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TABLE OF CONTENTS

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ORIGINAL ARTICLES

- LOSS OF SIGHT FROM POSTERIOR ACCESSORY SINUS DISEASE, WITH REPORT OF THREE CASES. *By Leon E. White, M.D., Boston.* 891
- ON CRANIAL MEASUREMENTS OF PERSONS DYING IN INSANE HOSPITALS. *By Lawson Gentry Lourey, M.D., Boston.* 899

CLINICAL DEPARTMENT

- TWO CASES OF LEIOMYOSARCOMA. *By C. H. Hare, M.D., Boston.* 901

BOOK REVIEWS

- The After-Treatment of Operations. *By P. Lockhart-Mummery, F.R.C.S.* 902
- On Modern Methods of Treating Fractures. *By Ernest Hey Groves, M.D.* 902
- The Breast: Its Anomalies, Its Diseases, and Their Treatment. *By John B. Deaver, M.D., Joseph McFarland, M.D., and J. Leon Herman, M.D.* 903

EDITORIALS

- MINERS' CONSUMPTION. 904
- TETANUS IN WAR AND PEACE. 904
- MEDICAL NOTES. 905

THE MASSACHUSETTS MEDICAL SOCIETY

- ANNUAL MEETING OF THE COUNCIL. 910
- NOTES FROM THE DISTRICT MEDICAL SOCIETIES. 910

HARVARD MEDICAL SCHOOL

- DEPARTMENT OF PREVENTIVE MEDICINE AND HYGIENE. 919

CORRESPONDENCE

- A CORRECTION. *Francis H. Williams.* 922
- MASSACHUSETTS COMMITTEE FOR THE STATE CARE AND TREATMENT OF SOLDIERS SUFFERING FROM NERVOUS AND MENTAL DISEASES. *L. Vernon Briggs.* 922

MISCELLANY

- RESOLUTIONS ADOPTED BY THE LYNN MEDICAL FRATERNITY. .. 910
- ORGANIZATION OF AMERICAN BASE HOSPITAL UNITS. 919
- APPEAL FOR RED CROSS VOLUNTEERS. 921
- NOTICES, APPOINTMENTS, RECENT DEATHS, ETC. 922

Original Articles

LOSS OF SIGHT FROM POSTERIOR ACCESSORY SINUS DISEASE, WITH REPORT OF THREE CASES.*

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UNPREPAREDNESS in America is well illustrated by our knowledge on unusual cases. Limiting ourselves, as we do, to but a small portion of the great field of medicine, we find there are subjects even in this seemingly small field about which most of us have only an exceedingly vague knowledge.

While we are conversant with the literature and investigative work done on the ordinary run of cases, there is no special incentive to look up subjects that may never be of any practical application. It is only when some special case is forcibly called to our attention that we take the time to find out what others have done. We always hope that the field has not been well covered, that there may be a chance for us to do a little original research work, but are doomed, in most instances, to find that it has been so thoroughly investigated that little or nothing can be added.

The study of retrobulbar neuritis from accessory sinus disease is no exception. So well has the ground been covered by such writers as

Birch-Hirschfeld, Onodi, Loeb, Holmes, Sluder, Knapp, Killian, Hajek, de Schweinitz, Posey, de Kleyn, Berger, Van der Hoeve, Halstead, and many others, that excepting the report of an occasional case or some pathological findings, little or nothing can be added.

Before reporting my own cases I feel that a review of a few of the conclusions and some of the cases found in the literature will be of interest:—

The observations of Beer in 1817 are the earliest writings I have been able to find pertaining to this subject. He says, in an article, "On Vicarious Blindness from Suppressed Snuffles, without Evident Accumulation of Mucus in the Frontal Sinus," "that the recognition of this form of amaurosis (or literally black cataract) is greatly facilitated by a history of a severe and suddenly suppressed cold in the head immediately preceding the ocular complication." Beer further says that "the cases all do well if one is able to re-establish a copious discharge of mucus from the nose"; without doubt Beer had to do with retrobulbar neuritis due to retention of pus in one of the posterior accessory sinuses.

