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Lateral-Trigonal Intraventricular Tumors. A New Operative Approach

By

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With 4 Figures

Summary

With the introduction of additional diagnostic methods, computerized axial tomography, interventricular tumors are discovered at a time when these lesions are still small and may have presented very insignificant or no clinical symptoms. If the lesion is a benign tumor as a meningioma and within the lateral ventricle of the dominant hemisphere a very difficult problem presents itself to the patient and surgeon. Shall they wait until the tumor reaches such a size to make more permanent symptoms to justify entering the ventricle by the conventional approach through the middle temporal gyrus and leaving the patient at least with a visual field defect? Or should surgery be postponed until the ventricle especially the temporal horne is enlarged due to blockage by the tumor, making the operative procedure technically easier? The authors present a method used in three atrial trigonal meningiomas of the dominant hemisphere which did not result in any neurological deficit which was not present before surgery and which abolished paroxysmal attacks of hemianopsia and severe headaches in one patient. The latter patient was believed to have suffered from migraine for 2½ years.

Truly intraventricular tumors are rare lesions like choroid plexus papilloma or meningiomas. Of 393 supratentorial meningiomas, Tönnis reports 11 meningiomas which had their origin from the chorioid plexus of the lateral ventricles. Of these, four were on the left side. Abbott and Courville found in their review of the literature which includes the observation of Cushing and Eisenhardt that of the intraventricular meningiomas the lateral ventricles are the predominant site. Zülch describes the meningioma of the lateral ventricle as having a smooth surface of an egg to fist size, and that these lesions are especially situated at the trigonum and in close connection with the chorioid plexus. Zülch furthermore mentions that the menin-

giomas of the lateral ventricles have their vascular supply from the post. chorioidal arteries and anterior chorioidal arteries. He has observed a meningioma of the lateral ventricle in a 11 year old girl which weighed 618 Grams.

Gardner and Turner observed a fibroblastic meningioma in a 3½ year old girl. Delandscheer up until 1965 reports 175 intraventricular meningiomas in the literature. Tönnis saw a 12 year old child in which the meningioma was imbedded deeply within the frontal and parietal lobes, another lesion grew into the temporal horn. Only in one of his intraventricular meningiomas did the neoplasma have its origin from the temporal horn position of the chorioid plexus. Taren reports on 4 patients all tumors were located at the atrium (trigonum).

All authors that have reported on these lesions agree that the clinical picture is not a striking one. The symptoms may be extremely vague. The only symptom which has a localizing value and which is not infrequently present, especially when the tumor has reached a certain size are visual field defects or hemianopsia. The latter symptom may be intermittent as it was in one of our three patients which occurred together with throbbing headaches and was diagnosed for years as migraine. Both symptoms disappeared post surgery. Gassel and Davies reports on similar intermittent symptoms during change of posture. In some patients mild euphoric or depressive episodes are reported (Tönnis). Wall, Huber and Courville emphasize the minimal value of symptoms in regard to localization. Calcification of the tumor on routine x-ray of the skull has pointed to the lesion in 4 intraventricular meningiomas in Tönnis' series. But here we have to consider that the tumor has its most common location at the glomus and could be misleading when the glomus is calcified and the tumor is still small. Calcification on the other hand has been observed more in the larger and thereby older tumors (Zülch). The visual disturbances appear to be the most significant as mentioned above and of these especially the hemianopsia is to be observed (Busch). Two of our patients had visual field defects and the third had paroxysmal hemianopsia. Tunnel vision was observed in one of the patients reported by Tönnis.

The blood supply to this tumor comes from the chorioidal arteries and especially from the posterior median and lateral chorioidal arteries (Krayenbühl, Yaşargil, Zülch, Olivecrona). Wackenheim points out that the opacification of the chorioid plexus of the lateral ventricles occurs rather early at the end of the arterial phase and persists for some seconds until the end of the venous phase. Attention to this may give us some information on the symmetry of the

chorioidal structure itself and any possible lesions on either side especially by simultaneous filling using vertebral angiography in the frontal projection. Now, with the ever increasing use of computerized axial tomography, intraventricular lesions of very small size are being discovered some of these are discovered totally unexpected. This also includes Colloid Cysts (Goldring). These relative small lesions of the trigonal area, basically benign tumors, which have

