THE CHOROID PLEXUS AND PSAMMOMAS.

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THE ruffle-like structures, called choroid plexuses, which float in the ventricular fluid of man's brain, have aroused the curiosity of anatomists for centuries, yet they took little more interest in them than gardeners take in weeds. Of late these plexuses have acquired importance for pathologists and clinicians.

THE CHOROID PLEXUS.

In the living brain a choroid plexus is red, for it is well supplied with blood, and the fringes floating in pools of

FIG. 1.—Diagram of a mammalian brain showing the distribution of the choroid plexuses.

cerebro-spinal fluid resemble the beautiful long red gills of the larva of the Alpine salamander.

In order to understand the relations of the various plexuses it is worth while to review their distribution. The velum interpositum with which they are so intimately connected, indeed it is the supporting structure of the plexuses, is a fold of pia mater, and arachnoid, buried in the brain when the primary cerebral vesicles turn backward to envelop the primary encephalic vesicles which ultimately become the third and fourth ventricles; the middle vesicle persists as the aqueduct of Sylvius. All parts of the velum which come in close relations with the ventricles are richly furnished with vascular epithelial tufts. These tufts reach their highest development along the fringes of the velum, which extend into the lateral ventricles, and its cornua. The fourth ventricle has a rich choroid plexus, and the villi are big in the lateral recesses; at the orifices of these infundibula the plexus floats in the fluid of the pool called the cisterna magna. There is a mystery surrounding the lateral recesses of the fourth ventricle. The orifice of each recess is in close relation with the slight depression in the petrosal marking the centre of the circle formed by the posterior semicircular canal; this spot marks the osseous grave of the bulbus endolymphaticus. In some fishes the duct of the swim-bladder is in communication with the ductus endolymphaticus; the communication may be direct, or through the intervention of a chain of ossicles to which classical and picturesque names have been applied—tripus, scaphium, and claustrum. Is this the remains of an old communication between the canal system of the internal ear and the intracerebral collection of fluid?

In the fourth ventricle of the horse's brain the choroid plexus forms a conspicuous ring around the orifice of each lateral recess. When the brain is removed from the skull the plexus forms a bunch and conceals the opening, but if the brain be immersed in water the orifice of the recess is easily seen. The plexus at each lateral recess rests upon the roots of origin of the glosso-pharyngeal and vagal nerves.

The orifices of the lateral recesses of the fourth ventricle establish communication between the ventricular cavities of the brain and the general subarachnoid spaces of the brain and spinal cord. The foramen of Magendie, described as existing at the apex of the calamus scriptorius, is, I believe, an artefact. It does not exist in the horse.

Choroid plexuses are highly developed arachnoid tufts and often contain cholesterol. They are glandular organs and secrete cerebro-spinal fluid. The plexus differs from other secreting glands in having its secreting cells on its outer surface. There is convincing experimental proof that most of the cerebro-spinal fluid is secreted above the aqueduct of Sylvius.

My interest in the clinical importance of the choroid plexuses was aroused especially in relation with the plexus of the fourth ventricle. In 1886 J. H. Dooty, at that time medical officer at the asylum, Powick, sent me the cerebellum and bulb, obtained from a lad aged 17, who died there after manifesting violent symptoms indicating a tumour of the brain. On examining the parts I found the fourth ventricle crammed with a tangled overgrown choroid plexus, forming a mass as big as a bantam's egg. The lateral recesses were tightly stuffed with villous tufts. The interventricular communications were completely obstructed and the aqueduct of Sylvius much dilated.

The boy died from an overgrowth of the choroid plexus of the fourth ventricle. In the terms of pathology it was a crowd of papillomas. This is by no means an isolated case, and I have collected several similar examples, and each had a tragic ending. Papillomatous masses in the fourth ventricle illustrate the baneful effects environment imposes even on simple tumours. Parallel conditions occur in the larynx, in the conduits of the urinary organs, and in the bladder. In the brain the danger lies not only in the interruption of the interventricular waterway, but also from the pressure the clumps at the orifices of the lateral recesses exert on the roots of the vagi. It also teaches that complete stoppage of the interventricular communications may be as inimical to life as complete obstruction of both ureters.

PSAMMOMAS.

In 1867 Virchow coined the term "psammoma" (sand tumour) for a tumour peculiar to the meninges of the brain and spinal cord. Pathologists subsequently confirmed this observation, and the energy of surgeons has made them familiar objects in museums. Such tumours resemble in shape and size walnuts, and are occasionally bilateral. They are frequent in relation with

the lateral recesses of the fourth ventricle, and set up serious symptoms by pressing on the medulla and the roots of the vagus and other important cranial nerves. As a rule, they have slender connexions with the brain. In a remarkable case described by Strahan in 1883, a soldier had bilateral recess tumours. Savage examined the specimen and reported that the tumours had no attachment to the cerebellum, or pons, or medulla, and were loosely connected with the membranes about them.

The microscopic structure of psammomas supports the idea that they arise from choroid plexuses and arachnoid tufts. The tissue is arranged in whorls, and in the centre of each vortex there is a blood vessel. The idea of a cluster of villi

FIG. 3.—Microscopic characters of a choroid plexus (Morowoka).

FIG. 2.—Lateral view of the cerebellum and medulla of a horse showing a cluster of the choroid plexus around the orifice of the lateral recess of the fourth ventricle.

surrounded by fibrous tissue, and the whole encapsuled by a laminated capsule, is irresistible. When the mass of choroid plexus, or arachnoid tuft, is completely invested and growth arrested, the sequestered epithelium becomes impregnated with cholesterol sand. Hence the picturesque names—psammoma, cholesteatoma, and pearl tumour; some gleam like mother-of-pearl.