In 1886, Berger and Tyrman, who were among the first to study the anatomical relations of the optic nerve, reported their findings in the examination of the differences in the partition wall between the optic nerve and the sphenoidal sinus. They also gave a brief review of the previously reported cases of blindness, some 26 in number, arising from sphenoidal disease.

In 1896, Dr. C. R. Holmes reported a case

* Read before the New England Ophthalmological Society at Boston, Feb. 8, 1916.

of "Unrecognized Empyema of Left Sphenoidal Sinus with Intense Headaches and Total Loss of Sight in Left Eye," etc., which was such a typical case showing the result of pressure on the optic nerve whenever the exit of the pus in the sphenoid became obstructed, that it has, since then, been referred to by many writers on this subject:

The patient when first seen had pain in the left eye with vision 20-100; margins of disc slightly hazy; some venous engorgement; field of vision normal. The left nostril was almost completely closed by deviation of the septum and hypertrophy of the middle turbinate. Within two weeks the eye became totally blind and the optic nerve white. The sphenoidal sinus was opened and pus found. The case improved at first, but had several relapses due to faulty drainage. Vision improved so that at the end of five months she could see the face of a watch well enough to tell the time.

The following case of Dr. Holmes illustrates the seriousness of sphenoidal disease:—

The patient had suffered from marked nasal obstruction for twenty years and trouble with his eyes for four years. During a cold he would complain of pain in the temples and deep behind the eyes. Examination revealed both nostrils free from pus, but practically occluded by enormously swollen turbinates. A few days after the removal of a portion of the inferior turbinate the patient was suddenly seized with intense pains in the head and expired in about twelve hours, with symptoms of cerebral hemorrhage. The post mortem showed a blood clot covering the area of the sella turcica, anterior clinoid process and optic chiasm. On removing this it was found that the dura and bony roof over the sphenoidal cavity had been entirely destroyed.

In 1906, Schmiegelow reports two cases of retrobulbar neuritis due to latent suppuration of the sphenoidal and ethmoidal sinuses.

The other case was that of an 18-year-old girl vomiting and headache. Vision in one eye only was affected. There was no subjective nasal symptom. Examination, however, revealed pus in the sphenoid, which was opened, as well as the posterior ethmoid cell. Vision at once improved.

The other case was that of an 18-year old girl with optic atrophy which ran a varying and chronic course without signs or history of any acute neuritis. Both eyes became involved in the course of two and a half years. Examination showed double purulent sinusitis of both sphenoids and ethmoids. Headaches disappeared and vision improved after the sinuses had been opened and drained.

Knapp reported a case with nausea and frontal headache followed in two weeks with loss of sight in left eye to 20-70.

There was a pronounced neuro-retinitis. The visual field showed a normal periphery with a central scotoma for white and colors. Pus and crusts were found in the nose. The removal of a portion of the middle turbinate was followed by a great escape of

pus, with improvement of the vision within 24 hours to 20-50. At the end of seven weeks vision was normal. Six weeks after the beginning of blindness in the left eye, the right eye was similarly but less markedly affected, which responded to treatment similar to that on the left side.

Sluder reported a case where blindness came on in both eyes 3 or 4 days after an acute coryza. The superior meatus was shut by swollen tissue. Treatment was followed by escape of pus and eventual restoration of vision.

Wiener reports a case of double retrobulbar neuritis in a specific patient where absolute blindness came on within 24 hours.

History of a coryza; had dull pain over middle of forehead. The fundi showed a low grade of optic neuritis; discs pale; veins engorged and tortuous; crusts and muco-purulent secretion found in both sides of nose. As the case did not respond at the end of 4 days to nasal treatment, the middle turbinate was removed on one side and the ethmoid cells cleaned out. Offensive pus was evacuated. Two days later the other side was operated on similarly and a similar condition found. A vision of 20-200 returned in one eye, while the other remained permanently blind. Both nerves showed some atrophic changes. Specific treatment was of no benefit.

