Incisural Meningiomas of the Falco-Tentorial Junction

A Report of Two Cases

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Reports of meningeomas arising from the tentorium at its junction with the falx are rare. In 1962 Sachs et al., reviewing other series as well as their own, found 11 incisural meningeomas arising from the falco-tentorial junction, or Carre-four falcotentorial (C.F.T.), a term introduced by Talairach et al.11

We have 2 more such cases to report. The first was diagnosed by vertebral angiography, and the tumor successfully removed through a transtentorial approach. The second was discovered at autopsy in a patient with advanced carcinoma of the cervix, and suspected posterior fossa metastasis.

These 13 cases are similar; moreover 5 of them died undiagnosed. If the level of clinical suspicion is sufficient to suggest vertebral angiography, the diagnosis can usually be definite.

Case Reports

Case 1. E. R., a 45-year-old woman, was admitted to the Neurosurgical Service of Pahlavi Hospital on March 5, 1965.

History. Her main complaints were progressively severe headache for 8 months and attacks of vomiting for 6 months. Three months before admission she developed dimness of vision and occasional diplopia, and a burning sensation on the left side of the face and head, and diminished hearing in the left ear. She had been incontinent of urine for a short time but on admission had mild urinary retention. Ataxia had progressed rapidly for 2 months so that she had been unable to walk for the last 2 weeks.

Examination. The patient was slightly confused but cooperative. She had bilateral papilledema. There was partial nerve deafness on the left and partial trigeminal sensory loss, including an absent corneal reflex. There was dysarthria and marked dysmetria and adiakokinesia of the right upper and both lower extremities. There was no nystagmus. Visual field showed a partial left homonymous hemianopsia. Upper and lower quadrants were equally affected. There was some diminution of sensation to pin prick in the left arm and trunk. Plain X-rays of the skull were normal. A right carotid arteriogram did not show any abnormality apart from slight hydrocephalus. In the phlebogram the vein of Galen and straight sinuses were not visualized.

Vertebral angiography (Figs. 1 and 2) showed a large, well-vascularized mass in the midline about 2½ cm. posterior to the basilar artery. The posterior cerebral and superior cerebellar arteries were larger than normal. Many small arteries from these main vessels supplied the tumor. The posterior cerebral and superior cerebellar arteries were abnormally separated. A diagnosis of incisural meningioma, presumably arising from the falco-tentorial junction, was made.

Operation was performed with the patient in a prone position under intratracheal general anesthesia with moderate hypothermia (20°C). A right occipital bone flap was turned down. We chose the right side in spite of the left-sided facial pain and deafness. Since she already had a left homonymous hemianopsia, we feared that any unpredictable damage to the left occipital lobe might cause blindness. The medial edge of the flap was on the sagittal sinus and the inferior border on the lateral sinus.

The dura was opened along the upper border of the lateral sinus and hinged medially on the sagittal sinus. All veins entering the lateral and sagittal sinuses from the right occipital pole were clipped and severed. The occipital lobe was retracted from the tentorium and falx until the edge of the tentorium was reached. At this point a small part of the tumor could be seen above the level of the tentorium.

An incision was made in the tentorium 1 cm. lateral to its junction with the falx, and extended anteriorly through the tentorial edge just lateral to the midline. Tumor attachment to the tentorial edge was carefully dealt with by endothermy. The medial cut edge of the tentorium was fixed by two silk sutures and used for retraction. The tumor then became clearly visible. Small arteries around about three quarters of the tumor were coagulated and cut. The mass could then be removed in small pieces. Thus the whole tumor was removed. Its attachments to the tentorium in the midline were thoroughly cauterized. The opening in the tentorium was not sutured.

Histological Report. Sections were stained with H & E and showed a highly cellular and vascular tumor. There were many large vessels and capillaries with only 1 endothelial layer. Tumor cells contained round and oval nuclei with a considerable amount of cytoplasm. A diagnosis of angionnous meningioma was made.

Postoperative course was uneventful. For about 2 weeks facial paresthesia was worse than before the operation, but gradually improved. When discharged, the patient still complained of some facial discomfort. Hearing returned to normal about 4 weeks after the operation. Ataxia gradually improved and after 2 months there was practically no cerebellar sign. There was no change in the visual fields.

Case 2. E. G., a 45-year-old woman, was also admitted to the Neurological Service of Pahlavi Hospital with a history of headache, ataxia, right-sided deafness and facial numbness. Eighteen months previously she had been treated with radiotherapy for an advanced carcinoma of the cervix. Although she had been suffering from slight headaches for a year, the attacks had only
become severe in the last 4 months. In the last 2 months she had developed steadily increasing giddiness and ataxia with tinnitus and diminished hearing on the right side. For the last 3 weeks she had had difficulty in swallowing fluids, numbness in the right side of the face, and had lost considerable weight.

**Examination.** The patient was thin and emaciated and had bilateral papilledema. Nystagmus, diminished sensation of the right side of the face and diminished right corneal reflex were present. There was severe ataxia with no lateralizing cerebellar sign. Plain x-rays of the skull and carotid angiography were normal.

The CSF pressure at lumbar puncture was 240 mm.; CSF protein was normal. The normal protein content and normal size of internal auditory meatus ruled out the diagnosis of an 8th nerve neurinoma.

Pneumoencephalography was attempted, but there was no filling of the ventricles. The patient died 24 hours after this procedure because of respiratory failure.

**Autopsy Findings.** There was a large carcinoma of the

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**Fig. 1.** Case 1. Lateral vertebral angiogram demonstrating the tumor. Although part of the tumor appears to be above the level of the tentorium, the posterior cerebral arteries are not raised because they encircle the tumor.

