Angiographic Appearance of a Papilloma of the Choroid Plexus of the Lateral Ventricle

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Cerebral angiography is considered by many to be the diagnostic contrast study of choice in the evaluation of suspected supratentorial mass lesions. It has been demonstrated that the very young patient can be studied effectively and safely. Generally, carotid angiography is used by these authors when lateralizing signs are present, regardless of age.

Recently we have had the opportunity to study by carotid angiography a young patient in whom a hemiparesis developed 1 week following a blow to the head. As the result of the carotid angiograms, a preoperative diagnosis of a papilloma of the choroid plexus of the left lateral ventricle was made by the authors and surgical therapy was instituted, resulting in the total removal of the tumor.

Since the diagnosis and treatment of the tumor in this patient was made, Sears and Burnett have published their paper on the angiographic appearance of a papilloma of the choroid plexus. As was stated by them, the angiographic diagnosis of the papilloma of the choroid plexus in their patient could have been made preoperatively.

It is felt that our case represents the first published report of a papilloma of the choroid plexus diagnosed preoperatively from the carotid angiogram.

Case Report

A 25-month-old white male was admitted to Walter Reed General Hospital on Oct. 22, 1961, with a history of having fallen and struck his head 2 weeks previously. There were no immediate sequelae. One week later he began to drag his right foot. On the day of admission he was noted to have weakness of the right arm and facial weakness. He also then stopped saying the few words he knew. The past history and developmental history were normal except that his parents had noted that his head was slightly large but felt it to be normal since the father's head also was slightly enlarged.

Examination. On admission he was described as a normal-appearing infant male with a slightly enlarged head and a right hemiparesis. The remainder of the physical findings were normal.

Roentgenograms of the skull showed the cranial vault to be enlarged in length and breadth with pronounced spreading of the sagittal and coronal sutures and slight spreading of the lambdoid sutures. No intracranial calcifications were noted. The electroencephalogram revealed an abnormal slow-wave pattern in the left temporoparieto-occipital area interpreted as indicative of left-sided brain damage.

A percutaneous left carotid angiogram was performed on Oct. 26, 1961. This showed evidence of a tumor stain with an associated cyst in the left trigonal area. A diagnosis of papilloma of the choroid plexus, with an adjacent cyst laterally, was made by the Neurosurgical Service.

Operation. On Oct. 27, 1961, a left posterior temporoparietal craniotomy was performed. Through a transcortical incision a cyst was entered which contained approximately 150 cc. of xanthochromic fluid, as well as evidence of relatively fresh hemorrhage. The protein contained in the cystic fluid was 4 gm. per cent. The cyst, which was lateral to the ventricular system, was emptied and its wall was biopsied. Directly medial to the posterior extent of the cyst was seen the tumor which occupied the area of the trigone of the left lateral ventricle arising from the choroid plexus. The anterior choroid artery entering the tumor posterolaterally was clipped and divided. A circumferential dissection then was performed about the encapsulated tumor, 4×3×2.5 cm. in size, which was removed intact (Fig. 1). The left lateral ventricle was not enlarged except at the trigonal area.

Postoperative Course. The patient awakened immediately and was tolerating oral fluids 3 hours later. Eight hours after operation he had a right-sided seizure fol-
followed by a series of generalized seizures requiring intravenous anticonvulsants and a tracheostomy. For 5 weeks he continued to have a stormy course manifested by respiratory difficulties, unexplained elevations of temperature and an apparent cortical blindness. He then began to improve rapidly, and became alert, oriented and ambulatory. He was discharged on the 50th hospital day. At that time the only abnormal finding was a right homonymous hemianopsia.

One month later he was again speaking the few words he knew prior to his injury and showed no evidence of the hemianopsia. Postoperative roentgenograms of the skull showed a normal cranial vault except for the outline of the craniotomy bone flap.

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**Fig. 2.** Photomicrograph of the tumor.

**Fig. 3.** (left). Left carotid angiogram, arterial phase, lateral projection. Note contribution of anterior and posterior choroid arteries.

