

ENDOSCOPIC TREATMENT OF POSTERIOR FOSSA ARACHNOID CYSTS

Yusuf Ersahin

Division of Pediatric Neurosurgery Ege University Faculty of Medicine Izmir, Turkey

ABSTRACT

Objectives. The aim of this paper is to present the results of endoscopic intervention in retrocerebellar arachnoid cysts.

Material and methods. The patients with posterior fossa arachnoid cysts in which a neuroendoscopic intervention had been done between 2000 and 2004 were retrospectively reviewed. Age, gender, presenting symptoms and signs, radiological findings and previous modes of treatment were evaluated. A rigid neuroendoscope was used in all procedures.

Results. There were 6 boys and 3 girls who ranged in age from 1 month to 16 years (mean 29.9 months). Endoscopic cyst fenestration was successful in 7 of 9 patients. Of the 4 patients who had been previously shunted, 3 became shunt free.

Conclusion. Endoscopic cysto-cisternostomy should be the first step in the management of posterior fossa arachnoid cyst in the institutions where neuroendoscopy is routinely practiced.

Key words: neuroendoscopy, arachnoid cyst, posterior cranial fossa

INTRODUCTION

Arachnoid cysts are usually developmental lesions, which may occur wherever cerebrospinal fluid (CSF) and arachnoid membranes are present. There are different opinions on the management of intracranial arachnoid cysts in terms of both the surgical indications and the mode of surgical intervention. The aim of this paper is to present the results of endoscopic intervention in retrocerebellar arachnoid cysts.

MATERIAL AND METHODS

The patients with posterior fossa arachnoid cysts in which a neuroendoscopic intervention

had been done between 2000 and 2004 were retrospectively reviewed. The patients with quadrigeminal plate, cerebello-pontine angle and clival arachnoid cysts were excluded. Age, gender, presenting symptoms and signs, radiological findings and previous modes of treatment were evaluated. A rigid neuroendoscope was used in all procedures.

When the patient's symptoms and signs have improved and the patient has not needed further surgeries such as shunting or open surgery, the endoscopic intervention was considered as successful.

The diagnosis of arachnoid cyst was made by magnetic resonance imaging (MRI) in all patients. Patients had a computed tomography (CT) within several hours after endoscopic surgery to rule out complications. Postoperative T2-weighted MRI was done to show signal voids through opening between the cisterna magna and cyst (Fig. 1).

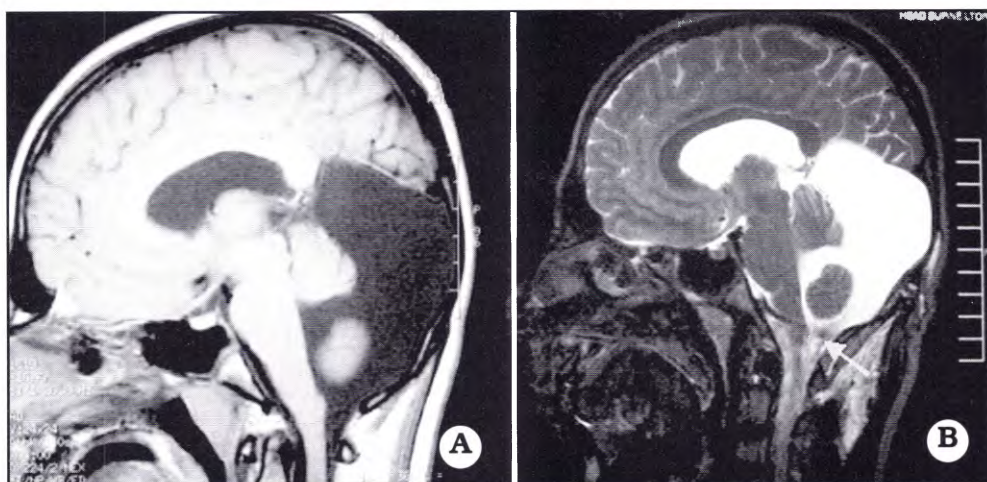


Fig. 1. A. Preoperative T1-weighted sagittal MRI showing retrocerebellar arachnoid cyst. B. Note the flow void (arrow) through cysto-cisternostomy on postoperative T2-weighted sagittal MRI.

