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Basal Hernias of the Brain.

BY

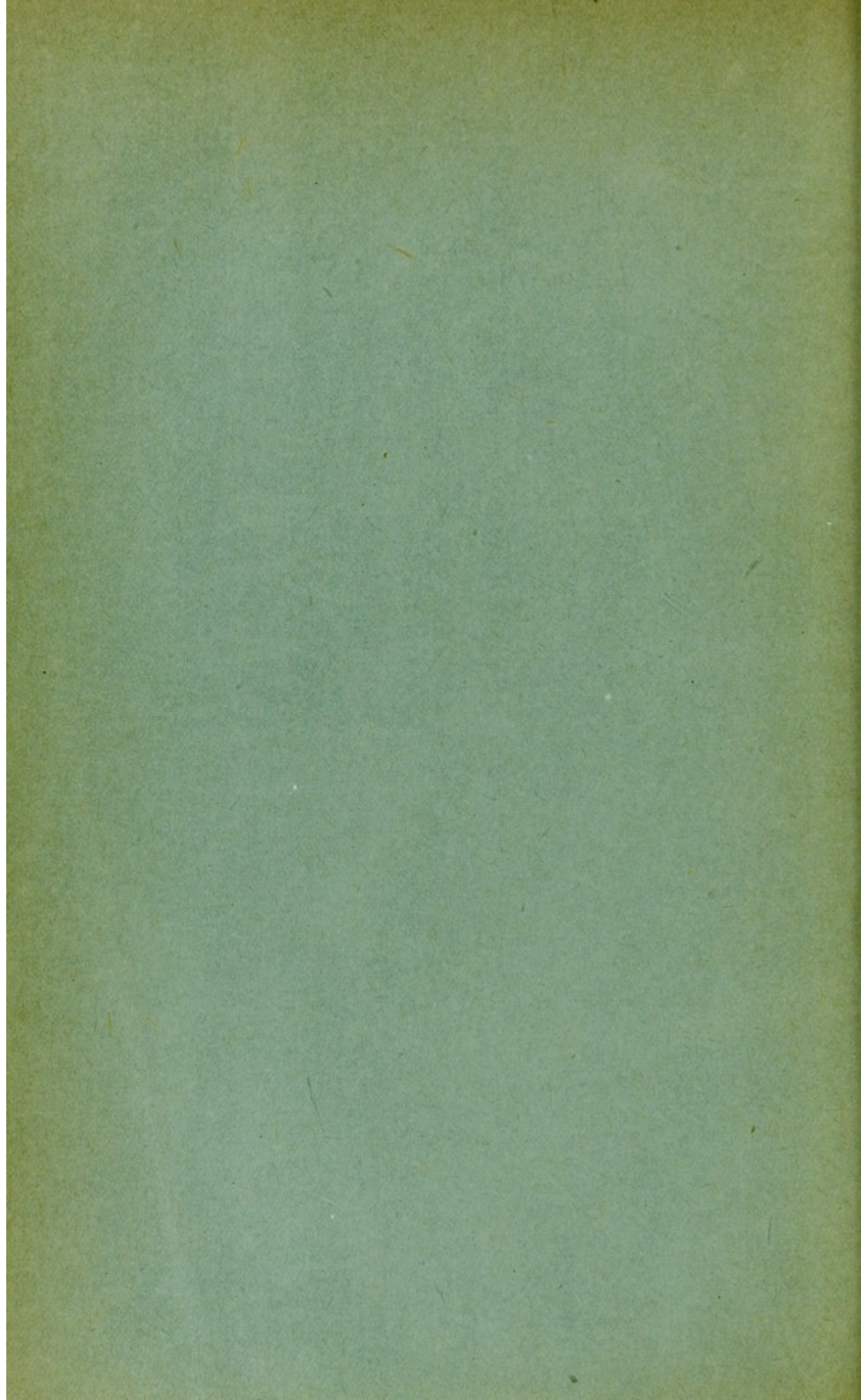
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AND CHICAGO POLYCLINIC, CHICAGO.



FROM

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BASAL HERNIAS OF THE BRAIN.

BY CHRISTIAN FENGER, M.D.,

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WHILE the occipital and sincipital cerebral hernias form external visible tumors in the occipital and naso-frontal regions respectively, we find no external visible tumors in the basal hernias. As the sincipital hernias, however, leave the cranium in close proximity to the place of exit of the basal hernias, let us first review briefly the various forms of sincipital hernias:

1. The naso-frontal hernias leave the cranium between the frontal and nasal bones and form a tumor in the median line in the region of the glabella.

2. The naso-ethmoidal hernias leave the cranium between the frontal and nasal bones on the one side and the lateral mass or labyrinth on the other, which is forced or displaced downward toward the nasal cavity. The tumor appears externally in the region of the border between the osseous and cartilaginous portions of the nose, hanging down toward the tip or the wing of the nose.

3. The naso-orbital hernias leave the cranium between the frontal ethmoid and lachrymal bones. In the region of the latter they enter the orbit and present at or near the inner canthus of the eye.

All the above-named varieties present external visible tumors. The naso-ethmoidal and naso-orbital varieties are probably not distinguishable from each other, as they leave the cranium at the same place; namely, the nasal notch of the frontal and the cribriform plate of the ethmoid bone. Furthermore, the same hernia may divide into two branches, of which the anterior passes downward and forward behind the nasal bone, to protrude in the face at the border of the osseous and cartilaginous part of the nose, and the posterior branch descends into the anterior and medial portion of the orbit between the frontal, ethmoid and lachrymal bones. There is always some defect of the bones in question at the point where the encephalocele leaves the cranium.

4. Basal hernias are, as already stated, distinguished from the other sincipital hernias by not causing a protruding tumor in the face. Heinecke⁶ distinguishes between three forms of these hernias:

- I. Cephalocele spheno-pharyngea is the most common variety, and

leaves the cranium through an opening between the body of the sphenoid bone and the ethmoid bone, or through one of these bones, to come down in the nasal or naso-pharyngeal cavity. Extending from this point they may present in one of the nostrils, as in Czerny's case; in the naso-pharyngeal cavity as in the cases of Giraldès, Otto, and Klimentowsky, cited from Larger,¹¹ and in my case, or come down into the mouth through a cleft palate, as in the cases reported by Virchow, Lichtenberg, Klintosch and Serres, also cited from Larger.