**Fig. 4 (right).** Diagram of Fig. 3. Abbreviations in Figs. 4 and 8:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>A.C.</td>
<td>Anterior cerebral artery</td>
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<tr>
<td>B.V.</td>
<td>Basal vein of Rosenthal</td>
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<tr>
<td>d.v.</td>
<td>A deep vein</td>
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<tr>
<td>I.C.</td>
<td>Internal carotid artery</td>
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<tr>
<td>I.C.V.</td>
<td>Internal cerebral vein</td>
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<td>M.C.</td>
<td>Middle cerebral artery</td>
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<td>P.C.</td>
<td>Posterior cerebral artery</td>
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<td>P.Chor.</td>
<td>Posterior choroid artery</td>
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<tr>
<td>S.S.</td>
<td>Straight sinus</td>
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<tr>
<td>S.V.</td>
<td>Septal vein</td>
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<tr>
<td>V.A.</td>
<td>Venous angle</td>
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Angiography of Papilloma of Choroid Plexus

Pathologic Diagnosis. Papilloma of the choroid plexus (Fig. 2).

Discussion

In 1954 Huang and Araki and Wall wrote of the angiographic configuration of meningiomas of the lateral ventricle. The angiographic differential diagnosis between a meningioma and a papilloma of the choroid plexus of the lateral ventricle would seem to be impossible. If the patient were an infant or a juvenile, a papilloma of the choroid plexus would be the more likely diagnosis.

Bohm and Strang presented a series of 25 cases of papillomas of the choroid plexus, 8 of which were in a lateral ventricle. They stated that: "Arteriography revealed pathological vessels in 2 cases." They did not state whether this aided them in their preoperative evaluation. Crofton and Matson showed a picture of an angiogram of a patient with a papilloma of the choroid plexus of the lateral ventricle, but made no comment about it.

Lindgren demonstrated a papilloma of the choroid plexus on the arterial phase of a vertebral angiogram. Ernsting reported a case of subarachnoid hemorrhage which on carotid angiography revealed a vascular tumor fed by the anterior choroid artery. It was then proven to be intraventricular by pneumoencephalography, was biopsied with a needle and later removed after microscopic diagnosis was made of a papilloma of the choroid plexus. Laurence et al. felt that their reported cases of papillomas of the choroid plexus might have been demonstrated angiographically had this study been performed.

Radiographic Findings. Study of the carotid angiogram of our case reveals that the tumor was supplied mainly by the anterior choroid artery and to a lesser extent by the posterior choroid arteries (Figs. 3 and 4). As has been demonstrated by Galloway and Greitz, the posterior choroid arteries are actually three in number: one medial choroid artery arising from the medial aspect of the

Fig. 5. Left carotid angiogram, capillary and early venous phase, lateral projection.

Fig. 6. Diagram of Fig. 5.

Fig. 7. Left carotid angiogram, venous phase, lateral projection.

Fig. 8. Diagram of Fig. 7.
posterior cerebral artery within the interpeduncular cistern, and two lateral choroid arteries arising from the posterior cerebral artery more distally and from its lateral side. It can be seen that it is the lateral choroid arteries which helped contribute to the tumor stain in our case. Hudson\textsuperscript{6} defined the vascular pattern of the choroid plexus of the lateral ventricle in man, observing the major arterial supply to be the anterior choroid artery, particularly to the area of the glomus.

The lateral carotid arterial phase and accompanying diagram (Figs. 3, 4 and 8) show the direct contribution of the anterior choroid artery from the internal carotid artery, and the posterior choroid arteries from the posterior cerebral artery to the tumor itself. On the capillary phase (Figs. 5 and 6) the tumor and the accompanying cyst are well outlined. The effect of these two space-occupying masses produces the apparent hydrocephalus indicated by the stretching and smoothing of the curve of the anterior cerebral artery on the lateral arterial projection and the elevation of the middle cerebral artery.

The venous drainage pattern (Figs. 5, 6, 7 and 8) from this tumor is directly to the internal cerebral vein via the vein of the occipital horn and thence to the vein of Galen.

The thalamostriate vein cannot be identified positively. The position of the basal vein of Rosenthal is in accord with a mass superior and lateral to it.

Summary

The angiographic appearance and a clinical summary of a child with a papilloma of the choroid plexus of the left lateral ventricle with adjacent formation of a cyst are presented. The arterial supply to and the pattern of venous drainage from this tumor are discussed. The use of carotid angiography in the evaluation of supratentorial mass lesions is re-emphasized.

References