"BRAIN TUMOR"

This was a 48 year old [redacted] female who had been in excellent health and who had had 14 children in a total of 16 pregnancies. She had no significant family history and denied alcoholism or smoking. She was fairly obese and had minor digestion troubles.

Two months prior to admission she noticed a slight haziness before her right eye. The haziness gradually became worse and ten days prior to admission she noted that she could not see at all from the right eye and that often the left eye was weaker than normal. During these two months she had experienced intermittent, dull frontal headaches but no symptoms of diplopia or muscle weakness or paresthesias or convulsions. She went to the Emergency Room and was sent to Eye Clinic where the following findings were noted:

The blood pressure was normal.
On the right eye she had light perception; on the left eye, acuity was 20/40 with or without correction.
She had 4 diopters papilledema with a few small hemorrhages on the left disc.
There were no venous pulsations noted.
In the right eye there were numerous superficial hemorrhages both large and small and extending along the vein.
Pupils were equal and reacted well.
She did not cooperate very well but it could be established that she had a right hemianopsia which of course could only be demonstrated in the left eye.

She was referred to the Neurosurgical Service where she was found to be slightly dull and where the eye findings were confirmed. Reflexes were equal and there were no other neurological findings. The steady progression of the symptomatology made a tumor most likely and ventriculograms and arteriograms were performed. A dense tumor stain was seen on the arteriogram in the temporoparietal lobe. The staining was so intense that a meningioma with very high degree of vascularization was considered most likely.

The patient was operated on and a huge reddish-purple fleshy mass was removed. Frozen section came back as glioblastoma. It was felt that as much as was possible had been removed of the tumor and later permanent section changed the pathological diagnosis back to meningioma.

Immediately post operatively the patient was aphasic and had a right hemiparesis. She was seen six months later and had then only slight right-sided weakness and was able to see somewhat out of the left eye. The right eye remained blind.

CASE 2: [redacted]

A 27 year old [redacted] female who was first admitted at the age of 5 yrs. when she had a positive Wassermann in the blood and negative in the spinal fluid and focal convulsions. She was followed in clinic and kept under control until 3 days prior to admission when she developed generalized seizures involving both sides and followed by weakness and difficulties in speaking. On admission she had several right-sided seizures which was in marked contrast to her previous episodes which over the last 22 years had involved only the left arm.

On examination she showed a questionable nystagmus with a weakness of the right masseter, a right facial palsy of central type, increased reflexes on the right and no specific sensory changes. She had left-sided EEG focus.

Due to the fact that she had changed seizure pattern it was felt that the new seizures might indicate the development of a tumor and she had left carotid arteriogram which showed a small rounded tumor with increased vascularity. Pneumoencephalograms confirmed the findings and gave an estimated 6 x 4 cm tumor with probable preoperative diagnosis of astrocytoma. Postoperative diagnosis was astrocytoma grade 3 and radiation treatment followed.

She was last seen two months ago and at that time developed no further neurological signs. Seizures of the old type had reoccurred and she at once had to be admitted for status epilepticus but when she was taking medication she was well controlled.

CASE 3: [redacted]

This is a 48 year old [redacted] male who was hit on the head by a machine while working at the [redacted]. He received a laceration over the right frontal area. He was taken to the hospital where it was found that he had a large non-tender mass which was protruding over the top of his head. On questioning he stated that this mass began as a small elevation at the center of his head and slowly had grown over one year. It had never been painful. He had had no increase in frequency of headaches and the headaches did not seem to be related to the mass. There was no history of other neurological symptoms. It was felt that the mass might represent a meningioma and the patient was transferred to [redacted]. On examination he was found to have the above described mass and a question of papilledema was raised. There were no neurological signs. Chest films were normal. Skull films showed a 9 cm hemispherical bony mass which was approximately 2 cm thick. It had an increased bone density with a striated appearance. The EEG was normal. The carotid angiography showed a meningioma in the upper part of the frontal lobe occluding the sagittal sinus without any marked invasion of the brain. Dye was injected into the sinus and the occlusion was confirmed. On operation the tumor was removed and the sinus which was filled with tumor resected until free flow appeared. The pathological diagnosis was meningioma.

CASE 4 [redacted]

This 54 year old [redacted] male was admitted to the Medicine Service with a gradual onset of left-sided weakness of about one month's duration and steadily progressive. He also has a slight lower left facial weakness. He has had no convulsions and no severe headaches. It was described that he had not been himself prior to admission and specifically evidence of recent memory loss had appeared.

The patient had first gone to the [redacted] and had received the diagnosis of amyotrophic lateral sclerosis with stroke.

When admitted he was found to have a right frontal temporal slow wave focus on electroencephalogram, a normal skull x-ray, a question of mediastinal nodule enlargement and on pneumoencephalograms space occupying lesion in right cerebral hemisphere at the juncture of frontal and temporal lobes which was confirmed by carotid arteriography. Increased vascularity was noted.