Another case of Wiener's was in a perfectly healthy 9-year-old child where complete blindness came on within 10 hours following an acute coryza. There was some frontal headache. Fundi showed double optic neuritis with dilated and tortuous retinal veins. The nose was filled with a muco-purulent secretion. The patient improved under local treatment, and at the end of 4 weeks had vision of 20-70 in both eyes.

Paunz reports 6 cases.

In one, there was pain in one eye two weeks, with vision 5-50; paracentral scotoma. Pus was found in the ethmoids. Three months later the vision was 5-5 but the scotoma still remained and the fundus showed some choroidal changes.

A second case had coryza for a month with pain and partial loss of vision in one eye; central color scotoma absolute for blue, relative for red. In the operation on the posterior ethmoids no pus was found, only thickened mucosa. Five days later, vision 5-5 and scotoma less marked.

A third case had a specific history but failed to improve under inunctions; in fact, he grew worse until vision was for light perception in one eye and 5-50 in the other. In the operation on the nose polypi and hypertrophied tissue were found but no pus. Within 10 days vision was 5-5.

His fourth case was one of chronic retrobulbar neuritis, both eyes, with vision 5-70. Loss of vision had been gradual for 4 months. Central color scotoma. Both disks showed pallor on temporal halves. Pus was found in the left antrum, ethmoid and sphenoid. Seven weeks later vision 5-15 in one eye and 5-10 in the other. Color scotoma had disappeared, fundi unchanged.

The fifth case was of one week's duration with total blindness; crusts and pus found in posterior ethmoid cells both sides. Specific remedies failed to help, no specific history. Both disks became atrophic. Blindness permanent.

In his sixth case loss of vision came on after a cold. Eyes blurry in the morning, was blind at night. Fundi normal, no perception of light. The operation on left ethmoids evacuated considerable pus. Vision improved at first, then as it dropped, the right ethmoid was opened. Thereafter vision improved regularly and was normal in one month.

In 1909, Kranss reports a case of unilateral retrobulbar neuritis with large central scotoma. The nerve showed slight, if any, change, but the retina was hazy in the macular region. Draining the ethmoid cells brought immediate relief.

Stark reported three interesting cases before the ophthalmological section of the American Medical Association in 1915.

In one case, 10 weeks after an injury causing a fracture at the base of the skull, the vision in one eye suddenly became obscured. He could read in the morning but by evening could see objects only indistinctly. Vision 21-100. No fundus changes found except a possible engorgement of the retinal vessels. Peripheral field of vision normal for white but an absolute color scotoma for red and green. Empyema of the ethmoids was found and drainage obtained by the removal of the anterior end of the middle turbinate. Three months after this operation vision was normal, although the central scotoma for red and green lasted a year.

In the second case the vision in one eye became suddenly dim some four weeks after an acute rhinitis and a few days after having severe pain on the side of the head. The fundus was perfectly normal. Nasal examination showed a polypoid degeneration of the middle turbinate on the affected side. The removal of the anterior end was followed by temporary improvement, but as there were three attacks of pain with loss of vision within three months it was necessary to remove the remainder of the middle turbinate and clean out the ethmoid cells. In four weeks the vision was normal and so remained.

In the third case the patient, a physician, became suddenly blind while driving his automobile. Vision, when examined a short time later, was 20-30 right, and 20-15 left. Fundi fairly normal. Peripheral field for white normal. Absolute central color scotoma for red and green. After the escape of half a teaspoonful of foul smelling pus from the nose the vision improved so that it was normal within a few hours and the color scotoma disappeared.

Coppez reports a case of blindness from sphenoidal sinus disease:

Influenza was the cause. Operation on one of the sphenoids was followed by improvement of vision in the opposite eye only. Optic atrophy followed in the eye on the operated side.

Caldwell had a case which showed marked hyperemia of the disk with final atrophy of both optic nerves as a result of ethmoid and sphenoid disease.

Halstead's patient had sudden blindness in the left eye resulting from disease of the antrum, ethmoids and sphenoid sinus on the right side.

