meningiomas

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DEFINITION AND CYTOGENESIS

Harvey Cushing showed that these tumours are found at the sites of arachnoid granulations and on histological examination, there is so much resemblance between the structure of the tumour and that of normal granulation that the arachnoid cells are regarded as the origin of the majority of this group of neoplasms. They tend to be related to major venous sinuses and commonly arise parasagitally or on the base of the skull. Another common site is the sphenoid ridge. Rarely a meningioma may arise from the tela choroidea and appear as an intraventricular tumour.

INCIDENCE

Meningiomas account for about 15% of all primary intracranial tumours and for 25% of intraspinal tumours. Most cases occur between the ages of 20 and 60 years with a peak incidence at 45 years. In the cranial cavity, the female to male ratio is 2:1; in the spine it is 4:1.

PATHOLOGY

The meningioma is usually a well defined, smoothly lobulated firm mass attached to the dura by a broad base and indenting the brain. Less frequently it forms a thin, flat, dural plaque which may have a smooth or shaggy inner surface. Very rarely it forms an extensive sheet between the dura and the brain and cord — diffuse meningiomatosis. Most tumours are sharply delimited and non-invasive, but some show slow marginal invasion of the surrounding tissues — the dura, skull or brain. Those which invade the bone excite the formation of an externally projecting, dense, bony boss on the skull.

The cell type of these tumours is an oval cell with a large nucleus. These cells show a tendency to whorl formation. The centre of the whorl is liable to degeneration and calcification (psammoma bodies). The ratio between cells and stroma varies. Occasionally, the meningioma presents variability in its cellular picture and tissue structure; angioblastic meningiomas show a rich network of vascular spaces. In other tumours, the cells contain lipoidal substances and appear xanthomatous.

GROWTH AND BEHAVIOUR

Meningiomas grow slowly over a period of years — even 20-25; a fair average is five years. Because of their slow growth and because they cause gradual compression, there are fewer localizing symptoms than with other tumours.

As a rule, even when dural attachments are not removable, as along the longitudinal sinus, many of this group of tumours do not recur. However, some are malignant in that they grow more rapidly, invade the dura, bone or brain and occasionally produce metatases. These may be termed meningosarcomas.

SIGNS AND SYMPTOMS

A meningioma is on the whole much more likely to be silent than other types of tumours in the cerebral hemisphere. If not silent, it usually causes only focal seizures. Headaches, visual impairment and focal seizures are the most common complaints in that order. However, with a meningioma of the convex surface of either cerebral hemisphere, seizures are usually the first symptom.

Other signs and symptoms are mental changes such as loss of memory, apathy and indifference and carelessness in habits.

TREATMENT

Complete enucleation of the tumour is the only treatment. When possible, the dural attachment should be excised, but rather than run an undue risk, it is better to leave this undone. The removal may be difficult when the tumour is richly vascularised.

CLINICAL CASE

Mrs. E. Thomas **Aged 76 yrs.**
Admitted 23.6.73

The patient presented with a 6 month history of loss of grip in left hand and unsteadiness on legs.

The left hand felt dead and heavy and she occasionally had paraesthesiae in the whole of her hand. At the same time, her left foot also became weak and she found herself dragging her foot on walking. Prior to December 1972, she occasionally fell onto her left side for no apparent reason. There was never any loss of consciousness.

For the past two years, she has had occasional severe stabbing headaches, starting frontally and radiating to the occiput. They lasted 10 to 15 minutes, were not exacerbated by anything and went away spontaneously.

She has no difficulty with speech or vision and no right sided symptoms. There is no history of dizziness. She has never had any previous similar trouble.

Cardiovascular System:— No positive signs.
Respiratory System:— No positive signs.
Gastrointestinal Tract:— No positive signs. She has no vomiting. Appetite is good and her weight steady.
Genitourinary System:— No positive signs.

Past Medical History

Patient had a colostomy followed by reanastomosis for diverticulitis (1966).
No other serious illnesses.

Social History

The patient lives with her husband. She does not smoke and only drinks occasionally.

Family History

Father died of carcinoma bladder; Mother has heart trouble. Her four sisters and two brothers are all well.

On Examination the patient looks well. She is cheerful and co-operative. She is not clinically anaemic, cyanosed or jaundiced. There is no clubbing or lymphadenopathy. She is not in pain.

Thyroid and Breasts:— No abnormality detected.

Cardiovascular System:— Pulse — 80 per minute; regular.

Blood pressure — 150/80.

Jugular Venous Pressure — 0.

No oedema; apex beat not displaced; heart sounds normal.

Respiratory System:— Trachea central; lung expansion good; percussion note resonant; breath sounds vesicular. No adventitious sounds.