Following the arteriogram the patient became obtunded, hemiplegic and developed a 6th nerve palsy on the right side. His pulse fell to 60 and he had difficulty with respiration. He was operated on as an emergency and a large metastatic carcinoma was found in the right frontal parietal region. Pathology confirmed the operative diagnosis and suggested metastatic pulmonary carcinoma. It is to be noted that his spinal fluid was completely normal.

He expired shortly after operation and no post was obtained.

CASE 5: [redacted]

This is a 45 year old [redacted] male who by profession was a [redacted]. He had been a very reliable and friendly man up till 4 months prior to admission when he started drinking and he got into frequent arguments with his friends and with his wife. He was finally divorced and had one month later a grand mal seizure. Subsequently several episodes of changes in consciousness occurred and he was admitted to a hospital 5 days prior to admission here in a severely confused state. During one of his episodes of drinking he had been in difficulty with the police and upon being taken into custody had been hit on the back of his head. Following this he complained bitterly of severe occipital headaches.

When no cause for his confusion could be discovered he was transferred to [redacted] with a tentative diagnosis of subdural hematoma. Here several alternative diagnoses were entertained and the neurological status continued to show confusion as the only positive sign. The skull x-ray was normal and the EEG was not done. A spinal tap was done and was normal.

In view of the fact that the patient did not improve and that the time lapse since his last drinking episode was longer than would be compatible with a post-alcoholic confusion, an arteriogram was done. This showed a vascular tumor in the left temporal lobe. The tumor was thought to be either a glioblastoma or a meningioma. On operation a tumor was found in the corresponding region and was thought to be a glioblastoma, a thought which was confirmed by the pathology department.

The patient has remained confused although not quite so severely for the six months following the operation.

(Adapted from A. B. Baker: Brain Tumours. The Journal Lancet 80:410, 1960)

A. Birth to 16 years.

Cerebellar astrocytoma	Headache and incoordination over months	Surgical	Cure
Cerebellar ependymoma	Acute onset intracrenial pressure	Surgical	Palliative
Medulloblastoma	High IC pressure, truncal ataxia	Surgery plus X-Ray	Transient
Craniopharyngeoma	Headache, decrease vision, optic atrophy	Surgery	Temporary
Pinealoma	IC pressure, upward gaze paralysis	X-Ray plus Shunt	"
Brain stem glioma	Progressive cranial nerve palsies	None	"

B. 16 to 45 years.

Cerebral astrocytoma	Progressive focal involvement-years	Surgery	Palliative
Meningioma	Seizures, focal signs-years	Surgery	Cure
Acoustic neurinoma	Deafness, tinnitus	Surgery	Cure
Pituitary adenoma	Headache, bitemporal field cuts	X-Ray (Surgery)	Semi-cure
Angioma	Seizures, transient weakness	?	None

C. Middle and old age.

Metastatic tumour	Varying plus general symptoms	Surgery	Palliative
Glioblastoma multiforme	Progressive focal-months	None	"

BRAIN TUMORS 1956 - 59

Parkland Memorial Hospital

1.	Astrocytoma	13
2.	Glioblastoma multiforme	8
3.	Medulloblastoma	2
4.	Neuroepithelioma	1
5.	Ependymoma	2
6.	Meningioma	9
7.	Craniopharyngioma	2
8.	Hemangioma of intrinsic vessels of brain	1
9.	Cholesteatoma	1
10.	Melanoma	2
11.	Fibrosarcoma	1
12.	Adenocarcinoma	11
13.	Epidermoid carcinoma	4
14.	Tumors, uncertain histologic type	1

A.	Primary, malignant	23
B.	Primary, benign	16
C.	Metastatic	18

FACTORS INVOLVED IN THE PRODUCTION OF SYMPTOMS FROM A BRAIN TUMOR

A. Increased intracranial pressure:

Occurs through four different mechanisms.

1. The tumor mass occupies a certain amount of space.

2. The tumor occludes the outflow of spinal fluid.

3. The tumor causes an accumulation of fluid in surrounding cells (spaces).

4. Obstruction of venous outflow.

The increased pressure leads to generalized symptoms:

1. Papilledema.

2. Nausea, vomiting, dizziness.

3. Generalized convulsions.

B. Displacements of intracranial structures result in:

1. Headache.

2. False localizing symptoms such as abducens paralysis.

C. Localizing symptoms.

These vary with the location and type of tumor.

(Wohlfart, G.: Hjärntumorer, Nordisk Lærebog in Intern Medicin, Gyldendal 1958)

Of particular importance are psychiatric symptoms:

Pool, J. L. and Correll, J. W.: Psychiatric symptoms masking brain tumor. J.M.Soc. New Jersey 55:4-9, 1958.

Of 25 patients reviewed, 13 had been treated with psychotherapy for 2-15 years.

Depression was the commonest diagnosis. Ten had benign, operable tumors.

