

The importance of neuroendoscopy for the treatment of tumors in pineal region.

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Neuroendoscopy

Although advances in neuroimaging and microsurgical technique have improved the safety and efficacy of pineal tumour surgery, the optimal treatment for pineal tumours and the frequently accompanying noncommunicating hydrocephalus is still debated. Individualizing therapy of the vast range of lesions that arise in the pineal area requires histopathologic diagnosis. Stereotactic biopsy and different "open" procedures are common methods for obtaining tissue diagnosis. Stereotactic biopsy has several drawbacks, including sampling inaccuracy, which can be especially troublesome in the pineal area due to the heterogeneity of many tumours found there, and the danger of bleeding due to the closeness to the brain's primary deep venous drainage system. Direct surgical excision is usually recommended, but it requires the patient to undergo a major surgery with all of its dangers when less invasive alternatives, such as radiation therapy for germinoma, may be available. If hydrocephalus is present, it should be treated before a formal tumour excision.

At the time of presentation, approximately 90% of patients with pineal area tumours had hydrocephalus. Many individuals are suffering from increasing intracranial pressure and require immediate hydrocephalus therapy. Hydrocephalus has traditionally been treated using an external ventricular drain or a ventriculoperitoneal shunt. Ventricular drains and shunts, on the other hand, carry the risk of infection and failure, and shunt dysfunction is common in patients with pineal tumours and hydrocephalus. In one study, approximately 20% of patients with pineal tumours and hydrocephalus required a shunt revision because of a postoperative malfunction. This high incidence of malfunction is thought to be linked to increased CSF protein and cellular detritus.

Ventricular shunts may play a role in the spread of certain pineal neoplasms. Following shunting, there is a modest but clear risk of peritoneal metastasis in individuals with malignant germ cell tumours or pineoblastoma. Although millipore filters have been employed to prevent tumour seeding on occasion, they have not shown to be effective due to a substantially higher risk of ventricular shunt dysfunction.

We provide an alternate surgical technique for treating select patients with pineal area neoplasms that allows for symptomatic hydrocephalus therapy as well as a safe tumour biopsy under direct vision in the same procedure. Patients with noncommunicating hydrocephalus who arrive with increasing intracranial pressure receive an emergency endoscopic third ventriculostomy through a precoronal burr hole. This allows symptomatic hydrocephalus to be controlled quickly without the need of an external ventricular drain or device. The posterior third ventricular tumour is biopsied under direct vision and CSF

samples are obtained for tumour markers and cytology during the same surgical exposure. If necessary, definitive surgical extirpation of the tumour is performed using an appropriate conventional open approach to the pineal area. The use of an endoscope during open microsurgical tumour excision may improve visibility of the tumour and surrounding tissues.

In the midpupillary line, a burr hole is produced anterior to the coronal suture. We choose rigid endoscopes because their optics and operating channels are generally better than those of flexible fiberoptic endoscopes. However, due of the reduced steerability, the typical coronal burr hole must be adjusted to allow the surgeon to reach both the anterior third ventricular floor and the posterior third ventricular tumour from the same entry point. The typical coronal burr hole gives a direct route to the floor of the anterior third ventricle through the foramen of Monro, but a poor approach to the tumour in the posterior third ventricle. The burr hole is relocated a little more anterior than normal when endoscopic third ventriculostomy is coupled with biopsy of a pineal area mass, utilising preoperative sagittal magnetic resonance imaging (h4RI) as a guide. This generally allows for a good path via the foramen of Monro to both the anterior third ventricle's floor and the posterior third ventricle's tumour.

The lateral ventricle is cannulated with a Gaab rigid endoscope sheath (Karl Storz, Tuttlingen, Germany). CSF is taken for tumour markers and cytology after the obturator is removed. A 4 mm diameter 0° simple viewing lens placed into the endoscope sheath is used to observe the ventricular architecture. A microchip camera connects the lens to a television display. The choroid plexus, septal and thalamostriate veins, and the foramen of Monro are all recognised as standard anatomic landmarks. The endoscope is pushed into the third ventricle through the foramen of Monro, and anatomic markers along the floor of the ventricle are identified.

The third ventriculostomy is the first to be done. A smaller diameter lens and working channel system are placed into the rigid endoscope sheath in place of the viewing lens. A blunt probe is used to pierce the floor of the third ventricle in the midline, immediately anterior to the mammillary bodies, under direct visual guidance. Because of the risk of damage to the basilar artery, which lies under the thinning tuber cinereum, we have avoided employing laser or radiofrequency radiation along the third ventricular floor. Under the transparent floor, the basilar artery may frequently be seen pulsing. The fenestration is carefully placed prior to the basilar apex. To expand the fenestration, a no. 3 French Fogarty balloon catheter is utilised. The balloon is repeatedly inflated and deflated until a window in the ependyma and adjacent arachnoid membrane is formed.

After that, the endoscope is pointed posteriorly toward the

aqueduct in order to see the tumour in the pineal area. Injury to the fornix and perforaminal veins be avoided at all costs. The tissue from the lesion is extracted using biopsy forceps. If required, the bipolar cautery can be used to coagulate arteries on the tumor's surface. A biopsy is not done if the tumour

looks to be very vascular. One of the working channels in the endoscope sheath is used to irrigate the ventricle with warm lactated Ringer's solution. The endoscope is withdrawn, and the burr hole is covered with a piece of gelfoam. Layers of the scalp are closed.

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