THE CONSERVATIVE TREATMENT OF THIRD VENTRICLE TUMORS*

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The treatment of neoplasms arising in the region of the third ventricle has long been a trying and difficult problem. For practical purposes of treatment, such lesions can be divided into two broad groups.

(1) Completely benign lesions such as colloid cysts, cysts of the septum pellucidum, etc. When an accurate diagnosis of such a lesion has been made by ventriculography, there is no question of the excellent results that can be obtained by direct surgical removal. Thus such cases present no particular problem.

(2) Gliomas arising from neighboring nervous tissue and also the teratomas that originate in the region of the pineal gland. Following total or subtotal removal of such tumors from the region of the third ventricle, the operative and case mortality is exceedingly high and is at least 40 per cent. This mortality is approximately the same for both pinealomas and gliomas in this region and thus the surgical treatment of both these pathological groups can be considered together. It is this group of neoplasms whose surgical treatment is controversial.

On the basis of early experiences by one of us (R. G. S.), the following plan of treatment has been carried out over the past 10 years in all cases in which the signs and air studies conclusively demonstrated the presence of a third ventricle tumor other than a colloid cyst, etc. We now forego the satisfaction of an immediate biopsy and content ourselves with a subtemporal decompression followed by intensive irradiation. With such a regimen, the patient may follow one of three clinical courses. If the histologically unverified neoplasm should be of a radiosensitive type, the clinical prognosis is good. If the tumor should be malignant and insensitive to radiation, there will be no alleviation of symptoms. Likewise if the tumor should fall into the group of completely benign lesions, such as the colloid cysts, no therapeutic results will be achieved by such treatment. In both of these latter groups, when the subtemporal decompression fails to become soft after an adequate period of radiation and symptoms fail to regress, a direct exploration of the third ventricle is carried out. In this way the occasional colloid cyst which may be misdiagnosed by ventriculography will be demonstrated and surgically removed, and also subtotal removal of malignant tumors may at this time be carried out with subsequent histological verification to allow an accurate prognosis.

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Fourteen patients have been so treated. Of these 6 fall into the first group, in which an excellent result was obtained by such treatment. Six patients later proved to have malignant tumors and 2 proved to have completely benign cystic lesions, and these were subsequently reoperated upon. In the following reports, representative cases will be presented from each of these groups.

CASE REPORTS


Mr. S. S., aged 34 years, was well until 8 months prior to admission when he started having severe headache. He had rarely been free of headache during this time. He had occasionally been nauseated during the height of a headache, but never vomited. At times the headache was unilateral, more often on the left side. He had no other symptoms.

Examination. X-rays. X-rays of the skull were normal. Ventriculogram showed that the lateral ventricles were only mildly dilated and the 3rd ventricle was well outlined. A mass could be seen projecting down from the posterosuperior wall of the 3rd ventricle, approximately 1 cm. in diameter.

Operation (Jan. 4, 1936). Right subtemporal decompression.

Course. The headache was somewhat relieved by the decompression. Lumbar puncture on the 5th postoperative day showed a spinal fluid pressure of 320 mm. The patient was discharged on the 8th postoperative day and received a course of x-ray therapy.

Follow-up. The patient has remained well for 10 years since operation.

Case 2. Piloid astrocytoma of third ventricle. Transfrontal biopsy; subtemporal decompression; irradiation. Patient well.

Miss M. W., aged 10 years, first began to complain of headache 5 years prior to admission. She had recurrent attacks of severe headache about every 3 to 4 months for the next 4 years. The headache was always frontal in location and was often accompanied by vomiting. Three months prior to admission a very severe episode of headache occurred during which she was unable to retain fluids because of persistent vomiting for 3 days. The vomiting was preceded by nausea. There were no other complaints.

Examination. The left optic disc showed evidence of primary optic atrophy while there was 2D of chokes on the right. The visual fields showed a left temporal defect. The remainder of the examination was normal.

X-rays. X-rays of the skull showed convolitional atrophy with almost complete erosion of the posterior clinoids. Ventriculogram was not diagnostic because of poor filling but the impression was gained that the anterior horn of the left ventricle was displaced upwards and to the left.

Operation (May 18, 1931). Left frontal craniotomy. The left frontal lobe was elevated and the optic chiasm exposed. A friable gelatinous neoplasm presented between the optic nerves, more on the left. A small piece was removed for histological study. A right subtemporal decompression was then made. Pathological diagnosis: Astrocytoma fibrillare.