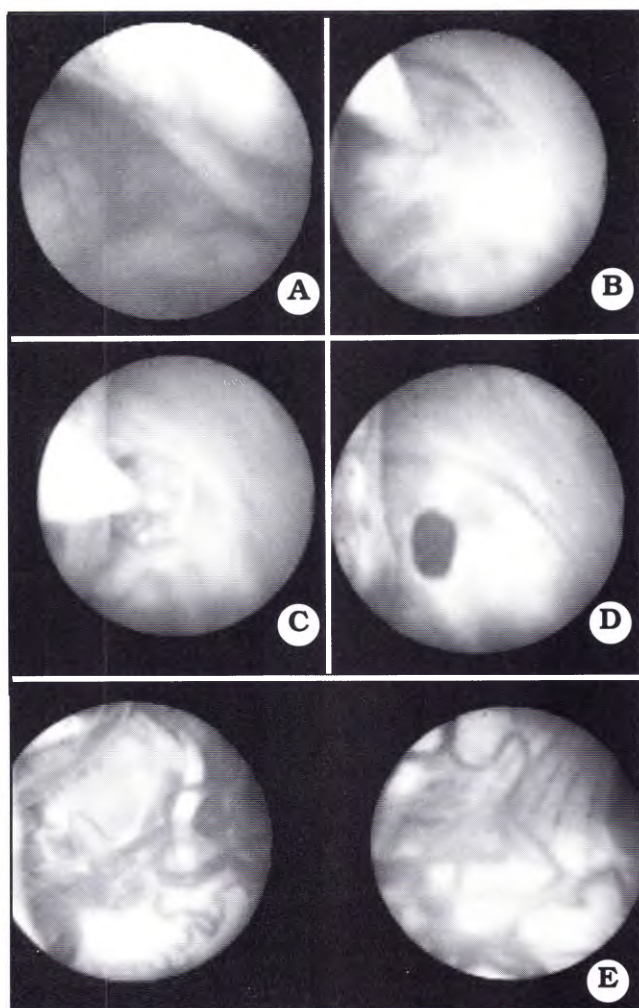


Fig. 2. (A. Endoscopic photograph showing the cerebellar hemispheres and inferior border of the cyst. B. Bipolar coagulation of the inferior wall of the cyst. C. Balloon dilatation of the fenestration. D. Fenestration of the inferior cyst wall (cysto-cisternostomy). E. Visualization of the lower cranial nerves and the spinal cord by the rigid neuroendoscope.

Technique

All patients were operated on under general anesthesia in prone position. A vertical paramedian skin incision, 3-4 cm in length is done in the suboccipital region. The side in which the arachnoid cyst is larger was used. A very small craniotomy (1.5 cm x 2 cm) below the transverse sinus is performed, since a small burr hole does hinder the rigid neuroendoscope from moving obliquely and accessing the cisterna magna. The dura is linearly incised and zero degree straightforward rigid neuroendoscope (Karl Storz, Tuttlingen, Germany and Channel Neuroendoscope, Medtronic, Minneapolis, MN) is inserted into the cyst after the cyst is punctured. A cysto-cisternostomy is performed between the cyst and cisterna magna. The lower cranial nerves and the spinal cord are visualized (Fig. 2). At the end of the procedure the dural incision is either primarily sutured or grafted with a collagen matrix (DuraGen, Integra LifeSciences Corporation, New Jersey, U.S.A.)

RESULTS

Nine patients with posterior fossa arachnoid cyst underwent an endoscopic procedure. Six boys and 3 girls ranged in age from 1 month to 16 years (mean 29.9 months) (Table 1). In 3 patients, posterior fossa cyst was diagnosed by ultrasound before birth. Five patients were delivered by cesarean section and 4 had a normal vaginal delivery.

Macrocrania was the most common presenting symptom and sign. All patients had a non-communicating hydrocephalus. Four patients who had been previously shunted at another

Table 1: Summary of the patients with retrocerebellar arachnoid cysts.

Case	Gender	Age	Symptoms and signs	Previous treatment	Endoscopic procedure	Complications	Outcome
1	Boy	16 y.	Headache, vomiting, papilledema	VP shunt	Cysto-cisternostomy		Successful
2	Girl	4.5 m.	Macrocrania		Cysto-cisternostomy		Successful
3	Boy	3 m.	Macrocrania, bulging fontanelle		Cysto-cisternostomy	Subcutaneous CSF collection	Failed CP shunt
4	Boy	1m.	Macrocrania		Cysto-cisternostomy		Successful
5	Boy	2 m.	Macrocrania, bulging fontanelle	CP shunt	Cysto-cisternostomy	CSF fistula	Failed open surgery-Cpshunt
6	Boy	4 y.	Somnolence, ataxia and opisthotonus		Cysto-cisternostomy		Successful
7	Boy	13 m.	Bulging fontanelle and psychomotor retardation	CP shunt	Cysto-		Successful
8	Girl	1.5 m.	Macrocrania		Cysto-cisternostomy		Successful
9*	Girl	4.5 m.	Macrocrania and vomiting	VP shunt	Cysto-cisternostomy*	Subcutaneous CSF collection	Successful