**Fig. 2.** Case 1. Anteroposterior vertebral angiogram. Note the midline position of the tumor with posterior cerebral arteries on either side.

**Fig. 3.** Case 2. Cerebellum seen from above with the tumor removed. Note the smooth base of the cavity posteriorly and the depression on the superior surface of cerebellum more anteriorly.
ruggiero's manifestations, dilated. average that reported in occupied this down tumor with of the cerebellum. The tumor was round and entirely encapsulated with large vessels on its surface (Fig. 3). Both lateral ventricles and the 3rd ventricle were very much dilated. The lower part of the aqueduct and the 4th ventricle were normal. The tumor was diagnosed as a fibroblastic meningioma.

Discussion
Cushing and Eisenhardt,4 in their monograph on 295 meningiomas, reported that 23 were sub-tentorial. Castellano and Ruggiero,5 in a survey of 1,854 meningiomas, found 168 posterior fossa tumors. Taveras6 discusses 24 cases with masses in the region of the incisura. Of these, 16 were meningiomas, 5 aneurysms, and 3 chordomas. He reported 2 surgically verified meningiomas arising from the tentorial edge.

As tumors arising from the falcotentorial junction appear to be completely removable, we feel that more attention should be paid to their clinical manifestations, diagnosis, and operative removal. In the 11 cases reviewed by Sachs et al.10 and the 2 cases reported here, there were 9 females and 4 males. This corresponds to Castellano and Ruggiero's5 observation that 69 per cent of posterior fossa meningiomas are in females. The average age of these patients was 42 years. When the case of a 2-year-old girl reported by Heppner6 is excluded, their ages vary from 21 to 74 years.

The early onset of increased intracranial pressure can be explained by pressure on the aqueduct of Sylvius,5 obliteration of cisterna ambiens, or distortion and pressure on the great vein of Galen.4,5,10 Although the last factor is often referred to as a cause of hydrocephalus in tumors of the pineal region, Bedford has shown that experimental occlusion of this vein in the monkey does not produce hydrocephalus.6

Radiological Investigations
Plain x-rays may show an enlarged sella turcica with rarefaction of posterior clinoids. In 2 cases the pineal was found to be depressed. This phenomenon has been explained in this manner; the tumor arises originally above the level of the tentorium, and in this position it produces an internal hydrocephalus, which pushes the tumor down below the tentorium. Pressure on the vein of Galen has been blamed for the production of this hydrocephalus.4,10

Ventriculography is of great value in locating these tumors. As pointed out by Davidoff and Epstein,5 filling of the 3rd ventricle is necessary to demonstrate the presence of a rounded mass protruding into the postero-inferior part of the 3rd ventricle, as well as non-visualization of the aqueduct and the 4th ventricle. Thalamic tumors may also give a similar picture.

In pneumencephalograms, obliteration or deformity of the cisterna over the quadrigeminal plate associated with forward displacement of the aqueduct are important features.12 If the tumor is large, an indentation in the posterior part of the 3rd ventricle is seen. As there have been at least 2 deaths following this procedure which at best does not define the nature of the lesion, we feel that vertebral angiography is safer and a more useful method.

Angiography. Taveras6 describes a case of a 47-year-old woman in which diagnosis of a pinealoma was made after air studies. Biopsy disclosed a meningioma. Vertebral angiography was later performed. In the lateral angiogram there was elevation of the parieto-occipital branches of the posterior cerebral arteries and slight depression of the temporo-occipital branches. In the antero-posterior view, separation of the posterior cerebral arteries was seen.

In our Case 1, the tumor was also visualized by vertebral angiography. From the lateral angiogram it was obvious that the tumor was incisural in position, and from the anteroposterior view, that it was in the midline. Posterior cerebral as well as the superior cerebellar arteries supplied the tumor. The anteroposterior angiogram showed that the 2 posterior cerebral arteries, after circling the brain stem, still remained separated for a short distance. This suggested that a small part of the tumor presented above the level of the tentorium. The extreme vascularity of the mass with small arteries in the periphery suggested a meningioma.

This picture was quite different from that of an aneurysmal dilatation of the great vein of Galen which always has a homogenous appearance, and large draining vein. An arterial aneurysm could also be excluded by the appearance of the mass, its position and the absence of a single arterial connection.

Another procedure which might help in localization of these tumors is falco-tentoriology as described by Talairach et al.11 We were unable to find a case of an incisural mass where this procedure had been employed.

Operative Treatment. Although most of the tumor is usually situated below the tentorium, a subtentorial approach is difficult and hazardous. Horrax7 reported successful removal of a large pinealoma through a transtentorial route. Poppen9 described a similar procedure. We preferred to make an occipital bone flap to give a better exposure. Removal of the occipital pole was not needed. Probably hypothermia helped us in this matter, as there was no brain swelling and we
had ample space to work in. Intravenous urea would probably have been equally effective.

Although the tumor was obviously extremely vascular, we did not have much difficulty with hemostasis. This was probably due to hypothermia and hypotension, and because we dealt with peripheral vessels first before attacking the tumor itself. We think that the major difficulty in these cases is one of diagnosis; the operation itself is not as formidable as it may sound.

Summary

We have added 2 cases of incisural meningioma of the falco-tentorial junction to the 11 already reported. All these cases have a similar clinical pattern characterized by early papilledema, involvement of 5th to 8th nerves, ataxia, dysarthria and visual field defects. Vertebral angiography is the most helpful diagnostic aid and can lead to satisfactory operative removal of the tumor.

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References