CASE REPORTS AND TECHNICAL NOTE

ANGIOGRAPHIC APPEARANCE OF A PAPILLOMA OF THE CHOROID PLEXUS

A CASE REPORT

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Papillomata of the choroid plexus are considered rare among intracranial neoplasms. Ventriculography is the usual means by which such growths have been demonstrated during life. So far as we have been able to learn, few have been reported as showing calcification on the plain radiographs, and fewer have been recognized clinically by angiographic means. Indeed, Almeida Lima stated that intraventricular tumors had no special angiographic appearances.

There has been considerable interest in these lesions because of the possibility that they may produce hydrocephalus by excessive formation of cerebrospinal fluid. Except where such a tumor produced locally an obstructive hydrocephalus, this would logically be expected to be a communicating type of hydrocephalus.

Following is a case report in which is described a choroid-plexus papilloma occupying the atrium of the right lateral ventricle, producing an obstructive hydrocephalus in that portion of the ventricle isolated by the mass of tumor itself, namely, the occipital and temporal horns and part of the atrium. The possibility of a generalized hydrocephalus is, in this instance, not substantiated.

A fairly close localization of the tumor was suggested by the physical findings, refined and strengthened by roentgenologically visible calcification within the cranial vault, and further defined by angiography. It is noted, however, that the arteriograms, containing, as we think they do, evidence probably sufficient to have justified the histological diagnosis preoperatively, were not fully exploited.

Radiology. Plain roentgenograms of the skull on admission show separation of sutures and intracranial calcific density in the region of the right temporal lobe. On the occipital view, flattening of the petrous pyramid on the side of the lesion (right) is evident.

With reference to the arteriograms, on the anteroposterior views (Fig. 1), one recognizes the shift of the anterior cerebral arteries from right to left in a gently curvilinear fashion, with, incidentally, a negative frontopolar-artery sign, and a remarkable upward displacement of the Sylvian vessels. The posterior cerebral arteries are also well visualized, and appear quite symmetric. A slightly later phase demonstrates a clear-cut stain of the tumor.

On the lateral view (Fig. 2) the anterior cerebral artery appears substantially normal. It does not appear stretched, but presents its usual tortuosity. Again, elevation of the Sylvian vessels is seen, and is noted to be convex upwards in the anterior portion of the vessels as visualized. This is possibly more suggestive of the deformity seen with masses of the middle temporal lobe than of the diagonal elevation characteristic of generalized hydrocephalus.

Distinctly visualized in the lateral view is stretching of the posterior communicating artery. There is some retrograde filling of the basilar artery, and this vessel possibly is somewhat more erect than usual. The anterior choroidal artery, also stretched and rather large, is well seen entering the large area of tumor stain. Further, one easily recognizes the posterior choroidal artery arising from the posterior cerebral artery in its usual manner, and also entering the tumor stain.

Participation of other vessels in the formation of the rich precapillary plexus of the tumor itself is uncertain on the original films, however suggestive such may appear on the reproduction.

It is noted here that this important participation of the two choroidal vessels was not remarked preoperatively.

In résumé, the angiographic studies demonstrate a large mass occupying the right temporal lobe, which mass is actually the temporal horn of the right lateral ventricle. They further demonstrate the intrinsic vasculature of a neoplasm located somewhat more posteriorly and, as events proved, actually lying within, and responsible for the dilatation of, the temporal and occipital horns of the right lateral ventricle. Such a neoplasm, had it been extraventricular and/or produced no obstruction to the flow of cerebrospinal fluid, must
Fig. 1. Arteriogram, common carotid, facial view, right side injected. Note shift of anterior cerebral arteries, bilateral filling (no contralateral carotid compression used), symmetry of posterior cerebral arteries, negative frontopolar-artery sign and marked elevation of Sylvian vessels on the right side.

have produced a quite different angiographic appearance.

It is precisely this difference between the unmistakable position of the tumor as revealed by the staining of its intrinsic vasculature, and the deformity demonstrated in the vessels of the neighborhood, that should have aroused suspicion as to the nature of the lesion. This discrepancy, together with the clear demonstration of the participation of the two choroidal vessels, might well have made the histological diagnosis clear.

Granting that a mild degree of hydrocephalus in the rest of the ventricular system may not be demonstrated so graphically by arterial as by ventricular outline, it seems that in this case there is no direct evidence to suggest a generalized hydrocephalus.

Pathology. The microscopic section (Fig. 3) appears quite typical of benign papilloma of the choroid plexus. No cilia or blepharoplasts are seen. Microscopic aggregates of calcium are present.

CLINICAL SUMMARY

The patient, a 16-month-old white boy, was the first child of an apparently healthy young couple. He was born after an uneventful, full-term pregnancy. There were no obstetrical complications. No comment was made concerning tension of the fontanels.

Development was along normal lines until about the age of 1 year, when the parents thought him to be lagging behind on the developmental scale. He did not walk until he was 14 months old. His parents were just then beginning to wonder if his head might not be a bit enlarged.

He was active, eating and gaining weight well until 1 week prior to admission, when he became listless, anorexic, and shortly ceased walking, although he would still pull himself to a standing position.

