Intracranial Meningioma

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I. CASE REPORTS

INTRACRANIAL MENINGIOMA

CASE I

Forty-five year old, white male with motor aphasia and a two-year history of right-sided Jacksonian seizures. Meningioma, left fronto-parietal region. Postoperative fatality.

Convulsions

1931 - Patient was told that he had a convulsion during the night. During this year, he has 9 similar attacks, all at night. He is not aware of them but is observed by his wife.

1932 - Experiences 9 attacks (about one month apart). During this year, he develops tingling sensation in the fingers and toes on the right side. He also observes that the attacks start with twitching of the right side of the face.

1933 - Attacks are more frequent, being clonic and tonic in character and occasionally accompanied by incontinence. At times, he is conscious throughout the attacks. Also experiences a speech difficulty.

Admitted

10-24-33 - Physical examination - essentially negative except for evidence of very mild right hemiplegia with motor aphasia, characterized by aphemia, agraphia, dyslexia and allochiria. Visual fields negative. Laboratory: Urine -negative. Serologic test for syphilis on blood - negative. Spinal fluid - pressure 16 mm. mercury, no leucocytes. Kolmer Wassermann and Kline- 4+. X-ray of skull - negative.

Operation

11-13-33 - Oval tumor, 5x3x2.5 cm., enucleated in left fronto-parietal region. The surrounding bone and meninges are very vascular and transfusion is necessary. The tumor is loosely attached to the surrounding tissue, the attachment being for the most part vascular.

Unconscious

11-14-33 - Does not regain consciousness. Blood pressure 140/80. Dressings removed and no evidence of pressure is found. Spinal puncture shows no increased intracranial pressure. Temperature rose to 107°.

Expired - 11-16-33.

Description of Brain Tumor

Gross: The tumor is an oval mass, measuring 5x3x2.5 cm. It is attached on one surface to a flap of dura which is removed with the tumor. The opposite side of the tumor is fairly smooth with a slight amount of lobulation. The external surface (opposite the dura) is marked by several branching blood vessels.

On cross section, the tumor is of uniform appearance. It is reddish-brown in color, soft, shows no hemorrhage or calcareous nodules. A small piece of brain tissue is attached to one portion of the tumor opposite the dura.

Microscopic: The predominating type of cell is a long spindle type. The axis of the various cells run in various directions. There is slight tendency toward whorl formation. The tumor is quite vascular and numerous capillary spaces are seen. A few large nuclei and occasional mitotic figures are seen.

Conclusions: Endothelioma (psammoma) of dura.

Note: No autopsy. Cause of death not known.

CASE II

Fifty year old, white male with 3-month history of left-sided Jacksonian motor seizures. Flat meningioma over right parietal region (meningioma en plaque). Too extensive for removal. X-ray therapy.

Jacksonian Epilepsy

7- -32 - Headache associated with convulsive seizure which begins in the left big toe and culminates in a generalized convulsion. Attacks begin with pain in the left great toe. This is followed by jerking of the toe. The thigh then begins to jerk. The clonic movement then involves the entire left side of the body. Finally, his left arm and shoulder become tonic. He loses consciousness. He sleeps for several hours after the attacks. The convulsions become more severe and frequent. He has paresis and disturbed sensibility of the left side of the body. Since his first attack, he drags his left leg and complains of weakness of the left arm.

Admitted

10-13-32 - Physical examination: Well-developed, well-nourished, white male, 48 years of age. Eye grounds - negative. Cranial nerves - negative. Left hemi-paresis with increased deep reflexes on that side. Hypalgesia over left lower leg. While under observation, he has two convulsions essentially the same as already noted. Laboratory: Blood and urine - negative. X-ray of skull - negative. Encephalogram - marked deformity of right ventricle, chiefly on lateral and superior aspects. Ventricle is displaced downward.

Operation

11-4-32 - Right parieto-frontal osteoplastic flap. Diffuse flattened tumor spread widely over the parietal region. Microscopic diagnosis - endothelioma. Removal not attempted. Deep x-ray therapy given. Discharged.

