again insert some special form of tube or plug which can be removed for irrigation of the sinus.

4. Failing cure by these methods, we can open the anterior wall of the sinus, remove the diseased mucous membrane, and insure efficient drainage, either into the mouth or nose or both.

I cannot speak from a large experience of the intranasal opening, but it might be useful in cases of intranasal origin when the corresponding teeth are sound. It has the advantage of not communicating with the mouth, and it drains from the lowest point of the antrum. It has the disadvantage that the naso-antral opening is very prone to contract, thus rendering syringing by the patient difficult and painful.

The opening into the canine fossa will not drain the antrum from its lowest point, and many patients find irrigation by this method difficult and painful.

One of the worst cases of nerve prostration I have ever seen was due to the irritation and constant neuralgia induced by rubber plugs worn in a bilateral case of this kind.

Our choice of treatment will generally lie between the alveolar method of drainage and some form of radical operation. Of the latter, the best known are Kuster's, the Caldwell-Spicer, and Jansen's operations.

I need only say that Kuster's operation consists in making a large opening into the canine fossa, curetting away the diseased mucous membrane, and packing or irrigating the cavity until it is lined by healthy granulations, when the bucco-antral wound is allowed to close.

Caldwell-Spicer and Luc (Paris) modified this operation by making a counter opening into the nose, packing the sinus, and suturing the bucco-antral mucous membrane. In forty-eight hours' time the dressing is removed, and subsequent irrigation carried out for some three weeks or more through the naso-antral opening.

Jansen, in order to obliterate the antrum removes as much as possible of its bony anterior wall.

The ordinary details of these operations are so well known that it is only necessary to emphasize a few points which seem to be of practical importance.

In the alveolar method of treatment the upper end of the drainage-tube should be practically flush with the floor of the antrum, in order that drainage may easily take place. The length of the alveolar perforation can easily be ascertained by a suitably-curved probe.

In Kuster's operation the gauze packing inserted at the first operation should be removed in forty-eight hours and not replaced. Irrigation with warm boracic lotion should be carried out three times a day for three or four weeks, the bucco-antral opening being kept patent by means of a rubber plug or tube.

When suppuration has entirely ceased and the mucous membrane as seen through a suitable speculum is healthy, then the plug may be removed and irrigation continued for a few days longer, until the bucco-antral fistula is closed.

In the Caldwell-Spicer operation it will be a great advantage if anteriorly the circumference of the opening in the canine fossa be nearly level with the inner wall of the antrum, and if its inferior limit reach to the level of the floor of that cavity. The first condition renders it easy to make a satisfactory opening into the nose, and the second will insure more perfect drainage. The radical operation will be rendered easier if the anterior half of the inferior turbinal has been previously removed.

In this operation (as also in Kuster's) especial care should be taken to remove diseased mucous membrane from the ethmoidal and alveolar regions and from the concavity of the malar bone.

I have no experience of Jansen's operation but have been told by those who have seen it that considerable deformity and flattening of the cheek often result. Whatever operation be undertaken for the cure of maxillary sinus suppuration, it is of special importance that any intranasal obstruction should be removed as a preliminary treatment, and the more so when such obstructions take the form of chronic inflammatory growths in the middle meatal region.

As to the choice of method to be adopted in an individual case, opinions will vary. Two months ago I published the results of treatment of thirty-five cases of chronic antral suppuration in private practice, thirty-four of which were drained through the alveolus. Sixteen of these were cured of their discharge in periods varying from two to eighteen months, while of the others fourteen were so relieved of their symptoms that, in spite of the fact that they suffered from practically no discharge, they preferred to continue wearing their tube, lest by the removal of it the discharge should recur and necessitate further operative procedure.

In all these uncured cases except one the headache had dis-

appeared, the discharge had diminished almost to vanishing-point, and the patients were perfectly comfortable, although one could not call them cured while they wore their drainage-tubes.