The vision returned after operation. He thought this contralateral involvement was caused by a rupture of sphenoidal septum, but later investigations show that the left optic nerve can be in relation to the right sphenoid, or vice-versa.

In an article published in 1910, de Schweinitz says in regard to scotoma as a result of sinus disease, that, "in a certain number of cases, the manifestation is that of a retrobulbar neuritis with its well-known symptoms of obscuration of vision beginning in the central field and rapidly progressing to complete or nearly complete blindness. At first the ophthalmoscopic appearances are negative but later there is blurring of the margins of the disk, diminution of the calibre of the retinal arteries, and pain on movement of the eyeball. In the study of this affection, not infrequently the sinuses have been neglected," "or rhinologic examination has failed to detect sinus infection where later investigations, or later results, have demonstrated well marked disease."

He reports a case that has many interesting features:—

Vision, when first seen, was 6-30 in each eye. The eye grounds were normal. The vision continued to fail. There was a delicate ringed scotoma in the left field, and a triangular paracentral scotoma in the right. Intranasal examinations showed only a universal congestion; that is to say, there was no pus, no polypi or no definite lesion indicating sinus disease. The x-ray examination was likewise negative. The left sphenoid was catheterized and a small quantity of pus withdrawn. Vision was now reduced to the ability to distinguish the largest typed letters at a few centimeters from her eye. Vigorous treatment, consisting of hot vapor baths, the administration of small repeated doses of mercury and suitable intranasal treatment, together with washing out of the sphenoid sinus at stated intervals, was followed by a measure of relief, and by a slight improvement in vision. After a year's residence in warm climates, the field of vision was found normal, and the vision had risen to 6-25.

In the *New York Medical Journal*, March 2, 1907, Posey says:—

"The connection between a sinusitis and an ocular inflammation can often be made only after very skilful and repeated examinations. Until within a very short time many ophthalmologists dismissed the possibility that an ocular inflammation could have originated in a sinusitis, by the patient's declaration that he did not have at the time, or shortly before, a bad cold in his head, or by the statement of an assistant, who took but a hasty view of the nares, that there was no pus in the nose."

"That congestion of the sinus, without exudation, is sufficient to occasion ocular symptoms....I have seen demonstrated in cases where competent rhinologists had failed to discover any exudate in the sinus whatever."

"There were cases of retrobulbar inflammation of the optic nerve which were observed in earlier

years following grippe and in association with catching cold or rheumatism, where in place of the simple and effective treatment directed to the sinuses, they received active and often depressing and harmful general medication; as a consequence, blindness was the not infrequent result."

That there are many cases of optic neuritis not due to accessory sinus disease hardly needs mentioning, but there must be many cases where the origin is in doubt. Hajek expressed this thought well when he said:—"That the teaching of a common rhinologic origin for retrobulbar neuritis did not rest on a solid basis so far as actual proof is concerned." While he obtained improvement in some cases after opening the ethmoid cells without finding any disease, in other cases where sinus disease was suspected, but not found, no improvement resulted and the patients eventually became blind.

Birch-Hirschfeld has contributed much interesting and instructive literature on this subject. His article on his findings in a case of carcinoma of the posterior ethmoid cells, producing optic neuritis with central scotoma, has been quoted by many subsequent writers. The histological examination in this case revealed venous stasis due to compression of the orbital veins by the tumor, and isolated disease of the papillomacular bundle posterior to the site of entrance of the vessels into the optic nerve. This consisted in an edema of the optic nerve, swelling and proliferation of the glia cells, and disintegration of the nerve fibres.

This author believes the central scotoma, in diseases of the accessory sinuses, to be due to a venous stasis brought about by an extension of the inflammation in the sinuses to the blood vessels at the apex of the orbit.

