cranial nerve lesions were contralateral. When at operation an apparent reason for the entire clinical picture was found in the supposed pontine glioma and the cause of the pain in the severe stretching of the nerve, we were lulled into such a false sense of security that the opposite side of the brain stem was not explored. We were awakened only by the autopsy disclosures. Barely 6 months later the second case was found. No suspicion was entertained that the patient had more than "typical" trigeminal neuralgia until the huge contralateral tumor was found on exposure of the brain stem for trigeminal tractotomy. Had the entire distribution of the 5th nerve not been involved in this case, the patient's pain would have been treated by transtemporal subtotal division of the sensory root and the cause of the pain would have been missed.

In an earlier report on trigeminal neuralgia\(^2\) it was suggested that the cerebellopontine angle should be explored and the root severed there, if indicated, in patients displaying any signs of organic trigeminal involvement and in patients younger than the usual "tic" group. These two cases prove that even this routine would not insure the surgeon against an occasional unpleasant surprise. The contralateral side must be explored if the cause of the pain appears to be due to distortion of the brain stem and stretching of the trigeminal sensory root.

**SUMMARY**

Two cases are reported of trigeminal neuralgic pain due to contralateral posterior cranial fossa meningiomas. One patient had pain involving all divisions of the trigeminal nerve, indistinguishable from typical trigeminal neuralgia. In the other case the pain was a part of a syndrome believed due to a glioma of the pons, or to a basilar aneurysm.

**REFERENCES**


**RESECTION OF THE SUPERIOR LONGITUDINAL SINUS**

**REPORT OF CASE**

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Resection of the superior longitudinal sinus is a surgical problem that has only partially been solved. The qualified neurosurgeon knows the indications for and the technic of the operation, but he is faced with the question of what part of the sinus can be removed with

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safety. A meningioma that surrounds or invades the superior longitudinal sinus is the most common condition that necessitates resection of the sinus.

The superior longitudinal sinus begins at the crista galli in the frontal region of the cran-ium. It gradually increases in size as it passes posteriorly in the upper margin of the falx cere- bri and terminates in the confluence of sinuses in the vicinity of the internal occipital protuberance. Its tributaries consist of some eight to twelve superior cerebral veins and numerous other veins communicating with veins of the nose, scalp and dipoie. Sargent stated that the superior cerebral veins empty into the superior longitudinal sinus by four principal trunks, the frontal, precentral, postcentral and occipital vessels. Other authors refer to the precentral and postcentral trunks as the rolandic veins and they are so named in this publication. The principal collateral communications of the superior cerebral veins are the middle cerebral veins which empty into the cavernous sinus and the diploic veins which communicate with the frontal and supra-orbital veins.

From the surgical standpoint the sinus is divided into three parts. The rolandic veins enter the sinus in either the middle or the posterior third. Since the rolandic veins are the principal carriers of venous blood from the motor cortex, surgeons have avoided removing the middle and posterior thirds.

According to Dandy the evidence in the literature that resection of the superior longitudi- nal sinus can be tolerated is scant. Much of the available data is derived from study of sinus thrombosis which usually is associated with infection. This information has limited value since infections of the central nervous system are infrequently confined to the sinus and the presence of encephalitis, meningitis, phlebitis, septicemia or systemic manifestations of infection has a tendency to obscure the cerebral dysfunction that results from occlusion of the sinus alone.

Dandy found in the literature only 9 cases of extensive ligation or resection of the superior longitudinal sinus and he added 4 of his own cases. Each of these 13 patients had a large meningioma which involved the longitudinal sinus. Eight resections included the part of the sinus anterior and 5 included the part posterior to the rolandic veins. In most of these cases temporary spasticity of the lower extremities occurred. Since recovery of motor function was practically complete, Dandy concluded that the temporary paraplegia was primarily due to direct trauma of the motor cortex incident to removal of the tumor. He suggested that resection of the sinus in these cases was achieved without appreciable loss of motor function because the chronic compression or occlusion of the sinus had allowed sufficient time for the development of adequate collateral circulation. Since no one has reported extensive resection of a normal patent sinus, his conclusions cannot be proved or disproved.

MacLean studied 6 cases of primary thrombosis of the longitudinal sinus with chronic obstruction from the clinical and pathologic standpoint. In these cases no definite evidence of infection involving the longitudinal sinus or central nervous system was found. The patients survived obstruction of the longitudinal sinus for relatively long periods. The venous drainage of the right side of the cerebrum appeared to be more dependent on a patent sinus than that on the left side. MacLean divided the signs and symptoms of obstruction into four groups: (1) external evidence of collateral circulation, such as dilatation of the veins of the forehead and scalp, edema of eyelids, conjunctival injection or exophthalmos; (2) mechanical changes from damage to cerebellum and spinal cord due to dilated accessory venous channels; (3) jacksonian convulsions, hemiplegia or the presence of blood in the spinal fluid as the result of cerebral venous stasis and (4) headache, mental dullness progressing to stupor, or cerebral blindness. Some of these signs and symptoms were observed in the case herein reported.