II. Cephalocele spheeno-orbitalis, which leaves the cranium through the superior orbital fissure to enter the orbit behind the globe of the eye.

III. Cephalocele spheeno-maxillaris, which, like the second form, leaves the cranium through the superior orbital fissure, but instead of remaining in the posterior part of the orbit, descends through the inferior orbital fissure into the spheeno-maxillary fossa. The tumor presents, and can be felt in the mouth on the medial side of the ascending ramus of the inferior maxilla, and is visible on the outside of the face, on the cheek below the zygoma, in the same place where the retro-maxillary branches of retro-nasal fibroids present.

The two last-named hernias are exceedingly rare, and I have been unable to find all the varieties to which Heinecke's classification refers. Larger mentions three instances of retro-orbital encephalocele referred to by Spring. In the case published by Walther, the tumor descended through the superior orbital fissure, and caused exophthalmos and destruction of the eye. Spring had seen two similar specimens in the museum at Bonn.

The first variety, the spheeno-pharyngeal, is less uncommon. I shall mention the more accurately described instances of this variety, as they present more of surgical interest than Heinecke ascribed to them when he said: "Cephalocele basalis is of no surgical importance, as it has been found only in non-viable monsters (*nicht lebensfähigen Missbildungen*)."

Attempts at the removal of encephalocele by operation have been made by Lichtenberg, Czerny and myself. Lichtenberg's patient died from the operation; Czerny's patient survived the operation, but died later from apparently independent causes; my patient made a definite recovery.

Lichtenberg¹² reports the case of a newborn girl in whom a large reddish tumor, the size of a small fist, hung out of the mouth, covering the chin, with its base resting on the sternum. On more minute examination it was seen that the patient had a hare-lip situated nearly in the median line of the lip, and complicated with cleft palate. The tumor was divided into two portions by a slight constriction in the middle, was elastic to the touch, and was attached by a pedicle which could be followed up to the right wall of the nasal cavity by opening the mouth, where it was continuous with the nasal mucosa. The patient died from

the operation, and the autopsy demonstrated that the tumor was a cerebral hernia.

Klinton¹⁰ gives a vague description of an infant in whom a tumor protruded in the mouth. The patient had a hare-lip and cleft palate, some bones of the face were wanting, and the eyes were atrophied. In the sella Turcica was an opening the size of a goose-quill through which the neck of the hernia came down into the mouth, there to form a tumor the size of a hazelnut. This contained the hypophysis, which was hollow and communicated directly with the ventricle.

Serres¹⁵ describes an infant in whom some portions of the brain, with their envelopes, protruded from the cranium in the median line between the sphenoid and ethmoid bones. The tumor descended into the nasal fossa, almost into the pharynx.

Giraldès,⁵ according to Dupuytren,³ observed an encephalocele which descended into the interior of the nose.

Otto,¹³ cited by Spring, states that he has seen in the museum at Vienna a cerebral tumor which had penetrated into the nasal cavity through the cribriform plate of the ethmoid.

Kelsch,⁸ according to Otto, has seen a case in which the hypophysis was situated in the sphenoidal sinus.

Klimentowsky,⁹ describes an encephalocele in a newborn child, in which the anterior portion of the two frontal lobes descended into the right side of the nasal cavity, as was verified by the autopsy.

Rippmann,¹⁴ cited by Meyer, found in a fœtus of twenty-three weeks, the head of which was double the normal size, and consequently hydrocephalic, a lobulated tumor having a pedicle three or four lines in thickness, which descended through a canal in the body of the sphenoid bone.

Virchow¹⁷ describes a specimen in the Berlin museum, of hydrencephalocele palatina in a newborn child. (See Fig. 1.) From the open mouth protruded an irregular nodulated tumor the size of a small apple. It was apparently adherent to the hard palate, but upon section it was seen that it had pushed both the vomer and the hard palate forward and upward, and that it emerged from the cranial cavity through a broad opening immediately anterior to the sphenoid bone, and behind the still cartilaginous ethmoid. The anterior portion of the sphenoid was forced downward and backward, and the connection between it and the vomer interrupted by the tumor, so that the vomer was connected only with the ethmoid. The anterior portion of the sac contained a cavity lined with smooth dura mater, below and behind which were several irregular smaller cavities. In the upper portion of the tumor was brain substance which extended from this point up into the cerebral portion of the cranial cavity. The brain was pushed downward toward the base of the cranial cavity, and above it was a large cavity filled with fluid, and surrounded by a thick membrane.

In addition to this more or less cursory discussion of cases from the older literature, there has now appeared an accurate and excellent report of a case by Meyer,¹⁹ from Czerny's clinic. The case was one of congenital nasal polypus, and was brought to the Heidelberg clinic for operation. The child died six weeks later, and the diagnosis was made after post-mortem microscopical examination.

FIG. 1.



The patient was a child three days old, well developed, weighing five or six pounds. The left ala nasi was broadened and pushed upward by a soft, elastic, compressible, pedunculated, transparent tumor the size of a hazelnut, half of which protruded through the opening of the nose, and was clad with smooth, yellowish-red mucous membrane, and covered with dried crusts of serous exudate. The tumor did not increase in size when the child cried; it was attached $1\frac{1}{2}$ cm. behind the free border of the septum. Upon incision of the tumor bloody serum escaped, and upon pressure puriform mucus was forced out.

On October 22, 1888, the left ala nasi was divided at its line of insertion and pushed upward. The pedicle was tied off by a double ligature and divided, and the tumor removed. The external wound was united, and an iodoform gauze-collodion dressing applied. This dressing was at first changed every day; later on, every two or three days. A serous discharge continued from the nose. The wound healed, and the child did well for a few weeks; then it suffered gradual loss of strength, and died six weeks after the operation from marasmus. There was no meningitis.

The autopsy revealed that the wound was healed. The left eye was located obliquely, so that the left inner canthus was 2 or 3 mm. deeper than the right. In the left nostril was a polypoid grayish-red tumor, which extended nearly to the external opening. The fontanelles were broad and large. The subarachnoid fluid was somewhat increased. The meninges in the right central fissure were opaque, and the left frontal lobe less prominent than the right, as if it had sunk back.