As the concluding deductions in a long and excellent article by Loeb on the "Relations of the Optic Nerve to the Accessory Cavities of the Nose," published in 1909, he says:—

"Sphenoid sinusitis would naturally be called to account as the prolific cause of the infection in nerve involvement but for the fact that the sphenoid is less commonly affected than the other sinuses, and, except in closed empyema, the pus is evacuated in a large measure through the nasal opening. Stagnant and decomposing pus is more or less common on the floor, that part farthest removed from the optic nerve; but this factor becomes most potent where the orifice is at the level or about the optic nerve as shown in 4 out of 15 heads, as the likelihood of trouble is greatly increased by the immediate propinquity of the stagnant and decomposing pus, which in these cases is separated from the nerve only by a thin lamina of bone and the nerve sheath."

In 7, out of the 15 heads studied, one sphenoidal sinus was found to be in relation to both optic nerves, which explains sufficiently contralateral optic neuritis.

"The posterior ethmoid cells are frequently affected but have little influence on the optic nerve on account of the meagerness of their relation, viz., the posterior external angle. When, however, the posterior ethmoid cell replaces a portion of the sphenoidal sinus, the optic nerve in its passage along the external wall becomes most vulnerable as it is closer to the mass of pus and for a greater distance than under any other circumstances."

In a later article, Loeb reports an instructive case in which the radiograph showed both ethmoids obscured, and in which, on operating, he found enough trouble to warrant his diagnosis of an acute ethmoiditis just becoming purulent.

His case was of five weeks' duration with increasing loss of vision for three weeks. One week after removal of both middle turbinates and cleaning out the ethmoid labyrinths the vision was about normal.

To Onodi is due great credit for his research work on the relations of the accessory sinuses to the optic nerve. He has written several books which are profusely illustrated with life-size photographs of sections through the sinuses made in every conceivable way. He has also traced the development of the sinuses from the foetal stage to maturity and has also studied the sinuses from x-ray plates.

Onodi's findings furnish the anatomic foundation for the theory of blindness from accessory sinus disease, and explain contralateral and double-sided blindness from one-sided sinus disease.

He also investigated the enlargement of the blind spot in posterior accessory sinus disease, and found it present 38 times in 70 cases showing empyema. He reports a case of long standing optic atrophy on one side and optic neuritis and temporal hemianopsia on the other, where slight improvement followed an operation on the posterior ethmoids and sphenoid.

CASE 1 has been reported in full in the *BOSTON MEDICAL AND SURGICAL JOURNAL*,* but briefly is as follows:—

Miss R. S., 23 years of age, was seen five years ago. She gave a history of gradual loss of sight and severe pain of almost daily occurrence in and behind the left eye for two years. The sight was so poor that Dr. H. B. Chandler, who referred the case, could not get her visual field. He reported the case to be one of retrobulbar neuritis with a fairly normal fundus. On nasal examination pus was seen in the region of the left sphenoid and an exploratory operation advised. Advice was not acted upon and her subsequent history has shown a further loss of sight so that at the present time vision is only for light and darkness. The left-sided purulent discharge and the pain have persisted off and on ever since.

When x-rayed five years ago the plates were negative, but four years later they showed an ethmoiditis.

* Vol. clxxiv, p. 791.

CASE 2 has also been reported in detail.* Briefly, Mr. C. J. McC., postoffice clerk, 25 years of age, in good health and of good habits, noticed, without apparent cause, a slight foginess in his left eye, which increased so that within three days his vision was 1-10; 48 hours later the right eye became similarly involved. There was no pain or discomfort in the eyes or head. Dr. William J. Daly, who referred the case, reported a marked central scotoma for white and colors, as shown in the charts. He found a blurring of the edges of both disks and an increased capillarity. Dr. Percy Brown made several x-ray plates and reported "an

obliteration of the cavity of the sphenoid at a point which is usually but half the dimension (antero-posteriorly) of the normal sphenoid." "That portion usually lying below the sella turcica was completely occluded." The examination of the nose was practically negative, excepting that on probing the sphenoids the probe entered the right a full centimeter farther than it did the left. The left sphenoid was opened; there was no pus, only a thickened mucosa. A marked deflection of the sphenoidal septum to the left was found, which accounted for the apparent shallowness. Recovery was rapid and vision was normal in three weeks, and has remained so.

FIG. 1.—Case II. Object 1 cm.

FIG. 2.—Case II. Unshaded portion shows visual field for blue.