Course. The patient’s postoperative course was smooth and she was discharged 2 weeks later at which time the papilloedema was receding. She was given a course of irradiation, following which the decompression became soft. Her vision on the left, where the glioma had partially surrounded the optic nerve, was very poor and on the right was 20/70. Otherwise she continued to be asymptomatic. She has remained well for the past 16 years.

Comment. The above 2 cases represent typical examples of a glioma and a probable teratoma in the region of third ventricle which did well following this conservative therapy. Histological diagnosis was obtained in the last case only because the inadequate ventriculogram suggested a neoplasm in
the region of the left optic nerve with extension into the frontal lobe. However, exploration disclosed the astrocytoma of the diencephalon. It is unusual that this histological type of glioma should respond so well to irradiation.


Mr. E. S., aged 33 years, began to suffer from mild frontal headache 5 months before admission, although his doctor stated that personality changes had been present for 3 years. Shortly after onset of the headache, his eyesight began to fail and he noted dizziness and unsteadiness of gait. On one or two occasions, he had numbness and tingling in the distribution of the left 5th nerve and occasionally in the left arm. Three weeks before admission his condition became much worse and he had been bedridden since that time, with disorientation and complaining of voices talking to him.

Examination. The patient was confused as to time and place and was slightly drowsy. There was bilateral papilloedema, 5D on right and 3D on left. Corneal sensation was diminished on the left. There were moderate dysmetria and ataxia, more noticeable in the left arm, and a tendency to fall to the left.

X-rays. Ventriculogram showed only a small amount of air in the anterior portion of the 3rd ventricle with dilatation of the lateral ventricles. A mass could be seen protruding into portion 2 of the right lateral ventricle.

Operations. (March 7, 1936) Subtemporal decompression. (April 24, 1936) Right posterior frontal craniotomy. By a transventricular approach, a soft tumor mass was found protruding into the right frontal horn from the 3rd ventricle. It had also invaded the corpus callosum. A portion was removed for microscopic study and a portion about the size of a golf ball was removed by suction. Pathological diagnosis: Glioblastoma multiforme.

Course. Following the subtemporal decompression the patient was given 6000 r of irradiation with no remission of symptoms and no decrease in the bulging of the decompression. For that reason, he was reoperated upon and the malignant glioma disclosed. Following the second operation, he made an uneventful recovery and was sent home.

Follow-up. The patient died 3 months later.


Mr. E. L., aged 24 years, was well until 8 months prior to admission when he began having headaches which were severe and accompanied by vomiting. Shortly thereafter he noted the onset of diplopia which had intermittently continued until admission. On two occasions the headaches were so severe that he lost consciousness. In addition to the episodic headaches, he complained of occasional buzzing in the right ear.

Examination. There was bilateral papilloedema of 4D. He had right external rectus weakness and a questionable right supranuclear facial weakness.

X-rays. Ventriculogram showed tremendous dilatation of both lateral ventricles with no filling of the 3rd ventricle. The sella was enlarged and convolutional atrophy of the skull was present.

Operations. (Feb. 23, 1935) Subtemporal decompression. (June 8, 1935) Right frontal craniotomy. Following a transventricular approach through the right frontal horn, a greyish tumor mass was seen protruding through the foramen of Monro. After partial section of the fornix, the tumor was removed and found to contain a gelatinous yellow fluid. Pathological diagnosis: Colloid cyst.

Course. Following the subtemporal decompression, he was given a course of x-ray therapy. He improved at first, but the symptoms then returned and he was reoperated upon 4 months later with removal of the colloid cyst. Following this he did very well, and returned to work 4 weeks later. He has remained well for the past 12 years.

Comment. The last 2 cases represent instances in which the patient did
not do well following the conservative regimen outlined. In Case 3, a malignant glioma was proven at the second operation. In Case 4, the ventriculograms were misinterpreted as indicating a glioma of the third ventricle and for that reason the conservative surgical treatment was carried out, without relief of symptoms. Four months later a direct surgical exposure of the lesion disclosed a colloid cyst, which was removed. In both these groups of cases the initial trial of conservative measures did the patient no ultimate harm.

