

In all ordinary cases an enema given two or three hours previous to the time of examination will thoroughly cleanse the lower bowel. The patient is placed in the position previously described; the surgeon stands erect and introduces the proctoscope gently into the bowel, the obturator being removed as soon as it passes the sphincter muscle; the air can be heard to rush in, and the bowel is distended so as to admit of the easy passage of the instrument as above described. With the head mirror, sunlight (which is preferable) or electric light may be used to illuminate the entire mucous surface. When illumination is obtained by an electric bulb placed at the distal end of the tube, as in the electrosigmoidoscope, the tissues assume an unnatural reddened hue; when the light is reflected as above described, the tissues exhibit their normal appearance. Artificial distention is seldom necessary, and there is no window, therefore, in the proximal end of the instrument to interfere with treatment, obtaining specimens, etc. If it is desired to cleanse the bowel more thoroughly by passing water higher into the sigmoid or colon, this can be done by pouring the fluid through the tube as if it were a funnel, which is shown in Fig. 2. The quantity of water that will be retained, when introduced in this way, is surprising; and it readily passes the ordinary obstructions met with in using the colon tube. The mucous surface of the bowel is so fully exposed that ulceration, both as to extent and character, is readily determined. Scrapings may be made for microscopic examination; local applications can be made with precision, and through the tube of large size the Paquelin or electric cautery may be applied to ulcers.

THE SUBMUCOUS RESECTION OF THE LATERAL NASAL WALL IN CHRONIC EMPYEMA OF THE ANTRUM, ETHMOID AND SPHENOID.*

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A certain reaction is setting in against radical operations in the treatment of chronic nasal accessory sinus disease. This is due to several causes. Those relative to the sinuses under discussion, i. e., the antrum, ethmoid and sphenoid are as follows:

1. Many unnecessary radical operations have been performed. Cases which had proved obstinate to conservative measures have been operated on radically only to demonstrate that but a moderate degree of pathologic change had taken place, and that the chronicity of the disease had been established by insufficient drainage or by some anatomic peculiarity in the size or shape of the cavities.

2. Of those patients operated on radically through the canine fossa by the most widely accepted methods, with perfectly satisfactory results as far as curing the discharge is concerned, some suffer such distressing symptoms, due to trauma of the soft tissues of the cheek and to extensive destruction of the nasal mucous membrane, that the amount of benefit which they have received may be considered problematic.

3. Many cases operated on by radical methods have failed of complete cure. This has been ascribed to sev-

eral causes, such as: (a) Great size of the antrum; (b) Character of the pathologic process; (c) Combination with disease of other sinuses. Some one or all of these causes are no doubt at work in a great many of these cases. However, failure has occurred in some of my own cases in which the Luc-Caldwell operation had been made and in which no one of these conditions had obtained. This led to the belief that irregularities in the healing process had taken place which had prevented

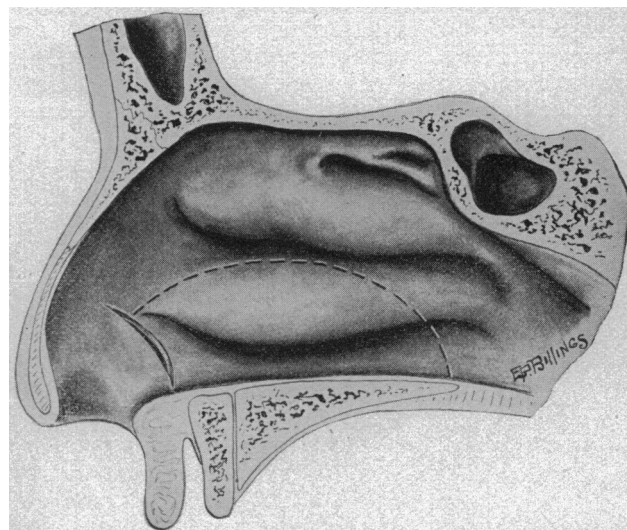


Fig. 1.—Initial incision along lateral wall of piriform opening. Dotted line shows line of incision of mucous membrane flap to be made later. (Note that the dotted line passes through the mucous membrane of the lateral wall of the nose outside the inferior turbinate, i. e., the median wall of the antrum. The turbinate is not removed or disturbed.)

a satisfactory convalescence. This belief was strengthened by observations made during secondary operations performed in two cases which had been operated on previously after the Luc-Caldwell method, and which