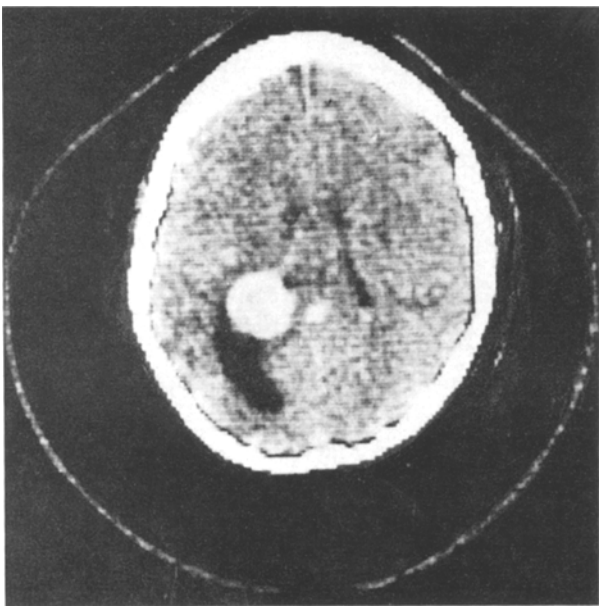

Fig. 1

given a minimum of symptoms present a difficult therapeutic challenge (see Fig. 1). All operative descriptions reviewed, and there are not many, use a transhemispheric approach coming from the convexity of the hemisphere. (Dandy, Olivecrona, Cushing, Tönnis, Kempe) In the left sided lesion, the approach is through the middle temporal gyrus (Tönnis, Olivecrona, Kempe). Cushing used a curvilinear incision in one of the temporal parietal convolutions. Cramer in 1959 reported a series of cases from the Neurological Institute, New York and recommended resection of the occipital lobe as the best approach to the lesion. Busch went through the frontal lobe removing a disc of cortex.

It is clear from reviewing the reports in the literature that at least some neurological deficit and most frequently the visual field

defect will be permanent. On the dominant side more severe neurological deficits are to be feared, and the statistics reveal that most of these lesions reported are not only in females, but within the dominant hemisphere (Northfield).

Our three patients were females and the tumors were located within the left dominant hemisphere. Characteristic of these small lesions are their location, few symptoms as hemianopsia and headaches. Only the headaches disappeared post surgery, minimal right lower quadrantanopsia was observed in the second patient which also persisted post surgery. The third patient had attacks, increasing in frequency of right sided hemianopsia with severe headaches lasting up to 36 hours accompanied by vague abdominal discomfort. She was diagnosed to having migraine for $2^1/_2$ years. All symptoms disappeared post surgery.

Description of Operation for Left Trigonal Tumor

Under general endotracheal anesthesia and controlled ventilation to assure maximal brain relaxation the patient is placed in the sitting position resting like in an easy chair, the head supported at the nape of the neck. A three-pronged head holder may be used. The outline of the skull flap and craniotomy are given in Fig. 2. The craniotomy is over portions of the parietal and occipital bones reaching over the midline. It is important that the craniotomy reaches over the sagittal sinus to permit later on additional retraction on the right side. The dura is opened and reflected toward the superior sagittal sinus. The dural opening should be about 8 cm in the sagittal diameter and not less than 6 cm in the transverse diameter.

Any bridging veins toward the sagittal sinus are coagulated and divided to permit lateral retraction of the exposed left hemisphere. Wide retractors are less traumatic in retracting the brain. Additional room is obtained in retracting the sagittal sinus and falx towards the right side (Fig. 3). Usually the exposure of the edge of the tentorium overlaying the splenium of the corpus callosum is done in one swoop (Fig. 3). The edge of the tentorium is elevated by a blunt nerve hook, coagulated and incised at about 1 cm from the midline, and the sinus rectus. The incision is carried posterior, parallel to the sinus rectus for about 3 cm. The entire portion of the splenium and posterior section of the corpus callosum is now divided by first coagulating the fine vessels running on its surface. The division is done using either a fine suction or bluntly. This done will expose the dorsal surface of the tela chorioida, which covers here the pos-