DISCUSSION

The symptomatology of these cases was remarkably constant if those of malignant tumors are excluded. Headache, vomiting and failing vision were common to all of them and in 8 cases these were the only symptoms. Two patients complained of inconstant tinnitus, often during the height of the headache, and recurrent diplopia in addition to the above symptoms. In all the cases the most interesting feature of the headache was its paroxysmal nature. During an attack the pain was very severe, usually frontal in distribution, but between attacks there was little or no pain. Presumably the mechanism responsible for such headache was an intermittent blockage to the flow of cerebrospinal fluid through the third ventricle. If this assumption is correct, then gliomas as well as benign cysts are capable of producing such intermittent obstruction.

In 8 cases the only positive neurological finding was a high degree of papilloedema. The lack of other neurological manifestations would indicate that each lesion was primarily of the third ventricle with minimal involvement of the hypothalamus, thalamus or basal ganglia. In 5 cases other neurological findings were present: paralysis of the 6th nerve, paresis of the 7th nerve, trigeminal hypesthesia, occasional visual field defects and occasional signs of thalamic or pyramidal tract involvement in the larger, invasive malignant tumors. The symptomatology and pathophysiology of these lesions have been well summarized by Fulton and Bailey. 3

The diagnosis in each case was substantiated by the characteristic ventriculographic findings. In all instances of radiosensitive glioma, the neoplasm occupied the posterior half of the third ventricle as judged by ventriculography. One of the benign tumors was biopsied and 3 of the malignant gliomas were histologically verified when subtotal removal of the neoplasm was performed. The pathology in both of the benign cystic lesions was confirmed at operation. In the remainder of the cases, and in the majority of the cases treated by decompression and irradiation alone, verification of the lesion rested solely upon the response to irradiation.

There are no methods available for determining from clinical examination or air studies which third ventricle tumor is malignant and which is benign. The duration of symptoms may offer a clue, yet it is interesting to note that 3 patients in the radiosensitive glioma group had symptoms for less than 1 year and 1 had complained of headache for only 1½ months. The clinical data for the entire series of patients are summarized in Table 1.
<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Duration of Symptoms</th>
<th>Ventriculogram</th>
<th>X-ray Therapy</th>
<th>Remission of Symptoms</th>
<th>Resection</th>
<th>Colloid Cyst (Proven)</th>
<th>Malignant Glioma (Proven)</th>
<th>Pneumonia (Proven)</th>
<th>Survival</th>
<th>Comment</th>
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<tr>
<td>W.S.</td>
<td>15</td>
<td>M</td>
<td>4 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>Pt. well</td>
</tr>
<tr>
<td>B.S.</td>
<td>19</td>
<td>F</td>
<td>1.5 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>6 yrs.</td>
<td>Pt. well</td>
</tr>
<tr>
<td>S.S.</td>
<td>34</td>
<td>M</td>
<td>8 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>10 yrs.</td>
<td>Pt. well</td>
</tr>
<tr>
<td>J.N.</td>
<td>28</td>
<td>M</td>
<td>4 yrs.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>18 yrs.</td>
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<tr>
<td>M.W.</td>
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<td>x</td>
<td>x</td>
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<td>x</td>
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<td>R.D.</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>1.5 yrs.</td>
<td>Pt. well</td>
</tr>
<tr>
<td>A.A.</td>
<td>22</td>
<td>M</td>
<td>6 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>2 mos.</td>
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</tr>
<tr>
<td>P.M.</td>
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<td>M</td>
<td>2 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>L.T.</td>
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<td>2 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>4 days</td>
<td>Died</td>
</tr>
<tr>
<td>P.B.</td>
<td>13</td>
<td>M</td>
<td>6 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>8 yrs.</td>
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</tr>
<tr>
<td>E.S.</td>
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<td>M</td>
<td>4 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>3 mos.</td>
<td>Died</td>
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<tr>
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<td>F</td>
<td>3 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>6 mos.</td>
<td>Died</td>
</tr>
<tr>
<td>J.P.</td>
<td>25</td>
<td>M</td>
<td>3 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>10 yrs.</td>
<td>Pt. well</td>
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<tr>
<td>F.L.</td>
<td>24</td>
<td>M</td>
<td>8 mos.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>12 yrs.</td>
<td>Pt. well</td>
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TREATMENT OF THIRD VENTRICLE TUMORS