The perforation of the alveolus is a simple operation carried out under "gas" anæsthesia, and the patient rapidly acquires the art of irrigating his own antrum. At first this should be done twice daily, and then as the discharge diminishes, the intervals of irrigation may be lengthened.

Chronic empyema of the antrum is not dangerous to life. It is true that the constant swallowing of pus may interfere with the general health, but the purulent discharge quickly diminishes when alveolar drainage is established and irrigation practised.

For these reasons, I think we should, *as a rule*, give the patient a chance of cure or great improvement by this the simplest mode of treatment.

An exception may be made in cases of long standing where polypi or œdematous granulation tissue surround the maxillary ostium and indicate a similar condition of things within the sinus. Nothing short of a free opening into, and curettement of, the antrum would be of any permanent value in these cases, although great relief to symptoms might follow alveolar drainage.

The radical operations referred to are somewhat severe in their nature, and necessitate at least ten days' confinement to home. For several days after the operation the cheek may be swollen and painful, and some patients experience a considerable amount of shock. However skilfully the operation be performed, a cure cannot always be promised, neither does it always result.

I would reserve the operation for the class of case already mentioned—namely, for those who cannot tolerate such a small inconvenience as syringing the antrum daily, for those in whom alveolar drainage has not effected a cure, and for those who are going abroad and want to have the disease cured as quickly as possible.

I have performed Kuster's and the Caldwell-Spicer operation several times, and recently have been quite pleased with the results of the former, which is at the same time the simpler operation. In the more extensive procedure there is a great tendency for the nasal antral opening to contract no matter how large it be made at the time of the operation. If the bucco-antral wound be immediately sutured it rapidly heals, and we are precluded from examining the internal surface of the antrum if suppuration should recur.

Finally, some patients experience difficulty in syringing out

their antra by way of the nose, possibly because they are naturally clumsy.

In Kuster's operation, carried out as I have indicated, there is free drainage, irrigation is easy and painless, and the bucco-antral opening may be kept open for weeks by means of a suitable rubber plug, so that the antrum may be periodically examined through a speculum by reflected light. I would like to hear the advantages of the two operations discussed, because I hold no particular brief for either one against the other.

Whatever local treatment be adopted in cases of chronic antral suppuration we must not forget the great importance which the general health plays in these cases. More than once patients have said that excessive smoking, too sumptuous a dinner, or "one or two extra glasses," inevitably produce a free discharge the next day or two, while others are equally positive that sea-air or a sea-voyage immediately checks the discharge.

In our general treatment of the case we must not neglect such hints as these.

Should the maxillary antrum be associated with suppuration of the ethmoidal or frontal sinus, I am strongly of opinion that it is wiser to operate upon the upper sinuses before endeavouring to check the discharge of pus from the antrum, for the simple reason that in these cases the antrum is often acting only as a reservoir of pus which is generated in the higher sinuses. If the reverse procedure be adopted, it not uncommonly happens that the antrum will be reinfected by the pus which issues from the frontal or ethmoidal sinuses.

In conclusion, it may be said of the treatment of chronic suppuration of the antrum that it is essentially a disease in which the severity of the treatment should be proportioned to the needs and temperament of the individual case. Some will be cured and others vastly benefited by the simple alveolar or intranasal method of drainage and irrigation, while the failure of these means or the peculiar circumstances of the patient in another case may demand more radical measures.

Oliver Wendell Holmes once said that "Science is a first-rate piece of furniture for a man's upper chamber if he has common sense on the ground-floor"; and if we, as rhinologists, bear this more frequently in mind, we shall not only earn the esteem of our colleagues, but add additional honour to the fair name of our speciality.

DISCUSSION.

Dr. GRÜNVALD (Munich) deprecated the practice of removing part of the lower turbinal in order to give access to the antrum; it was too important a structure to be even partly sacrificed without serious reason. The disfigurement caused by removal of the anterior wall of the frontal sinus was only slight in suitable cases.