Follow-up

6-12-34 - Letter from local physician: Totally disabled. There is slight paralysis of the left side of the face. He has involuntary stools. Hearing and sight are good, and he is apparently normal mentally except for emotional instability. He is well nourished and his appetite is good. "In a year or year and one-half following surgery, he apparently has not taken the course of usual highly malignant brain tumor."

Readmitted

9-21-34 - Physical examination: left arm and leg spastic. Patient seems slightly confused and emotionally unstable.

Re-explored

10-10-34 - Elevation of flap. Tumor mass extends along the upper part of the right cerebral hemisphere. The exposed area is about 4 inches in diameter but the limits of the tumor can not be ascertained. The tumor seems to push the cortex before it. It is dark in color, interspersed with yellowish areas. Its vascularity is not greater than the rest of the tissue. Biopsies are taken from the anterior and posterior regions of the tumor. Extent of the tumor makes removal impossible.

X-ray treatment

Deep x-ray and discharged 11-10-34. At the time of discharge, he regains the use of his left hand and left leg slightly.

Biopsy of tumor: Shows round and flattened, polygonal cells with an abundance of cytoplasm. The cells are large and there is only a slight tendency to whorl formation. There is no definite palisading. The piece of tissue is very cellular and no mitotic figures are seen. Diagnosis: Meningioma, cellular type.

II. ABSTRACT

INTRACRANIAL MENINGIOMA

By Alex Blumstein.

General

These tumors may arise from the leptomeninges (almost anywhere). In Cushing's series, they form 13% of all intracranial tumors (271 or 2,023). In Davidoff's series (cited by Cushing), 31% of the tumors in the collection of the Psychiatric Institute of New York are of this nature and, as would be expected, are usually situated near the frontal lobes. They are frequently

slow growing and often give rise to very few symptoms in the early and even in the late stages of their expansion.

Location

Cushing observes that the majority of the lesions occur in the anterior half of the cerebrum. In a series of 75 "cerebral fibroblastoma" (Frazier and Alpers), the following sites are given:

Area	No. of Tumors
Frontal	22
Precentral	18
Temporal	18
Parietal	8
Occipital	9
Total	75

Diagnosis

1. Life History: These tumors are essentially slow growing and, according to Frazier and Alpers, years may elapse before they give signs of their presence. They believe that 5 years is not an unusual period to elapse before there is "the slightest inkling of the existence of a tumor." In 2 cases of the frontal lobe series, there is a history of headache for 10 years; in one case in which there is a tumor of the temporal lobe, vision had been failing for 10 years.

2. Age: They occur in patients of middle age. Of 185 cases, the average age is 43 years at the time of the first hospital admission. In 75 cases (Frazier and Alpers), there are only six cases under 20 years of age (3, 6, 10, 11, 12, and 18, respectively). The average age is 38 years.

3. *Symptoms: Those within the cranial chamber have their favorite sites and corresponding symptomatology. Tumors involving the frontal lobes are particularly common and easily overlooked since the symptoms they provoke simulate paresis or other mental disorders.

*The general symptoms of increased intracranial pressure are not included.

a. Convulsions are not uncommon. In 75 cases, the following incidence is given:

Location	Jacksonian Convulsion	General Type
Frontal	3	4
Precentral	8	2
Temporal	2	3
Parietal	5	0
Occipital	1	4

It can be seen that Jacksonian convulsions do not always imply a precentral tumor. However, given a case of Jacksonian epilepsy with monoplegia or hemiplegia, increased intracranial pressure and no cuts in the visual field, the lesion is in all probability in the precentral gyrus. In 291 cases of intracranial meningiomas, 90 had convulsive seizures (Groff); 18 had grand mal, 7 petit mal, 65 Jacksonian seizures (36 motor type, 22 sensory-motor type and 7 pure sensory). Fifty-four of the cases of Jacksonian epilepsy had tumors involving the frontal or parietal lobe. Of 116 patients with meningioma in the frontal, parietal or temporal lobe, 80 had convulsions.

