

## FOURTEEN CASES OF CHRONIC MULTIPLE SINUSITIS (MAXILLARY ANTRUM, ETHMOID CELLS AND SPHENOID SINUS) OPERATED UPON BY WAY OF THE MAXILLARY ROUTE.\*

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The writer confesses to such a confusion in his own mind as to whom belongs the credit for the operation performed on the following cases that he thinks it better to try to name the route taken rather than to endeavor to give the credit to the proper author or authors who may first have described it. Jansen, Boeninghaus, Luc and others probably all about the same time concluded that the maxillary route was a good one in certain cases, and the differences in their operations, if any exist, probably are in minor details only. The writer became familiar with the advantages of the operation through the courtesy of Jansen in Berlin about two years ago, and the operation described is with slight changes similar to the operations he saw performed by Jansen at that time.

An apology is due perhaps for describing the operation again so shortly after its publication in *THE LARYNGOSCOPE* (March, 1904); but the description of it now is essential for the understanding of these cases, and moreover, it is considered to be so useful that the repetition may be pardoned.

The operation is performed under æther anæsthesia and with the aid of an electric head light, as follows: The jaws are held apart by a mouth-gag inserted on the well side. The choana of the diseased side is tamponed by a post-nasal tampon of cotton. To prevent blood reaching the pharynx from the mouth, a gauze sponge is held by dressing forceps between the jaws and the cheek of the affected side at the juncture of the posterior ends of the upper and lower alveoli. The cheek is retracted by a blunt retractor held by an assistant. The tongue is held forward by a silk ligature passed through it. This prevents delays by the tongue falling backward. An incision extending from the posterior end of the alveolus to the anterior border of the canine fossa is made through the mucous membrane periosteum, just below and parallel with the attachment of the cheek. A periosteal elevator is then used to free the anterior and

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lateral convex surface of the antral wall from its periosteum and soft parts. The bleeding is controlled by pressure with gauze. The antrum is opened by a chisel sufficiently to allow of the use of a rongeur, which is then used to remove the outer wall of the antrum, anteriorly to its junction with the internal wall, inferiorly to the floor, superiorly almost up to the intra-orbital canal and posteriorly along the external wall to just behind the anterior border of the masseter muscle. This part of the operation is nearly bloodless unless the lining membrane of the antrum is wounded. The membrane is then incised and the cavity inspected. After completely removing the lining of the antrum with a large, sharp curette, the bony internal or nasal wall is removed, anteriorly to the junction with the external wall, posteriorly to its junction with the posterior wall, and inferiorly to the floor of the antrum with the same instrument, care being taken to preserve all of the membrane on the nasal side. The superior part of this wall, which is formed by the ethmoid cells, is removed with the sharp spoon, as are all of the ethmoid cells and also the middle turbinate. A superior turbinate process is sometimes present and is removed. The opening to the sphenoid sinus is now plainly visible. As much as possible of the anterior wall of the sphenoid is removed laterally, and always to its floor with a sharp curette, as is the diseased tissue lining the cavity. During these various procedures the cavity is frequently dried with gauze soaked in 1-1000 adrenalin solution, which usually controls the hemorrhage, at times quite troublesome. The upper part of the membranous wall usually is destroyed, but its lower two-thirds are preserved intact. The inferior turbinate bone is freed from its membrane piecemeal, both with the rongeur and with the sharp spoon, leaving the mucous membrane in a long strip attached anteriorly and posteriorly. This procedure is facilitated by the insertion of the small finger into the naris, which affords counter pressure. After the wound is thoroughly cleansed, the remnants of the nasal mucous membrane, consisting of tissue from the inferior turbinate and from the lower two-thirds of the nasal wall, are utilized as follows: That remaining from the wall is freed from its anterior attachment and is drawn into the cavity of the antrum, covering in large part the anterior wall and part of the floor. It is anchored by a stitch to the superior lip of the wound in the mouth, near its anterior end. The mucous membrane of the inferior turbinate is divided at the posterior end of its anterior third, and the posterior flap thus formed is placed along the floor of the antrum and anchored by a stitch to the inferior lip of the wound; while the anterior flap of turbinate mucous membrane is anchored around the "anterior angle." The result is that the lower

and anterior part of the antrum is fairly well lined with a functioning mucous membrane. The whole wound, from the interior of the sphenoid sinus to between the lips of the oral wound, is packed with iodoform gauze. The oral wound is not stitched.