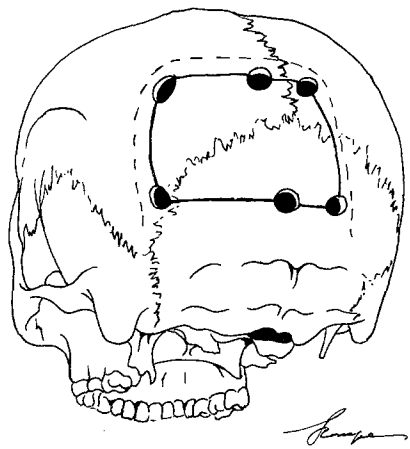

Fig. 2

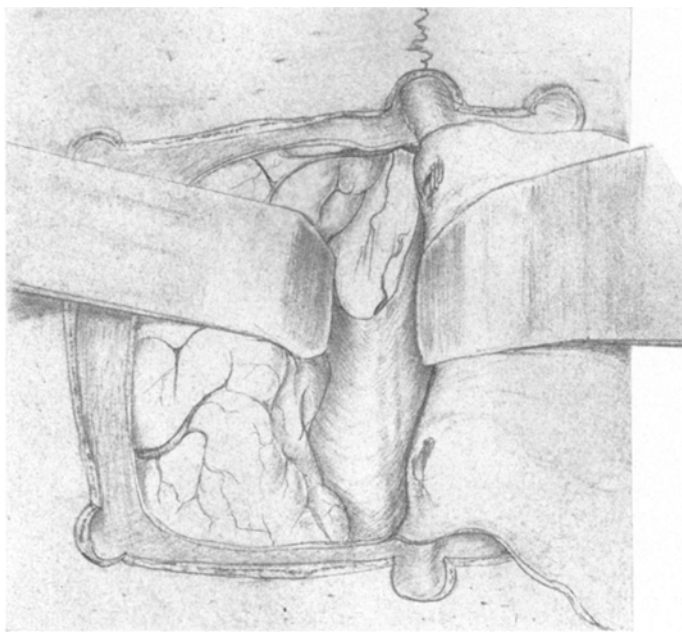

Fig. 3

terior roof of the third ventricle stretching out laterally over the pulvinar towards the chorioidal fissure. The tela chorioida carrying within its leaves the vein of Galen, the internal cerebral veins and the medial and lateral posterior chorioidal arteries. The whole

Fig. 4 a

overlaying posteriorly, the pineal body which itself lays over the medial portions of the anterior quadrigeminal plate. At this time of the exposure the surgical microscope or loops with 4 times magnification and fiberoptic headlamp are used. Also, if no expert assistant is available a self-retaining retractor to keep the left hemisphere retracted should be used. This retractor will have to be readjusted several times during the operation. The arachnoid of the tela chorioidea is grasped, left lateral from the vein of Galen by bipolar coagulation forceps and opened posteriorly until we reach

the culmen of the vermis; All layers of the arachnoid are opened at this location. This opens the cystern of the quadrigeminal plate, and will permit profuse drainage of cerebral spinal fluid and give additional relaxation and thereby needed space. At this time the left

