



Endoscopic Excision of Third Ventricle Choroid Plexus Papilloma

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Abstract

Choroid plexus papilloma is a rare intraventricular tumor in children. Its management poses a challenge. Here we describe such a case of third ventricular choroid plexus papilloma and its endoscopic excision through a single burr hole. A 1-year-old child presented with headache, vomiting, and a large head with sunset sign and tense fontanel. Computed tomography (CT) and magnetic resonance imaging brain plain and contrast revealed dilated ventricles with a frondlike mass in the third ventricle with intense contrast enhancement, suggestive of choroid plexus papilloma of the third ventricle. The lesion was excised completely using an endoscope placed through a single burr hole at the right Kocher's point. Postoperative recovery was uneventful. The child was relieved of his symptoms. CT scan revealed complete removal of the lesion. Histopathology confirmed the diagnosis of choroid plexus papilloma. We document our surgical experience and present an edited video of the surgery. The key steps and nuances are described in the audio timeline. The authors acknowledge the feasibility of performing this complex surgery via a minimally invasive method, which has not been accepted routinely for this pathology.

Keywords

- choroid plexus papilloma
- endoscopic approach
- third ventricle

Introduction

Choroid plexus tumors are benign World Health Organization grade 1 tumor that arises anywhere in the choroid plexus. They comprise 2 to 4% of tumors in less than 15 years of age. They are mostly found in the atrium, followed by the fourth ventricle. The third ventricle is a rather unusual location for this tumor.¹ Rarely choroid plexuses papilloma has been reported in cerebellopontine angle, suprasellar region, frontal lobe, epithalamic commissure, cerebellum, and pineal region.² These tumors have been traditionally managed by craniotomy and microsurgical excision. Minimally invasive procedures have rarely been adopted for this tumor. Here we describe a fully endoscopic excision of this tumor via a surgical ► **Video 1**.

Video 1

Endoscopic excision of third ventricle choroid plexus papilloma. Online content including video sequences viewable at: <https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0043-1771212>.

Case Description

A 1-year-old male presented with complaints of progressively enlarging head for 3 months, with recent onset vomiting and dilated scalp veins. Examination revealed sunset sign, tense fontanels, and papilledema.

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Computed tomography (CT) scan revealed dilated ventricles with a lobulated, frondlike lesion in the third ventricle, with areas of calcification. Magnetic resonance imaging brain showed the lesion to be T1 isointense, T2 hyperintense with areas of flow void and intense contrast enhancement. The management option was discussed with the parents. Given the young age, dilated ventricles, and ease of access via an endoscope, it was planned to approach the lesion minimally invasively via an endoscope. The surgical steps are described in the **Video 1** and its timeline. Postoperatively, the patient improved symptomatically. Recovery was uneventful. A postoperative CT scan did not reveal any residual lesion, and hydrocephalus reduced significantly. He was discharged on the 7th day. Histopathology confirmed the diagnosis of choroid plexus papilloma, a grade I tumor.

Video link: https://drive.google.com/file/d/1ZmPnC3XHa-5HyaNsceVBoqrwJhTaIG9-/view?usp=share_link

Video Timeline

00:01 to 00:17—This video demonstrates the endoscopic excision of a choroid plexus papilloma in a rare location of the third ventricle. A 1-year-old child with raised intracranial pressure had imaging features suggestive of a choroid plexus papilloma of the third ventricle. Skin is incised, a burr hole is made, dura coagulated and cut.

00:18 to 00:34—The endoscope is introduced into the lateral ventricle. The tumor, which appears reddish frondlike, is seen protruding through the foramen of Monro. The septal vein, thalamostriate vein, and normal choroid plexus are seen. The septum with multiple perforations due to chronic hydrocephalus is appreciated.

00:43 to 00:46—Through the perforated septum, the opposite ventricle is inspected.

00:52 to 1:02—The tumor is seen protruding through the opposite foramen of Monro. The anterior column of fornix and caudate is appreciated.

1:03 to 1:10—Attachment of the tumor to the choroid plexus at the venous angle is coagulated

1:25 to 1:30—The tumor is coagulated and shrunk all around for easy manoeuvrability.

1:46 to 1:47—The third ventricle is inspected for any attachments

1:52 to 1:58—The structures in the floor of the posterior third ventricle are seen—the aqueduct and the posterior commissure are appreciated.

2:01 to 2:05—The anterior part of the floor of the third ventricle is inspected.

2:09 to 2:15—The premammillary membrane appears thinned out, and more laterally, the oculomotor nerve is seen through the premammillary membrane.

2:21 to 2:35—Through the thinned-out premammillary membrane, the structures in the floor of the third ventricle are appreciated. From anterior to posterior chiasm, infundibular recess and dorsum sellae are

seen. The hypothalamus forms the inferior part of the lateral wall of the third ventricle.

2:36 to 2:42—The tumor is further coagulated and dissected off the opposite fornix by gentle traction.

2:52 to 2:54—The tumor is rolled off and further coagulated.

3:04 to 3:09—The choroidal feeders arising from the roof of the third ventricle, which is now seen, are coagulated and cut.

3:16 to 3:21—After separation from the roof, the posterior most part of the roof of the third ventricle is seen.

3:23 to 3:33—The tumor is now separate from all attachments; the Massa intermedia is seen. The tumor is held with grasping forceps and removed along with the scope under vision.

Discussion

Choroid plexus tumors, although benign, produce cerebrospinal fluid and bring about features of raised intracranial pressure. Its location in the third ventricle is rarely described in the literature. Tumors of the third ventricle have routinely been removed by craniotomy followed by transcortical or interhemispheric dissection, transcallosal transforaminal, transchoroidal, or transforaminal routes. The use of endoscopes for endoscopic third ventriculostomy or biopsy of lesions is well described.³ Purely endoscopic approach for choroid plexus papilloma has been sparingly described in the literature.^{1,4-6} The choice of its use depends a lot upon the comfort of the neurosurgeon and familiarity with the endoscopic anatomy.³ Ventriculomegaly is a necessity. The excellent vision provided by the endoscope into the corners, which is often not possible with microscopes, makes appreciation of the pedicle of the tumor possible. The irrigation and working channels of the newer endoscopes further assist in surgery.⁷ Bimanual dissection is a limitation with such channeled endoscopes, although using a partially flexible instrument through one of the two side channels may sometimes overcome this limitation. A monoport for endoscopic tumor excision may be troublesome in some cases, and use of multiport endoscopy has been found to be useful by some authors, which can help introduce another endoscope and more instruments, providing a different view and trajectory to the lesion.⁸

Choroid plexus tumors are richly vascularized, and hemostasis could pose a challenge with a purely endoscopic approach. Brisk bleeding may be controlled by placing the endoscope as close as possible to the bleeding site, copious pressure irrigation and bipolar coagulation. Bimanual dissection is difficult with large tumors close to vital structures; in our case, systematic coagulation and shrinkage helped identify surrounding third ventricular structures. Mismatch in the tumor and endoscopic port size may need a concurrent microscopic technique for delivery of a detached specimen from the ventricle.⁶ The successful outcome in this patient and reports by other neurosurgeons suggest that neuroendoscopy may be utilized for obtaining good outcomes minimally invasively in a selected group of patients.

Conclusion

Choroid plexus papilloma is rare, and that in the third ventricle is rarer. The use of pure endoscopy for successful excision of this tumor, although challenging, is possible. This technique may be utilized for the resection of other tumors in this location with favorable anatomy.

Note

A written informed consent has been obtained from the parents.

Conflict of Interest

None declared.

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