Stitching of the oral wound, as advised by Jansen, was not practiced in any of the cases, owing largely to the uncertainty in the mind of the writer of the wisdom of the procedure; and it was certainly a great comfort to be able to see the process of repair and to know beyond a doubt just what was taking place in the operated area.

In the first few cases operated upon the packing was carried much longer than in the later cases, which were packed at the time of operation, the packing being removed in three to four days and not reinserted. The highest temperature recorded in any case was  $103\frac{1}{2}^{\circ}$ , and this was attributable to other causes; in all of the other cases  $100\frac{1}{2}^{\circ}$  was the maximum.

Opiates were administered in nearly all of the cases for the pain immediately following the operation. After the first 24 hours iced cloths were found sufficiently efficacious to control the pain.

Each patient, excepting Cases 6 and 9, was in the hospital one week only, and in the cases of the males they resumed their customary vocations in two weeks.

*Case I.* Man, age 35, presented for examination in November, 1902, on account of "catarrh" and severe paroxysmal neuralgic pains in the occiput, vertex and face, which had been diagnosed "*Tic Douloureux*." His history dated back for 16 years when he had polypi removed from his left nostril. Since that time he had had treatment of his nose, including removal of the left middle turbinate, washing out of the antrum through the nose, and opening of the antrum through the canine fossa. Examination of the nose revealed pus exuding from the antrum, from the anterior and posterior ethmoid region, as well as from a small fistula in the canine fossa. Operation showed the antrum to be nearly filled with myxomatous tissue, the ethmoid cells extensively diseased and the sphenoid sinus, which was entered from the posterior ethmoid cell, contained much pus and granulation tissue. The inferior turbinate freed from the bone was used as a flap to line the floor of the antrum. Packing was carried five weeks and the patient was under treatment at intervals for six months, owing to a constant suppuration from some overlooked ethmoid cells which were later removed with a curette under cocaine anaesthesia. There has been no neuralgia since the operation. Recent examination reveals no pus.

*Case II.* Man, age 38 years, presented for examination December, 1902. He had had a profuse, foul-smelling nasal discharge from the left side of the nose for 20 years, with neuralgic pains in the face, vertex and occiput. He had considerable intra-nasal treatment, surgical and otherwise, which had given him relief at various times and for varying periods, only to have a return of his discharge and neuralgia when the treatments were discontinued. The dentists had extracted his bicusps and molars from the affected side. It was not his fault that he had derived no benefit for he was most anxious to be relieved and readily consented to the radical operation. This revealed the antrum to be literally packed with myxomatous tissue, as were the ethmoid cells, the superior and middle meati of the nose and the sphenoid sinus, which latter apparently communicated with the posterior ethmoid cell through which it was entered. The inferior turbinate tissue and the mucous membrane covering the nasal wall of the antrum were myxomatous and were removed, leaving no tissue for flaps. The patient carried the packing for five weeks and was treated five months in all because of a return of pus in the middle ethmoid region, accompanied by a tendency to polyp formation. This condition was relieved by removing with a curette under cocaine anæsthesia a small mass of cellular bony tissue—evidently small ethmoid cells overlooked at the time of operation. Recent examination shows the patient cured. He has had no treatment for several months.