The left frontal lobe could not be lifted up from the frontal fossa, but was fixed by a flattened string or band 1 cm. in antero-posterior diameter, and clad with vascular meninges. The pedicle made its exit from the cranium through a longitudinal, oval, funnel-shaped opening 1 cm. long and $\frac{1}{2}$ cm. broad in the cribriform plate of the ethmoid bone. It was smooth, hard, the size of a goose-quill, and descended into the posterior nares, and divided into two branches, one of which formed the polypus, while the other was adherent to the posterior border of the hard palate. The nasal septum was deviated to the right side, and the middle meatus of the nose absent. The left nostril was much larger than the right.

Meyer remarks that it is possible that basal encephaloceles are more common than would appear from the literature, but that they have been mistaken for nasal polypi, which they resemble, and have not been recognized as hernias of the brain.

As a result of research in the literature on the diseases of the nose, for which I am indebted to the kindness of Dr. George Morgenthau, the two following cases have been found:

Abraham¹ demonstrated a case on February 1, 1889, before the West London Medico-Chirurgical Society:

The patient was a man thirty-one years of age, who had a meningocele which occupied the greater part of the nose and originated beneath the nasal bones. After birth the tumor was relatively of the same size until 1883, when it became inflamed as a result of injury, and was incised, whereupon blood and "water" escaped. The watery discharge continued for about a day, when the wound of incision closed. At the time of demonstration the tumor was $2\frac{1}{2}$ inches in length and diameter, and showed expansile pulsation, which was registered graphically and showed rapid systolic uprise and well-marked diastolic impulse. These phenomena were only slightly affected by respiration.

Tilleux¹⁶ reports the case of a man who, following the removal of a nasal polypus, commenced to suffer from a profuse watery discharge from the nose, which persisted during the entire twenty-four hours, excepting when the patient was recumbent. When the head was bent forward the discharge seemed to increase. The amount of discharge in the twenty-four hours was about nine ounces. Upon analysis the fluid was found to be identical with arachnoid fluid. Tilleux therefore supposed that in the extraction of the polypus the cribriform plate of the ethmoid had been broken, and that the discharge occurred from the arachnoid cavity.

On March 16, 1891, I operated on a case of basal hydrencephalocele simulating nasal polypus, in which the compressibility of the tumor led me to suspect basal hernia before the operation, although I found it impossible to make a positive diagnosis until the polypus had been removed. I reported this case, and exhibited the specimen and patient, before the Chicago Medical Society, March 7, 1892. The case is as follows:

CASE.—*Synopsis: Symptoms of obstruction of nose from early childhood. Pedunculated polypus in left posterior nares, apparently somewhat compressible, pedicle located at root of nose. Suspicion of cerebral hernia. Attempt at positive diagnosis by aspiration of cerebro-spinal fluid from polypus failed. Removal of polypus by écraseur, followed by free discharge of cerebro-spinal fluid. Packing of left nostril with iodoform gauze, preparatory to radical operation to close hollow pedicle. Osteoplastic resection of superior maxilla as devised by Von Langenbeck. Pedicle found, transfixed, and ligated. Recovery.* A. A., Swede, single, twenty-nine years of age, coachman, came to my clinic at the College of Physicians and Surgeons March 4, 1891. Parents living and healthy; none of his brothers or sisters died at birth or in early life; no cranial or cerebral deformities in the family. The patient has had the usual diseases of childhood, and has also had occasional headaches. Even when he was a boy he could not blow his nose satisfactorily; there was no discharge at all. Two years before he had difficulty in breathing through the nose, and consulted an advertising specialist, who claimed that he removed a growth from the nose. The operation was attended by slight hemorrhage, but no serous fluid escaped. He could breathe well for a few days, but the nostrils soon became again obstructed.

Upon examination at the clinic I found a tumor filling the post-nasal space above the soft palate. On palpation with the index finger the tumor seemed somewhat compressible. As I thought the case might possibly be one of cerebral hernia containing fluid, I refused to operate, and told the patient to come to my office for further examination before deciding upon the method of treatment.

He came repeatedly to my office, and at each examination the tumor would upon pressure appear to decrease in size so that it could be pushed up into the left half of the posterior nares. It would remain small in size and in this location for a time, but within twenty-four hours would be as large and would occupy the same position as before. I could not see the tumor nor its pedicle from the nostril, but upon examination with the probe I thought I could trace the pedicle to the roof of the nose.

The suspicion of cerebral hernia made me consider the various operations for this condition. As ligature high up, near the base of the cranium would be called for, the operation necessary to gain access to this point would be somewhat grave. The choice of operations, therefore, lay between (a) temporary transverse resection of the nose at its root, as devised by Ollier and Von Bruns; (b) temporary division of the hard palate close to the median line, as devised by Annandale; and (c) temporary resection of the upper maxilla, as devised by Von Langenbeck.

As these operations preparatory to access are so grave, I did not wish to undertake any one of them on an uncertain diagnosis. On May 14th, therefore, I attempted to make the diagnosis certain by aspiration with the hypodermatic syringe at my office. I palpated the tumor with my left index finger. It was in the usual position—above the soft palate, behind the posterior nares. Without compressing the tumor I pushed a hypodermatic needle through the soft palate up into the tumor, and my assistant, Dr. Hall, withdrew the piston, but no fluid appeared. When this had been twice tried with negative results, I concluded that the tumor was an ordinary polypus and not a basal hernia, and pro-