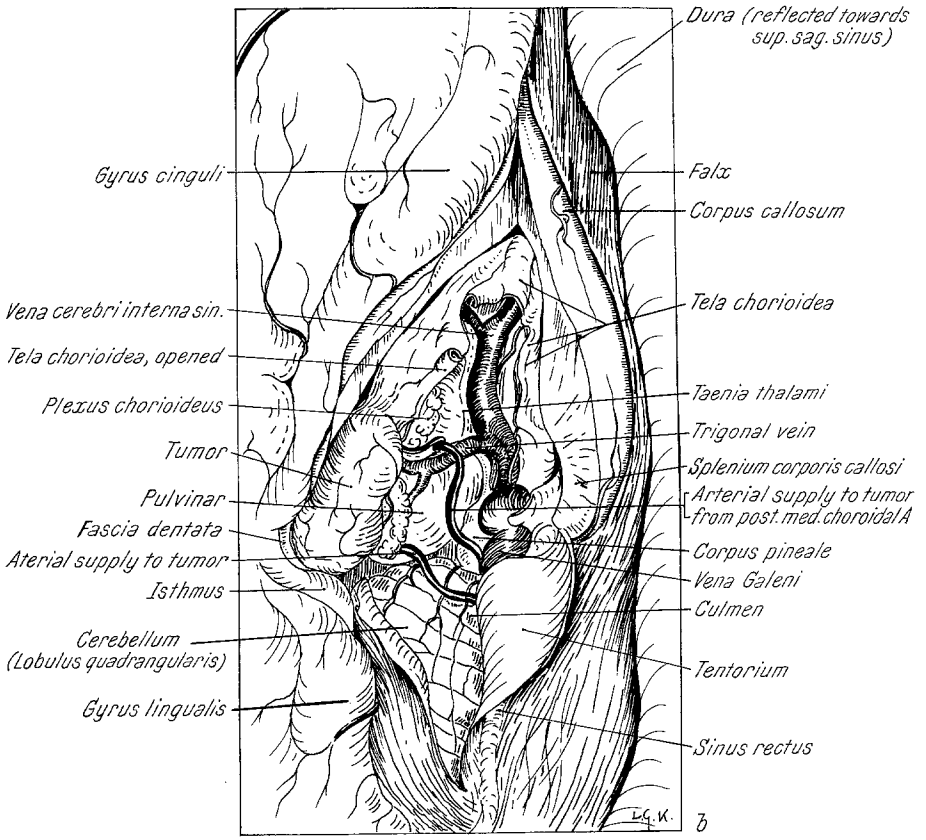

Fig. 4 b

lateral retractor is not readjusted yet, even so it will appear that we have a more relaxed brain to do so. First the entire arachnoid layers parallel to the left internal cerebral vein shuld be opened avoiding any injury to any major vascular structure within the tela chorioidea. Attention is to be given that we also open the deep layers of the arachnoid. It will now become obvious why we did not readjust the left lateral retractor by observing a multitude of vessels, branches of the posterior medial chorioidal artery running laterally accompanied with many veins which drain into the atrial

vein or directly into the left internal cerebral vein or even into the vein of Galen. So long we left the retraction to the necessary minimum all these vessels, since not tightened by the retraction, can be grasped, coagulated by bipolar coagulation, or clipped and divided thereby avoiding any impairment of the vein of Galen or the internal cerebral vein. The brain retractor is now readjusted and attention is given that the same is not inserted too deeply since we have to realize that the tumor we are after is superior and lateral to the pulvinar thalami, a structure we will see very well when the above named vessels are divided. Portions of the chorioid plexus of the lateral ventricle will come into view and we will follow them laterally and thereby portions of the tumor will be recognized. See Fig. 4 a and 4 b. In these figures the major vascular supply is still left intact for didactic purposes. Usually at this stage of the operation with as much tumor seen as in the picture, the vessels to and from the lesion should have been ligated and divided. The picture also lets us recognize how important it is that the brain retractor does not cover the chorioidal fissure and thereby tucking the tumor away from view. It is helpful to insert an 0 silk suture through the exposed tumor to help us move the same in any direction and thereby assisting in identifying the base of the tumor which constitutes the chorioid plexus. It may be necessary to divide the plexus by clipping and bipolar coagulation. This is first done to the portion of the chorioidal plexus leading over the thalamus. Thereafter by elevation of the tumor it will be possible to divide the chorioidal plexus leading posteriorly and inferiorly toward the temporal horn. The tumors we are talking about here are usually still small and attached by a very fine pedicle. It is the "attachment" to the feeding vessels and draining veins which give the false impression of a very wide base by coming from the lateral aspect when approaching the tumor through the lateral hemisphere. Here, we come from the midline moving laterally and have divided the major blood supply before we even see the tumor. It is the vascular supply of the anterior chorioidal artery and branches of the posterior lateral chorioidal artery which we still have to consider. At this stage of the operation as described up to the present we still may find additional branches from the posterior lateral chorioidal artery. The anterior chorioidal artery is taken care of when dividing the inferior aspect of the chorioid plexus. Branches of the posterior lateral chorioidal artery may swoop in a wide arch laterally and then approach the tumor capsule from lateral. So while rolling the tumor medially we will look for these branches and also when elevating the tumor by the 0 silk string. We may also remember that in mobilizing the tumor

we have another possibility in freeing the chorioid plexus by tearing the same with a blunt instrument at the junction of the taenia chorioidea with the taenia affixa. This "tearing" should be done by bipolar coagulation and sharp, micro scissor. This maneuver has permitted the mobilization of one tumor to such a degree that the retraction of the lateral hemisphere was never needed to be adjusted more than once.

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