*Case III.* Woman, age 65, presented for examination December, 1902. She had had her teeth extracted when 40 years old on account of right-sided trifacial neuralgia, which was not relieved by the operation. Since that time she had had her middle turbinate removed, the ethmoid cells partly curetted and her antrum opened and packed for several months through the canine fossa. The oral wound healed, but her neuralgia and pus persisted. For a year before she presented for examination she had had no treatment other than a nasal douching at home. Examination revealed pus oozing from between numerous polypi which filled the middle meatus. The right antrum failed to trans-illuminate. A probe entered the antrum just behind and above the anterior end of the inferior turbinate and gave vent to a free discharge of foetid pus. Operation disclosed a perforation about the size of a dime through the canine fossa, filled in with fibrous tissue. Deeply imbedded in the floor of the antrum was a tooth root, probably a molar fang. The osteum was much enlarged by disease and the antrum and ethmoid cells were filled with myxomatous tissue, necrosed bone and pus, while the

sphenoid sinus was filled with pus and granulation tissue. Its anterior wall was necrosed and very soft. No flaps were obtained. The patient carried the packing for six weeks. She was under treatment, which consisted of home douchings and office treatments with caustics for six weeks longer. Recent examination failed to reveal pus or crusts. There has been no return of neuralgia.

*Case IV.* Woman, age 40 years, presented by Dr. R. T. Howe for examination January 8, 1903. The history dates back 18 years when she had all of the teeth extracted from the left upper jaw on account of neuralgia, which was not relieved by their removal. The patient had been under treatment 12 years ago by Dr. Howe for pain in the inner canthus of the left eye and pus from the nose. The doctor had from time to time removed polypi and part of the middle turbinate from the left nostril, without relieving the discharge, although the pain in the eye was lessened. She had considerable headache localized about the eye and in the temporal region, no pain in the face. Three months before she had had an alveolar abscess opened on the upper left jaw with evacuation of pus. Examination revealed pus on the floor of the nose and exuding from the ethmoid region and the region of the *Hiatus Semilunaris*. Transillumination was complete, excepting of the left antrum and about the inner canthus of the left eye, where it showed dark. A probe discovered necrosed bone at the site of the alveolar abscess, but the probe, which was a very small one, did not enter the antrum. This case was operated on January 17, 1903. A prong of the root of the first molar tooth was found imbedded in a mass of granulation tissue on the floor of the antrum at the inner end of the fistula. The antrum and the ethmoid cells were filled with myxomatous tissue. The sphenoid sinus was thoroughly explored, but found healthy. Good flaps for lining the antrum were secured from the inferior turbinate and from the lateral wall. The packing was carried for four weeks. The patient was under occasional treatment until May. She was seen recently and found free from pus and pain. There remains a small fistula at the site of the oral wound which causes no discomfort. A recent severe attack of coryza with muco-purulent discharge from both nostrils caused much less trouble on the operated side and cleared up more rapidly than on the unaffected side.

*Case V.* Man, age 36 years. This patient was under treatment in the Manhattan Eye and Ear Hospital for a neuro-paralytic Keratitis with paralysis of the fifth and sixth nerves of undetermined origin; and was referred to the writer February 15, 1903, for what

proved to be a catarrhal deafness in the left ear. He had had a discharge of pus from the left nostril for three years, but no pain, which was accounted for by the anæsthesia present. A diagnosis of empyema of the ethmoid, antrum and sphenoid was made. Operation proved the diagnosis correct. All of the sinuses and cells were filled with myxomatous and granulation tissue. Packing was carried in this case for four weeks, and the cavity was douched four weeks longer when all suppuration had ceased excepting from a small area in the ethmoid region. The result on the anæsthesia was *nil*. The patient died of acute tuberculosis several months later.

*Cases VI and VII.* (This patient is reported as two cases because of the double operation). Man, age 24 years, presented for examination February 24, 1903, with a history of nasal suppuration and faulty nasal respiration dating from scarlet fever fifteen years before. He had severe pain over the right orbit and at the vertex of the skull, with occasional pains in the occiput and a constant sense of fullness in both antra. Both ears were discharging. Examination of the nose revealed foul-smelling, creamy pus lying on the floor of both nostrils, with pus exuding from the region of the *Hiatus Semilunaris* on both sides. Pus was detected by posterior rhinoscopy oozing from high up behind the middle turbinate. Pus was exuding also from the region of the right infundibulum. A large perforation was present in each membrana tympani with pus, and also granulation in the right middle ear. Trans-illumination failed in both antra and the right frontal sinus, while the left frontal sinus did trans-illuminate, showing an unusually large cavity. A diagnosis of pansinusitis, excepting the left frontal, was made, and the patient was operated on for his frontal right antrum, ethmoid and sphenoid at one sitting, requiring about 1½ hours. All of the cavities were diseased and contained much granulation and myxomatous tissue. Good flaps were secured for lining the antrum. Two weeks later the left antrum, ethmoid and sphenoid were operated upon and found to be similarly diseased. Fairly good flaps were secured. At the time of the second operation the right ear was curetted and necrosed ossicles removed. This patient had each antral wound packed for three weeks and they were treated by douchings for about two months longer—in all about three months. The frontal sinus was packed four months. It was unusually large. His recovery was uninterrupted and he is now perfectly well.