The paucity of accurate accounts of extensive removal of the superior longitudinal sinus with observations on resulting cerebral dysfunction prompted this case report.

REPORT OF CASE

The patient, a Greek lawyer, 40 years old, was examined at the Mayo Clinic on May 29, 1939. He had been ill for 6 weeks. His illness was characterized by occipital headaches which
extended to the right frontal region, weakness of the right hand and lower extremity, and irritability and depression which disturbed him and his family.

Examination of the nervous system revealed right hemiparesis, slight agraphia and aphasia. On examination of the eyes bilateral papilledema, a small hemorrhage in the left ocular fundus and normal vision and perimetric fields were found. Roentgenograms of the head showed no abnormal findings. Encephalography was performed on June 5, 1939, by one of us (J. G. L.) and this revealed that a large space-occupying lesion was present in the left frontoparietal region (Fig. 1).

Craniotomy was carried out the same day. A large osteoplastic bone flap was made in the left frontoparietal region of the skull. The scalp and bone were unusually vascular. In the parasagittal region a sunburst of vessels was observed in the dura and beneath these vessels the tumor was found. It was so large that it was necessary to ream out the center in order to collapse and deliver the capsule. The electrosurgical unit was used to separate the capsule from the longitudinal sinus. Two trunks of rolandic veins entered the sinus at either end of the tumor, but the collapsed tumor capsule was removed without disturbing these veins. The tumor, which weighed 75 gm., was described by the pathologist as a hemorrhagic degenerating meningioma (Fig. 2). The preoperative signs and symptoms disappeared in less than a month after operation. The patient occasionally had convulsions which involved principally the right arm and were followed by a short period of unconsciousness.

The patient successfully performed his usual occupation until the fall of 1942, when his symptoms returned. Examination of the nervous system on Nov. 19, 1942 revealed right

![Fig. 1. Encephalogram made prior to first craniotomy, showing shift of ventricular system to the right and downward displacement of left lateral ventricle. This was interpreted as evidence of a space-occupying lesion in the left frontoparietal region.](image-url)
hemiparesis, slight agraphia and aphasia. A ventriculogram made on Nov. 25, 1942 showed essentially the same findings as the encephalogram made prior to the first operation (Fig. 3). At craniotomy on the same day a large cyst was found in the parasagittal region. It contained about 3 fluid ounces (90 cc.) of yellow fluid. Underneath this cyst a recurrent tumor mass was attached to the longitudinal sinus by a broad base. The sinus was patent and was not sacrificed. As much tumor as possible was removed from the wall of the sinus by means of the electrosurgical unit. The tumor was reported to be a meningioma.

The condition of the patient improved dramatically after operation and he was given 2 courses of roentgen therapy. The convulsions, which involved chiefly the right arm and leg, continued to occur at intervals of 10 days in spite of sedation. However, the patient was well enough to perform his work successfully.

Early in 1946, symptoms returned for a second time and when the patient was examined at the clinic on Mar. 12, 1946, a firm mass was found in the center of the previous operative site (Fig. 4). Craniotomy was advised and 240,000 units of penicillin were administered daily for 2 days prior to operation as prophylaxis against infection.

On Mar. 22, 1946, at operation for which local anesthesia was used, one of us (J. G. L.) found that the tumor involved the superior longitudinal sinus and extended on both sides of the midline. The anterior portion of the longitudinal sinus was clamped, ligated and divided. This permitted delivery of the tumor. The tumor completely filled the sinus near the cut end. It was necessary to clamp and divide the sinus posterior to the communications of the rolandic veins in order to remove all of the tumor. About 10 cm. of the longitudinal sinus was removed. Two hemostatic forceps were left in place to control bleeding from the end of the remaining portion of the sinus. In addition some 1 inch (2.5 cm.) gauze strips were used for hemostasis. This method of controlling bleeding was necessary because of the technical difficulty of ligat-
Fig. 3. Ventriculogram made prior to second operation for recurrent tumor. The findings were essentially the same as those before the first operation (Fig. 1).

Fig. 4. Lateral view of skull showing extent of cranial defect. The rolandic veins entered the superior longitudinal sinus in the posterior portion of the defect.
RESECTION OF THE SUPERIOR LON\textsuperscript{3}ITUDINAL SINUS

The forceps were loosened 2 days after operation and on the 4th postoperative day were removed from the wound without incident. The tumor weighed 90 gm. and was described by the pathologist as a meningioma (Fig. 5).

