

HYDROCEPHALUS INTERNUS IN THE ADULT.

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A number of years before Quincke published his monograph on Meningitis Serosa Ventriculorum, I met with a middle-aged man in the Bay View Hospital, whose malady commenced with continued headache, stiffness of the neck musculature, hyperæsthesias and vomiting; symptoms which were slowly followed by paresis of the abducens and later by epileptiform convulsions. Then came progressive mental apathy, slowness of the pulse, wide dilatation of the pupils with tardy response to stimuli and eventually choked disks. After a time paralysis took the place of paresis, which extended to all four extremities, and was succeeded by contractures, until the man finally became completely bedridden, demented and blind. At first it seemed probable that within the cranial cavity was a slowly growing tumor so situated as to press upon the roots of the abducens nerves and impinge on the region of the motor and sensory paths as well as to increase the general intracranial pressure, but the man instead of dying lived for over two years, until finally the pneumococcus organism came to his relief.

The autopsy showed no local growth but an enormous dilatation of the lateral and third ventricles (the fluid contained being of a limpid straw color without lymph flakes), the downward pressure from the region of the distended hypophysis having occasioned the majority of the striking symptoms. In this particular instance there was no evidence of congenital malformation of the brain, no roughening of the ventricular lining, no evidence of an acute or recent process of any kind affecting the choroid plexuses to induce the diseased condition, nor was any lesion of the sinuses or larger veins observable.

Since the autopsy on this case some four others have come under my observation, but the majority of them were of a more acute

type, and closely corresponded to the description given by Quinke of his acute form of meningitis serosa.

Within the past year a new case came to my notice in the person of an epileptic woman who had been in the insane department of Bay View for many years. This case was so different in type from those preceding it, and from those described by Oppenheim, Benninghaus, Bresler, Kupferberg and others that a description of it seems not inappropriate. It differs from the others in the circumstance that there were no eye symptoms, either pupillary or retinal, as well as in the absence of paralytic symptoms of any kind, but it has this in common with the more frequent type, that it was attended by a progressive and fairly rapid mental weakening proceeding to a profound dementia, with progressive loss of bodily power, attacks of unconsciousness differing from the previous epileptiform convulsions by the fact that they were unattended by muscular cramps and that they were of hours' and not minutes' duration. Each of these prolonged seizures left the woman more and more helpless until for a short time before her death she was bedridden.

History.—Y. D., German, admitted to Bay View for epilepsy in 1875, aged 18 years, died February 10, 1901.

There is no record before 1892 of the patient beyond the date of admission and diagnosis, when she was placed upon the strontium bromide treatment, was carefully observed and a record made of the frequency of the attacks, her mental state, and general symptoms. The woman was of fair physique, five feet high and well nourished. There were no physical deformities of any interest. Evidences of local muscular weakness or atrophies of any of the muscles of the extremities or trunk were also lacking. The ocular reflexes and muscles of the orbit were perfect in their action. The fundus of each eye was normal.

The patient was mentally of low grade, had not been taught to read or write, but possessed considerable linguistic ability, speaking English and German fluently, though the range of her vocabulary was limited.

The epileptic seizures occurred at frequent intervals, sometimes several during the day and were of the classical type accompanied by entire loss of consciousness.

Her temperament was a fiery one, and for several years an

opportunity to come to blows with a fellow patient was always improved. She was cleanly and ate decently.

Under the strontium bromide treatment the patient for a time improved considerably, the attacks lessened in frequency and severity, averaging less than one a week, and she became brighter and more tractable. This improved state did not last long, and the severity and frequency of the seizures returned.

In 1895 it was noticed that D. was becoming less quarrelsome and more tractable. In this condition she remained not differing from the ordinary epileptic until 1900.