Examination. On the day of admission, the pediatrician noted a slight fever, bulging fontanel, and some evidence of dehydration. Lumbar puncture revealed crystal-clear fluid, normal with respect to chemistry, cytology, serology and bacteriology. During the tap, the child was resistive, and the high pressure recorded is not deemed reliable.

When seen in consultation, after he had been given

FIG. 3. Microscopic appearance of neoplasm under low power. Hematoxylin and eosin stain.
By dissection with the finger, it was not difficult to ele-
and remove the mass entirely. There was bleeding only
entered from the anterior portion of the temporal horn.
its opposite pole by a single medium-sized artery which
choroid plexus by several large arterial vessels, and at

closed. The tumor was attached to the glomus of
idly to a fraction of its bulk when its blood supply was
which completely filled the hand, but which shrank rap-
form of a gently curved, oblate structure, dark red,
sive gush of clear spinal fluid followed by the partial ex-
bridging portion of the vein of Labbé. There was a mas-
be felt beneath it. The cortex was opened just above the
cortex bulged moderately, and on palpation, fluid could
intravenous urea. When the dura mater was opened, the

were no pathological reflexes. Blood and urine were nor-

Subdural taps were dry bilaterally. On either side, 
ventricle was encountered at a depth of 5 cm. The fluid
released was clear, and was under an initial pressure of
300 cm. of water. At this time, the child was perfectly
quiet, and the pressure is considered to have been mea-
ured accurately. About 3 cc. of fluid were removed from
each side, and the specimens were examined separately,
they proving identical with respect to count of cells and
content of protein. All the values reported by the lab-
atory were within normal limits. No change in the
tension of the fontanels was noted, and there was no
clinical change.

On the day following admission, the child was an-
esthetized, and right common carotid, open, arteriog-
raphy was carried out, using 50 per cent Hypaque. 
These studies served at least for satisfactory localiza-

Operation. Immediately after arteriography, the child
was intubated, and a right osteoplastic parieto-occipital
bone flap was turned down. The dura mater was taut
and did not pulsate in spite of the use of the full dose of
intravenous urea. When the dura mater was opened, the
cortex bulged moderately, and on palpation, fluid could
be felt beneath it. The cortex was opened just above the
bridging portion of the vein of Labbé. There was a mas-
vageush of clear spinal fluid followed by the partial ex-
trusion of a papillary mass. By enlarging the cortical
stoma and elevating its edges, the relations of the tumor
could be clearly discerned. The mass itself was in the
form of a gently curved, obliterated structure, dark red,
which completely filled the hand, but which shrank rap-
idly to a fraction of its bulk when its blood supply was
closed. The tumor was attached to the glomus of the
choroid plexus by several large arterial vessels, and at
its opposite pole by a single medium-sized artery which
entered from the anterior portion of the temporal horn.
By dissection with the finger, it was not difficult to ele-
vate the mass, clip and divide the vessels at either pole,
and remove the mass entirely. There was bleeding only
from a few small venous channels which left the tumor at
irregular points along its course. These were controlled
easily with cautery.

With the tumor removed, it was apparent that the
choroid plexus itself, from glomus distally, had been re-
moved. The remnant choroid plexus, perfectly normal
in appearance, could be followed into the body of what
appeared a normal, or only slightly enlarged ventricular
body.

With tumor and spinal fluid removed, and with the
added effect of urea, the temporal lobe had shrunk to an
alarming extent. It was reexpanded somewhat with
warm saline, and the wound was closed.

Postoperative Course. The child did extremely well.
He left the hospital on the 7th day. He has been seen
often in follow-up examinations, the last one being some
months since operation. His head now measures 52 cm.
in greatest circumference. His fontanel has remained
slack, and is closing. The papilledema cleared within 2
weeks. He walks well, without hint of his old hemi-
paresis. No visual field defect is detectable.

SUMMARY AND CONCLUSIONS
A case is herewith presented of a child with a
unilateral tumor of the choroid plexus, histo-
logically benign, which appears to have been
responsible for a localized obstructive hydro-
cephalus. No evidence was seen of any degree of
generalized hydrocephalus. Rather, the hemi-
paresis, the homonymous hemianopsia, the
asymmetric enlargement of the skull, the radi-
ographic finding of focal intracerebral calcification,
as well as the angiographic studies, all indicated a
focal process.

The angiographic appearance of a choroid-
plexus papilloma lying in a lateral ventricle is
presented.

REFERENCES
1. ALMEIDA LIMA, P. Cerebral angiography. London:
2. CUSHING, H. Intracranial tumours. Notes upon a
series of two thousand verified cases with surgical-
mortality percentages pertaining thereto. Springfield,
Ill.: Charles C Thomas, 1932, xii, 150 pp.
3. MATSON, D. D., and CROFTON, F. D. L. Papilloma
of the choroid plexus in childhood. J. Neurosurg.,
1960, 17: 1002-1027.
4. WILKINS, H., and RUTLEDGE, B. J. Papillomas of
5. ZÜLCH, K. J. Brain tumors. Their biology and
pathology. New York: Springer Publishing Co., Inc.,
1957, xi, 308 pp.