Supratentorial Brain Cysts

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We have seen four unusual cases of benign, solitary, supratentorial brain cysts, none of which communicated with the subarachnoid or ventricular systems. Until Starkman and Brown described the clinical entity of supratentorial arachnoidal cysts in 1958, most of these lesions had been included in discussions of porencephaly, pseudoporencephaly, or cystic hygroma.

All of the cysts in our series behaved as intracranial masses, were associated with progressive neurological dysfunction, and were diagnosed preoperatively as brain tumors.

Case Reports

Case 1. This 74-year-old woman entered the hospital in September, 1965, with a 5-year history of progressive right-sided seizures associated with speech loss but not with unconsciousness. The past medical history was negative for trauma, infection, or intracranial hemorrhage. She sustained a coronary artery occlusion 3 years before hospital admission and had been treated with anticoagulants since that time. She also had a congenital left sixth nerve palsy.

Examination. Neurological examination was unremarkable save for the left 6th nerve paresis. Blood studies, urinalysis, blood sugar, urea, and skull x-rays were normal. Echoencephalography showed an 8 mm left-to-right shift. A left carotid arteriogram revealed marked stretching of the posterior parietal and angular arteries as they left the Sylvian fissure. There was no evidence of tumor stain or shunting. The Sylvian point was depressed. A brain scan was negative. The preoperative diagnosis was that of an avascular mass lesion in the left parietal lobe.

Operation. On September 13, 1965, operation through a left frontoparietal bone flap revealed dura under tension, beneath which in the parasagittal area was a cystic structure measuring 4½ cm in diameter (Fig. 1). The cyst produced a distinct 3 cm depression in the underlying parietal parenchyma. The surrounding brain gyri were normal in appearance. The roof of the lesion was opaque to light in places, and there was evidence of a clear fluid in the cavity of the lesion. Approximately 60 cc of fluid were aspirated from the cyst. After the cyst roof had been removed (Fig. 2), it was clear that there was no communication with the lateral ventricle; there was at least 2 cm of brain tissue between the cyst and the atrium of the lateral ventricle. Biopsies were taken of the cyst wall, and the procedure was terminated. The dura was closed in a water-tight fashion and the bone flap replaced.

The patient's postoperative course was unremarkable. In the past 1½ years, she has experienced only one focal seizure.

Pathological examination. The cyst fluid contained 280 mg/100 ml of protein with 20 mg/100 ml in the lumbar spinal level. The sodium content was 150 meq/liter and the potassium was 2.8 meq/liter. Serum electrolytes were not done. Histological examination of the wall of the cyst revealed ciliated epithelium resembling ependyma and resting on a felt-like neuroglial matrix. There was no evi-
dence of inflammatory infiltrates or hemosiderin deposits. The specimen had two types of tissue. The outer portion resembled cerebral white matter, being a network of glial fibers and glial nuclei recognizable as astrocytes, microglia, and oligodendroglia. Lining the cyst was a second component composed of ependymal epithelium. This layer had the following variations in structure that relate it to early development of the brain:

1. The ependymal cells varied in arrangement from flattened cuboidal, to mesothelial, to stratified columnar.

2. The ependymal cells were applied to the glial tissue in a variety of ways, from flat juncture, to shallow and deep indentations, convolutions, inclusion cysts, and diverticula. The papillary configurations, often having connective tissue cores, justified the descriptive designation of “choroidal cyst of subarachnoid space” (Fig. 3).

3. Cilia were particularly clearly seen (Fig. 4) in the presence of high, stratified, immature ependymal cells like those characteristic of the 7-week embryo. Cilia are ordinarily found in histological preparations of ventricle wall in normal newborn or fetal brains, but not in adults. Cilia do not occur on the choroidal plexus epithelium of adults or fetuses.

4. In summary, this specimen had the properties of partly formed choroid plexus, immature non-choroid plexus, ependyma, and brain tissue without neurons. We reconstruct these observations as the outcome of a displacement of primitive ependyma and mantle primordia outward into the subarachnoid space, at a time near the 2-month stage of embryo development.

Case 2. This 49-year-old man entered the Hartford Hospital on May 13, 1965, with complaints of pounding occipital headache exacerbated when he moved from horizontal to upright position, plus difficulty with balance and memory complicated by 1 week of nausea and vomiting. Throughout his life he experienced a resting tremor involving both hands.

Examination. The patient was somewhat evasive in his answers and had a short attention span. A talipes cavus deformity was noted in the left foot. Neurological examination was normal except for a fine low-amplitude tremor of both arms. Skull films were negative for erosion, thinning, or other evidence of intracranial pressure. Electroencephalography showed a dysrhythmic slow activity over the left hemisphere, most prominent in the left temporal area. Brain scan was negative. A pneumoencephalogram showed evidence of a mass lesion involving the left frontal lobe, displacing the left frontal horn beneath the falx. The opening cerebrospinal fluid pressure at the time of this test was 240 mm of water.

Operation. On May 16, 1965, through a left frontal osteoplastic bone flap, reflection of the dura showed a large cystic lesion occupying the most anterior and medial portion of the left frontal lobe. The surrounding cortical gyri appeared normal; the medial cyst wall abutted on the anterior falx. After the cyst was unroofed, 100 cc of clear, colorless fluid gushed forth. The interior walls were smooth, glistening, and appeared to be composed of compressed white matter. There was no evidence of a mural nodule or hemosiderin staining. The most medial portion of the lesion showed a bluish ependyma-like lining which probably corresponded to the lateral wall of the third ventricle. At no point did this cyst appear to communicate with the ventricular system or cerebral subarachnoid space.

Postoperative course. The patient's postoperative course was benign. He was dis-