The infiltration of these tumours with cholesterol resembles the deposition of lime salts in dead uterine fibroids.

A psammoma infiltrated with cholesterol is a dead tumour, but it rarely dies before it has wrecked the life of the man or woman by damaging brain or spinal cord.

The clinical symptoms produced by these extraordinary tumours sometimes permit of exact localization; often they are complicated tangles, difficult to unravel even with the help, separately or combined, of a neurologist, otologist, ophthalmologist, radiologist, and a physician. In this lecture I am mainly concerned with pathologists.

VILLI IN GENERAL.

Villi of various kinds play a large part in our lives, mainly for good, sometimes for evil. Soon after conception the chorion of the embryo becomes shaggy with exquisite villi, and although the villi are extremely delicate structures they are able to erode the maternal structures with which, in the normal course of events, they come in contact, embed themselves and develop a placenta.

It occasionally happens that they fail to form a placenta, change into peculiar grape-like bodies and transform into what is commonly known as a "hydatid mole." Some years ago obstetricians were startled by the discovery that such erratic changes in the villi sometimes lead to disastrous consequences in fertile women, for these altered villi behave like malignant tumours. They erode blood vessels, colonize the blood, disseminate and quickly cause death. This particular change is now known as chorionic cancer.

There is another variety of villus which occurs only under pathological conditions. Occasionally the ovary is occupied

by a cyst, usually unilocular, and its walls are covered by crops of papillomas closely resembling, in structure and appearance, the grape-like bodies of hydatid moles. The papillomas are able to erode the cyst wall and project on its outer surface.

There are two varieties of ovarian papillomatous cysts. One is clinically innocent. The other exhibits malignant properties, for it is not only erosive but it recurs locally and disseminates. I have published an account of one which set up secondary deposits in the mediastinum, and the papillomatous buds eroded the sternum and appeared as papillomatous cysts under the skin. When the papillomas erode the walls of the cyst the minute collections of shed epithelium become engrafted on the peritoneum, and warts, sometimes in thousands, arise from them. When examined microscopically such implanted warts are often found to be encapsuled by peritoneal exudation, and thus recall in miniature the encapsuled psammomas of the meninges.

FIG. 4.—Psammoma of the fourth ventricle. From a woman, aged 32. (Museum, Royal College of Surgeons.)

FIG. 5.—Structure of a psammoma.

CONCLUSION.

The study of these conditions, I venture to think, helps us to understand the nature of the psammoma. This tumour begins in an overgrown clump of choroid plexus, or arachnoid tufts. The epithelium capping the clumps is bathed in cerebro-spinal fluid, and becomes enclosed in a capsule of plastic exudate which stratifies and organizes. It is known that peritoneal exudation will encapsule sterile foreign bodies, ovarian papillomas, calcified epiploic appendices, intestinal and subserous uterine fibroids, and even a coagulated collection of sterile fluid or blood clot.

The villi of the arachnoid erode bone, as the Pacchionian foramina prove; chorionic villi, normal and abnormal, can penetrate the walls of the uterus, and ovarian papillomas in a favouring environment erode bone.

Surely this is sufficient evidence to justify the removal of psammomas from the miscellaneous group at present labelled endotheliomas.

THE TREATMENT OF GASTRIC ULCER.*

BY

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THE treatment of gastric ulcer labours under two great preliminary difficulties. The first is that it is often diagnosed as present when it is not. That this bears on treatment is shown by the very many gastro-enterostomies that have been performed for a supposed ulcer when none has existed; sometimes the gastro-enterostomy has had to be undone later.

Among the conditions the symptoms of which have often been erroneously ascribed to gastric ulcer is disease of the teeth and gums; cure of this may lead to the disappearance of symptoms thought to be due to a gastric ulcer. In the middle of the last century it was believed that young women suffered from haematemesis due to vicarious menstruation, and in one large textbook this was stated less than thirty years ago. When this belief was discarded, young women with dyspepsia and haematemesis were said to have a gastric ulcer, but gradually doubt was thrown on this view. Then, although these young women rarely died of their disease, a

few deaths occurred, and no ulcer was discovered. Some surgeons opened the stomach for this bleeding and observed that the blood did not proceed from an ulcer but from a general oozing over a considerable area. To this condition the name "gastrostaxis" has been given. It is commonest in young females, is occasionally seen in young men, and rarely kills. The opinion has been expressed that this condition is one of minute multiple ulcers, but there is evidence of its being a distinct clinical entity. Many cases of gastrostaxis are diagnosed as ulcer, and, as they almost always recover, the treatment of gastric ulcer may be thought to be more successful than it is.

There is no doubt that disease of the appendix, of the gall bladder, and even a stone in the kidney, may cause symptoms that are set down erroneously to gastric ulcer. Duodenal ulcer, carcinoma of the stomach, and various functional dyspepsias may be mistaken for it. All these conditions lead to errors of diagnosis sufficiently often to make most opinions expressed as to the results of treatment of no value. Other diseases are occasionally confounded with gastric ulcer, but not frequently enough to invalidate our views as to treatment.

When we consider the individual symptoms of gastric ulcer we also find ourselves in difficulties. Haematemesis may be completely absent, even when the ulcer is large, and is frequently seen in other diseases. The same is true of occult

* Being the introductory remarks at a debate on the treatment of gastric ulcer at the Royal Society of Medicine, February 2nd, 1922.