On the Treatment of Chronic Frontal Sinusitis

By Means of an Opening through the Anterior Wall of the Sinus, and Drainage through the Nose.

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ON THE TREATMENT OF CHRONIC FRONTAL SINUSITIS BY MEANS OF AN OPENING THROUGH THE ANTERIOR WALL OF THE SINUS, AND DRAINAGE THROUGH THE NOSE.*

By J. H. BRYAN, M. D.,
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In bringing this subject before the association again it is with the desire of trying to impress still further upon you the frequency of the anomalies that are met with in the fronto-ethmoidal and the fronto-maxillary regions; and also to direct your attention to a method of treating chronic suppurative inflammations of the frontal sinus which seems to shorten very materially the duration of this most obstinate disease. There is probably no affection in the whole domain of surgery that tries the patience and skill of the surgeon more than chronic abscesses affecting this cavity, especially when they also involve the ethmoidal region. When we consider the accompanying photographs, the wonder is

* Read before the American Laryngological Association at its nineteenth annual congress.

not that they are so resistant to treatment but that recovery ever takes place.

With an increased knowledge of the anatomy of these cavities, and the advances that have been made in surgery, the success met with in treating these affections has, it may be said, kept abreast of the surgery of other regions.

Until within recent years suppurating frontal sinusitis has been considered to be an uncommon disease in this country, but since the frequent visitations of epidemic influenza the cavity involved, as well as the other accessory sinuses, are found to be very frequently affected.

The mortality of this affection is much greater than is generally supposed, owing to the ready extension of the morbid process to the brain.

The three sinuses, the frontal, ethmoidal, and maxillary, are frequently affected at the same time, having a common origin for their disorder in the extension of the pathogenic organisms of an influenza from the nose. In some instances one cavity, generally the frontal, is acutely inflamed in the course of an influenza, and the ethmoidal and maxillary are subsequently involved by an extension of the morbid process to them, which can readily take place owing to their very intimate relations and to the very thin bony partitions separating them. Again, the extension may take place through direct but anomalous passages which are occasionally found connecting the sinuses. This is especially the case in the relation of the frontal and maxillary cavities. In a previous communication I exhibited a drawing of an interesting preparation in the Army Medical Museum which showed a direct communication between the frontal and maxillary cavities, thus explaining the readiness with

which abscess of the antrum could complicate a suppurative inflammation of the frontal sinus. I regarded this as a rare anomaly, for I could find no mention of this condition in the anatomical works consulted. Recently, however, I have read a paper by Dr. Fillebrown,* of Boston, who has made some interesting investigations on this subject. He states that he examined "eight different specimens in which the infundibulum, instead of terminating in the middle meatus, continues as a half tube, which terminates directly in the foramen of the maxillary sinus. In seven of these specimens there was a fold of membrane which served as a continuation of the unciform process, and reached upward covering the foramen, forming a pocket which effectually prevented any secretion from the frontal sinus getting into the meatus until the antrum and pocket were full to overflowing." In a private communication he further states that he examined fifteen more crania and found the infundibulum as described in his paper, and the pocket was present in all but two. This so-called anomalous condition, according to this authority, then occurs very often. As it has a very important bearing on the pathology of these cavities, it is a subject that should be still further investigated. Owing to the very intimate relation of the frontal sinus to the ethmoid bone, an involvement of the fronto-ethmoidal cells, or the cells formed by the union of these two bones, by an extension of the morbid process from the frontal sinus is of common occurrence. I believe in nearly all severe cases of empyema of this cavity the fronto-ethmoidal cells and the ethmoidal cells proper are involved to a greater or lesser degree.

* *International Dental Journal*, 1897.

In approaching a case of frontal-sinus abscess, with the view of an external operation, great caution must be exercised by the surgeon, for the sinuses vary greatly in size, and the variation between the two cavities in the