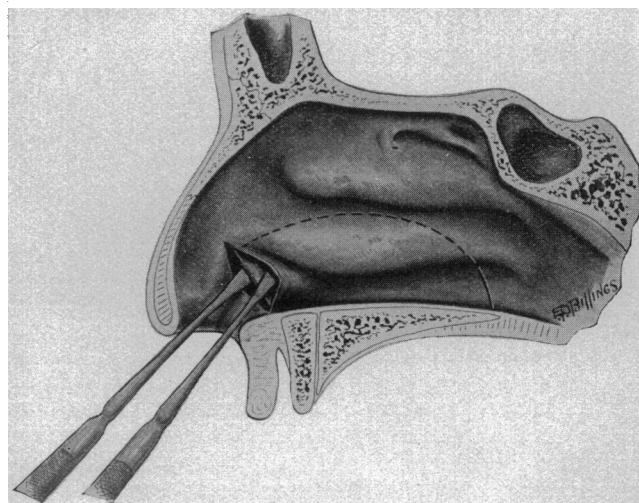


Fig. 2.—Elevation of mucous membrane of median wall of antrum in direction of dotted line. Turbinate not removed but remaining in original position.

continued to discharge pus into the nose. In one of these cases, several pockets had formed in the deeper parts of the antrum within which pus collected, and from which it was discharged spasmodically into the nose. In the other case, exuberant granulation tissue formation was the cause of failure. It was perfectly apparent that had the after treatment been carried out

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under visual control, satisfactory results would have been secured.

With that in mind I operated in three cases of chronic empyema of the antrum, and in four cases of chronic empyema of the antrum and ethmoid, after the method of Denker. This method is that of Luc-Caldwell, modified by the complete removal of the lateral wall of the piriform opening. This method gave uniformly satisfactory results so far as curing the discharge was concerned. It was, however, open to some of the objections of the Luc-Caldwell operation in that it required a long incision through the mucous membrane of the alveolus, complete resection of the anterior antral wall, and sacrifice of a large portion of the inferior turbinate. I, therefore, devised the following operative procedure which I have, in part, described previously.¹ It has for its purpose the treatment of those intractable cases of

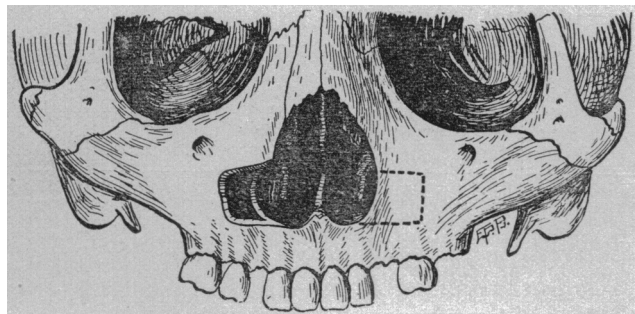


Fig. 3.—Removal of inferior half of lateral wall of piriform opening and lateral wall of nose.

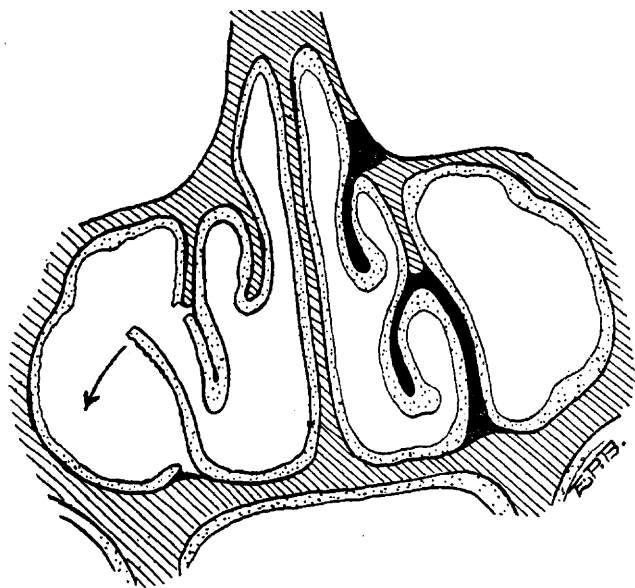


Fig. 4.—Enucleation of part of inferior turbinate; anterior view.

chronic suppuration of the antrum, either simple, or combined with disease of the ethmoid and sphenoid, which have resisted all less radical methods of treatment. It includes as thorough an investigation of these sinuses by the endonasal route as may be necessary in each individual case without unnecessary sacrifice of nasal mucous membrane.

TECHNIC OF OPERATION.

The technic of the operation is as follows:

1. Infiltration anesthesia with $\frac{1}{4}$ per cent. cocain

1. Annual meeting of the Middle Section of the Laryngological, Rhinological and Otological Society, Feb. 22, 1907.

in 1-10,000 adrenalin solution, injected along the lateral wall and floor of the nose and the anterior antral wall. This affords complete anesthesia and an almost bloodless field of operation.

2. An incision through the soft parts of the nostril, at the junction of the modified skin and mucous membrane, i. e., the inner margin of the vestibule, beginning about the middle of the lateral wall of the piriform opening and extending well down to the floor of the nose. This incision passes through the periosteum, which is incised along the lateral wall of the piriform opening (Fig. 1).