Professor KILLIAN (Freiburg) remarked that, in his experience, cases frequently occurred in which there were complicated sinuosities and cells in the orbital roof, and it was impossible to cure such cases radically without taking these sinuosities into consideration. In addition to a removal of the frontal wall, a resection of the lower wall was therefore necessitated. To avoid greater deformity he left the upper bony margin of the orbit in the form of a narrow crest. By a resection of the processus frontalis of the upper jaw the ethmoid was made accessible. The nasal mucous membrane was preserved, and, in the form of a flap, was implanted into the wound. The way from the frontal cavity to the nose was thus widely patent, and could not get obliterated by adhesions. No plugs or drainage tubes were inserted. The wound was stitched up by primary sutures, and healing was completed in a few weeks. The cosmetic results were very satisfactory. The different stages of the operation were illustrated in the plaster models exhibited.

Dr. DUNDAS GRANT advocated treatment by intranasal measures if possible, and quoted a case of empyema of the antrum in a girl, aged six years, in which he considered it unjustifiable to perforate through the alveolar process or the canine fossa on account of injury to the temporary or permanent teeth. He removed the anterior extremity of the inferior turbinated body, punctured by means of Krause's trocar, and introduced a self-retaining india-rubber drainage tube. After irrigation thrice daily for four days the pus disappeared. When the suppuration was occasioned by infection from the nose he recommended, in the first instance, at least, intranasal methods of treatment.

Dr. SCANES SPICER regretted that business in another section having detained him, he had not heard the opening essays of Drs. Tilley and Lermoyez.

With reference to maxillary sinus suppurations: In acute cases his practice was to puncture the antrum and wash out, through the nose if possible, if not, through the canine fossa. He only used the alveolar puncture if he thought an antral tooth were infecting the cavity, and, unless in special cases, he did not think a sound tooth should be sacrificed. Most acute cases speedily got well with

simple puncture and washing out with saline fluids. In chronic cases he still used his own radical method, though he had adopted Luc's modification of closing the buccal wound at once and carrying out all irrigations after through the nose, because it saved the patient a great deal of pain, was equally efficient, and avoided the risk of buccal reinfection. Also he always now resected the anterior half of the inferior turbinated bone in order to clear the way for a good naso-antral opening and prevent subsequent adhesions which in his earlier cases required some attention. Otherwise his method remained the same as it was, and he was very gratified at the way it had been adopted both in this country and on the Continent.

He had now had well over eighty cases of uncomplicated chronic antral empyema, and in only one had he found the empyema resist the operation and subsequent drainage, and in that case, which was bilateral, he now had evidence that the frontal and ethmoidal sinuses were diseased. It should not be forgotten that an operated antrum was a weak spot and sensitive to cold, and that occasionally, when a severe cold was caught, there might be a little yellow discharge of muco-pus for a few days, but if the naso-antral opening were patent it quite cleared up. Looking ahead, he hoped for an ideal time when it would be possible to treat all antral empyemata of non-dental origin entirely through the physiological tract, the nose, and without a buccal incision—both to avoid pain and loss of blood and the risk of infection from the mouth. Within the last fortnight he had attempted a radical operation in this way by nose only. He removed thoroughly the front end of the inferior turbinated bone, and then made an opening large enough to admit two fingers from the nose into the antrum, and as near the floor of the nose and antrum as possible, and then scraped out all the polypoid and cystic matter and pyogenic membrane he could reach. It remained to be seen if the free drainage and proper irrigation would be followed by subsidence and cure of the disease, though, perhaps, the present was hardly a fair test case, as there was extensive ethmoidal disease as well.