* *Loc. cit.*

FIG. 3.—Case II. Unshaded portion shows visual field for red.

FIG. 4.—Case II. Unshaded portion shows visual field for green.

CASE 3. Miss J. L. P., age 21, student, was referred to me January 13, 1916, by Dr. F. I. Proctor, who reported loss of vision in left eye to 20-40, swelling about the left disk and enlargement of the blood vessels. She gave a history of catarrhal colds as far back as she could remember. Had tonsils and adenoids removed five years ago. Following a severe cold three years ago she noticed for the first time a blurring of the eyes which lasted two or three days. Five months ago she had a blurring which lasted a week. She further says that with bad head colds she not infrequently has some difficulty in seeing, but up to the present attack has not given it much thought as there was no pain and the eyesight was not very bad. Present attack followed the grip and was characterized by violent pain for three days. Then she noticed that there seemed to be something in left eye that needed to be removed. As wiping did no good, she consulted Dr. Proctor, thinking the trouble was due to some foreign body.

On examination of her nose there was found on the left a moderate deflection of the septum, and an enlarged and swollen middle turbinate completely blocking the superior meatus. Her right middle turbinate was swollen, but not as firmly wedged in as the left. There was a mucopurulent secretion exuding from beneath both middle turbinates; trans-illumination negative. Hot solutions were used in the nose and with the subsidence of the swelling there was a profuse discharge. The pain was relieved at once and practically disappeared within 48 hours. The next day there was some blurring of the right eye and Dr. Hawkins, who followed the case for 10 days while Dr. Proctor was away, has given me the following report:—

January 14th. "Fundi examination shows margin of each disk slightly edematous, veins and arteries somewhat tortuous. This condition most marked on nasal side, left.

Vision: right, 20-30; left, 20-40. Visual fields

show a general contraction for both objects and colors. Colors retain normal relation. Each field presents an annular scotoma from 10 to 30 degrees.

January 25th. Vision: right, 20-20, left, 20-30 minus. Fields but slightly changed except that green is entirely within the annular scotoma and the red is perceived only in one small area on outer side of field in each eye.

Case was x-rayed by Dr. Percy Brown and his report is given in full:—

"The general situation in the case of Miss P. (No. 8562) as obtained by x-rays is somewhat as follows:

The sphenoids were investigated primarily by the so-called Bowen method, which permits of the projection of x-emanation from beneath the chin downward through the vertex of the skull when the head is in an extremely hyperextended posi-

tion; in other words, with the head hanging over the edge of the examining table to the limit of extension. By this method it is possible to obtain a comparison of both sphenoidal areas in a manner impossible in any other position. The general deficiency of the left sphenoidal area in this case may be seen in comparison with the right. Anatomically, the left sphenoid is not as large as the right, especially in the antero-posterior diameter and it is, seemingly, the seat of subsepta, together with a certain degree of infiltration.

The remaining accessory sinuses of the nose in this case, as obtained through an antero-posterior plane of the skull, are not, apparently, in marked degree abnormal, with the exception that the portions of each frontal sinus closely approximating the median line present a moderate opacity which, however, suggests a mural thickening of the mucosa rather than effusive material."

FIG. 5.—Case III. Object 5 mm.

FIG. 6.—Case III. Unshaded portion shows visual field for blue.

FIG. 7.—Case III. Unshaded portion shows visual field for red.

FIG. 8.—Case III. Unshaded portion shows visual field for green.

The swelling in the nose gradually lessened and the vision improved so that it was practically normal at the end of 3 weeks. The scotoma is disappearing, but is not entirely gone. The blurring has been gone for some days. This blurring symptom was interesting, as it would become pronounced with some slight blocking up of the nose, thus varying from day to day. There would also be an occasional pain when the eyes were especially blurry. This case is one that evidently needs an operation to establish better drainage from the posterior accessory sinuses. The removal of the left middle turbinate will probably suffice; if not, the sphenoid and possibly the posterior ethmoid will be opened.

The middle turbinate was removed and the patient has had no further trouble up to date, January 13, 1917.