VP: ventriculo-peritoneal, CP: cysto-peritoneal, *: repeat endoscopic procedure.

hospital, presented with headache, vomiting or symptoms of intracranial hypertension at the time of shunt malfunction. Ventriculo-peritoneal (VP) shunt and cysto-peritoneal (CP) shunt had been inserted in 2 and 2 patients, respectively. In one of the patients, we had to reinsert a CP shunt, following both endoscopic fenestration and cyst excision by open surgery. When this patient had been on external drainage before open surgery, more than 750 ml CSF per day were excreted to the drainage bag.

A repeat endoscopic fenestration was performed in one of the patients almost 2 years after the initial endoscopic intervention. Of the 4 patients with shunts, 3 became shunt free. Endoscopic cyst fenestration was successful in 7 of 9 patients. Postoperative subcutaneous CSF collection and fistula occurred in two and one patient, respectively. Two of the 3 patients with complication did not benefit from endoscopic cyst fenestration. A reduction in cyst size in varying degrees and a signal void through fenestration between the cisterna magna and cyst were shown on the postoperative MRI scans of the 7 patients (Fig. 3). In 2 patients, there was no change in cyst volume and ventricular dilatation increased and a CP shunt was inserted. The follow-up ranged from 3 to 51 months (mean 26.4 months).

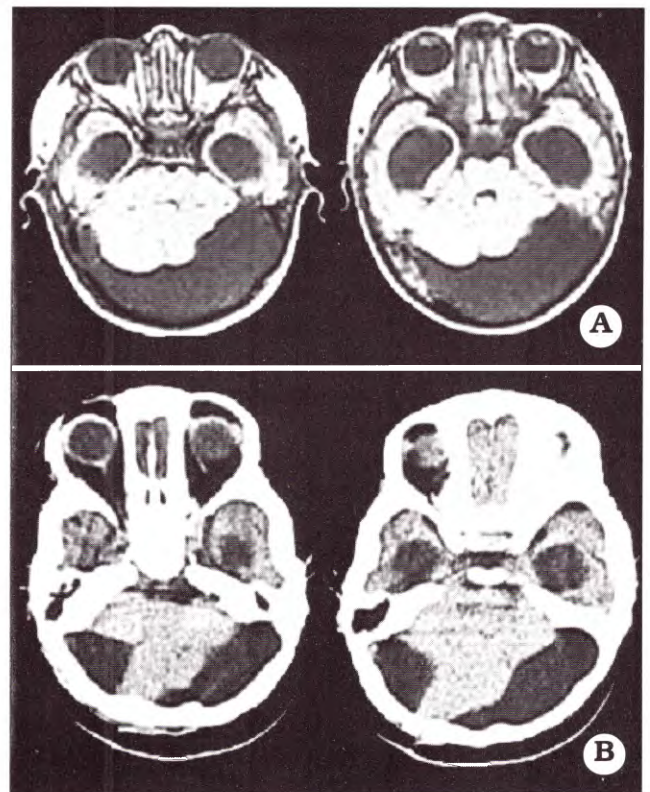


Fig. 3. A. Preoperative T1-weighted MRI scans showing a retrocerebellar arachnoid cyst. B. Postoperative showing a reduction in the cyst volume and some expansion of the cerebellar hemispheres.

DISCUSSION

Arachnoid cysts are occasionally encountered in the posterior fossa. Infratentorial arachnoid cysts may be retrocerebellar, supravermian (supracollicular) or in the cerebellopontine angle^{1,2}. However, we included only retrocerebellar arachnoid cyst in this series. Megacisterna magna, Dandy-Walker syndrome, cerebellar hypoplasia, hydrocephalus in the presence of a non-space-occupying retrocerebellar CSF collection, dermoid or epidermoid cysts, cystic cerebellar astrocytoma and cerebellar hemangioblastoma should be taken into consideration in differential diagnosis^{1,3-5}. Galassi et al⁶ reported that posterior fossa arachnoid cysts affect males more than females and may become symptomatic at any age and a history of a difficult or traumatic delivery was present in half of the cases. Six of the nine children were male in our series and all presented with hydrocephalus in their infancy. There were eight female and four male patients in the series of Samii et al⁷. No sex difference has been reported by others³. Posterior fossa cyst was diagnosed prenatally in 3 of the 9 patients and five patients were delivered by cesarean section and 4 had a normal vaginal delivery.