Of 21 cases of posterior fossa tumors, not one was complicated by convulsive seizures.

Of 66 patients with preoperative convulsions, 24 were relieved (average follow-up 4 years).

Thirteen of 201 cases without convulsions developed seizures after operation.

b. Regional considerations: Frazier and Alpers put their cases in 5 groups:

(1) Frontal: No picture is common to all. Mental symptoms are lacking in three-fifths of the cases. They are able to identify 4 types of syndrome in association with this region.

(2) Precentral: Weakness and motor Jacksonian attacks are important aids in diagnosis.

(3) Temporal: (18 cases). Eight caused weakness or hemianopsia and 2 aphasia.

(4) Parietal: Sensory Jacksonian attacks and astereognosis are helpful in localization.

(5) Occipital (9 cases): Four caused hemianopsia and 4 aphasia.

Central vision is relatively intact as compared with lesions in the temporal lobe in which central vision is usually implicated.

c. Special Syndromes: Cushing has, for practical purposes, studied the meningiomas with particular reference to their site of origin. He gives an analysis of 85 cases.

(1) Those that arise from the basilar leptomeninges in the vicinity of the pituitary fossa. They are especially prone to cause primary optic atrophy.

(a) Those from the sphenoidal ridge lateral to the sella press against the adjacent optic nerve and finally implicate the chiasm causing a homonymous hemianopsia. (Voris and Adson report 2 cases in this region with slowly developing proptosis and an associated density of the bone.)

(b) From the olfactory groove, these provoke a characteristic chronology of symptoms beginning with unilateral anosmia followed by an ipsolateral optic atrophy and ultimately a choked disc in the contralateral eye. (Foster Kennedy syndrome).

(c) Those arising from the arachnoid over the tuberculum sellae separate the optic nerves, elevate the chiasm, and ultimately lead to blindness, absorption of the sella, and to hypopituitary, hypothalamic, uncinate and general compression symptoms.

(2) The cranial-nerve foraminal tumors:

(a) At the porus acusticus with loss of hearing as the inaugural symptom (1 case of 85).

(b) From the trigeminal sheath with trigeminal pain and hypesthesia as early symptoms (5 cases).

(c) From arachnoid sheath of the optic nerve producing a unilateral painless exophthalmos.

(3) Tumors of the convexities (28 cases of 85) (temporal, frontal, paracentral, parietal and occipital).

(4) Parasagittal meningiomas (27 cases of 85). The tumors arise from the wall of the sinus or its lateral expansion, and are apt to have some attachment to the falx. Jacksonian seizures originating in a foot and followed in the course of years by a spastic paralysis in the corresponding leg is strong evidence of a parasagittal meningioma.

(5) Meningioma of the falx (2 cases of 85).

(6) Tumors of the transverse and sigmoid sinus. Two were supratentorial and 5 were subtentorial arising from the lower wall of the transverse sinus and giving a cerebellar syndrome.

4. Ocular changes. Papilledema was recorded in 26 of 75 cases and varies from 1 to 10 diopters. Unequal choking is not a striking feature. It seems that a higher degree of choking is present in tumors of the frontal lobe. One of 8 cases of parietal tumor shows choking. There are 4 instances of exophthalmos, all in frontal lobe tumor.

5. X-ray changes. Sosman and Putnam reviewed the roentgenologic finding in a group of 95 verified intracranial meningiomas; 47 showed recognizable changes characteristic of the tumor.

The characteristic bony changes are:

a. Erosion and vascularity
b. Osteoma formation
c. Spicule formation
d. Diffuse thickening
e. Enlargement of the meningeal channels

The tumor itself may calcify (probably the result of a regressive change).

"The changes are most frequently and clearly seen in meningiomas of the vault. Tumors about the sella are apt to cause a nonspecific distortion and destruction of the clinoids. Tumors of the base are often accompanied by a diffuse thickening of the floor of the skull."

Frazier and Alpers (75 cases) found 5 instances of calcification and 10 of hyperostosis; 6 and 13% respectively. In one instance, there is displacement of a calcified pineal gland. There are other cases in which the findings are indicative of increased intracranial pressure only.