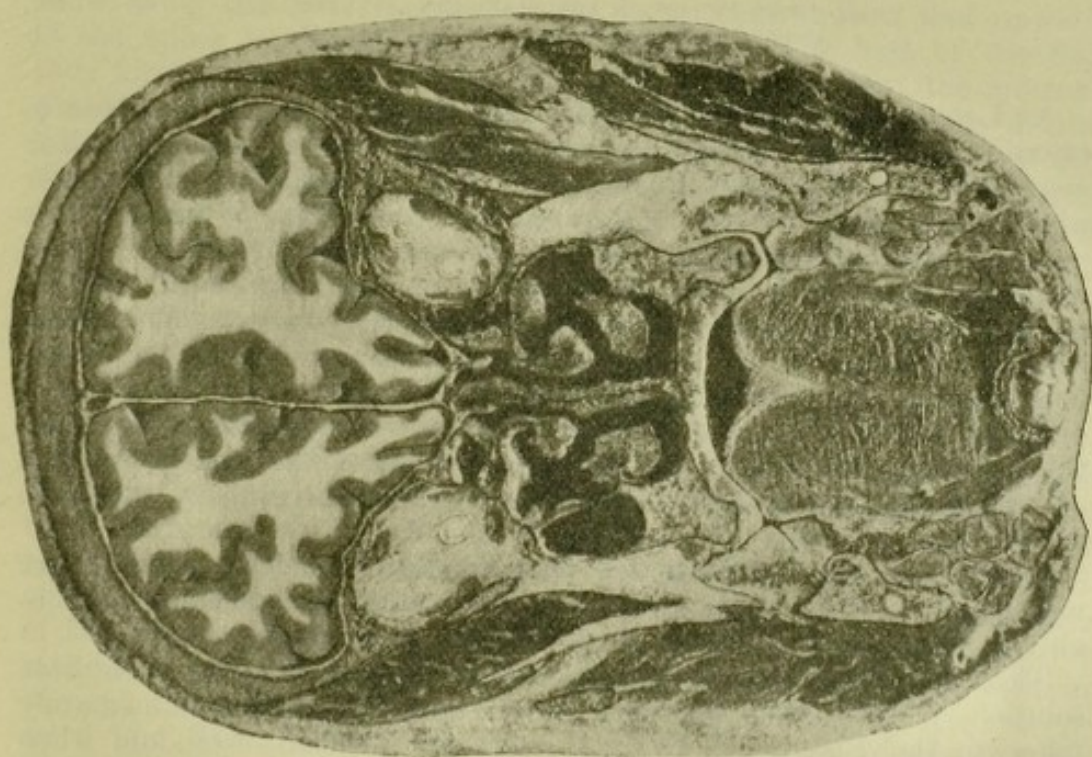
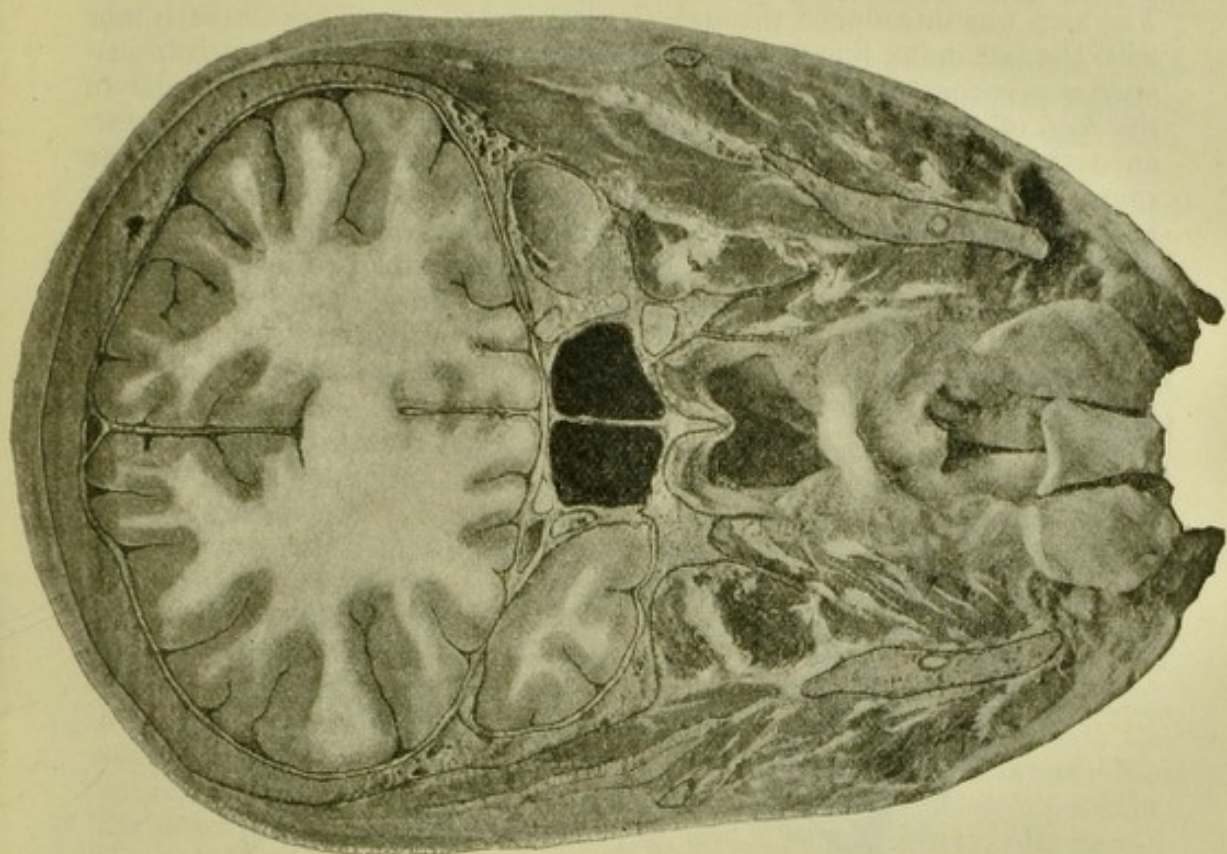
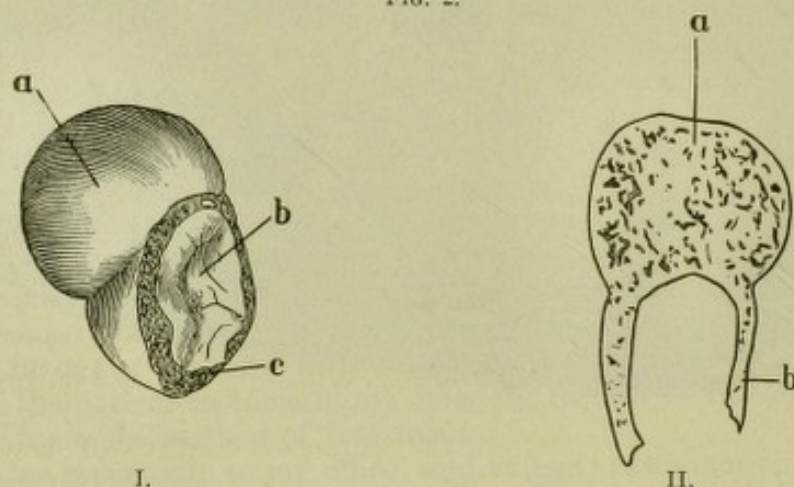