Endoscopic treatment of arachnoid cysts has been infrequently reported⁸⁻¹⁴. Endoscopic treatment of midline supratentorial arachnoid cysts such as suprasellar arachnoid cyst has been accepted as a choice of treatment by most of the neurosurgeons^{8,10,14-17}. However, the experience on the endoscopic treatment of arachnoid cysts in the posterior fossa is limited. Schroeder et al¹⁴ performed endoscopic cysto-cisternostomy in 2 patients with posterior fossa arachnoid cysts and the clinical improvement and cyst reduction were achieved in both patients. Hopf and Perneczky¹⁰ endoscopic neurosurgery in 2 and endoscope-assisted microneurosurgery in 1 patient with retrocerebellar arachnoid cysts. Of 3 patients, 2 improved clinically although cyst reduction was determined in only one patient. However, they reported that the best success rates were achieved in patients with intraventricular cysts (89%) and posterior fossa arachnoid cysts (78%) including quadrigeminal, cerebellopontine angle, supra and retrocerebellar cysts. Choi et al⁸ carried out cysto-cisternostomy in 5 arachnoid cysts in the posterior fossa and cyst reduction was achieved in 3. They did not find any case of reclosure of the fenestration site in any of the patients who underwent successful endoscopic procedure without

hemorrhage or infection in a series of 36 patients with congenital arachnoid cysts. They also think that reclosure of the fenestration site may be related to hemorrhage or infection⁸.

In the series of 7 patients with arachnoid cysts reported by Kim¹¹, the cerebellar arachnoid cyst disappeared following endoscopic fenestration. Gangemi et al⁹ reported a successful result in 2 patients with posterior fossa arachnoid cyst in which endoscopic cyst fenestration and endoscope-assisted microneurosurgery had been done. A 32-year-old with an arachnoid cyst of the posterior fossa manifesting as cervical syringomyelic myelopathy improved following endoscopic cyst fenestration. The inferior wall of the cyst was disturbing CSF pulsatile movement between the intraspinal and intracranial subarachnoid spaces¹². The symptoms and signs of intracranial hypertension were relieved by endoscopic cyst fenestration in 7 of the nine patients with a retrocerebellar arachnoid cyst in our series. One of the patients had a repeat endoscopic cysto-cisternostomy. This patient had had shunt infection before the first endoscopic procedure was done. The other patient in whom the endoscopic cyst fenestration failed had been previously shunted. He had CSF fistula through the skin incision after the endoscopic cyst fenestration and an external drain was inserted in the cyst because of infection. The daily amount of CSF, drained in the drainage bag was greater than 750 ml. Although a cyst excision was performed by craniotomy, he needed a CP shunt. CSF production by enclosed ectopic choroid plexus is one of the mechanisms of cyst growth^{18,19}. Such a mechanism may account for a high rate of CSF production in our patient.

No major complication following endoscopic surgery in posterior fossa arachnoid cysts has been reported^{8-12,14}. The complications of open surgery are more frequent and severe²⁰⁻²². However, open surgery and radical removal of the arachnoid cyst in the posterior fossa can be safe and effective in experienced hands^{3,7}. Shunt surgery has no mortality and very low complication rate. A marked reduction in cyst size is almost always seen on CT or MRI after shunting^{21,23}. Shunt dependency and complications are inevitable in the long term²⁴.

The number of the cases who underwent endoscopic cyst fenestration is small. We need to have a larger number of patients to prove the effectiveness of endoscopic intervention in posterior fossa arachnoid cysts. However, the results of

endoscopic surgeries reported in the literature so far are promising. Endoscopic cysto-cisternotomy should be the first step in the management of posterior fossa arachnoid cyst in the institutions where neuroendoscopy is routinely practiced.

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RESUMEN

Objetivo. Presentar los resultados del tratamiento endoscópico de los quistes aracnoideos de la fosa posterior.

Material y método. Se revisan las historias de pacientes tratados entre los años 2000 y 2004 evaluando edad, sexo, hallazgos radiológicos y tratamiento previo. En todos los procedimientos se utilizó un endoscopio rígido.

Resultados. Encontramos 6 niños y 3 niñas (edad promedio 29,9 meses) La fenestración endoscópica de los quistes fue útil en 7 de los 9 pacientes. De los 4

pacientes a los que se había implantado válvulas previamente, 3 no requirieron derivación.

Conclusión. El tratamiento endoscópico de los quistes aracnoideos de la fosa posterior debe ser el de primera opción en las instituciones que hagan esta práctica de rutina.

Palabras clave: fosa posterior, neuroendoscopia, quiste aracnoideo