Gastrointestinal Tract:— Abdomen obese with scars and striae. No masses or tenderness.

Central Nervous System:— The cranial nerves were intact except for minimal weakness of the left orbicularis oculi and left cheek.

The fundi are normal — no papilloedema.

Motor System — There is no obvious wasting of limb muscles; no fasciculation or fibrillation. Tone may be slightly increased on the left side (difficult to demonstrate because the patient cannot relax her limbs). There is no ankle or patellar clonus. Power is markedly reduced on left side. The patient can raise her arm and flex her fingers but cannot grip. She cannot dorsiflex or plantarflex her left ankle. The patient cannot walk unaided and drags her left leg.

Reflexes	**R**	**L**
Biceps	+	+
Triceps	+	+ +
Supinators	+	+
Knee	+	+
Ankle	—	—

Sensory System — There is diminished sensation of light touch, pin-prick, hot and cold and vibration sense in left upper limb and left lower limb below knee. Proprioception is markedly reduced on the left side. There is sensory wandering of the left arm. Astereognosis in left hand is unreliable due to the diminished sensation. There are no signs of cerebellar dysfunction.

Gait — Patient can not walk on her own.

The Provisional diagnoses at this stage were

? cerebrovascular episode

? cerebral neoplasm

? sub-acute combined degeneration of cord

Investigations

The following investigations were done:

Full blood count

E.S.R.

Blood urea and electrolytes

B_{12} and folate levels

Wassermann reaction and Kahn Tests

Chest X-Ray

Skull X-Ray

On 3.7.73 a **lumbar puncture** was performed — Report: Easy entry; clear fluid, colourless; pressure — 160 mm. Laboratory results were normal.

On 7.7.73 an **E.E.G.** was done — Report: The record showed a 10 c/s alpha rhythm arising in the post central areas. Irregular slow waves of theta and delta frequencies occurred posteriorly in the right hemisphere leads with phase-reversals in the parietal region. This finding is abnormal and indicates a localized right parietal lesion.

A **brain scan** (showing technetium uptake on a gamma camera) was done. — Report: There is a well defined area of increased uptake based on the falx in the right parietal region. This is highly suggestive of a meningioma on the scan.

In view of the above report the differential diagnosis was reconsidered and a neurosurgeon's opinion was asked for.

Surgeon's Comment:

The dense uptake in the post-parietal region with the intact intellect and absence of raised pressure confirms the diagnosis of a meningioma which may be partly adherent to the falx; her body image projection of the right leg is not perfect so there may be a slight extension across the mid-line. I would avoid angiography, for at her age it has a definite morbidity. I will arrange craniotomy.

Mrs. Thomas was operated upon on 12.7.73.

OPERATION

Surgeon's Report:

On examination the patient was intellectually intact with evidence of a right parietal/post-parietal lesion. There was sensory wandering of the left hand and possibly position loss of the hand up to and including the wrist. There was some involvement of the left leg. There was a left facial assymmetry. Her body image projection of her right leg was not perfect either. The scan showed a large circumscribed lesion in the mid-line consistant with a falx meningioma.

Operation:

Craniotomy — removal of soft falx meningioma.

the patient was supine with the head turned over to the left.

A right parietal flap was cut between five burr holes and taken laterally. Intra-cranial tension was not increased; on opening the dura, the brain looked flattened in the post-parietal region and on needling through this area 2 cm. from the mid-line some soft, almost pink tumour tissue was aspirated. At this stage I was a little concerned in case I had made a mis-diagnosis but indeed, under the post-parietal region at $\frac{1}{2}$ cm. depth was a completely smooth plum coloured tumour with a well demarcated capsule which could be sucked out quite easily. It was clearly a meningioma the size of a large golf ball arising from the falx and lower border of the sagittal sinus. One or two large branches of the anterior cerebral artery were entering the under surface of the tumour but it was removed completely. Its

attachment to the falx was exposed over an area of 3 cm. by 2 cm.; there was no tumour on the other side. The dura was closed and the bone flat replaced.

PATHOLOGY

A. During operation — a biopsy was taken for frozen section — Report: Fragments of meningioma of fibrous type. It appears to be benign.
B. Specimens sent after operation — Report:
Specimen 1 — Tumour. Sections show a cellular fibroblastic meningioma.
Mitoses are not evident.
Specimen 2 — Dura. Sections show normal dura. No tumour is seen.

Post-operative Course

The patient's post-operative recovery was uneventful. There was no change in the patient's neurological condition but the stabbing pain in head disappeared. On recovering consciousness the patient complained of right sided head and neck pain. This lasted for about ten days. Slight constipation and anorexia were the only other post-operative complaints and these subsided regularly.

She was discharged on 30.7.73.