PLATE SHOWING THE EXTENT TO WHICH THE CEREBRUM DESCENDS UPON THE CRANIAL BASE. (McEwen's *Atlas of Head Sections*, Series A, Plates 2 and 4.)

ceeded to remove the growth in the usual way with the wire snare. The loop was introduced through the left nostril, carried over the tumor with the left index finger, and tightened with the *écraseur* until resistance was encountered. I could now locate the tumor as being fixed to the roof of the nose between its middle and posterior thirds. I tightened the *écraseur* and divided the pedicle. After withdrawal of the snare slight hemorrhage occurred, but neither coughing nor sneezing brought forth the tumor. The hemorrhage soon ceased, but was immediately followed by dripping of a clear watery fluid, of which I collected about a teaspoonful in a watch-glass. This fluid upon being boiled showed the presence of a small amount of albumin, and upon the addition of nitrate of silver gave the characteristic white precipitate of chloride of silver.

FIG. 2.



I. TUMOR—NATURAL SIZE.

a. Solid portion of tumor. b. Cavity in pedicle of tumor. c. Divided border of pedicle.

II. CROSS SECTION OF TUMOR AND HOLLOW PEDICLE.

a. Solid portion of tumor. b. Wall of pedicle.

As I concluded that the fluid was cerebro-spinal, and as I desired to examine the tumor to make the diagnosis positive, I made the patient vomit, and this brought forth the tumor as shown in Fig. 2. The tumor when empty was of the size of a hazelnut and consisted of two portions—a solid distal and a hollow proximal portion. The solid distal portion was spherical, 18 mm. broad and 13 mm. deep, was covered with smooth mucosa, resembling in color a fibrous polypus of the nose. The hollow proximal portion of the tumor, which was separated from the distal portion by a groove, was 15 mm. in all its diameters. At the point of division the cavity was 1.5 by 1 mm. in diameter, and had a wall 2 mm. thick covered with smooth mucous membrane. The interior surface of the cavity was smooth, whitish, and showed distinctly dendritic vessels.

I now knew that I had to deal with a hollow pedicle of the diameter mentioned, which communicated with the cranial cavity and was probably in direct connection with one of the cerebral ventricles.

The left nostril was thoroughly cleansed with 1:1000 bichloride solution, packed with iodoform gauze, and the patient immediately taken to the Emergency Hospital. He felt perfectly well, and when lying down nothing was noticeable, but when he sat up with the head

bent forward, a discharge of clear cerebro-spinal fluid occurred from the left nostril.

The further plan of operation now came under consideration. The basis of this plan was to secure the pedicle for transfixion and ligature as close to its exit from the cranium as possible; that is, the nasal surface of the cribriform plate of the ethmoid bone. Taking into consideration the location of the pedicle, partly from what I had observed during the operation at my office and partly from our knowledge of the places of exit of basal hernias, I located the opening near the anterior border of the body of the sphenoid bone about 2 cm. anterior to the border of the posterior nares.

I found by investigation upon the cadaver that in order to gain access to the place of exit of the hernia, not simply for the scraping or cutting off of a tumor, but to obtain sufficient space for manipulation—that is, to pass a needle through the pedicle for transfixion or ligation—neither temporary resection of the nasal bone nor Annandale's longitudinal division of the hard palate and separation of the divided portions would give me the space required, but that the osteoplastic or temporary resection of the superior maxilla as devised by Von Langenbeck would enable me to deal satisfactorily with the pedicle.

This operation was accordingly proposed and executed on March 16th in the presence of the doctors from the Chicago Polyclinic, and with the assistance of Drs. Hall and Bernauer, in the following manner: The patient was anæsthetized with chloroform and placed in Rose's position, the mouth held open by Heister's gag, and a loop of heavy silk passed through the tongue.

An incision was made from the internal canthus of the left eye along the infra-orbital border and outward over the malar bone to its junction with the frontal bone, then downward over the anterior portion of the zygomatic arch to its lower border, and from here forward along the lower border of the malar bone inward and upward to the upper border of the wing of the nose. The base of the flap thus formed was the skin between the ala of the nose and the internal canthus of the eye. The incision having been carried down to the bone, the masseter was divided at its origin on the lower border of the malar bone and detached with the periosteum from the bone by a periosteal elevator. The elevator was pushed inward along the posterior surface of the superior maxilla through the spheno-palatine foramen, where it could be felt by the left index finger, and the contents of the orbit loosened from the floor and the outer border for three-quarters of an inch along the line of incision.

I now divided the zygomatic arch with bone-scissors and introduced a metacarpal saw through the spheno-palatine foramen into the nose, with the cutting edge upward, and divided the bony structures in the posterior wall of the antrum of Highmore, namely, the frontal process of the malar bone and the upper part of the posterior surface of the body of the upper maxilla. Then, bringing the handle of the saw forward, I cut through the bony floor at the orbit or the upper wall of the antrum of Highmore to the posterior border of the frontal process of the superior maxilla. The saw was now withdrawn and replaced in its first position through the spheno-palatine foramen, but with its edge directed downward and forward, and the lower half of the body of the maxilla divided on a line corresponding with the lower portion of the incision,

from behind forward and finally upward, terminating in the pyriform aperture of the nose. The saw was now withdrawn and the periosteal elevator passed into the spheno-palatine foramen, and the divided portion of the upper maxilla, now attached only by its nasal process to the frontal and nasal bones, lifted out after fracture of this process.

This part of the operation was attended with considerable hemorrhage through the wound, the mouth and the nose.

The resected portion attached to the skin flap was now displaced upward on the patient's forehead, which exposed and made readily accessible the left half of the nasal cavity and the antrum of Highmore.

I now found without difficulty the pedicle of the tumor, 2 cm. long, 1 cm. broad, and flattened so as to be about 6 or 7 mm. in thickness. The distal end of the pedicle terminated in a ragged surface where the *écraseur* had cut through, and showed distinctly a smooth outer surface, a large cavity, and a smooth inner surface, with no redness, swelling, or other signs of inflammation.