After operation the patient had slight weakness of the right arm and hand and a complete paraplegia. His convalescence in the hospital was long and stormy. In the first part the wound healed slowly and the patient's emotional and behavior reactions were profoundly pathologic. He was extremely irritable, moody and depressed and assumed cata-tonic postures. Control of the bowels and bladder was excellent. He was disoriented, moderately aphasic and agapthic. A few convulsions were observed, but were easily controlled by minimal doses of phenobarbital. In the last half of his convalescence emotional control improved, disorientation, agraphia and aphasia subsided and some motor function in the right arm and hand and lower extremities returned.

An extensive program of physical therapy and rehabilitation was prescribed and supervised. Five months after operation the patient had regained sufficient strength and movement of his lower extremities to be able to walk with the aid of two canes. While a residual paraplegic condition is present at the time of this report, the patient is ambulatory and has improved sufficiently to be able to return to work.

COMMENT

During the first and second operations in this case the longitudinal sinus and the rolandic veins were preserved with meticulous care. This made each of these operations more tedious and more difficult technically. However, this was done in order to preserve as much functioning venous circulation as possible. If the hypothesis of Dandy is valid, this choice of procedure permitted a gradual development of collateral venous circulation serving the frontal and parietal cortex since the tumor recurred slowly and the longitudinal sinus was occluded for a relatively long period.

It was necessary at the third operation to sacrifice a considerable portion of the longitudinal sinus in order to remove the tumor completely and spare the patient additional recurrences and operations. This procedure resulted in bilateral interruption of the rolandic veins. Since the patient was under local anesthesia, it was possible to observe the development of complete paraplegia as soon as the tumor was removed and the rolandic veins were resected. From an anatomic and physiologic standpoint it seemed doubtful whether motor function of the lower extremities or satisfactory control of the bowels and bladder would return. However, after the immediate postoperative period the patient had good voluntary control of micturition and defecation. His convulsions after the third operation were much less of a problem than they were before operation and he regained sufficient motor function to stand unassisted and walk with minimal support.

The technic of leaving hemostatic forceps within the cranial cavity was an emergency procedure which was necessary because of the excessive bleeding after sectioning the sinus in the posterior part of the parietal region. This procedure carries considerable mechanical risk for the patient and in addition, provides a possible route for infection. However, under the extraordinary circumstances of this operation, it was necessary in order to preserve the life of the patient.

While the third operation may be considered a technical triumph, the benefit to the patient would have been restricted greatly were it not for the extensive rehabilitation program. Physi-
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cal medicine may be expected to play an increasingly important role in the postoperative care of this type of neurosurgical patient.

Detailed reports of cases similar to this one are important in order to provide the surgeon with additional knowledge of what cerebral dysfunction to expect when it becomes necessary to resect that part of the superior longitudinal sinus which receives venous blood from the rolandic area.

REFERENCES


AUTODERMOGRAPHY

A NEW AND SIMPLE METHOD OF DEMONSTRATING THE PROPAGATION OF PAIN AND DISORDERS OF SURFACE SENSIBILITY

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This contribution describes a method of clinical examination for pain as well as other sensory disturbances, based on the active cooperation of the patient. The patient is asked to draw on his skin, with the aid of a dermograph pencil, his own areas of pain or rather projection of pain, of hypo- or hyperaesthesia, of disorders of tactile or thermic sensitivity, or segments of paraesthesia.

The author, working among African natives, saw cases of anaesthetic leprosy which itself draws areas of anaesthesia by depigmentation of the skin. In painful conditions of various etiology, the natives frequently demonstrate the painful areas by making scratches with their nails on the skin, and self-infected points de feu follow exactly the cutaneous segments. This suggested the method of demonstration of sensory disturbances here described.

By asking the patient to draw on his skin the outline of his subjective sensory disturbance, whatever its nature may be, one obtains, in a short time, accurate pictures of pain distribution, dys- or paraesthesia, made without influence of the examiner, and providing accurate clues to diagnosis and localization. It is my opinion that this subjective method surpasses the well known so-called classical “objective” methods, but certainly by combining both, the best results are likely to be obtained.

We are now using this kind of examination in all cases of pain and paraesthesia. When the drawings are made, the patients are photographed or the findings charted (Figs. 1 and 2).

Our greatest experience in the application of this method is with root pains in so-called lumbago and sciatica, mostly the monaradicular syndromes of the lower extremities. The drawings obtained are in agreement with the dermatome charts of J. H. Kellgren reported by J. Jay Keegan, and not in accordance with the work of Head, Foerster or Déjerine. The patient draws the areas of root pain and on checking these with tests for sensitivity, we find that they coincide exactly.

Early in the disease, cutaneous segments of hyperaesthesia are found; usually after longer duration there is hypaesthesia. In the majority of cases where an operation has been performed, our experience is in agreement with that of Keegan, who finds, in most of his patients operated upon, segments of hypaesthesia. These segments are independent of etiology.

Inman and Saunders described so-called “sclerotomes,” which indicate the areas of pain