Pathology

1. Distribution. Most of the lesions are found in the anterior half of the brain, particularly in the frontal, precentral and temporal regions (Frazier and Alpers, and Cushing).

2. Gross features. They are encapsulated and usually lie on the surface of the brain. Rarely they lie within the brain substance. They vary in size from 10 to over 310 grams. Their surface is usually lobulated. They are more or less spherical but they may be flattened and give the appearance of a granulomatous meningitis (meningioma en plaque). They may straddle the longitudinal sinus and compress both hemispheres. They may be firm, hard or soft in consistence. They are often very vascular and not infrequently they are cystic. In the great majority of instances, they are attached to the overlying dura which furnishes the blood vessels. They push the brain tissue before them without invading the substance. They apparently never penetrate the pia (Frazier and Alpers, and Mallory). Rarely, they penetrate the skull into the soft tissues outside. Frazier and Alpers report a case in a child, aged 10 in which a "relatively diffuse type of fibroblastoma lay on the dura and had no attachment whatever to the arachnoid."

3. Multiple meningiomas. In the great majority of cases, the tumors are single. Raaf and Craig add to the cases reported by Hosoi and bring the total number of reported cases of multiple intracranial meningioma to 29. Mallory comments on the occasional occurrence of meningioma in association with von Recklinghausen's disease. Cushing (Tumors of the Nervus Acusticus, p. 241) refers to reported cases of meningiomas associated with von Recklinghausen's disease.

4. Cut surfaces vary widely. Some are granular, others are homogeneous and cystic and others are densely fibrous. The color is sometimes a fleshy red and at other times a yellowish white.

5. Microscopic. Mallory in a study of 30 tumors found a series running from very cellular types to dense fibrous forms. The cells are usually large and more or less flattened, but are sometimes spindle shaped. They often show "a marked tendency to wrap themselves around each other or around strands of connective tissue or around blood vessels, so that variously sized, concentrically arranged, masses of cells (whorls) are formed". The fibrous whorls may become calcified and form psammoma bodies. A palisade arrangement of nuclei due to their arrangement in regular rows or clumps is sometimes seen.

Histogenesis: This is still in dispute. It is generally accepted that they arise from the arachnoid, but this may not be true in every instance. (Frazier and Alpers). Mallory believes the cell type to be a fibroblast. There are a number of subtypes--"angioblastic, chondroblastic and osteogenic as well as fibromatous and sarcomatous". The similarity of the tumor to the structure of arachnoid villi is pointed out by a number of observers. The cells in the proliferating buds on the surface of the arachnoid and of its villi often show a concentric arrangement or whorl formation. Occasionally, these whorls undergo calcification forming psammoma bodies.

Prognosis: These tumors are disconcert-

ingly prone to recur. Some recur very rapidly (4 to 6 months), others give signs of recurrence after a long delay (12 years in one instance). Cushing intimates that those with fibrous whorls are less apt to recur than the cellular types. (No statistics included on this point.) The surgical hazards are increased by the vascularity of the lesions, huge size which they may attain and their tendency to involve major venous sinuses, particularly the sagittal. Further, there is a tendency to secondary edema and cerebrospinal fluid fistulae. (Adson recommends the removal of hypertrophied or invaded bone as a possible aid in the prevention of recurrences.)

Statistics: (Cushing) Two hundred and seventy-one cases; 260 operated on 489 times. There are 54 deaths, a case mortality of 21%. In 69 new cases for which electro-surgical methods are available, there is 12% case mortality.

Impressions:

1. Intracranial meningiomas are slow growing, encapsulated tumors which practically always arise from the arachnoid.

2. They are tumors of adult life; the average age being about 40 years.

3. For practical purposes, they have been divided into groups according to their site of origin.

4. Some have a characteristic chronology of symptoms.

5. Convulsive seizures are a common symptom.

6. In a certain percentage of cases, the tumors are associated with characteristic changes in the bone which can be observed on x-ray examination.