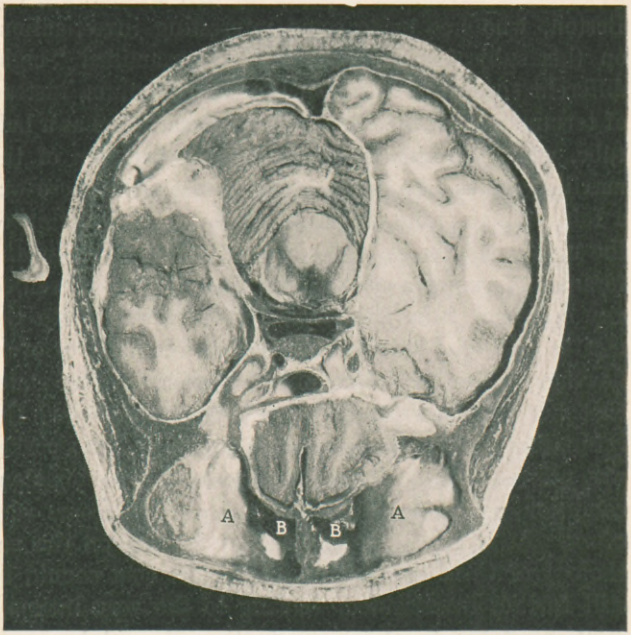

FIG. 1.—A, A, floor of frontal sinuses, which is observed to extend posteriorly to an unusual degree. B, B, anterior fronto-ethmoidal cells projecting into the sinuses.

same subject is sometimes very marked. In nearly all cases in normal conditions they are separated by a sæptum, which in the majority of instances is complete, although the cavities occasionally communicate through a small opening. The sæptum is frequently not straight,

deviating to one side or the other, thereby rendering one cavity smaller than the other, while in disease it is either entirely or partially destroyed.

There is no external sign which will enable us to ascertain the size of the sinuses, the prominence of the superciliary ridges being no guide as to the dimension of the cavities beneath them.

Herbert Tilley,* in an examination of one hundred and twenty skulls, found these cavities varying to a great degree. He found the sinus large enough in some instances to contain an ordinary bean, while the other was ten times as large, and occasionally the sinus was absent. He considers a sinus normal when it measures twenty-eight millimetres from the median line outward, reaching to about the junction of the inner and middle thirds of the supraorbital ridge; and in vertical extent, measured from the nasion, from twenty to twenty-two millimetres.

Lamb † has also made some measurements of these cavities which may be of some interest, as they are expressed in a different way. He states that he found the right cavity with a varying capacity from a third to a drachm and a half, or one and a third to six cubic centimetres, while that of the left cavity was from a third to a sixth of a drachm, or one and a third to four and two thirds cubic centimetres; as showing the difference existing between the two sides, he found in one case the left sinus was to the right as 70 to 95.

Fig. 1 is a photographic view of a frozen section of the head of an adult negress just above the floor of the frontal sinuses.

In this subject the size of the cavities is unusually

* *Lancet*, London, September 26, 1896.

† *Reference Handbook of the Medical Sciences*, vol. vii, p. 659.

large, and they project posteriorly to a greater depth than usual. Another interesting feature of this section is the development of the fronto-ethmoidal cells, the most anterior of which are seen to project into the frontal cavities.

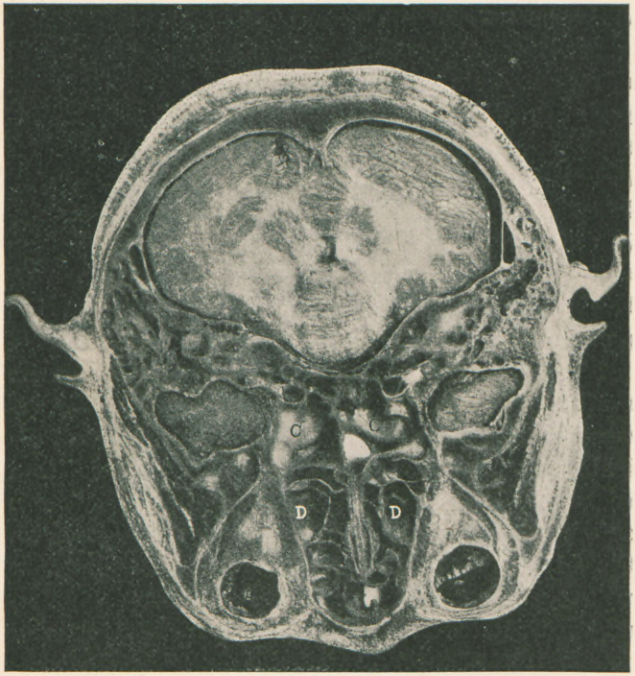

FIG. 2.—Showing the intricate arrangement of the ethmoid cells, with the posterior cells, D, D, unusually developed. C, C, sphenoidal sinuses.

Fig. 2 is a section made on a lower plane, passing through the ethmoid cells, and which shows very clearly the intricate arrangement of these cells.

Of the various methods proposed for the treatment of these chronic cases, the external method is generally conceded by most authorities to be the best.

The operation that offers the greater advantages is that proposed originally by Ogston,* and latterly independently advocated by Luc.† In this operation the incision is made in the median line, commencing at the root of the nose and extending from an inch and a half to two inches on to the forehead.