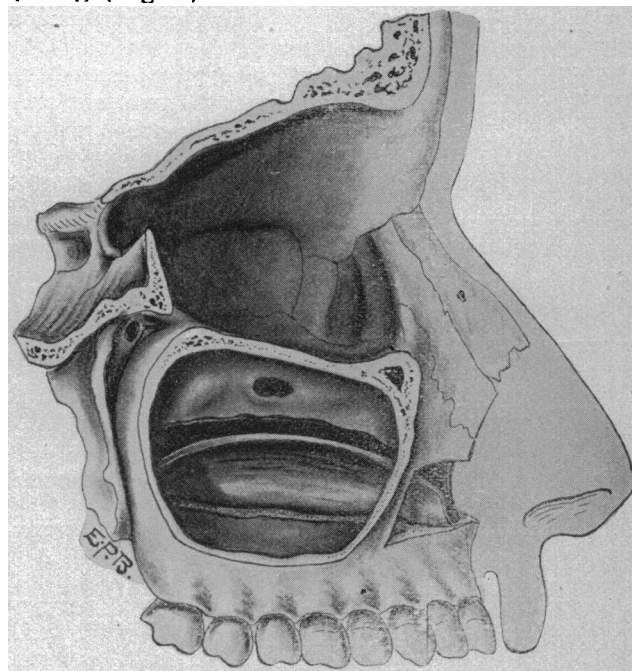


Fig. 5.—Showing how antrum is exposed fully to view; side view.

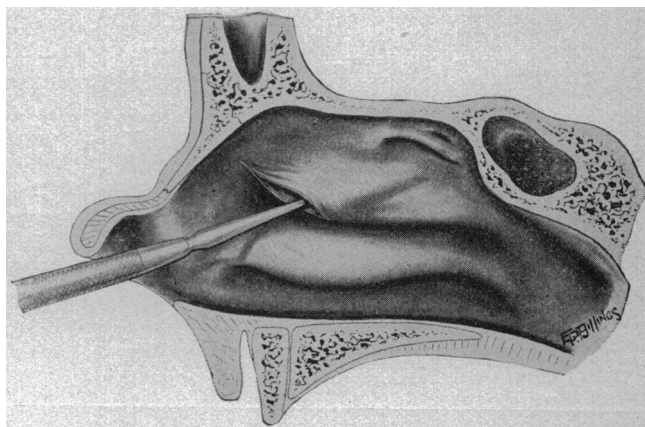


Fig. 6.—Showing manner of reaching the ethmoid through the middle turbinate.

3. Elevation of the mucous membrane and periosteum of the lateral wall of the nose from the floor of the nose upward to the level of the attachment of the inferior turbinate and backward as far as convenient (Fig. 2).

4. Elevation of the periosteum of the anterior antral wall for any desired distance.

5. Removal of the inferior half of the lateral wall of the piriform opening, and the lateral wall of the nose over an area corresponding to that part from which the mucous membrane has been elevated. During this

step the lowest portion of the lateral nasal wall is completely removed so that the floor of the nose is continued outward into the antrum without irregularity (Fig. 3).

6. Enucleation of any desired amount of the bone of the inferior turbinate without disturbing the soft tissue (Fig. 4).

7. Removal of the desired amount of the anterior antral wall, i. e., enough to allow view of the antrum (Fig. 5).

8. Penetration of the lining membrane of the antrum and inspection of the cavity.

9. As thorough curettage of the antrum as necessary.

10. Operation on the ethmoid, if indicated. The ethmoid is entered after enucleating the bone of the middle turbinate in the same manner that was employed in the case of the inferior turbinate through a vertical

obstructing deviation of the septum is present, it must receive attention before the operation on the accessory sinuses is begun. With the anterior wall of the sphenoid well in view, its removal is accomplished without difficulty.

12. Formation of a flap of mucous membrane from that part of the lateral wall of the nose beneath the level of the attachment of the inferior turbinate (i. e., the median wall of the antrum).

13. Removal of the deepest portion of the median wall of the antrum. This permits continuous drainage of the deepest parts of the antrum and prevents the formation of granulation tissue at this point. This step is postponed until the end of the operation because troublesome bleeding sometimes occurs from a branch of the lateral nasal artery when this piece of bone is removed.

TABLE OF CASES OF EMPYEMA OF ANTRUM.