He had seen one single case of chronic empyema of the antrum apparently cured by alveolar drainage and tube, and had met scores of patients who were going about washing out their antra several times a day for months and years, were undergoing pain and misery, and were under the erroneous impression that they had received all the benefit that surgery could give them. He had also had one success in a case of chronic empyema, in which a very large alveolar opening was made with a large trephine and dental engine and then a plug of base-plate gutta-percha shaped up to

resemble the crown and a conical fang of the missing tooth. The fang was moulded warm, and let into the trephine opening, and the crown into the gap between the other teeth, the pressure of the lower teeth pressing up and adjusting the artificial plug till it comfortably fitted in the gap and against the lower teeth. Very limited curettement was alone possible through the opening. This plug was removed for irrigation as required, and as the discharge lessened the fang was gradually shortened until the canal finally closed up. The cure was not completed for eight months, comparing very unfavourably with his radical method, which took usually about eight weeks.

With reference to frontal sinus empyemata, he was in no hurry to operate if there were no acute pain due to retention of pus in the cavity under pressure. He recommended first resection of the front end of the middle turbinated bone, and breaking down some of the anterior ethmoidal cell region, so as to promote drainage as much as possible, and allow the disease to subside spontaneously. Also he was not averse to a course of spa treatment, diet, and sulphur waters, always provided there were no symptoms of retention of pus under pressure. He had known marked benefit ensue from these courses, the symptoms disappearing even for years. On the other hand, if there were severe pain over the cavity, especially if it commenced at a regular hour each day, gradually attained to a maximum, and then subsided after lasting some hours, and if these phenomena were frequent, and if there was relative opacity on transillumination, he did not hesitate to perform the radical operation by external incision, trephining, curettement of the sinus in every recess, and he made the largest possible canal he could into the nose, and inserted the largest drainage tube he could. The results were usually most satisfactory, and ended in cure as far as that sinus was concerned, but unfortunately frontal sinus disease was only too frequently associated with other sinus affections in everyday practice.

Dr. PEGLER asked Dr. Lermoyez why he so carefully directed that in the case of a carious tooth having to be extracted in connection with disease of the antrum of Highmore, no perforation of the alveolus should be made. It was the custom in this country to bore through into the antrum after extraction, and drain the cavity from that situation in the first instance. In not a few instances perforation into the antrum was unavoidably made by the extraction itself.

REPLIES.

Dr. LERMOYEZ, in reply, said he preferred puncture and irrigation of the antrum from the nose to the alveolar method, because, according to his statistics, it gave about the same percentage of cures and was not open to the same objections. He thought Professor Grünwald's objections to Luc's operation were purely theoretical. Theory and practice were very different things. Let Professor Grünwald try the method and judge by his results.

Dr. HERBERT TILLEY stated that he thought that the causes of recurrence of suppuration in the frontal sinus after operation were frequently due to the surgeon overlooking extensions of the ethmoidal cells under the floor of the main sinus. If due care were taken to deal with these the radical operation might be undertaken with safety and with prospect of excellent result. The objection to alveolar perforation because it communicated with the septic cavity of the mouth was more theoretical than real. Like many others, he had cured several cases by this means and it was a simple measure which should be adopted before more radical measures were carried out.

SECTIONS OF LARYNGOLOGY AND OTOTOLOGY.

(Combined Meeting.)

THE ETIOLOGY AND DIAGNOSIS OF ETHMOIDAL AND SPHENOIDAL SUPPURATIONS.

L. GRÜNWARD, M.D., Munich.

ETIOLOGY.

THE etiology of these two diseases corresponds in general with that of other focal suppurations of the nose; they are acute infectious disorders of general or local origin. The principal factor in the production of a chronic disease from an acute inflammation in this situation is impediment to free discharge; thus it is easy to understand at once the most frequent cause of chronic suppuration in these cavities and its comparative rarity. The sinuses in question have their openings situated at their deepest and most dependent parts—that is, under the most favourable conditions for drainage. This, however, will be altered by swelling of the adjacent mucous membrane, and to this the ethmoidal bone especially is much exposed. Such a swelling may be superadded to a previous acute inflammation of the cells themselves, or it may be the consequence