To sum up the results in these 27 cases which were selected at random:—

There was complete recovery in 14; improvement in 7; total blindness in one or both eyes in 5; one death; 4 cases recovered without an operation; in three the sphenoid alone was opened, while the ethmoid was operated upon 10 times alone and 7 times in conjunction with the sphenoid. In 15 the onset was sudden, with a history of coryza in 12, and severe pain in 13. Pus was found in 22 cases and a thickened mucosa in 5. Scotomas and fundi changes noted in 14. X-ray finding helpful in 4.

Cases of retrobulbar neuritis can be divided into three classes:—1. The acute ones which usually follow the grip or a coryza and are accompanied by severe pain. The pressure of the secretions in the sinuses and the swelling from the inflammation in the mucosa cause constriction of the optic nerve and artery.

2. The chronic ones where there is less pain, if

any, and where an empyema of one or more sinuses is causing either a pressure on, or a toxemia of, the nerve.

3. Those cases where, on opening the sinuses only a thickened mucosa is found. Here hyperplastic changes are taking place and a periostitis in the sinuses by extension through the optic canal becomes a perineuritis.

From a study of the cases in this paper I think we may say that patients with retrobulbar neuritis demand our most careful attention. The diagnosis is made largely from the findings of the ophthalmoscope, vision and the visual fields. Radiographs may be helpful and should be taken, for even though they show no diseased sinuses, they may show some peculiar abnormality or some faulty development which might predispose to nerve involvement.

Enlargement of the blind spot is another valuable and early sign of neuritis. De Kleyn found in 52 cases of posterior accessory sinus disease enlargement 47 times, while he found the blind spot normal in his cases of frontal and antrum disease. In fact, in several cases, its presence enabled him to make a diagnosis of posterior accessory sinus disease which he verified by operation. Van der Hoeve says, "that enlargement of the blind spot for white and colors points with great probability to diseases of the posterior nasal accessory sinuses and justifies operative interference for this disease if there are no other causes for its presence."

The prognosis is, on the whole, favorable, especially where treatment is initiated before optic atrophy occurs. The success of any treatment must be based on a recognition of the pathology. The inflammatory process in the sinuses must be controlled. If pus under pressure is causing a strangulation of the nerve and artery, the pressure must be relieved, otherwise optic atrophy will follow. If the neuritis is caused by an extension of the inflammatory process or a toxemia, this condition must likewise be controlled. Each case should receive individual consideration. No one line of treatment is suitable for all. Some would get well without treatment. Other cases may clear up under appropriate general treatment, but severe cases, where there is actual danger of blindness, require the most careful and skilful treatment, both medical and surgical.

To relieve the pressure on the nerve, drainage from the posterior accessory sinuses should be established. This can be obtained in some cases by appropriate intranasal treatment. If this is unsuccessful, the middle turbinate, if obstructing, should be removed in whole or part.

In cases where there is no obstruction to the sinuses, only a thickened mucosa, the removal of the middle turbinate would not be indicated, excepting such portion as was necessary to get access to the sphenoid and posterior ethmoids.

If pressure on the nerve is not relieved within the next two or three days, as shown by an improvement in vision and the subsidence of the

pain, the front wall of the sphenoid should be removed. This is a comparatively simple and safe operation when performed by one familiar with the anatomy of the region. If relief does not soon follow, the posterior ethmoid cells should be opened.

A complete ethmoid exenteration is, I believe, rarely necessary, as the relation of the optic nerve to the anterior cells is almost unknown. The eyes should be carefully watched from day to day, and a further loss of vision should furnish the indication for the progressive operative interference. Do, by all means, what is necessary to safeguard the vision, but do not become unduly excited and inflict on a patient a needless amount of radical surgery.

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ON CRANIAL MEASUREMENTS OF PERSONS DYING IN INSANE HOSPITALS.*

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ONE may safely infer that a great deal of work has been done on this important topic, without very remarkable results. The first part of this inference is based upon the statements occurring in many works from 20-15 years ago, on the importance of having such work done.

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