Case.	Site.	Symptoms	Duration of Discharge.	Previous Treatment.	Duration of Previous Treatment.	Result of Previous Treatment.	Pathologic Findings.	Result of Lateral Resection.	After Treatment.	Remarks.
1 Mr. S.	Antrum ethmoid.	Discharge....	3 years.	Alveolar...	1 year.	No effect on discharge.	Suppurating mucous membrane.	Cessation of discharge.	10 days.	Controlled after 4 mos.
2 Dr. B.	Antrum ethmoid.	Trifacial neuralgia; discharge.	4 years..	Alveolar...	1 year.	No effect on discharge.	Stinking pus, granulations, polyps.	Cessation of discharge; temporary relief of pain.	3 weeks.	Resection of infraorbital nerve; relief from pain; controlled.
3 Mr. I.	Antrum ethmoid.	Discharge....	1 year.	Alveolar...	1 year.	No effect on discharge.	Suppurating mucous membrane.	Cessation of discharge.	2 months.	Controlled after 4 mos.; Syphilis.
4 Mr. D.	Antrum	Discharge....	2 years.	Alveolar and inferior meatus.	1 year.	Slight effect on discharge.	Suppurating mucous membrane, exuberant granulations at upper end of sinus through teeth.	Cessation of discharge.	Referred to home physician.	Controlled after 1 year.
5 Miss S.	Antrum	Pain, discharge; pul. tuberculosis	1 year.	Inferior meatus.	6 months.	Discharge ceased, but recurred.	Tuberculous gran. on turbinates, septum and in antrum.	Cessation of discharge; relief from pain.	2 months.	Gain of 21 pounds; controlled after 1 year.
6 Mr. G.	Antrum, ethmoid, R.	Discharge....	8 years.	Inferior meatus and middle meatus; many operations.	8 years..	No effect on discharge.	Polyp in nose, antrum and ethmoid; suppurating mucous membrane.	Cessation of discharge.	Occasionally for 3 months.	Controlled after 6 mos.
7 Mr. Y.	Antrum, ethmoid, L.	Discharge....	8 years.	Many operations thro' inferior and middle meatus.	8 years.	No effect on discharge.	Polyp in nose, antrum and ethmoid; suppurating mucous membrane.	Small amt of discharge in posterior ethmoid cell.	Occasionally for 3 months.	Disappeared from treatment.
8 Mr. C.	Antrum, ethmoid, sphenoid, frontal.	Frontal and occipital pain; discharge.	6 years.	Killian frontal operation; inferior meatus.	Several weeks.	Cure of frontal; improvement in antrum.	Foul pus in all accessory sinuses; polypoid mucous membrane.	Cessation of discharge.	2 months.	Controlled after 8 mos.
9 Mr. H.	Double antrum frontal and ethmoid.	Pain (L.); discharge.	10 years.	Radical frontal (double) alveolar.	6 years.	Cure of frontal; discharge persists thro' alveolar.	Foul pus; suppurating mucous membrane; exuberant granulations.	Cessation of discharge (L).	1 month.	Left side only operated; patient disappeared.
10 Mrs. D-l	Antrum	Discomfort, discharge.	Years.	Inferior meatus.	Several months.	Slight effect on discharge.	Stale pus; suppurating granulations.	Cessation of discharge.	3 weeks.	Controlled after 6 mos.
11 Mrs. D-w.	Antrum	Pain in teeth and cheek; discharge.	1 year.	Alveolar...	1 year.	No effect...	Stinking pus; polyps.	Cessation of discharge.	2 weeks.	Controlled after 4 mos.

incision along its anterior end (Fig. 6). This very materially decreases the thickness of the turbinate, makes it easily movable, and, in the average nose, makes possible sufficient retraction of the soft tissues of the middle turbinate toward the septum to afford access to the ethmoid bulla and anterior ethmoid cells which are thoroughly curetted. The middle turbinate is then pressed laterally, which enables the operator to see the posterior ethmoid cells which are easily opened.

11. Removal of the anterior wall of the sphenoid if indicated. Satisfactory view of the sphenoid is secured, in the absence of a deviation of the septum toward the affected side, by pressing the soft tissues of the turbinate laterally into the region of the ethmoid. If an

14. Careful approximation of the mucous membrane flap to the floor of the antrum.

15. Packing the antrum and nose with vaselin gauze.

DIFFICULTIES OF OPERATION.

The difficulties of the operation are those encountered in the submucous resection of the septum increased by the fact that the lateral wall of the nose is often sharply concave; that the bone of the lateral wall of the piriform opening is very dense and that the periosteum of the anterior antral wall is sometimes very adherent. Considerable difficulty was experienced in the first operations in saving the flap without perforation. While perforation or even loss of the flap is possibly of less

importance than is the same accident during the submucous resection of the septum, still it is much better technic to save it, as it certainly shortens the period of observation necessary after operation.

The operation on the ethmoid is the most difficult step in the entire operation. The anatomic configuration of the ethmoid is so varied that cells may escape notice during even the most painstaking examination. However, the removal of the lateral wall of the pyriform opening, and the enucleation of the bones of the turbinates make possible a very satisfactory view of this region.

AFTER-TREATMENT.