The skin and periosteum are elevated, and a centimetre of bone removed by means of a small crown trephine (Fig. 3) applied just outside of the median

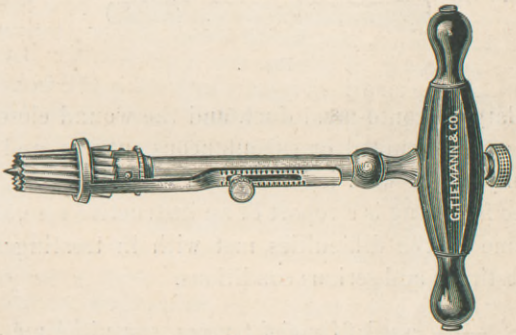

FIG. 3.

line and immediately above the supraorbital ridge. This opening will be found sufficiently large to allow of a thorough exploration of the sinus, and of the removal by means of the curette of any carious bone or polypoid tissue that may be present. The fronto-nasal duct should now be located with a probe, and enlarged by passing a

* *Medical Chronicle*, December, 1894.

† *Archiv. internat. de laryngol.*, Paris, 1896, ix, pp. 163–178.

trocar into the nose, using the little finger within the nostril as a guide. This duct is, as a rule, situated quite far back, and generally forms a large curve in its passage into the nasal cavity. If the trocar is passed into the nose at this point all danger of fracture of the cribriform plate of the ethmoid bone will be avoided, as well as the risk of septic infection.

After thoroughly removing all diseased tissue and washing the cavity out with antiseptic solutions the lining membrane may be touched with a twenty-per-cent. solution of chloride of zinc. A self-retaining rubber drainage-tube (Fig. 4) should now be introduced through

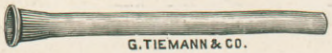

FIG. 4.

the enlarged fronto-nasal duct, and the wound closed by means of interrupted or subcutaneous sutures, and hermetically sealed with iodoform and collodion.

The following is a report of an instructive case, showing some of the difficulties met with in treating these very obstinate and serious conditions.

Mrs. ——, aged fifty-eight years, consulted me June 26, 1896, giving the following history: About two years ago she had a severe attack of influenza, which was prevailing at that time. The inflammation was confined principally to the upper respiratory tract. She suffered from excruciating headaches, the severity of which subsided as the inflammation grew less severe. The headaches have been continuous, however, being greater at times than at others, and they have been attributed to various ocular disturbances, which were not relieved by treatment.

She also complained of catarrhal symptoms, the se-

cretions being thick and yellow and confined to the left side of the nose. When she came under my observation, June 26th, she had the following symptoms: Pain over the left side of the face, but of greatest intensity over the supraorbital ridge and at the internal angle; morning nausea, loss of appetite, and general lassitude. The facial expression was an anxious one.

On rhinoscopic examination pus was observed in the left middle meatus, passing freely into the nasopharynx and through the anterior nares. The middle turbinate was somewhat enlarged. Percussion on the frontal bone and over the canine fossa was accompanied by considerable pain. The electric light showed the left frontal and maxillary sinus to be opaque.

July 1st.—The left second upper molar tooth was extracted and a small abscess found at the apex of the palatine root, which, however, did not communicate with the sinus. The antrum was opened by means of a small trephine at this point and a large quantity of thick, fœtid pus evacuated. The cavity was irrigated daily with a saturated solution of boric acid and hydrogen dioxide. Under this method of treatment the inflammation in the antrum subsided within three or four weeks. While the quantity of secretion within the nose was somewhat reduced, the frontal headaches continued with about the same severity. Upon my return from my summer vacation, September 1st, I found the patient's condition about the same as when I left her on July 1st, with the exception that the frontal pains seemed to be more severe. On attempting to probe the fronto-nasal duct the anterior ethmoid cells were found to be in a state of caries, which condition did not exist or was not discovered when previous attempts at probing were made.

September 14th.—Curetted the anterior ethmoid cells, removing several large spicula of bone, which resulted in better drainage, with a slight abatement of the frontal pain.

October 10th.—During the past ten days there has been no improvement in the patient's condition; the

frontal headaches have increased and are accompanied by nausea and vertigo. To-day, for the first time, there was detected a slight swelling of the skin over the left frontal region with some pitting on firm pressure. The patient's condition had now become so serious that an external operation was insisted upon.