The end of the pedicle was grasped by Kocher's artery-forceps, and transfixion and double ligature close to the roof of the nose, performed. The space for this purpose was not very abundant, and a very short needle was employed to pass a silk thread through the middle of the pedicle at about $\frac{1}{2}$ cm. to 1 cm. from the cribriform plate of the ethmoid. The pedicle was thus ligated in halves, and in addition one of the ligatures was passed around the entire pedicle. The ends of the ligatures were cut short.

The pedicle was now enveloped in iodoform gauze, which was packed very carefully along the upper third of the nose. The resected portion of the superior maxilla was replaced and the remainder of the nostrils packed with iodoform gauze. A separate packing of iodoform gauze filled the antrum of Highmore and was brought out through the lower border of the wound, while the ends of the strips used in packing the nose were brought out through the left nostril. A drainage-tube was placed beside the gauze packing in the antrum, the rest of the wound united and the usual dressing applied.

Notwithstanding the severe hemorrhage, the patient's pulse at the close of the operation was 88, and the temperature never exceeded 100.5° F., a point which it reached during the first week, but came down to normal in the second week. The pulse was 110 on the second and third evenings, 90 at other times, and was normal after the middle of the second week.

The patient was allowed to sit up after three weeks. In the fifth week, two small pieces of bone were discharged from the drainage-opening.

On June 1, ten weeks after the operation, the wound was so nearly closed that collodion dressing could be applied over the fistula leading in to the antrum, which remained open for about three months, but secreted little and did not interfere with the patient's work as coachman.

The accompanying photographs of the patient (Figures 3 and 4) show a face of ordinarily intelligent expression, the left eye a little more open than the right from division of some fibres of the seventh nerve distributed to the orbicularis palpebrarum. He can close the eye voluntarily. On the cheek is seen a fine linear cicatrix, which marks

the line of incision for the osteoplastic resection; and at the lower border of the malar bone there is a depressed cicatrix corresponding to the site of the drainage-tube into the antrum. The left ala of the nose is slightly flattened; this is the only indication of any asymmetry between the two halves of the face, and I am unable to state whether this flattening existed prior to the operation.

Besides this feature there is only one condition in the patient's face which has attracted my attention, and that is that the root of the nose

FIG. 3.

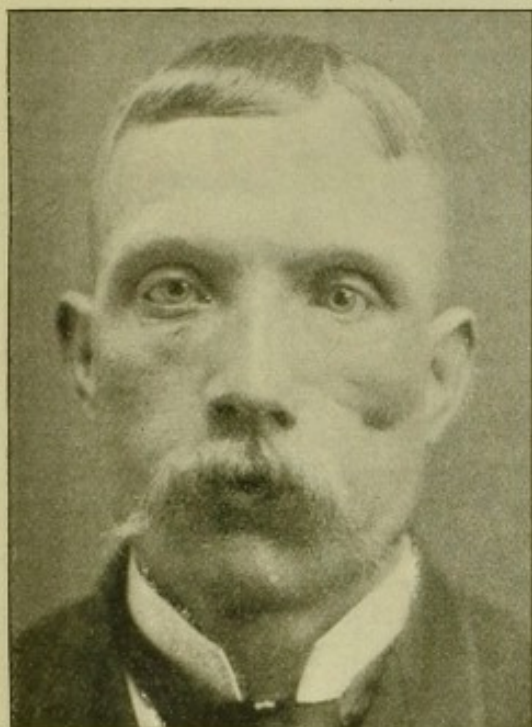
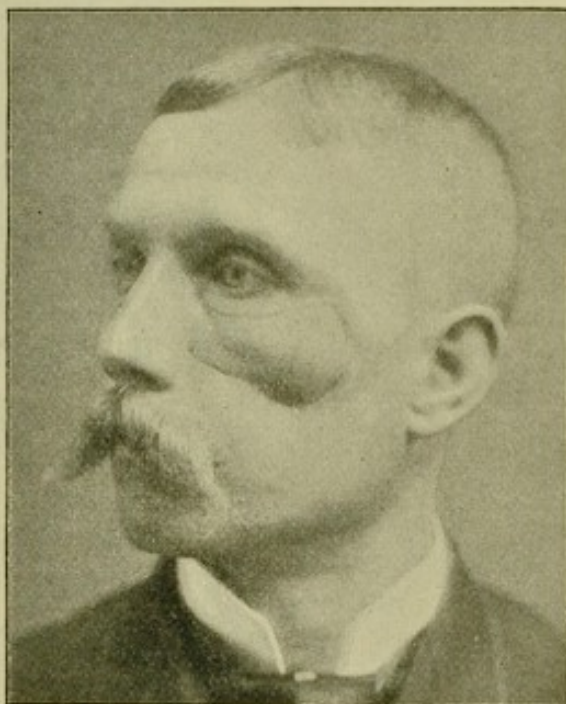


FIG. 4.



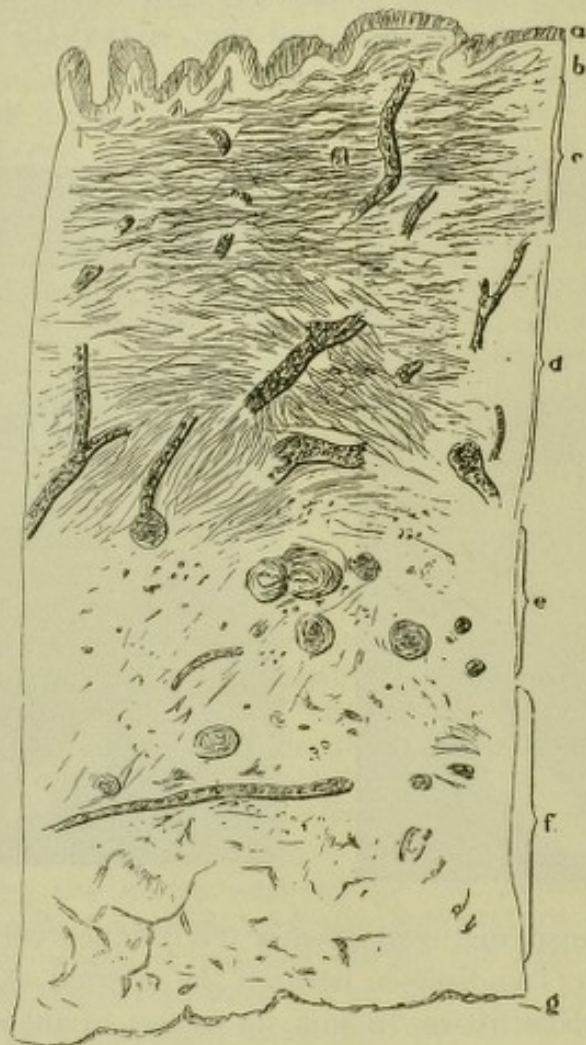
is abnormally broad, and consequently the distance between the eyes is unusually great. The distance between the internal canthi of the eyes is 45 mm., which is 10 to 12 mm. in excess of the normal distance. Upon measurement of adults I found this distance to vary between 30 and 34 mm. with an average of 32 mm. To this point I shall call attention later.