The after-treatment is very simple. The gauze is removed on the fourth or fifth day and the operative field is inspected and wiped dry. The packing is not reinserted. In some of my cases of antrum disease, not combined with disease of the ethmoid, no further treatment was necessary. Daily inspection of the antrum showed the cavity to contain only the slightest trace of moisture, which disappeared entirely within a surprisingly short time. This took place in cases which had been treated for long periods of time by other methods. In other cases, granulation tissue formed within the antrum, and necessitated the occasional use of the ring curette and the silver nitrate crystal. As the entire cavity could be seen this irregularity in the healing process caused not the slightest inconvenience or delay. In one case incomplete removal of the deepest portion of the median wall of the antrum permitted the formation of granulation tissue and collection of secretions at this point. The removal of the piece of bone permitted a speedy convalescence.

Cases in which extensive disease is present in both antrum and ethmoid present the greatest difficulties during operation and throughout the after-treatment. The latter must be carried out during a longer period than is required for cases in which the antrum alone is involved.

This operation seems to me to possess several advantages which make it worthy of further trial.

ADVANTAGES OF OPERATION.

1. It can be performed under local or general anesthesia.

2. It can be made just as radical or just as conservative as may seem wise, as the operation proceeds. This permits the operator to advise it in cases that have resisted other treatment, but in which he hesitates to advise such an operation as the Luc-Caldwell. It is also suitable for the most extensive combined cases of antrum, ethmoid and sphenoid disease, as it offers direct and adequate approach to all these sinuses. It accomplishes, therefore, all that the most radical operation previously described is able to do.

3. Surcharging the lymphatics with a saline solution forcible retraction of the soft tissues of the cheek than do any of the operations through the canine fossa. This results in very much less swelling of the soft tissues subsequent to the operation, and a minimum loss of function of those branches of the trifacial that supply that region. Many patients, after the Luc-Caldwell operation, complain of numbness in the cheek and upper lip, while others complain not only of loss of sensation but of pain over that area. This has not been noticed after the operation just described.

4. It offers a most satisfactory view of the antrum, ethmoid and sphenoid, and maintains it throughout the

after-treatment. This enables the observer to control the healing process quite as successfully as after the radical mastoid operation.

5. It may be divided into several steps which can be performed at different times; thus the antrum operation can be done at one sitting, the ethmoid at a second, and the sphenoid at a third, if desired. Although the small number of operations I have performed more or less after the method described is not sufficient for generalization on this point, I think that in many cases the antrum, ethmoid and sphenoid can be radically exposed with the destruction of practically no nasal mucous membrane. Probably, in some narrow noses, the middle turbinate may have to be sacrificed. This will certainly not be the case, however, in those cases in which the preservation of the middle turbinate is most essential to the patient's comfort, i. e., in broad noses or those in which there is a tendency toward atrophic rhinitis. In such cases the importance of preserving both middle and inferior turbinates is recognized.

6. It simplifies the after-treatment. In some cases after-treatment is quite unnecessary. They pass on to complete recovery without incident. In others, wiping out with cotton, and occasional irrigation or cauterization are indicated. Inasmuch as the entire antral cavity is at all times under perfect visual control, its after-treatment is carried on easily and without inconvenience to the patient.

7. Finally, it has given me more satisfactory results than has any other method I have tried. Of the twelve patients I have operated on, eleven have made complete recoveries, with cessation of all discharge, while the twelfth patient showed at the last observation some discharge in a high posterior ethmoid cell. The accompanying table gives the most important points in these cases.

ABSTRACT OF DISCUSSION.

DR. J. W. MURPHY, Cincinnati: At first glance the removal of so much of the anterior wall of the maxillary sinus in order to treat some diseased condition of its interior seems to be a very radical, not to say heroic, procedure. We all know that if we can thoroughly drain a suppurating cavity we shall not have much difficulty in successfully treating and stopping the source of the discharge. The chief difficulty encountered by the usual methods for opening these sinuses, either by the canine fossa, the usual method, or the Luc-Caldwell operation through the lateral wall of the nose, have been that the opening, which seemed ample at first, would often contract and close before epidermization was completed, and the retention of pus with the presence of granulation tissue would soon destroy the beneficial effects of the operation. Then, too, the cavity operated on was after a short time not open to ocular inspection. By the method proposed by Dr. Canfield, the removal of the anterior wall of the pyriform opening of the nose, the whole of the antrum is under the control and direct inspection of the surgeon.

Another important feature of this operation is that the nasal wall and ridge of bone between the floor of the nose and the floor of the antrum is entirely obliterated, and the mucous membrane of the wall is brought down so as to cover the denuded bone on the floor of the antrum. While I often chose the alveolar route I was never quite satisfied with it, since it necessitated communication between the mouth and diseased sinus.