*Case VIII.* Woman, age 36 years, presented for examination March 5, 1903. Five years before she had had the second bicuspid tooth in the right upper jaw removed because of disease in its root

accompanied with pain in the right antrum. Since that time she had had a yellow, foul-smelling discharge from the right nostril. This discharge was aggravated by *la grippe* one year ago. She had frequent attacks of headache on the right side radiating from the inner canthus of the right eye to the vertex and occiput. Of late she had had but little pain in the antrum. Examination revealed two molar teeth much diseased in the right upper jaw. The nose contained much foul-smelling, greenish pus, which exuded from beneath and from above the middle turbinate. The latter was enlarged and crowding its natural space. This mass, together with much myxomatous tissue, was removed under cocaine anæsthesia, and for several days the patient experienced much relief from pain. The supuration continued, and the pain returned, however, and on April 2, the radical operation was performed. The antrum was found filled with myxomatous masses as were the ethmoid cells. In curetting the posterior ethmoid cell, the sphenoid sinus was entered, found diseased, its anterior wall removed and the contents, myxomatous tissue and pus, removed with a curette. The inferior turbinate and a considerable portion of the nasal membrane of the naso-antral wall were secured as flaps. The wound was packed for a month. Recovery was complete in two months. The wound in the mouth closed four months after operation.

*Case IX.* Woman, age 72 years. This case was reported in full in *THE LARYNGOSCOPE* (March, 1904). She gave a history of neuralgia and removal of teeth for its relief 30 years before. She had carried an antrum drainage tube through the alveolus for several years. Her neuralgia was most marked in the face, but extended into the vertical and occipital regions. The diagnosis of antrum and ethmoid disease was proved correct by operation. The sphenoid disease was not diagnosed until at the operation. Good flaps were secured. Packing was carried 16 days. There was complete relief from pain until three months later, when a return of pain was accompanied by suppuration in the sphenoid. As this subsided, her pain left and did not return until a few days ago, when suppuration was again found in the sphenoid sinus.\*

*Case X.* Woman, 53 years old, presented for examination November 12, 1903. She gave a history of supposed trouble with teeth for which they had all been extracted from the right upper jaw, and of having had the right antrum opened through the alveolus six years before. She complained of no pain, but was troubled by the discharge of foul-smelling pus from the fistula in the alveolus.

\* Patient examined October 29th. No treatment since June 15; found perfectly well.

and from the nose. Examination revealed pus exuding from the osteum and posteriorly from beneath the middle turbinate. Posteriorly pus was exuding from the region of the sphenoid, and a cotton-armed probe brought forth pus and blood from the sphenoid. She was operated upon November 21, 1903. Much pus, granulation tissue and detritus were found in the antrum, ethmoid and sphenoid. Good flaps were secured. Much bleeding, arterial in character, took place near the sphenoid cavity on the lateral wall. This was easily controlled by artery forceps. The packing was carried five days only. In three weeks the patient left the city, and douched the cavity herself for two months. Recent examination proves her cured.

*Case XI.* Man, 45 years old, presented for examination November, 1903. History of discharge from the nose for nine years, dating from *la grippe*. He had had the antrum washed out through the nose and had had considerable intra-nasal surgery performed by another surgeon. The patient complained of no pain. Examination revealed much myxomatous tissue in the region of the middle turbinate, which was absent. Pus was exuding from between the polypoid masses. A probe readily entered the antrum and sphenoid. In each instance it was followed by pus. Operation revealed a myxomatous disease of the antrum, ethmoid and sphenoid. Good flaps were obtained. The patient carried the packing ten days and made a complete recovery, including closure by cicatricial contraction of the mouth wound in three months.

