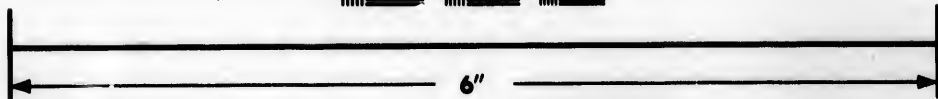
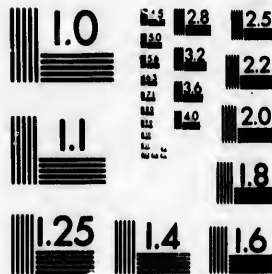


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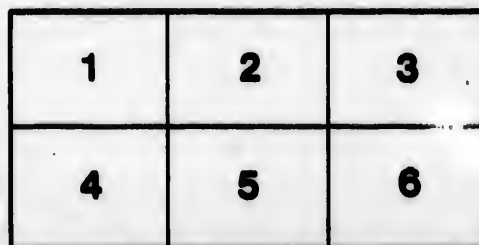
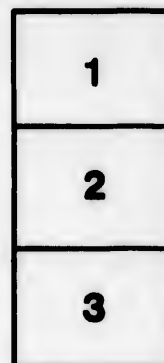
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Assistant Surgeon-General for the National Army
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CEREBRAL COMPLICATIONS CAUSED BY
EXTENSION FROM
THE ACCESSORY CAVITIES OF THE NOSE.*

By ROBERT H. CRAIG, M. D., C. M.,
ASSISTANT LARYNGOLOGIST TO THE MONTREAL DISPENSARY.

CEREBRAL affections are the most dangerous complications that frequently ensue as a result of or associated with purulent inflammation of one or more of the accessory nasal cavities. It is to be hoped that since Harke's and Zuckerkandl's anatomo-pathological work on this subject has been presented to the profession the relationship existing between diseases of the nasal cavities and inflammatory diseases of the base of the brain will be more clearly understood.

The pathological changes which one observes in the meninges or brain substance as a result of extension of infection from one or more of the nasal cavities will depend upon the virulence of the micro-organism and the situation of the source of the infection—viz., whether it originated from the frontal, ethmoidal, maxillary, or sphenoidal cavities. Hajek has pointed out that ex-

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Dr. F. G. Finley
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perience demonstrates that a slight inflammation of one or more of the cavities often shows a particular tendency to involve the meninges or cerebrum; yet, on the other hand, closed empyema may exist for years without affecting the meninges, and therefore, besides the cause of the infection, there are certain predisposing factors which must be considered:

1. Congenital defective formation in the bony walls of the nasal cavities.

2. Partial or complete closure of the normal apertures of the cavities.

3. Pronounced virulence of the infectious material.

There can be no doubt that many inflammatory products of the nose are carried to the meninges by the nasal veins, which anastomose with those of the dura mater. Zuckerkandl demonstrated, by injecting a fluid into the superior longitudinal sinus immediately above the frontal cavities, that the veins in the mucous membrane of the frontal cavities and those leading into the foramen cæcum, as well as those of the superior half of the nose, were filled with fluid injected from above. The anterior and posterior ethmoidal veins empty into the superior longitudinal sinus usually directly, at other times they enter the meninges through the superior ophthalmic vein, and less frequently through the inferior ophthalmic; there is also a vein which passes through the lamina cribrosa and enters into the superior longitudinal sinus or into the veins of the olfactory tract.

Schäfer and Thane state that "colored fluids can be made to pass from the subarachnoid space through the arachnoid villi into the prolongations of the subdural space, which surround those villi within the venous

sinuses and lacunæ, and thence into the sinuses themselves"; therefore, if the cavernous and longitudinal sinuses, and particularly the former, are not filled with the normal quantity of blood, there will be a lessened amount of cerebro-spinal fluid in the subdural space and other lymphatic spaces of the cerebrum.

It is well known to nasal surgeons that children suffering from nasal or nasopharyngeal growths are unable to compete, either mentally or physically, with children who enjoy good health. The same also applies to adults, and the following case, which was kindly referred to me by Dr. W. H. Drummond, illustrates the effects of pressure of the nasal veins upon those of the meninges:

CASE I.—A man, aged fifty-eight, a dye worker by occupation, complained of almost constant dizziness and inability to concentrate his mind upon his work. The organs, so far as could be ascertained, were normal. Examination of the nose revealed a slight deviation of the sæptum to the right and marked hypertrophy of both middle turbinals; bands of tissue connected the left middle turbinal with the sæptum; both inferior turbinals were slightly hypertrophied, and there was a chronic nasopharyngitis.

After removal of the hypertrophies from the middle turbinals, the patient experienced complete relief from the attacks of dizziness.