During 1900 her mental failure was rapid and progressive. Attacks differing from the previous epileptic seizures now began. These occurred about once a month between the epileptic spasms and were unaccompanied by muscular cramps. Without previous warning the patient would become comatose and so remain for from 12 to 15 hours. Each attack left her more and more helpless until in the last few months of life she was bedridden and badly demented, though to the last able to answer a simple question with a "yes" or "no," though very slowly and with great apparent effort.

There was never any indication of paralysis of any of the several muscular groups inclusive of the ocular muscles. The ophthalmoscopic examination was negative.

Death took place after an attack of pleurisy followed by passive congestion of the lungs.

Autopsy Abstract.—Section 18 hours after death. Body of a white woman fairly well developed. Rigor mortis present. No glandular enlargements. Abdominal cavity. Peritoneum smooth. Liver, gall-bladder, spleen, intestines, normal.

Kidneys, cortex 4 mm. Weight, left, 100 grams, right, 110 grams. Bladder normal. Generative organs senile and atrophied.

Thoracic Cavity.—Left pleura normal, right bound down by adhesions. Pericardium smooth. Epicardium smooth. Myocardium moderately firm. Valves natural. Passive congestion of the bases of both lungs.

Cranial Cavity.—Skull and dura normal. Brain weight with soft membranes, but after some fluid had escaped from the torn hypophysis, 1370 grams. The hypophyseal region much tumefied.

Both hemispheres were equal in size, the convolutions simple.

Cerebellum.—Both lobes were equal in size, the folia normal in appearance. The pons and medulla were rather small. The fourth ventricle was not dilated. The iter is patulous and not dilated. The medulla is of normal aspect.

Cerebral Convolution.—*Right side.* Anterior lobe: The three frontal gyri are broad and have few folds connecting them in their anterior portions. The first frontal is composed of two separate gyri divided into two almost equal portions by a longitudinal sulcus, and there is no fusion until the frontal pole is reached. The second frontal is narrower than the broad first, nevertheless it measures in its middle portion 3 cm. and is entirely separate from the upper and lower convolutions until quite at the anterior pole. The third frontal measures $3\frac{1}{2}$ cm. in width, and is crossed vertically by three deep tertiary sulci.

The furrows between the frontal convolutions are deep and unbridged in any part. The precentral sulcus is not bridged. The precentral gyrus measures $1\frac{1}{2}$ cm.

The Rolandic fissure begins well within the interhemispheric furrow and runs deep into the Sylvian. The post-central furrow is well developed.

The interparietal furrow is not well marked, being broken in three places by broad bands of cortical substance.

The region of the angular gyri is very irregularly disposed, but has nothing of especial interest. The convolutions of the occipital lobe are likewise complicated, but have no especial features.

The Sylvian fissure shows no abnormalities of development.

The three convolutions of the temporal lobe are quite regular.

Internal Aspect.—All convolutions and furrows conform closely to the customary type. The calcarine and occipito-parietal fissures are of normal development.

Inferior Surface.—There are no construction abnormalities present.

Left Hemisphere.—*External Aspect.* The development of the three frontal convolutions is less regular than those of the opposite hemisphere. The convolutions fuse together into an intricate mass of small gyri six cm. from the pole. The præcentral furrow is without bridging its entire length.

The two central convolutions are fairly broad, and well developed. The Rolandic fissure conforms to the usual type.

The interparietal fissure is better marked than its fellow of the opposite hemisphere. The occipital and angular convolutions conform quite closely to those of the contralateral hemisphere.

Mesial Aspect.—The convolutions are quite regular in type. The primary fissures are unbridged.

Inferior Aspect.—The convolutions conform in all details to those of the other hemisphere.

The Gray Matter.—This averaged in the central regions $2\frac{1}{2}$ mm.; in the posterior portions 2 mm.

Corpus Callosum.—The genu of the corpus was quite small, while the body in its thickest and best developed part was 3 mm. thick. 7.80 cm. back of the anterior extremity of the genu the white substance began to diminish in thickness, and then suddenly became a thin leathery membrane less than 5 mm. in thickness. This completely covered the ventricles. The length of the membranous portion of the body was $4\frac{1}{2}$ cm. The splenium had entirely disappeared.