The necessity for the subtemporal decompression as a part of this conservative course may be questioned. It was undertaken in each instance to preserve eyesight and to relieve headache and vomiting. If every third ventricle neoplasm were highly radiosensitive, the decompressive operations might be dispensed with. However, if the lesion proved not to be radiosensitive, then serious damage to vision might occur while awaiting the results of irradiation. Furthermore, in advanced cases, the subtemporal decompression is a valuable safety valve during the 3 or 4 weeks required for the roentgen treatment. The subtemporal decompression serves one other important function. It gives reliable information regarding the block of the cerebrospinal fluid pathways. Thus in all cases in which the decompression fails to become flat within 8 weeks following irradiation, a surgical exposure of the third ventricle is indicated. A procedure such as the Torkildsen ventriculostomy would fulfill all the criteria for reestablishment of the spinal fluid pathways mentioned above. But under such circumstances, one would have no way of knowing whether the neoplasm was radiosensitive until actual damage to the diencephalon and neighboring structures had occurred. Likewise a recurrence of the neoplasm would remain unrecognized until a later date than would otherwise occur had a subtemporal decompression been performed. For these reasons it is felt that the sacrifice of nervous tissue in the temporal lobe is justified.

In this series of 12 cases of glioma (including pinealoma) of the third ventricle, 6 patients responded well to this conservative treatment and have remained well. Six additional patients proved to have malignant tumors which did not respond to irradiation and in these cases, subsequent surgical exposure of the neoplasm with subtotal removal was carried out. These patients, with one exception, have all died within 3 years of operation. Thus the operative and case mortality for the 6 cases of the benign glioma group (including 3 probable pinealomas) was 0 per cent, and all the patients are living. In the group of malignant gliomas, the operative mortality was 33 per cent and the ultimate mortality was 83 per cent at the end of 3 years.

Araki\(^1\) reported an operative mortality of 38.9 per cent for 36 cases of third ventricle tumor (including 20 pineal tumors) which he reviewed from the literature.\(^2\) Of this group, 30 patients were operated on by a unilateral posterior transcallosal approach; 4 by a transventricular route; and 2 by resection of the occipital lobe. The operative mortality was 30–50 per cent by the first two procedures and 100 per cent by the last method. There was no definite difference between the results of operations for tumors of the third ventricle and those for pineal tumors. Not included in this series are the 12 pinealomas and 11 tumors of the third ventricle reported by Jefferson and Jackson,\(^3\) their mortality in the latter group of non-malignant tumors being 37 per cent.

The life expectancy of patients with malignant neoplasms in this locality is exceedingly small regardless of the type of treatment. However, there is no comparison between the hazards of radical surgical removal and the
excellent results obtained by this type of conservative treatment in the group of radiosensitive lesions.

Because of his 100 per cent case mortality in cases of pineal tumor, Cushing in 1929 began treating such cases in this same conservative way. He said:

It has been our custom, when a tumour of the pineal region was suspected or has been demonstrated by ventriculography, to make a generous subtemporal decompression, should loss of vision be feared, in the hope of temporarily relieving the tension while the tumour is being subjected to active radio-therapeuis. This is of course a therapeutic shot in the dark so long as the tumour's precise histological type is unknown; but it may be condoned on the grounds that the pineoblastomas at least may be looked upon as tumours probably as susceptible to the effect of radiation as the cerebellar medulloblastomas. There have been no postoperative fatalities in the 10 cases diagnosed as "pineal tumour unverified" and thus treated.

Four additional cases have been so treated by Horrax and Daniels with good results.

Thus if we think only of clinical results, it is our belief that many third ventricle tumors can be treated in this manner with a lower mortality rate and a much shorter period of hospitalization than when radical means are employed.

SUMMARY

1. In all patients in whom the symptoms, neurological signs and ventriculogram conclusively demonstrate the presence of a third ventricle tumor (other than a colloid cyst), a subtemporal decompression is performed and this is followed by intensive irradiation. In those cases in which the patient fails to respond to this conservative regimen, a direct surgical attack on the lesion is carried out. In this way, the occasional cyst (colloid or of the septum) will be demonstrated, and subtotal removal of malignant lesions with histological verification can be carried out.

2. Fourteen patients have been so treated. Of these, 2 failed to respond and subsequent reoperation disclosed cysts which were removed. Six patients had malignant gliomas which were proven at subsequent reoperation and 5 died within 3 years. Finally, 6 patients (including 3 with probable pineal tumors) treated in this manner did well and all are at present living.

REFERENCES