CASE II.—Kindly referred to me by Dr. J. M. Elder. A man, aged fifty-six. Face presented a sallow, unhealthy appearance. Patient complained of suffering from occasional headaches for the past ten years, and was subject to cold in the head, particularly in the spring and autumn months. For the past year the headaches were becoming more frequent and accompanied by attacks of dizziness. On the morning of November 22, 1899, he had such a pronounced attack of dizziness that he "almost fell out of the carriage." He stated that he

4 CEREBRAL COMPLICATIONS FROM NASAL DISEASE.

had had a discharge from the right nostril for the past ten years.

Examination of the viscera revealed no abnormalities.

Nasal examination showed deviation of the septum to the left, with a bony-cartilaginous ridge extending from the anterior naris to the choana on the left side. There was marked hypertrophy of the right middle turbinal and considerable pus in the right middle meatus.

Exploratory puncture of the right maxillary antrum revealed the presence of a large quantity of pus.

I drained the antrum through the alveolar process of the second bicuspid, and, as pus was still present in the nose after thoroughly cleansing the antrum, I removed the anterior end of the middle turbinal and curetted the ethmoidal bulla; pus flowed freely. There was considerable hæmorrhage following the removal and curettement, which I controlled with several large plugs of sterilized absorbent cotton, saturated in a glycerin-alcoholic solution of suprarenal extract.

Since the operation the patient presents a healthy, ruddy appearance. He has had no recurrence of the attacks of headache or dizziness, and states that he has not enjoyed such good health for the past ten years.

In both of these cases in all probability the effects of pressure upon the nasal veins caused a damming back of blood from the veins which communicate with those of the meninges, and the disturbance in the maintenance of the equilibrium of the basal meningeal veins, which secondarily affected the amount of cerebro-spinal fluid in the subdural space and other lymphatic spaces of the cerebrum, manifested itself by attacks of dizziness. This theory is purely mechanical, but appeals to me as rational.

The Nasal Ætiology of Cerebro-spinal Meningitis.—Weigert was the first to demonstrate, by a bony section

of the nose from a case of cerebro-spinal meningitis, that the superior half of the nose and its cavities presented intense inflammatory changes. Weichselbaum confirmed or supplemented Weigert's investigations by making sections of the nose from ten cases which had died from cerebro-spinal meningitis. Out of this number the cavities in five were diseased. Cultures of pus from the meninges and nasal cavities revealed the presence of the *Diplococcus pneumoniae* and other pus-producing bacilli, such as the *Staphylococcus aureus* and *Streptococcus pyogenes*, as well as the *Diplococcus intracellularis*.

The following case came under my observation in December, 1899:

A girl, aged nine, had suffered from general malaise and headache for a period of two weeks. At the expiration of that time the pain had become more marked in the outer half of the right frontal and parietal region; it was aggravated by noise and photophobia was present. The patient complained of a feeling of nausea, but did not vomit. Temperature, $102\frac{1}{2}^{\circ}$ F.; pulse, 130; family history good; lungs normal. There was a mucopurulent discharge from both nostrils, more copious from the right. The family physician suspected some meningeal involvement, and requested me to make an examination of the nose and ears.

The ears were normal.

Examination of the nose revealed a mucopurulent secretion in both nostrils, particularly in the right middle turbinated space. There was atrophy of both inferior turbinals. The anterior end of the right middle turbinal was markedly enlarged; the ethmoidal bulla on this side was distended and pressed upon the inferior and inner surface of the middle turbinal.

I advised both nostrils to be sprayed with a two-percent. solution of cocaine in listerine every hour, to be

followed a few minutes later by large quantities of equal parts of glycothymoline and water, in order, if possible, to flush out the cavities and prevent any possibility of untoward effects from the cocaine.

A large amount of pus came away in the return fluid. Twenty-four hours after this treatment was instituted the headache and other unfavorable symptoms had disappeared, and the temperature and pulse were almost normal. From the history and symptoms of this case I regard it as one of attenuated meningitis caused by extension of infection from the right ethmoidal labyrinth.

Reports of Huguenin's, Ogston's, and Warner's cases of meningitis following infection from one or more of the cavities are instructive, and a synopsis of the case of the last-named authority may prove interesting:

A man, aged thirty-two, a gardener by occupation, presented himself for treatment, complaining of intense pain in the frontal region, which, however, soon became general. The patient was unable to sleep, and vomited twice during the first twenty-four hours. On the second day coma and convulsions supervened, and death occurred the beginning of the third day. The post-mortem revealed acute meningitis, involving both halves of the basal meninges; the lateral ventricles were full of pus; the dura mater at the base presented a healthy appearance, with the exception of that portion which covers the lamina cribrosa, which was slightly thickened and easily separated from its attachment. The lamina cribrosa was covered with exudate. The frontal cavities were completely filled with pus, as well as the mucous membrane of the olfactory portion of the nose and that of the ethmoidal labyrinth. No bony caries was found.