Centrum Ovale.—The white matter has apparently been diminished to one-half its former depth, its place having been taken up by the dilated ventricles.

Lateral Ventricles.—Anterior horns. These are equally but widely dilated. Two prominent knobs of white substance stand out from the wall of the right horn. The septum lucidum is represented by a few string-like fragments attached to the corpus callosum and floor of the ventricles, in their anterior portion, while in the posterior regions it has entirely disappeared. The fornix is atrophied, and with difficulty can be traced.

The basal ganglia stand out prominently from the floor of the ventricles. The anterior gray commissure is intact but is stretched to a thin cord. The posterior commissure is also present but is attenuated to the size of a thread.

Lateral Horns.—The distension is here equal to that of the anterior horns.

Posterior Horns.—The dilatation is equally marked as in the anterior horns.

Choroid Plexuses.—These are but slightly granular. On both sides there is a white thrombus in a prominent vein.

The tissues surrounding the lateral ventricles are indurated and cut quite differently from the surrounding white substance. The

lining membrane is considerably thickened, pulls off readily, but has remained transparent.

Third Ventricle.—The distension here is as great as in the lateral ventricles. The infundibulum is much thinned. The commissure of the optic nerves has been distorted and apparently somewhat thinned by the pressure from behind.

A microscopic examination of the atrophied portion of the corpus callosum showed that the medullated fibres had entirely disappeared, and had been replaced by a fine felted meshwork of fibrillæ, apparently of neuroglia origin, having round nuclei thickly scattered among them. The vessels in the atrophied portion of the body were not notably diminished in numbers, and around them in places were proliferations of coarse fibrillæ staining differently from the others with safranin and nigrosine, and seemingly belonging to the connective tissue. The vascular walls were not thickened.

From the clinical report and anatomical examination there had been, in this case, an early instability of the nerve tissues of the brain, with the result that periodical nerve storms occurred taking the form of epileptic attacks. Whether an early dilatation of the cerebral ventricles was an influencing factor in the induction of these seizures is uncertain. The full evolution of the convulsions would indicate that at least it did not begin until the brain had attained about its maximum of development. In any event during the years of growth of the body and early womanhood this dilatation did not advance, as the patient from her 18th to her 40th year showed no progressive dementia or signs of focal brain trouble. Only after that period came a time when to the ordinary epileptic crises a progressive weakening of the mental faculties of a comparatively rapid nature attended by seizures differing in character from the earlier ones was added. These insults were not of graver aspect than those preceding them, and were mainly differentiated by the period of unconsciousness being prolonged, not for minutes but for several hours. Finally death came; not from the primary disease but from an intercurrent malady.

In looking over the pathological anatomy of the case it becomes apparent that disease of the choroid plexuses had little to do with

the general malady; in fact, whatever lesion was noticeable in these vascular organs was of unimportant character and had little bearing upon the evolution of the hydrocephalus. The longitudinal and lateral sinuses were patulous and free from disease, the Pacchionian granulations were not more prominent than is usual at the age of the patient, and otherwise the autopsy fails to assign a sufficient cause for the existence of the hydrocephalus internus. Can we refer it to an imperceptible though present stoppage of the return blood-flow through the smaller veins and lymph channels ending in the pia mater? From the gross pathology of the cerebral hemispheres there is no evidence to substantiate this view, local or general disease of the veins or lymph spaces of ancient character or the appearance of congestions or anæmic states of the tissues being absent. It is, however, the most probable theory.

The similarity between the symptomatology of hydrocephalus internus of the adult type in its ordinary form and that of cerebral tumors is of considerable importance both from a diagnostic and surgical standpoint, and should be well borne in mind before an operation is decided upon when there are no definite focal symptoms.