Microscopical examination of the hollow portion of the tumor shows the following layers in a section of its wall: (Fig. 5.)

The nasal surface shows, (a) a continuous layer of cylindrical epithelium with papillæ; (b) a thick, rather homogeneous layer of connective tissue half the thickness of the epithelial layer; (c) a thick layer of firm, fibrous tissue, with heavy connective tissue bundles densely interwoven, and rather sparsely provided with medium-sized vessels. This layer has the same structure as the periosteum and dura mater, and undoubtedly represents the continuation of these structures. (d) A layer of much finer connective tissue fibres, much more vascular than the previous layer, showing numerous larger and smaller vessels, corre-

sponding to the outer layer of the pia mater. (e) A layer of fine, fibrillated connective tissue, with scattered small nucleated cells, and yet comparatively rich in vessels, corresponding to the deeper layer of the pia mater, and the beginning of the cortical substance of the brain. (f) A layer of gray cortical brain substance, characterized by fine fibrillated neuroglia tissue, in which there were no large vessels, but subcapillaries and capil-

FIG. 5.

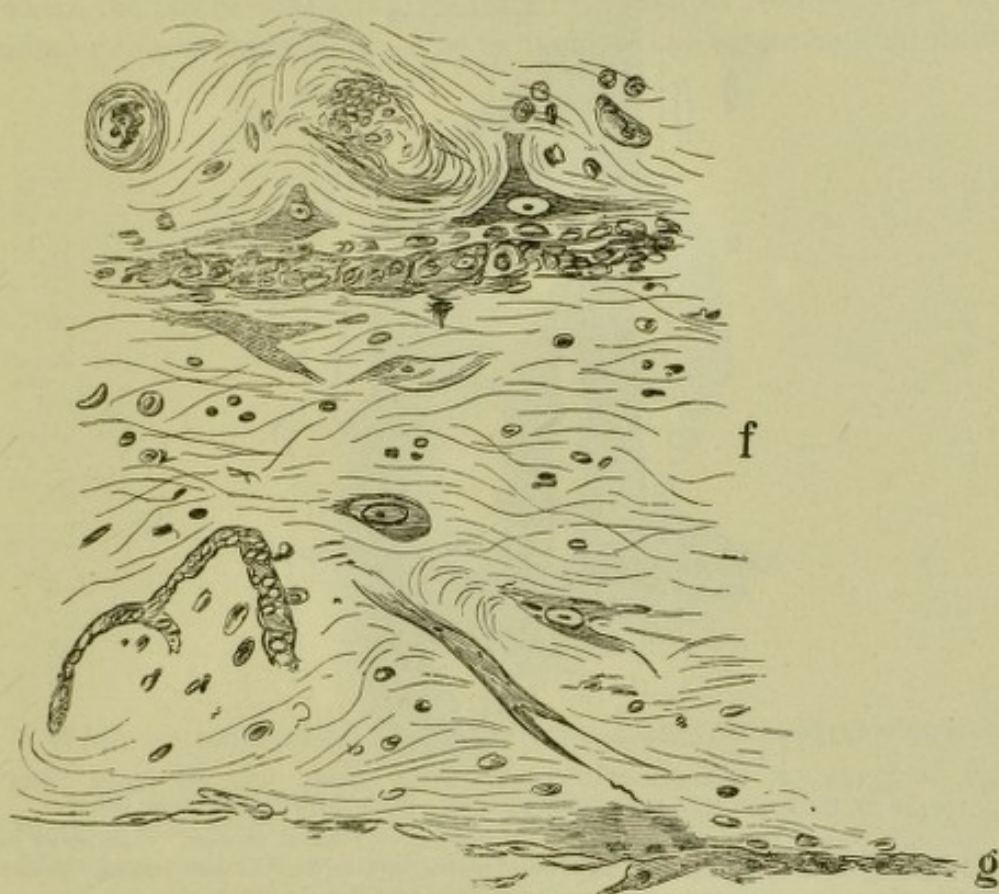


laries only, as is evident from their rectangular branching in this substance, shown by the higher power (Fig. 6). Numerous ganglion cells, partly small round cells, with large oval nuclei and distinct nucleoli, partly large multipolar ganglion cells with large cell-bodies, large oval nuclei and nucleoli, could be seen, and two or three branches or poles could be traced for a distance out into the surrounding tissue. No distinct anastomosis between any two cells could, however, be seen. (g) The cerebral wall of the sac is clad with a layer of flat endothelial cells, some of which, as seen in the figure, are loosened, and appear as free spindle-shaped cells with distinct nuclei.

The microscopical examination shows distinctly that the tumor was a cysto-encephalocele, as we find under the covering membrane of the nose, first dura mater, then pia mater, then a layer of cortical brain sub-

stance surrounding a cavity clad with endothelium. Although no layer of white brain substance was present, there is no doubt that this cavity was a continuation of a ventricle, probably the third ventricle. Its regular shape, and the fact of its being entirely surrounded by a layer of cortical brain substance, makes it distinctly different from the serous cavities which we find in hernias of the brain as well as of the spinal cord, developed from, or an exaggeration of, the subarachnoid lymph-spaces.

FIG. 6.