In Dreyfuss's tables, which show the relationship existing between empyema of the different cavities and inflammation of the meninges and brain substance,

there are five cases of death caused by extension of the infection from the antrum of Highmore, eighteen cases of death following empyema of the frontal cavities, ten cases following infection from the ethmoidal labyrinths, and eleven cases following empyema of the sphenoidal cavities.

The many channels by means of which the viruses gained an entrance to the meninges or brain substance are stated very fully in Dreyfuss's excellent tables, but want of time prevents me from reproducing *in toto* his statistics. Suffice it to state that after a careful consideration of these one would conclude that the most frequent intracranial lesion following empyema of the antrum of Highmore is thrombosis of the cavernous sinus, while that which follows empyema of the frontal cavity is intracerebral abscess, and the specific brain lesion following empyema of the ethmoidal labyrinth is meningitis.

After such reports have been recorded as those mentioned, the most exact clinical and anatomic-pathological observations should be made in order that we may be able to demonstrate to our fellow practitioners the great importance of recognizing the relationship existing between the diseases of the brain and its membranes as secondary to empyema of one or more of the accessory nasal cavities.

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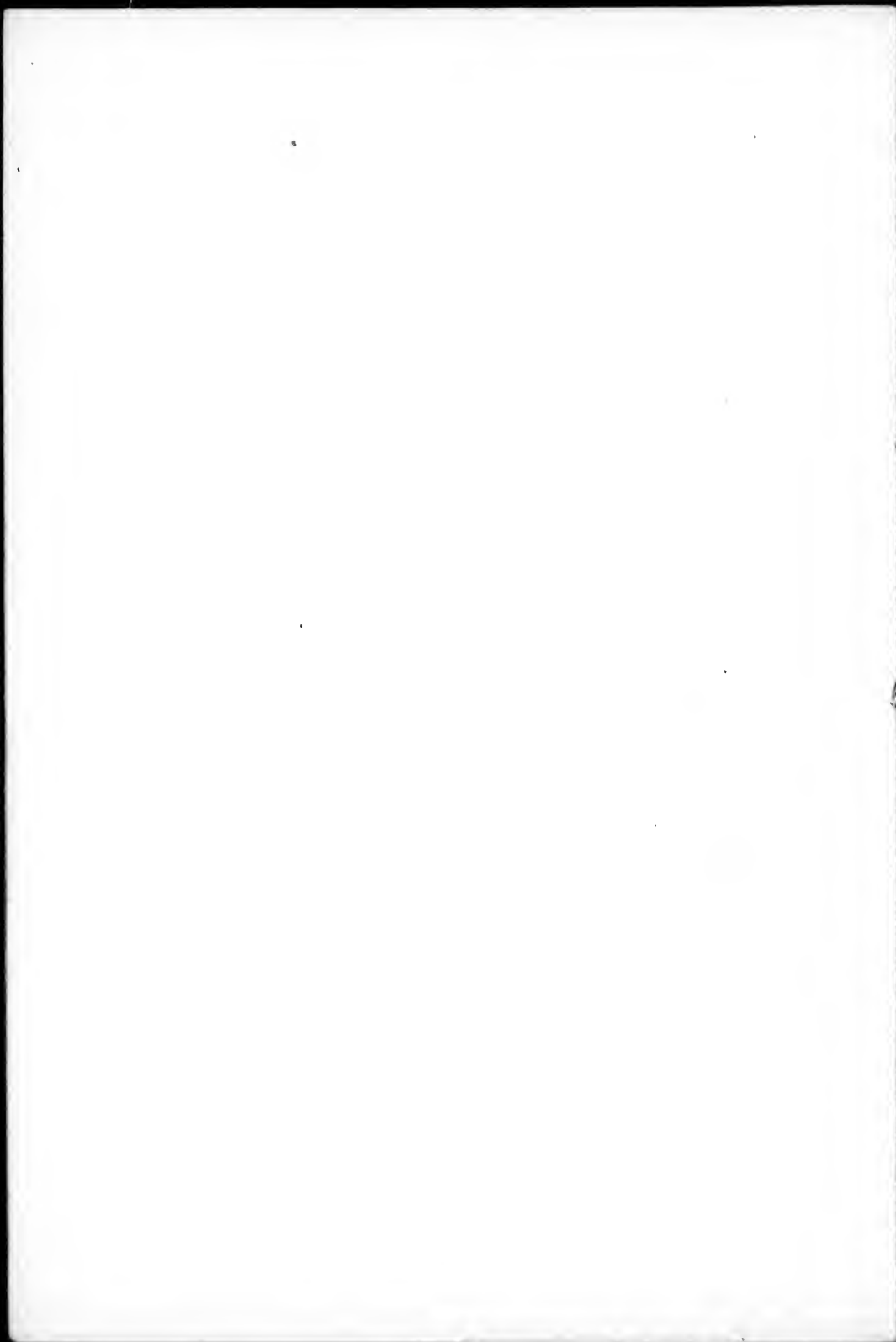
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