Endoscopic surgery for intraventricular tumor

In select patients, complete endoscopic removal of solid intraventricular brain tumors is possible and safe. Factors that influence the ability of a surgeon to perform a complete endoscopic resection include tumor size, composition, and vascularity. The procedure requires careful patient selection, the use of refined endoscopic instrumentation, and a disciplined surgical technique [1)].

see Endoscopic surgery for intraventricular tumor in children

Indications

The selection of the patients takes into consideration various characteristics of the tumor: ventricular size, the presence of calcification, the degree of tumor vascularity and the extent of attachment.

One of the absolute determining factors is chemosensitivity. For potentially chemo-or radiosensitive tumors (e.g. germ cell tumors), no gross total resection is attempted, only CSF sampling, biopsy, and - if indicated - ETV is planned.

Biopsy

The role of endoscopy for diagnostic biopsy is well established. Expansion of these techniques may allow for definitive resection of intraventricular tumors.

Intraventricular tumor and paraventricular tumors are frequently associated with cerebrospinal fluid (CSF) pathway obstruction. Thus the aim of an endoscopic approach is to restore patency of the CSF pathways and to obtain a tumor biopsy. Tumor biopsy may increase tumor cell dissemination. For patients presenting with occlusive hydrocephalus due to tumors in or adjacent to the ventricular system, endoscopic CSF diversion is the procedure of first choice.

Tumor biopsy in a study did not affect safety or efficacy [2)].

Endoscopic surgery for choroid plexus papilloma

Complications

Intraventricular hemorrhage in four cases (two of them died)

Seizures

Parinaud's sign

Transient palsy of third cranial nerve

Hemiparesis

Cerebrospinal fluid leak

Infection

Case series

2015

Since January 2012, patients with posterior third ventricular tumors causing hydrocephalus underwent dual ETV and EBX procedures using the combined rigid-flexible endoscopic technique. Following institutional review board approval, data from clinical, radiological, surgical, and pathological records were retrospectively collected.

Six patients 3.5-53 years of age were included. Lesion locations included pineal (n = 3), fourth ventricle (n = 1), aqueduct (n = 1), and tectum (n = 1). The ETV and EBX were successful in all cases. Pathologies included pilocytic astrocytoma, pineoblastoma, ependymoma Grade II, germinoma, low-grade glioneural tumor, and atypical choroid plexus papilloma. One patient experienced an immediate postoperative intraventricular hemorrhage necessitating evacuation of the clots and resection of the tumor, eventually leading to the patient's death.

The authors recommend using a combined rigid-flexible endoscope for endoscopic third ventriculostomy and biopsy to approach posterior third ventricular tumors (behind the massa intermedia). This technique overcomes the limitations of using a rigid endoscope by reaching 2 distant regions [3)].

2014

Forty-five patients who underwent endoscopic surgery with a flexible endoscope for intraventricular brain tumors were divided into small-ventricle and ventriculomegaly groups according to the frontal and occipital horn ratio (FOR). Retrospective review of these cases was performed and achievement of surgical goals and morbidity were assessed.

RESULTS:

Among the 45 patients, there were 14 with small ventricles and 31 with ventriculomegaly. In the smallventricle group, targeted tumors were located in the suprasellar region in 12 patients and in the pineal region in 2. In the ventriculomegaly group, tumors were located in the pineal region in 15 patients, in the suprasellar region in 9, in the lateral ventricle in 4, in the midbrain in 2, and in the fourth ventricle in 1. In the small-ventricle group, ventricular cannulation was successful and the surgical goals were accomplished in all patients. In ventriculomegaly group, sampling of the tumor was not diagnostic due to intraoperative hemorrhage in 1 patient. There were no significant differences in the rate of achieving the surgical goals or the morbidity between the 2 groups.

CONCLUSIONS:

Endoscopic surgery using a flexible endoscope is useful for management of intraventricular brain tumors in patients with small ventricles. A flexible endoscope allows excellent maneuverability in introducing the device into the lateral ventricle and manipulating through small ventricles.

2011

Between 2003 and 2010, 31 patients aged between 7 months and 77 years, diagnosed of solid and/or cystic intra and/or periventricular tumors, underwent neuroendoscopic biopsy.

Domínguez-Páez et al. analyze operative technique, pathological result, management of associated hydrocephalus, rate of complications and postoperative technique.

32 endoscopic procedures were done and biopsy was successfully performed in 28 cases, with positive histological result in 25 of them (78% success rate per procedure and 89% success rate per biopsy). Most frequent pathological diagnosis was grade II astrocytoma. 30 patients had associated hydrocephalus that required endoscopic third ventriculostomy (19 cases, with 73.7% success rate) and/or septostomy (12 patients, 3 associated with ventriculostomy and 9 with ventriculo-peritoneal shunt). Frameless neuronavigation was used in three selected cases. During the surgery and the postoperative period the following complications appeared: intraventricular hemorrhage in four cases (two of them died), seizures in two patients, new neurological findings in three cases (Parinaud's sign, transient palsy of third cranial nerve and hemiparesis associated with palsy of third cranial nerve), and cerebrospinal fluid leak and infection in one case. 19 patients received subsequent treatment (microsurgical resection in 1, radiosurgery in 2, radiotherapy in 8, chemotherapy in 5 and chemo-radiotherapy in 3).

Endoscopic management of intraventricular and/or periventricular brain tumors is effective, and allow diagnostic biopsy and simultaneous treatment of the associated hydrocephalus in many cases. So, it could be the treatment of choice in those tumors that are not suitable for microsurgical resection. Although this technique is not exempt of serious complications, morbimortality could be lower than conventional microsurgical approach [4)].

2006

Eighty-one patients who underwent endoscopic management of an intraventricular brain tumor were identified from a prospective database. Of these patients, seven underwent attempted endoscopic surgical removal of a solid primary brain tumor. Patient selection, surgical technique, procedure-related morbidity, and extent of removal were reviewed. Five patients underwent complete resection of a solid intraventricular brain tumor, a treatment option that was based on intraoperative assessment and confirmed by postoperative imaging. No patient experienced any procedure-related morbidity. Of the individuals in whom a total endoscopic resection was successful, there has been no symptomatic or radiological evidence of recurrence (mean follow up 20 months). Maximum tumor diameter ranged from 0.5 to 1.8 cm for patients who underwent complete resection, whereas maximum tumor diameter measured 2.4 and 2.5 cm in the two patients in whom a subtotal excision was performed [5)].

Revision

Gross total resection was achieved in 11 of 12 cases (92%). Maximal tumor diameter ranged from 9-26 mm (mean 16.6 mm). Pathology included subependymal giant cell astrocytomas (SEGAs), ependymomas, nongerminomatous germ cell tumors (NGGCTs) and pilocytic astrocytomas. Mean follow-up was 35 months (range 10-109 months). All patients returned to their neurological baselines following surgery. Local tumor recurrence occurred in one patient and distant recurrence in another.

In one patient, a transitory intraoperative elevation of intracranial pressure without clinical implications occurred. There was no permanent morbidity or mortality in this series. Hydrocephalus was present preoperatively in five cases and was treated either with tumor removal alone or with an additional endoscopic third ventriculostomy. No patient required a ventriculoperitoneal shunt.

Neuroendoscopic gross-total resection of solid intraventricular tumors is a safe and efficacious procedure in carefully selected pediatric patients.

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