be responsible for having initiated the trouble. With certainty, however, the x-ray will tell us whether the sinus is divided by septa with the formation of an accessory cavity. This skiagraphic information will further secure the almost unailing needle punctures through the nasal side. The puncture after all gives positive knowledge. When it is thus established that pus is present, the all-essential question is, to prove whether it is a product of inflammation within the maxillary, or whether it is the outcome of a flow into the antrum from the parts above it. To determine this we must re-examine our patient, say, after the expiration of two hours. If pus reappears in the middle meatus in so short a time it is now definitely settled that it must come from one of the higher sinuses, frontal or anterior ethmoid. Which one? Differentiation is now hardly required, for all anatomical data prove the intimate connection between the anterior ethmoid cells and the frontal sinus. By continuity and contiguity of structure these two sinuses are usually coaffected. Therefore, whether we wash out the fronto-ethmoid cavities with a canula or use the suction apparatus; whether we apply lavage and suction after resection of the middle turbinate, it can only amount to corroboration of the evidence already unmistakably furnished by the needle punctures, namely, that pus in the antrum at first originated from the sinuses situated higher up.

The final question is to determine whether the reservoir type of maxillary is itself the seat of actual disease and not simply a receptacle for the accumulation of pus. This can be readily ascertained by irrigating the maxillary several times at intervals of forty-eight hours. When pus reappears at each irrigation there is only one meaning possible, we have a genuine sinus infection. To insure this method the diagnostic value it really possesses, proper drainage from the fronto-ethmoid region must have been previously established. To this end, a middle turbinectomy is practiced, all bony projections in the hiatus, especially those formed by the uncinate process and bulla ethmoidals, are pared off, any existing polypoid masses are resected; in fact, the removal of any and all structural hindrances.

All this is done with the object of making the line of least resistance for fluids moving along the hiatus *away from and not toward the maxillary sinus ostium*. When we have re-established drainage from the fronto-ethmoid region along the more usual route in the hiatus, the repeated irrigations of the maxillary will not fail us in their diagnostic value.

CONCLUSION

I consider every chronic maxillary sinus affection as of the reservoir type until the reverse is proven.

Discussion follows paper by Dr. J. W. Jervey, page 293.

THE MAXILLARY SINUS*

BY JOHN T. CREBBIN, M.D.,
New Orleans, La.

The maxillary sinus is situated in the body of the superior maxillary bone. Owing to its accessibility, this sinus was considered more frequently affected than the others, but as we have investigated further, we find this is not so.

This sinus exists at birth, but only reaches its full development at puberty, the walls varying in thickness. The roots of the first and second molar teeth sometimes protrude into the antrum. The infection may extend through these teeth, and it is estimated that at least one-half of all empyema of the antrum has its origin in diseased teeth, while the remainder is due chiefly to intranasal diseases and anatomical deformities of the nose.

The ostium maxillare, situated beneath the middle turbinal bone, is the natural opening. The cavity depends for drainage upon the cilia of the epithelial lining. This is an extremely delicate mucosa, and is a continuation of the nasal mucosal lining, being composed of an epithelial, a glandula and a periosteal layer. Occasionally, a vertical septum divides the antrum into a posterior and anterior cavity. Horizontal septa have been found less frequently.

The maxillary sinus is subject to acute

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.

and chronic inflammatory changes, cysts, benign and malignant tumors. The chief symptom is pain and discharge of pus from the nose. Pain is especially true of an acute attack, being more severe about the eminence of the malar bone and in the infraorbital region. Diagnosis is made by the location of pain and intermittence in the flow of pus. Transillumination and the skiagraph are also valuable agencies in helping to make a diagnosis.

Many an acute attack can be cured by making an application of cocaine 2 to 4 % and adrenalin to the ostium maxillare for a few minutes, followed by an application of lunargen 40 %, or by irrigating through the natural, or an artificially made opening, under the inferior turbinate bone. Naturally in chronic cases, this line of treatment will relieve, but certainly will not cure. After a reasonable length of this treatment, one is justified in resorting to surgical intervention.

Cowper, in 1707, was the first to introduce the method of draining the antrum through an opening made in the alveolus, and for two hundred years this method was followed until Mikulicz made an opening through the nasal wall. His method was in vogue until quite recently, when Caldwell, Luc and others modified and improved on his investigations. Under no circumstances should a tooth be removed with the object of drainage and irrigation through this opening unless the tooth is diseased. Such procedure can not be too strongly condemned. The simplest operation is the removal of a section of the anterior-inferior portion of the naso-antral wall. However, this operation has but a small sphere in the surgery of the antrum.

The Caldwell-Luc have their advocates, but it is generally accepted that the Denker operation is superior to all others. This should be done under a local anesthetic, either the usual method of novocaine, $\frac{1}{2}$ of 1 %, and adrenalin injections, or by the nerve blocking method. A general anesthetic is seldom, if ever, indicated.

Although advised by Denker and the majority of operators, the anterior end of the inferior turbinate bone should never be removed. The incision is the same as in the Caldwell-Luc operation, except that it is extended to the median line. After

the antrum is thoroughly curetted, instead of entering the nasal cavity posteriorly to the bridge and cutting forward, as advised by some operators, the logical procedure is to extend the bony opening toward the median line and remove the bridge of bone between the opertura pyramidalis, thus including the inferior-external angle. The bony wall between the antrum and nasal cavity is then removed, extending the opening posteriorly to the desired depth, and superiorly, to the attachment of the inferior turbinate bone.

After this has been accomplished a narrow layer of gauze, three or four inches in length, is saturated with compound tincture of benzoin and introduced into the antrum through the nasal opening. The incision is then sutured. The next day the gauze is removed and no irrigation or after-treatment is necessary, as a rule. In the event there is edema of the parts, cold applications will help to reduce it.

This operation, following the suggestion of not removing the anterior end of the middle turbinate bone, is superior to the others. It is done more quickly and the nasal opening is permanent, which gives free drainage and ventilation to the antrum.

1207 *Maison Blanche*.

Discussion follows paper by Dr. J. W. Jervy, page 293.

X-RAY AID IN THE DIAGNOSIS OF NASAL ACCESSORY SINUS DISEASE*

By J. W. JERVEY, M.D.,
Greenville, S. C.

He that seeketh and knoweth not that which he seeketh is a fool, and disappointment shall be his portion even unto the end of his days. But he that seeketh and knoweth that which he seeketh is a wise man and it shall be found unto him, even though it be happiness, the most elusive of all psychic abstractions. For if a man seeketh happiness and knoweth happiness, surely he hath happiness.

For all I know that may be an old Arab-

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Thirteenth Annual Meeting, Asheville, N. C., Nov. 10-13, 1919.