13th.—After thoroughly cleansing the parts a vertical incision was made in the median line extending from the nasal boss to two inches on the forehead; the integument and periosteum were elevated, and a small button of bone about a centimetre in diameter was removed from over the frontal sinus by means of a crown trephine applied about two lines to the left of the median line and about three to four lines above the supra-orbital ridge. After removing the bone with the trephine the cavity was found filled with a thick, fœtid, purulent secretion, and with numerous small granulations.

The cavity was thoroughly curetted and washed out with a solution of bichloride of mercury (1 to 3,000). It was then discovered that the posterior wall at its most dependent part was the seat of extensive caries, which was carefully removed with a sharp spoon. The sæptum was examined and found to be intact. The fronto-nasal duct, which was situated unusually far back, was enlarged by means of a trocar passed into the nose, using the little finger as a guide, and a drainage-tube was introduced through the enlarged opening. The external wound was then closed by means of a subcutaneous catgut suture, and hermetically sealed with iodoform and collodion.

15th.—The patient has fully recovered from the effects of the operation, and is quite comfortable, with no pain in the head. Temperature and pulse normal. The secretions are passing freely through the drainage-tube. The sinus was washed out with a solution of formalin (1 to 2,000). This application was attended with considerable pain, which, however, subsided in a few minutes.

The use of the formalin solution was persisted in notwithstanding the pain, as it was considered to be an ideal antiseptic for such cases, in view of its supposed penetrating qualities; but little benefit could be obtained from its use, as the secretions continued to flow through the drainage-tube in about the same quantity. The patient continued to do well until the morning of October 23d, when the drainage-tube slipped out of the nose. The cavity was, however, thoroughly washed out with the formalin solution through a Eustachian catheter. 8 A. M., temperature, 98°; 9 P. M., 100.6°. During the day she complained of great general discomfort and pain in the head. There was also noticed a slight puffiness of the skin over the opening into the frontal sinus.

24th.—The patient passed a restless and wakeful night, suffering greatly from hiccough, and complaining frequently of chilly sensations. 8 A. M., temperature, 98°. At 9 P. M. she had a severe chill, followed by vomiting. 11 A. M., temperature, 103.6°. She was given a brisk cathartic, and, after a thorough evacuation of the bowels, she received in a suppository ten grains of quinine every three hours, and half an ounce of whisky every two hours. The swelling over the frontal sinus was greatly increased and more painful. The iodoform and collodion dressing was removed, when an abscess was found to have formed in the lower half of the line of incision. This was thoroughly cleansed with hydrogen dioxide and dressed with iodoform gauze. The sinus was washed out with a saturated boric-acid solution and hydrogen dioxide. At 10 P. M. the temperature had fallen to 101.4°.

25th.—There was a decided improvement in the patient's condition this morning. The sinus and wound were treated as on the previous day. 8 A. M., temperature, 99.4°; 9 P. M., 100.4°.

26th.—Passed a good night; secretions from the frontal sinus very much diminished, and frontal wound healing, the margins of which were now drawn together with adhesive strips. 8 A. M., temperature, 99.2°; 9 P. M., 99.2°.

27th.—The temperature was normal this morning, and continued so during the rest of the patient's illness. Under the local application of the boric-acid solution and hydrogen dioxide the secretions from the sinus rapidly subsided. The frontal wound healed within ten or twelve days without leaving a very perceptible scar, the natural cleavage of the skin being a little more pronounced than originally.

The patient was practically well within six weeks from the date of the operation. The duration of her treatment might have been very much reduced had it not been for the unfortunate accident resulting in a slight septic infection. This infection can be accounted for in one of two ways. The operation was done in as thoroughly an aseptic manner as possible, but after the drainage-tube slipped out of the nose some retention of pus probably took place and the under surface of the frontal wound, which was in close proximity to the opening into the sinus, might have received some infection from the cavity, or the catgut suture employed may not have been absolutely sterile. I believe the infection took place from the sinus. All danger of retention could have been avoided had a self-retaining drainage-tube been used.

The operation offers many advantages over that of making the incision along the under surface of the supra-orbital ridge and entering the sinus at the inner angle, in that the opening is made sufficiently large to permit of a thorough inspection of the interior of the cavity, and any diseased tissue, as carious bone, granulation or polypoid tissue can be thoroughly removed; the sæptum dividing the two cavities can be thoroughly inspected to ascertain whether it is intact, and a drainage-tube

passed from the sinus into the nose without any danger of injuring the cribriform plate of the ethmoid bone.

The method of treating empyema of this cavity by passing a drainage-tube through the frontal opening into the forehead leaves a very unsightly scar, and occasionally the patient recovers with a fistulous opening in the forehead.