TOTAL REMOVAL OF INTRAMEDULLARY TUMORS*

JAMES GREENWOOD, Jr., M.D.
Department of Neurosurgery, Methodist Hospital and Baylor
University College of Medicine, Houston, Texas

(Received for publication August 26, 1954)

Complete removal of intramedullary ependymomas has been carried out at times when the tumor was of suitable consistency and when a definite cleavage plane made such removal possible.\textsuperscript{1,2,3} Total removal usually leaves some neurological deficit, and in the cervical region may be dangerous. It is felt that the report of 6 cases in which intramedullary ependymomas were removed completely might be worth while, since 3 of the 6 patients apparently have no significant neurological disability.

From the technical standpoint, certain prerequisites seem to be needed for total removal of these usually benign tumors, the most important being (1) that surgery be carried out before paralysis is too far advanced; (2) that the tumor be of such consistency that it can be handled without damage to the cord; (3) that there be a good plane of cleavage between the spinal cord and the tumor; (4) that the multitude of fine, almost invisible vessels which pass from the tumor into the cord, particularly in the region of the central canal, be properly coagulated and cut so that a dry field will be maintained through the procedure (unipolar coagulation is inapplicable in this location while by contrast bipolar, or two-point coagulation, seems to do little, if any, damage, provided irrigation with saline solution is carried out while coagulation is being done); and (5) gentleness that does not exceed the elastic limit of cord tissue. Some tumors have invasive characteristics or their consistency may be such that total removal should not be attempted. Certainly good temporary results can be obtained by partial removal or by simple midline section of the cord with decompression. Removal may be possible as a secondary procedure after a period of waiting which allows the tumor to extrude itself.

CASE REPORTS

Case 1. Mrs. L.R.N., aged 41, was examined on Aug. 13, 1941. Fairly progressive weakness in the legs, beginning 8 months before, had reached the point where she was unable to walk without help.

Examination. Deep reflexes were markedly increased in the lower extremities, bilateral Babinski was present, and there was a transient ankle clonus. There was loss of sensation of pain, temperature, vibration, and stereognosis below the 5th rib, while position sense was fairly well preserved. A Queckenstedt test showed evidence of a partial block, and myelography showed interruption of lipiodol at the level of the superior border of the 7th thoracic vertebra.

\* Read before the Harvey Cushing Society, Santa Fe, New Mexico, May 6, 1954.
Operation. A laminectomy of C7 and T1–6 vertebrae was carried out, with
the dentate ligaments being sectioned on both sides at the level of the 5th thoracic
vertebra. The spinal cord was incised in the midline and the tumor was gently dis-
sected out. The vessels attaching the tumor to the central canal were coagulated
with two-point coagulation forceps, using saline irrigation for cooling. The dura
mater was easily closed.

Microscopic Examination. The tumor was composed of typical epedymal cells
with tendency to pseudorosette formation around vascular channels.

Course. Following surgery, her neurological picture was very much worse, al-
though she was able to move her legs slightly within a few days.

During the succeeding several months she was able to walk with help and when
examined 1 year after surgery was able to walk perfectly, but was not able to walk
more than about a block. Pain sense had entirely recovered except for a small area
of hypalgesia in the left leg. Reflexes were approximately normal and there was no
bladder disturbance. Two years later she considered herself perfectly well, although
she felt that the left leg was not quite normal. Walking did not tire her and there
was no limp or spasticity. The patellar reflex was increased on the left. Examination
in February, 1954 revealed that she is still quite normal.

Case 2. Mrs. L. McA., aged 46, was examined Nov. 10, 1942. Paralysis of the legs
had begun over 3 years before, with numbness in the lower extremities and diffi-
culty in controlling the bladder.

Examination. There was about 25 per cent normal strength in the left leg and
about 50 per cent in the right. There was a partial sensory level up to the 2nd rib on
the right and up to the 4th rib on the left. Reflexes were markedly increased and
a bilateral Babinski sign was present. Myelography showed a block at the level of
the 4th thoracic vertebra.

Operation. A laminectomy was done from C6 to T4 laminae inclusive. The spinal
cord was divided posteriorly in the midline and the tumor was gently dissected out.
Blood vessels connecting the tumor to the central canal were coagulated with two-
point coagulation forceps and, after removal, the cavity which extended from the
7th cervical vertebra to the upper portion of the 4th thoracic was clean and there
was no evidence of contusion.

Microscopic Examination. The tumor was a typical epedymoma with pseudoro-
sette formation about the tissue spaces and vascular channels.

Course. Following surgery, the patient had only slight movement in the right leg. Unfortunately, a fulminating pneumonia developed, complicated by delirium
tremens, and she expired on the 5th postoperative day.

Autopsy showed that the spinal cord was in good condition with no evidence of
contusion or swelling. The history of alcoholism was obtained only after toxic
symptoms appeared.

Case 3. Father T. McG., aged 59, was examined July 2, 1952. He complained
chiefly of throbbing pain in the right arm and hand, present for 12 years. In 1949
the right scalenus anticus muscle had been sectioned at a clinic out of the State.
For 2 years he had had considerable difficulty in walking.

Examination revealed analgesia in the cervical 5th, 6th, and 7th dermatomes on
the right and in the 5th and 6th dermatomes on the left. There was marked stiffness
in walking, reflexes were increased in the lower extremities, and spasticity was de-
finite in both legs. Myelography showed a block at the 4th thoracic level.