Then, too, a fistulous opening was so often established that the patient was compelled to wear a metal or hard rubber plug to prevent the entrance of food into the cavity. By this method there is no communication between the antrum and the oral cavity. Another important feature is that the opening is so ample and the drainage so complete that after-treatment, usually of more importance than the operation itself, is ren-

dered so simple and the time of after-treatment so much shortened, that often it can be carried out by the family physician. Since the advent of the submucous operation on the septum, and the success attendant on it, it seems but natural that a similar procedure and technic should follow in the opening of the accessory cavities of the nasal space. It is analogous to the radical mastoid operation, and should be reserved for those cases of chronic suppuration in which less radical methods have been resorted to, but in which sufficient drainage could be maintained only by removing entirely the lateral nasal wall so as to form one large cavity, easy of treatment and ocular inspection.

DR. CHARLES H. BAKER, Bay City, Mich.: I can not see from Dr. Canfield's description of the operation any reason whatever for doing a submucous operation. It seems to me that he has missed the point; that the thing which he has accomplished, and the thing we should all seek to accomplish, is better drainage than we have had from previous methods of operation. This method which he has outlined carries the incisions clear back and removes the lateral wall, and leaves a big hole, instead of a little hole which soon closes in a chronic case. What is gained by the submucous operation? Simply a flap which can be turned on to the wall of the sinus. Is there any advantage to be gained by that? I say no, because it is not necessary to curette the whole sinus. There are some cases in which it is necessary to curette, but in many it is not, provided the drainage is sufficient. If you will carry out your opening to the opening of the pyriform opening and chisel off the lower margin of the junction between the nasal cavity and the floor of the antrum you have accomplished what you desire—free drainage—and then you have left a mucous surface lining both antrum and nasal cavities with a narrow line between, over which granulations readily form, and you have no necessity for this great flap of mucous membrane which will atrophy, unless you have curetted the wall of the antrum, for there is nothing for it to be attached to. I do wish to congratulate Dr. Canfield on the thoroughness with which he gets access to these sinuses and the size of the opening which he procures by this means, thereby doing away with probable closure afterward.

PROF. A. JANSEN, Berlin: I have used for fifteen or eighteen years that step of the operation which consists of the formation of a flap of mucous membrane, but did not find that the flap served as a source of epithelium for the parts of the cavity not covered by it. I therefore advise against making it. Even the complete removal of the nasal wall, as advised in Dr. Canfield's paper, will not always prevent some collection of secretion at the bottom of the maxillary sinus with the patient in the upright position, because in many persons the floor of the sinus lies about a centimeter below the level of the floor of the nasal cavity. However, drainage is not the only thing that brings about a cure in the treatment of empyema of the antrum of Highmore, other things, especially free ventilation, being of great importance. I regard the removal of the whole turbinate as an objection to Dr. Canfield's procedure and disapprove of removal of more of the nasal turbinated bodies than is absolutely necessary. The chief disadvantage of radical turbinotomies is their leaving the nasal cavity too roomy; this favors the collection of secretion in the nose, makes its expulsion difficult and may create obstinate scabbing in some instances. I have very rarely accomplished a cure of chronic empyema of the antrum of Highmore by removing its nasal wall submucously. I have followed such cases for from one to two years and the good results have been so rare that I have given up the procedure. My experience includes about 300 cases.

DR. EMIL MAYER, New York: I think that the method in a long line of cases will do more good than the statements of the last two speakers would indicate. I have had the pleasure of seeing Dr. Jansen's work and patients. The number of patients that present themselves with serious conditions in many of the larger cities of Germany can not be paralleled in this country; therefore we can not make a valid comparison. I have seen cases of maxillary antrum disease in which the antrum was opened as freely as is proposed by Dr. Canfield, and these patients have remained absolutely well. To open the antrum a very ingenious device has very lately been pre-

sented by my assistant, Dr. Yankauer, in New York, which consists of a combination of a hook, as presented by Myles of New York, and a ring chisel which slides over the hook. A small hole is made in the antrum, the hook is placed in and the chisel is pushed forward so as to cut out a sliver of bone. It is removed, the bone extracted, and so one continues until as large an opening as is desired is made; and the operation is comparatively easy to do. One little advantage the instrument has is that when the chisel is slipped over, it has at the end a roughened edge so that a hammer could be used. I feel that these future operations will be largely intranasal. I have seen patients that I am sure would at one time have been submitted to external operation get entirely well—in time, it is true, but without disfigurement, without delay from their every-day work.