7. They are nearly always attached to the dura and, apparently never penetrate the pia.

8. Grossly, they may be spherical, lobulated or flat.

9. Microscopically, they range from the very cellular to the fibrous, and they are characterized by whorl formation.

10. The similarity of these lesions to arachnoid villi and arachnoid clusters has been pointed out.

11. Their vascularity as well as the immense size which they may attain, and their frequent attachment to the dural sinuses adds to the surgical hazards.

12. They are very prone to recur.

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III. SKIT

Name - Unknown

Talent - Supplied by the School of Nursing.

Note: Do not stamp on floor, or whistle during the act.

IV. GOSSIP

Harold J. "Speedy" Dvorak writes from Prague, Czecho-Slovakia. In part, he states that everything is under control, is having a good time enjoying Europe and has been doing some work in surgery at Jirasek's Clinic, Charles University. Dr. Dvorak is on a travelling fellowship.....Health Service Physician Bernard Aloysius Watson spent part of last winter in Florida as the personal physician of Mrs. Madeleine Force Astor Dick Fiermonte. While there, he caught a sail fish--but you have probably heard about that before.....Gertrude Thomas, Director of Hospital Dietetics, is President of the Penwomen's Group. In addition to writing textbooks, she also does verse, plays, songs and stories. Some of her contributions appear under the name of Gail White. She recently won a prize of $50.00 for one of her contributions.....Owen Harding Wangensteen, head of the Department of Surgery, was recently named as one of the twenty-five who had made the greatest contribution to Medical Science during 1934. His recognition came as the result of his work on "Nasal Suction in Bowel Disorders". This may be old to you but Chief Punster Surgeon Archa Wilcox remarked that "pull" did not get him in but it might have been "suction".....Chief Neurologic Surgeon Alfred Washington Adson, our guest today from the Mayo Clinic, enjoys a splendid reputation as a teacher. His contributions before medical organizations are always enjoyable.....The Regional Meeting of the American College of Surgeons will be held in the Twin Cities in the spring.....Osmer Samuel Randall is now head of the Tumor Clinic at the Veteran's Hospital in Chicago. Sam, who never liked the "Osmer" part, came to us by way of Texas, Johns Hopkins, Oklahoma and Kansas. Like the Canadian mounted, "he got his man", as all of his earlier interests were in Malignancy. His contributions to this Bulletin were always helpful and we congratulate him on his success.....The Blumstein family are organized into a group called the "family circle". There are fifteen members in good standing and "Alex". The mother is Honorary President. The circle meets at stated intervals, keeps a log of the family doings and has organized the children into the "Junior Family Circle". This unique plan of social organization is said to work very well.....Internist Hobart Reimann is prepared to tell you which pneumococcus of the rapidly growing family is responsible for the infection in your patient. More than thirty different varieties are now recognized.....There is a growing interest in the possibility of oral typhoid vaccination. Preliminary reports are optimistic but an argument has developed as to whether it represents local bowel immunity or general immunity. Skeptics wonder if it is really effective, while enthusiasts insist that a dose every spring by mouth will keep you protected.....Emil Goetsch, Professor of Surgery at the

Long Island College Hospital Medical School, will be the guest of the Minneapolis Surgical Society one week from today, February 7th. He will address the group on some phase of thyroid disorders and will also be our guest at the Medical School for part of the day. He is a distinguished authority in his field and well worth hearing..... Max Cutler, head of the Tumor Clinic at Michael Reese Hospital (Chicago), will give the Judd surgical lecture early in February. Be sure to watch for the announcement. He will also give a tumor clinic at the Hospital and go over our tumor set-up with us. His tumor service is one of the best west of New York and his supply of radium makes ours look very sick. He is directly responsible for popularizing transillumination of the breast as a diagnostic measure and has recently edited a book with Cheadle on "Diseases of the Breast". Again this is an opportunity you should not miss.....One of our youngsters in the Pediatric section was most profane in a picturesque way, especially when being treated by painful procedures. The nurse suggested that it was not very nice for a little girl, 8 years old, to swear as she did. She corrected her by the reminder that she was only 7..... .....