*Case XII.* Woman, age 63 years. Had the teeth extracted many years before for neuralgia, which at times was severe, and had been called "*Tic Douloureux*," by her physicians. The writer operated on her right frontal sinus and antrum in 1899 after a preliminary course of operative treatment in the ethmoid region. The frontal sinus healed by granulation after several months of packing. The antrum was freely opened by way of the canine fossa, thoroughly curetted, and apparently healed; but the suppuration continued from the nose and the pain in the occipital and vertical region and in the face persisted. The pain in this case was particularly severe at the vertex and in the occiput. In June, 1903, she submitted to the radical operation. There was much hemorrhage, especially from the external lateral wall of the antrum, from which was curetted a large mass of what Dr. Jonathan Wright subsequently reported to be a probably malignant adenoma. There was also much bleeding, arterial in character, in the position of the sphenopalatine foramen. The bleeding was controlled by artery forceps. The ethmoids and the sphenoid were found badly diseased, containing tissue similar in character to



that removed from the antrum, but this tissue was lost. No flaps were saved, and the case was packed for two weeks, when the patient was given a douche which she used all summer. She had complete relief from the pain, but a slight discharge persisted. Recently there has been some pain over the malar bone, and the growth is again visible and growing rapidly. The pathological report from Dr. Jonathan Wright is confirmatory of his previous diagnosis.

*Case XIII.* Female, age 22 years, presented for examination April 2, 1904, giving a history of a decayed molar tooth in the right upper jaw, with occasional attacks of face-ache and pain in the eye, extending backward into the occiput. These pains were relieved by a discharge of pus from the right nostril. The pains and discharge had been present for many years and the patient claims to have had the discharge since twelve years of age. Examination revealed both molar teeth badly decayed to the roots. The second bicuspid tooth was absent. Pus was oozing from the region of the osteum, the posterior ethmoid and sphenoid regions. The sphenoid opening was not found, owing to the presence of an unusually large middle turbinate. Operation revealed a large fang of a tooth (second bicuspid) lying almost free in the antral floor. The molars had been removed by a dentist before the operation. The posterior half of the antrum was divided by bony partitions into a pneumatic cellular structure. These cells as well as the main cavity of the antrum were filled with pus, myxomatous tissue and granulations, as also were the ethmoid cells and sphenoid sinus. The latter was entered through a large posterior ethmoid cell. Good flaps were obtained in this case. The patient carried the packing for four days only, was discharged from the hospital in one week, and in less than two weeks from the time of operation was attending to her duties as general house-maid. One month after operation she had a severe coryza with as much watery secretion from the operated side as from the unaffected side. The inferior turbinate was in a state of erection. No harm resulted from the coryza, and she is now free from pus and pain.

*Case XIV.* Female, age 40 years, presented for examination April 30, 1904, with a history dating from about one year before when she had had *grippe*, which was accompanied by pain in the antrum, vertex and occiput, and much purulent discharge from the nose. This latter cleared up under treatment, but the discharge from the left side persisted in spite of considerable intra-nasal treatment by another physician. Examination of the nose revealed pus exuding from the anterior ethmoid cells, from the region of the osteum and from the region of the sphenoid sinus. A cotton-armed probe