DR. OTTO T. FREER, Chicago: I regard it as certain that in time the operation through the alveolar process and buccal walls of the antrum will be completely abandoned. I regard the operation proposed by Dr. Canfield for making this opening as needlessly formidable and elaborate for all but the extremely rare cases in which caries of the antrum exists, tumors are to be removed or in which the suppuration has extended beyond the confines of the maxillary sinus in the severe form of the disease classified by Killian as *sinuitis maxillaris exsudans sive exulcerans*. No good reason can be found in ordinary cases for beginning the removal of the nasal wall at its very front by resecting the outer wall of the *apertura pyriformis*, thus including a firm strong part of the facial skeleton in the bone cut away with the possibility of deformity, however slight, in an occasional patient. I do not think it necessary to have the wide entrance to the antrum. In my experience, to produce speedy cessation of the suppuration and complete recovery, it is merely necessary to insure permanent ventilation of the antrum by an opening made in its nasal wall by means of the trephine and a knife-edged cutting bur of my devising, both driven by a high-speed electric motor. I described this operation in the *Laryngoscope* and *Chicago Medical Recorder* in 1905. As a preliminary to the opening of the antrum the anterior half of the inferior turbinated body is cut away, a procedure which in my hands has never led to permanent bad effects, such as scabbing, crusting or atrophic rhinitis, so that I regard it as harmless. The opening should extend from the nasal floor up into the middle meatus and reach well forward and back, and if made large enough, it will remain permanently open. I saw closure of the opening in only one case in which the patient would not permit sufficient reaming out of the hole with the bur. In my experience, under the influence of drainage and ventilation, polypoid thickening and hypertrophy of the lining of the antrum always return to a normal condition. I do not curette the interior of the antrum and prefer to preserve its mucosa intact. I have seen 17 consecutive recoveries in 17 patients operated on by this method, and regard it as one of the most certain and satisfactory procedures in rhinology. The chisel and cutting forceps have been substituted for the trephine and bur instruments for the purpose by others, but I have found that the implements of precision and speed for the work are the ones mentioned. The main point I wish to bring out is that a complete removal of the nasal wall of the antrum and the opportunity to inspect the whole interior of the cavity are not needed and that an opening sufficient to give permanent free ventilation and drainage suffices in all but the rarest cases of suppuration of the antrum.

DR. W. E. CASSELBERRY, Chicago: Assuming a case in which it is determined that the intranasal operation is best and suitable, shall one trouble to make this elaborate submucous dissection of the intranasal wall, or simply make the usual, quicker, and, it is said, easier operation originally credited to Krause but recently amplified and reintroduced by Freer, Myles, Corwin and others? I admire the technic and the ability that Dr. Canfield has displayed in his new submucous method, and I think that it may possess certain important advantages that will justify us and repay the patient for the additional length and for the tediousness of it. I have experienced immense difficulties myself in operating by the so-called easy methods, the usual one of Freer and others, by simple removal of a variable part of the antro-nasal wall.

The first difficulty I encounter pertains to the lateral curvature of the outer bony wall of the nose, which, just within the nostril, makes an angular bend which is difficult to see around, making it necessary to place instruments, guided by touch or by knowledge of direction alone. By penetrating under the membrane we should be able to displace the ala nasi and the tissues of the face somewhat to the side, securing thus a direct straight tunnel of access. If so, the first difficulty in the intranasal operation would be obviated rather than augmented by the submucous method. The second great difficulty is from hemorrhage. After using adrenalin to the limit, there are many persons in whom the bleeding is still enough to befog the view. In operating in a deep cavity a bloody field will dim the brightest light. We have learned from the now accepted submucous septum operation that we can see more distinctly through the small incision and to a far greater depth within the raised ballooned mucosa, because the field is less bloody, than we could by the old surface methods of septum operating, for the larger vessels are raised with the mucous membrane and perichondrium. Probably Dr. Canfield has found the same advantage in the submucous antrum operation. If so, it would go far to compensate for the tedious technic.

DR. G. SLUDER, St. Louis: For several years I have done an operation, in wide noses, which is simpler than this and accomplishes this saving of the lower turbinate. It consists of a scissors cut which detaches the lower turbinate back to its posterior fourth. The detached portion of the turbinate is then pushed upward. The window is then made into the antrum and the turbinate put back into its original position, where it reattaches itself. When the healing is complete the turbinate is normal in its position with the antrum opening underneath it. These cases have been satisfactory after three years' standing. In narrow noses I remove one-half or two-thirds of the lower turbinate, because more breathing space is necessary.

DR. J. E. LOGAN, Kansas City: In the extensive operative procedures carried on to-day in opening the sinuses I believe that we fail to realize the disappointing results that we often get. These procedures leave a great deal of cicatricial tissue in which atrophy is likely to follow, and they break away or take away the inferior turbinate, which is a most useful body for the distribution of nutrition to the nasal cavity. They destroy to a great extent the power and function of that organ. This flap pressed back into the maxillary sinus will of necessity leave cicatricial areas, which condition is very undesirable. Such a radical procedure as this suggested by Dr. Canfield must be resorted to only in extreme cases, as it is possible to relieve most of these cases by simpler methods.