It will probably always be difficult, if not impossible, to state at the outset whether a nasal polypus is or is not a hernia of the cerebrum. This is especially true in meningoceles and encephaloceles, in which the tumor is not compressible. In hydrencephaloceles the compressibility of the tumor, followed by return to its former size, as in my case, will lead us to suspect communication with the cranial cavity. Aspiration with the hypodermatic needle when the tumor is not compressed may bring out cerebro-spinal fluid and lead to a positive diagnosis. That this procedure was not successful in my case was due to the fact that the needle entered the peripheral solid portion of the tumor, and I believe that repeated attempts, through the nostrils, for instance, would eventually have resulted in the withdrawal of cerebro-spinal fluid.

The location of the pedicle should also be considered; when it ex-

tends up toward the roof of the nose, in the region of the cribriform plate, we may suspect cerebral hernia, as this class of polypi is of necessity limited to this locality. Fig. 7 shows the points of exit of some of the recorded cerebral hernias.

As a point in diagnosis, my attention has been attracted to the distance between the eyes. It is possible that a basal cerebral hernia might cause a broadening of the root of the nose and a corresponding increase

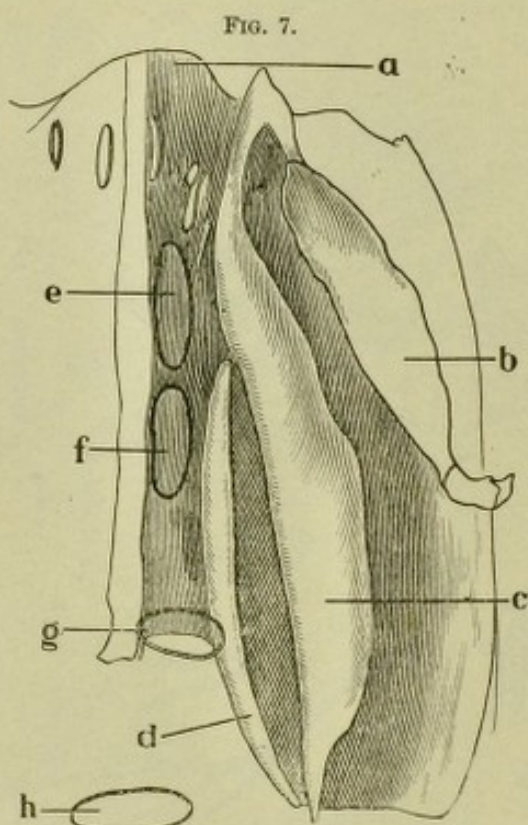


FIG. 7.
PLACES OF EXIT FOR BASAL ENCEPHALOCELES. Ethmoid bone seen from below.

a. Cribriform plate. b. Unciform process. c. Inferior turbinated process. d. Superior turbinated process. e, f. Cases reported by Czerny, Serres, Spring, and Klimentowsky. g. Cases reported by Heinecke, Virchow, and Fenger. h. Case reported by Rippmann.

in the distance between the inner walls of the orbits, just as occurs in sincipital hernias. In my case the measurements show an increase in the inter-orbital distance of 1 cm., and this increase imparted to the face a certain expression which may be seen in the full-face photograph (Fig. 3).

As an analogue to this I have added a reproduction of a photograph of a case of cerebral hernia in the glabella, reported by Volkmann¹⁸ (Fig. 8), in which it seems to me a similar expression is present.

Bruns² depicts a cerebral hernia at the root of the nose in which an increased distance between the eyes is apparent. I merely call attention to this symptom as a possible help in diagnosis, the value of which future observations must decide.

There is very little difference between cerebro-spinal fluid (Hoppe-

Seyler) and pure lymph (Hensen and Dähnhart). They contain respectively 98.7 and 98.6 per cent. of water, and 0.6 and 0.14 per cent. of albumin. There will probably be only slight difficulty in recognizing the cerebro-spinal fluid when it escapes through the nose, as any secretion, even the most watery, through the nasal mucous membrane, will contain some mucin, and will consequently be more or less viscid. Furthermore, it may be confidently expected to contain at least as much, if not more, albumin than is found in the hydropic exudates of the serous cavities, where the pericardial fluid, for instance, contains 2.46 per cent. of albumin, or fifteen times as much as is found in the cerebro-spinal fluid.

FIG. 8.



While we must admit the correctness in general of Heinecke's remark that most of the basal cerebral hernias possess no surgical interest, as they are found only in non-viable children, the case reported by Abraham, and my own case, show conclusively that patients with basal hernias may live to adult age, and my case demonstrates in addition that the development of the brain and mental faculties may be unimpaired, notwithstanding the cerebral hernia.

The treatment should be extirpation, even if the tumor is small and causes no other disturbance than that of a stationary nasal polypus; there will always be the danger of meningitis and death from accidental injury or surface inflammation. We would think, *à priori*, that the greatest danger would exist in case of hydrencephalocèles. A suppuration into the cavity would at once expose the entire ventricular system of the brain to infection, and it is well known that when an abscess opens into the lateral ventricle, death follows in a short time.

The surgical treatment is comparatively simple so far as the size of the pedicle is concerned, because it is always small, or narrow, seldom larger than a goose-quill, and, consequently, requires only simple ligation, which is best accomplished by transfixion.

The difficulty in operating lies in the inaccessibility of the pedicle at a point close to its exit from the cranium. The more posterior the point of exit, the greater the difficulty of the operation.

Various preparatory operations are required in the treatment of hernias whose pedicles are situated in different parts of the nose. Ligation and transfixion require much more operating space for manipulation than does simple division of the pedicle.

The anterior third of the nasal cavity can be reached, as in Czerny's case, by longitudinal division of one nostril, or by Ollier's method of temporary transverse osteoplastic resection of the nasal bones and septum at the root of the nose, or by Bruns' lateral osteoplastic resection of the nasal bones and septum.

If the pedicle is located in the anterior part of the middle third of the nose, Annandale's operation, which has already been mentioned, may give sufficient space for manipulation. If it is located in or just anterior to the posterior third of the nasal cavity, Von Langenbeck's resection of the superior maxilla, as practised in my case, will be required. If, however, the pedicle should be found to be located in or behind the posterior nares, I am of the opinion that nothing short of total extirpation of the superior maxilla will furnish the space necessary for operating, and it is a serious question whether a tumor in this location should be removed, when its extirpation would entail so great a sacrifice.

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