brought pus from the sphenoid. On probing the anterior ethmoid region, the probe entered three distinct spaces through one opening; the first direction taken was high up laterally and anteriorly; the second, high up posteriorly and laterally; the third, high up and anteriorly. The first two cavities entered discharged pus on the withdrawal of the probe, and denuded bone was detected. It was considered that the first two cavities entered were the *bullæ ethmoidalis* and an unusually large anterior ethmoid cell occupying a higher position than usual. The last cavity entered did not discharge pus, and no bare bone was found. It was supposed that this cavity was the frontal sinus. The writer was considerably perplexed by this condition, and especially so since the patient had been told by two good rhinologists that she had frontal sinusitis. Trans-illumination did not help the diagnosis, for both frontals failed to trans-illuminate, as did the left antrum. After carefully confirming the result of the first examination, it was concluded that the frontal was not affected, and on April 28, the antrum sphenoid and ethmoid were thoroughly curetted. They were all found to contain pus and myxomatous tissue. While operating in the ethmoid region, the anterior ethmoid cells were explored with great care well up into the region of the floor of the frontal sinus. Considerable pus was found in the *bullæ* and a large cell that was found anterior to it. No flaps were obtained. The patient carried the packing four days and was not repacked. There was no discharge found on the dressings. Pus appeared for a few days in the douchings, but none has been found coming from the frontal region, and for two weeks there has been no pus found. The oral wound has nearly healed, and judging from the experience gained from previous cases, this patient will be entirely well within the month.\*

To summarize: All of the patients but one had disease of the sphenoid sinus; in twelve of these occipital and vertical pains were present; in eight—all with sphenoid disease—the pains extended also into the face and were neuralgic in character; while in four cases the pains closely simulated "*Tic Douloureux*." These cases were all cured except two, viz: *Case 12*, which was malignant, and *Case 9*, in which suppuration returned several times in the sphenoid, each return being marked by an attack of "*tic*." It seems to the writer that the presence of pain in the vertex and occiput or in trigeminal neuralgia when accompanied by pus in the posterior nares, is symptomatic, almost diagnostic of sphenoid disease.

In twelve of the patients there was pain in the region of the eye, especially in the region of the inner canthus. This pain was ex-

\* Patient has been well since the middle of June.

plained at the time of operation by the finding of disease in the most anterior ethmoid cells.

In all of the cases excepting *Case 5* there was a total absence of frontal sinus disease; and since they all were chronic cases, most of them of many years duration, it is interesting to ask: What factor was present to preserve the frontal sinus from the primary infection, to cure it if it was infected, or to protect it if from subsequent invasion by the disease already established in the ethmoid region? Were the teeth the prime factors of the infection of the antrum, with a subsequent extension of the suppurative process upward and backward into the ethmoid cells and sphenoid sinus; and if so, why, again, did the frontal sinus escape? In eight of these cases the teeth were found diseased at the time of operation, or there was a clear history of diseased teeth, at least of dentalgia. That diseased teeth cause many cases of antrum disease is not questioned, but on the other hand the writer believes that many a tooth has been sacrificed, when proper treatment of the antrum would have saved it. A tooth having roots protruding into a suppurating cavity—the roots protected by only a thin mucous-membrane periosteal covering—could readily become diseased by contiguity of tissue; and the writer believes that in at least some of his cases this actually had taken place, at least to the extent of producing dentalgia.

In all of the cases excepting *Case 12* and *Case 9* there was a complete and permanent relief from pain following the operation.

Of the nine cases operated upon more than a year ago four have had a return of pus. Two of these returns were in the ethmoid region and were cured by subsequent curettement; one was malignant; and one was in the sphenoid. The continued suppuration in the latter case was probably due to a prolongation of the sinus into the wing of the sphenoid bone, or some other similar condition. The return of pus in the ethmoid region was the result of fear born of inexperience of perforating through the internal plate of the ethmoids. Experience having given a better technique, the cases operated upon later had practically a complete exenteration of the ethmoid cells and have not since suppurated.

There has been a troublesome crust formation in four cases; but there was an atrophic process present throughout the whole of the nasal cavities before operation in these patients.

The tear-duct was cut off in at least half the cases, but this has caused no symptoms, the duct simply emptying higher up.

*Arterial hemorrhage* deep in the wound was easily controlled by artery forceps in three cases. The possibility of hemorrhage in this locality certainly demands the most open kind of a wound that it is possible to secure in any operative procedure that may have to be undertaken. In any of these three cases the hemorrhage would have been practically beyond control had the operation been performed by the *intra-nasal route*.

In conclusion, the operation as described is advised only after a careful study of each case, and where the hope of a cure by milder measures can not be held out to the patient.

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