EXPERIMENTAL PATHOLOGY

Augustsson, K., and Kahler, H. Studies on gliomas in tissue culture, using time lapse cinematography.
J. Neuropathology and Experim. Neurology 19:469, 1960.

Astrocytes and oligodendrocytes from tumors and normal material have very similar characteristics. The so-called atypical forms seen in histological material are due to unfavorable environment and come and go in the tissue culture. In contrast an entirely different cell type is seen from malignant gliomas and has motility characteristics which do not correspond to glia. This is interpreted as a true tumor cell having mitoses. In addition fibroblasts appear, probably from blood vessels.

A different view is presented by:

Lumsden, C. E.: In Windle, ed. Biology of Neuroglia. Springfield, p. 273, 1958.

Of interest in this connection is that experimentally induced tumors often assume different characteristics depending on the environment.

Zimmerman, H. M.: Nature of glioma as revealed by animal experimentation.
Am. J. Path. 31:1-29, 1955.

Greene, H. S. N. The transplantation of human brain tumors to the brains of laboratory animals.
Cancer. Res. 13:422, 1953.

Miyawaki, H. and Ishii, S.: The heterologous intracerebral transplantation of human brain tumors.
Arch. Path. 70:508, 1960.

One take out of 38 even with whole body irradiation and cortisone treatment, the tumor taking a pinealoma showed simplification in structure.

Smyth, G. E. and Henderson, W. R.: Observations on cerebrospinal fluid pressure.

J. Neurol. Psychiat. 1:226, 1938.

One of the first articles emphasizing the danger of lumbar puncture in the presence of unequal pressure in the ventricles and the lumbar space. Five out of six patients had herniation and intrapontine hemorrhages.

Howell, D. A.: Upper brainstem compression and foraminal impaction with intracranial space occupying lesions and brain swelling.
Brain 82:525, 1959.

McMenemey, W. H. and Cumings, J. N.: The value of the examination of the CSF in the diagnosis of intracranial tumors.
J. Clin. Path. 12:400, 1959.

Emphasizes the evaluation of the fluid for tumor cells especially if a falling spinal fluid sugar is noted. Tumour cells are frequently found in carcinoma, rarely in gliomas.

Marks, V. and Marrack, D.: Tumour cells in the cerebrospinal fluid.
J. Neurol. Neurosurg. Psychiat. 23, 194, 1960.

Centrifugation and redilution with albumin-EDTA gives a better smear than previous techniques. Normally occurring cells are lymphocytes, G and M cells. Other cells, particularly those which look different, are larger, large nucleus have and show mitoses are highly suspect. Secondary carcinoma cannot be separated from primary tumours. Low sugar supports cardinomatosis dx. The degree of false negatives not estimated but one false positive occurred. (Three more false positives later reported-meningitis-sarcoid, syphilis.)

DIAGNOSIS

Laux, W.: Zur Diagnostik der Hirntumoren im höheren Lebensalter. Deutsch. Med. Wchnschr. 81:98-101, 1956.

Peyton, W. T.: Tumors of the brain in the elderly. Geriatrics 14:697, 1959.

The reason why tumors are considered more uncommon in the higher age groups is because they are usually overlooked. Actually no statistical difference in incidence exists between the age group 50-60 and the group 60-70. Glioblastoma is very common and it is the author's practice to attempt removal of the tumor.
He also operates on solitary metastasis.
Most common symptoms are headache and personality changes, paralysis and seizures.

Dodge, H. W.: Epileptic seizures associated with mass intracranial lesions. Proc. Staff Meet. Mayo Clinic 33:487, 1958.

When a patient in the age group 29-59 has seizures of focal character and of recent onset the burden of disproving the existence of a mass lesion lies with the physician.
In the age group 50-59 the grand mal seizure is not infrequently associated with brain tumor. (Still of all people who have their first seizure after age 30 only 15% have brain tumors.)

Wickbom, I.: Angiography and pneuography in the diagnosis of slightly space occupying supratentorial tumours. Acta Radiol. 46, 158, 1956.

In 30 out of 71 cases the use of only one of the two methods was unsatisfactory.

COMPLICATING FACTORS

Bickenstaff, E. R., Small, J. M., and Guest, I. A.: The relapsing course of certain meningiomas in relation to pregnancy and menstruation. J. Neurol. Neurosurg. Psychiat. 21:89, 1958.

Lundberg, N., Kjallquist, A., and Chuan Bien.: Reduction of increased intracranial pressure by hyperventilation. Acta Psychiat. Neurol. 34:Suppl. 139, 1959.

Intracranial pressure rises are relieved by hyperventilation at 11 l/min. or higher. Interruption of hyperventilation is accompanied by a sudden rebound and can be very dangerous. It is therefore distinctly contraindicated to start IPPB on strokes, tumors and other intracranial lesions without a thorough knowledge of the handling of intracranial emergencies. The hyperventilation seen in these patients tends to correct the pressure and should not be tampered with.