PROF. A. JANSEN, Berlin: In my treatment of empyema of the maxillary antrum I operated through the buccal wall and through the nasal wall at first and was annoyed by persistent granulations and the failure to heal. I used to operate with primary closure by the Caldwell-Luc method, which I employed before those authors described it. The whole nasal wall was taken away, with primary closure of the buccal opening. At present, in difficult chronic cases, I do not take away the nasal wall, but leave the opening made into the mouth open and implant Thiersch grafts in the antrum, thus leaving a permanent communication between it and the mouth. In cases of slight gravity, or those which are only of moderate severity, I operate through the nasal wall. In syphilitic cases the prognosis of operation through the nasal wall, combined with specific treatment, is favorable.

DR. W. W. CARTER, New York: I think that this is one of the most ingenious submucous operations yet devised, but that in it the full value of that turbinate tissue is not taken into account. When that tissue is turned down into the antrum it is thrown out of the direction of the incoming current of air, and is, therefore, not useful functionally. I think that the nasal cavities would be broadened too much by this operation, and that is the very thing we must obviate, because it does favor atrophy.

DR. S. F. SNOW, Syracuse, N. Y.: It seems to me that in these cases the question whether we shall try to save the mucous membrane or not is fully answered by the case itself as it presents. In those that have come under my care I

have found that the tissues were so degenerated, and in some instances polypoid, that the question of doing a submucous operation would never occur to me, and I have freely sacrificed the tissue. I used the nasal cutting forceps, trimming away the tissues with all the freedom required, because they were white, degenerated polypoid masses, with the underlying bone so soft that a stiff curette would scrape them right out, and in two cases I got such a free view of the antrum as Dr. Canfield describes. For five years I have done no work through the canine fossa, but my operations on the antrum have been through the lateral wall of the nose, and they have all been successful. Some of the cases were very bad ones, too, and the free, complete drainage obtained from the cavity has resulted in a cure.

DR. GEORGE P. MARQUIS, Chicago: I think that one of the chief points which Dr. Canfield brings out here is one which the foreign operators, such as Professor Jansen, Hajek and Killian, have tried and discarded, and that is the preservation of this membranous flap. It seems to me that we really are going backward to take this up and provide in the antrum a stimulating cause for further secretion.

DR. R. BISHOP CANFIELD, Ann Arbor: I stated in the paper that this operation was for use only in the most intractable cases. The nasal mucous membrane and the turbinates are important. This operation destroys almost no mucous membrane. The mucous membrane that forms the flap that is turned down over the floor of the antrum is not formed from the turbinate, but is formed from the mucous membrane of the median wall of the antrum. If that flap keeps up secretion it can be sacrificed. At present I am not sacrificing any nasal mucous membrane except that which covers the posterior ethmoids. The mucous membrane of the lateral wall is even more important than that of the septum. It is necessary to the physiologic activity of the nostril. Consequently I attempt to preserve it. In my experience with antral cases the flap has hastened healing. I may be glad to discard it later. If the antrum were simply a pus pocket it could be cured by drainage, but the intractable cases to which I refer are ones in which remarkable pathologic changes have taken place in the nostril and in the mucous membrane of the sinuses. These cases can not be cured by drainage. In all the cases in which I have operated according to the method described operations had been previously done by other methods. As I have said, the entire lateral nasal wall is preserved with the exception of the median wall of the antrum underneath and outside the turbinate. Such an opening must be made, no matter what operation is done. By making it as I suggest a view can be obtained into the antrum at the time of operation and during the after-treatment. This does not mean that the inferior turbinate is sacrificed or that the air current plays into the antrum. The turbinate later falls down over the opening so that two or three months later you would never know that the antrum had been operated on unless you should cocaineize the turbinate, lift it up and look into the cavity. Because the turbinates are preserved, this operation is especially suitable to cases of atrophic rhinitis. Atrophic rhinitis is frequently associated with disease of the nasal accessory sinuses and can not be relieved until these cavities are taken care of. They must be operated on without unnecessary sacrifice of nasal mucous membrane if there is any left.

One speaker advocates operating through the canine fossa and leaving the buccal wound open. Any permanent communication between the nose and the mouth creates a disgusting condition. Then, too, a permanent opening through the canine fossa frequently causes permanent symptoms—light-headedness, sense of cold, continued pain and some anesthesia of the cheek. These symptoms are not present in the cases in which operation is done by my method. It is difficult to see into the deeper parts of the nasal cavity, and this operation, since it is rather technical, calls for a bloodless field. This can be secured by injecting cocaine and adrenalin (0.5 per cent. cocaine in adrenalin 1:10,000), along the lateral nasal wall and floor of the nose. Briefly, this operation is to offer an intranasal method of operating on intractable empyema of the antrum, ethmoid and sphenoid without disturbing the function of the nose or destroying the nasal mucous membrane.