Case Report

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Synchronous Ventriculoscopic and Microsurgical Resection of Complex Craniopharyngiomas

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Key Words
Craniopharyngioma · Brain tumor · Neuroendoscopy · Microsurgery · Hydrocephalus

Abstract
Background: Surgical resection of craniopharyngiomas may be challenging sometimes because of the size, location and tenacity. Simultaneous endoscopic and microsurgical resection is a novel way to approach such lesions. The aim of this report is to discuss the usefulness of combined endoscopic and microsurgical approaches in treating complex craniopharyngiomas along with a review of the literature. ***Methods:*** A child with hydrocephalus and a large suprasellar craniopharyngioma underwent synchronous endoscopic and microsurgical resection of the lesion. ***Results:*** Gross total resection of the tumor was achieved. There were no postoperative complications. Hydrocephalus was also treated successfully. ***Conclusions:*** Neuroendoscopy can complement microsurgery in approaching complex craniopharyngiomas particularly when these tumors are large and accompanied by hydrocephalus.

Introduction

Craniopharyngiomas are benign, extra-axial, usually suprasellar masses that account for approximately 4% of the intracranial tumors and half of the suprasellar brain tumors in the pediatric population. Histologically, craniopharyngiomas can be adamantinomatous, squamous papillary or mixed. Most pediatric craniopharyngiomas are adamantinomatous; these tumors can be heterogeneous in consistency, with coexisting cystic and solid components. The tumors can sometimes be quite large and tenacious, making resection difficult. The authors present a novel technique combining endoscopic ventricular surgery with microsurgery to facilitate the resection of selected craniopharyngiomas (fig. 1).

Case Report

Presentation

D.G. was a 7-year-old female who presented with 6 months of intermittent headache associated with nausea and vomiting over 1 month. The examination was remarkable for somnolence and papilledema. CT and MRI showed a large, partially calcified, sellar and suprasellar tumor extending into the third ventricle and blocking both foramina of Monro, causing hydrocephalus (fig. 2). The endocrine evaluation was unremarkable. The tumor was felt to be a craniopharyngioma and a combined ventriculoscopic and microsurgical approach was chosen.

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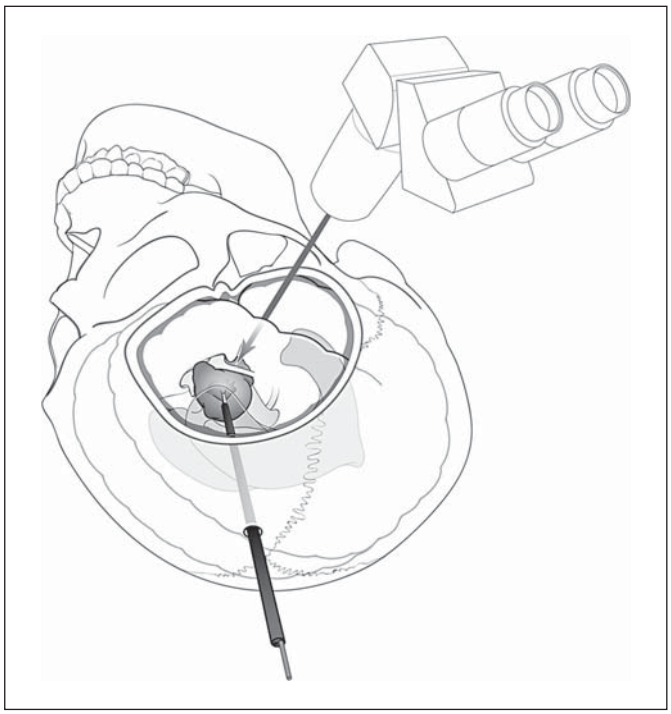

Fig. 1. Synchronous ventriculoscopic and microsurgical resection of a large craniopharyngioma.

Operation

Using frameless stereotactic guidance (Brainlab, Chicago, Ill., USA), the frontal horn of the right lateral ventricle was cannulated with a rigid endoscope (Aesculap, Tuttlingen, Germany) passed through a precoronal burr hole placed just medially to the midpupillary line. A cystic tumor was identified at the right foramen of Monro. The surface of the tumor, which was partially calcified, was opened with an endoscopic bipolar coagulator. Green machine-oil-like fluid was evacuated with a suction catheter. Portions of the cyst wall were debulked with bipolar coagulation and grasping forceps. A tunnelled ventricular catheter was left in place.

Next, in a sterile fashion, the head of the patient was repositioned for a pterional craniotomy. The brain was nicely relaxed. A microsurgical resection was performed working between the optic nerves and through the lamina terminalis. In our case, the synchronous endoscopic and microsurgical procedures were carried out in a single sitting under the same general anesthesia, with the endoscopic approach done first.

Postoperative Course

Postoperatively, the patient had a smooth course. She did not develop diabetes insipidus or other endocrinologic deficits and the ventricular drain was weaned and removed. A postoperative MRI (fig. 3) confirmed radical resection of the tumor. Pathological examination revealed an adamantinomatous craniopharyngioma. The patient was discharged in a good condition and has remained neurologically well with no evidence of recurrent tumor on surveillance imaging at 2 years.

Discussion and Review of Literature

Surgery of craniopharyngiomas is traditionally performed using microsurgical technique. Traditional approaches for craniopharyngiomas include the pterional, subfrontal, basal interhemispheric, bifrontal interhemispheric through the lamina terminalis, transcallosal and transsphenoidal [1–7]. Each approach carries its own advantages and limitations requiring careful surgical planning and patient selection.

Craniopharyngiomas may grow to involve more than 1 intracranial compartment and may also extend into the ventricular system, making resection by a single approach challenging. Gore et al. [8] have reported synchronous endoscopy and microsurgery for selected ventricular lesions. We have applied this technique for the resection of large complex craniopharyngiomas. Neuroendoscopy is a minimally invasive approach taking advantage of an existing intraventricular corridor. It is helpful not only for the resection of intraventricular portions of a tumor but also allows for the treatment of hydrocephalus that often accompanies large craniopharyngiomas. Lowering the intracranial pressure by releasing CSF relaxes the brain and can make microsurgical intervention easier. We believe the synchronous ventriculoscopic and microsurgical approach may benefit patients with large cystic and solid craniopharyngiomas who present with hydrocephalus.

Our patient developed hydrocephalus from suprasellar expansion of the craniopharyngioma and blockade of the foramina Monro. In our case, the intraventricular tumor was approached first endoscopically followed by placement of a ventricular drain. The intraventricular portions of these tumors could have been addressed microsurgically via a single basal approach, but this would have been more time-consuming requiring significant brain retraction [9].

Conclusion

Selected large complex craniopharyngiomas can be treated with combined endoscopic and microsurgical approaches. Neuroendoscopy can complement microsurgery in the resection of complex craniopharyngiomas, particularly those that extend into the ventricular system. Synchronous endoscopy and microsurgery can be helpful for managing the hydrocephalus which frequently accompanies those lesions.

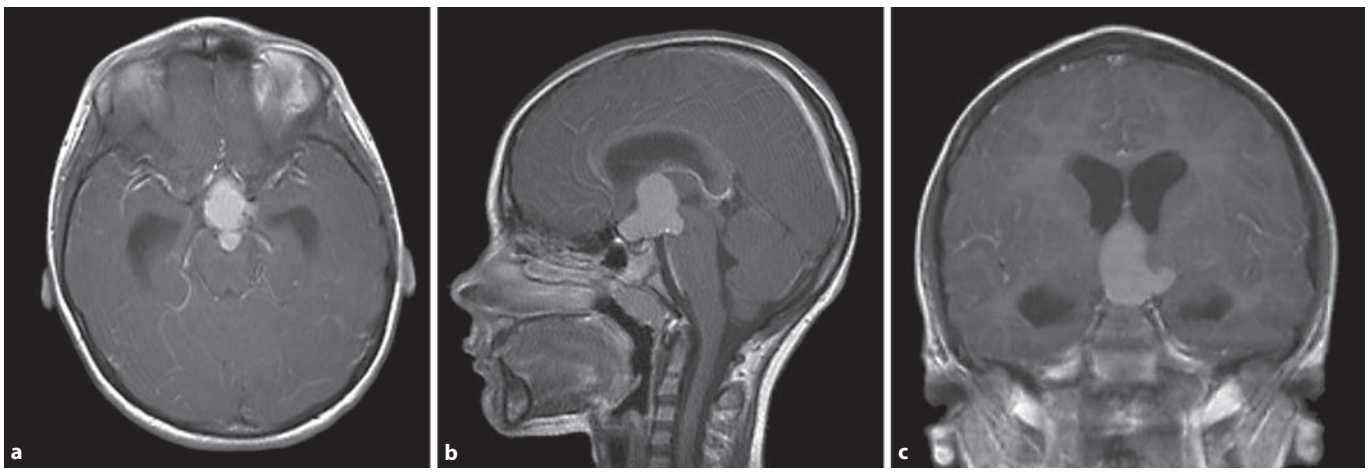

Fig. 2. Preoperative contrast-enhanced T_1-weighted MRI demonstrating a large suprasellar tumor with hydrocephalus. **a** Axial image. **b** Sagittal image. **c** Coronal image.

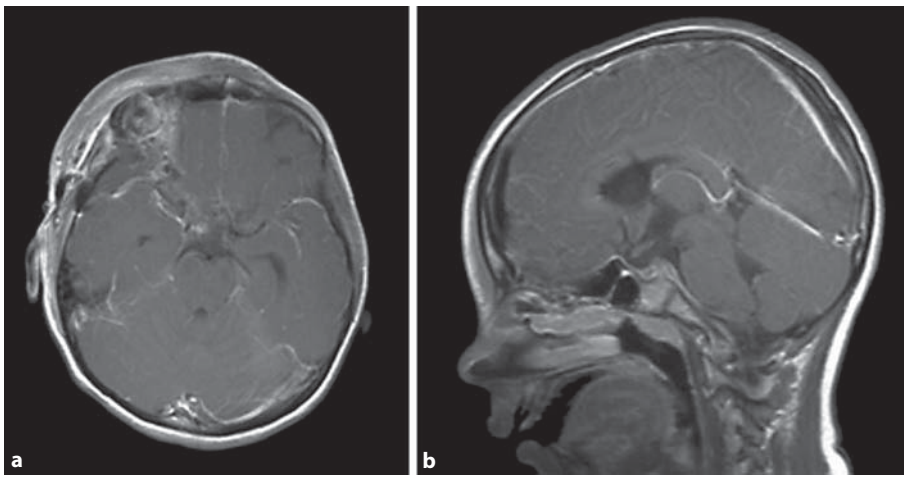

Fig. 3. Postoperative contrast-enhanced T_1-weighted MRI demonstrating resection of the tumor. **a** Axial image. **b** Sagittal image.

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