Surgical Treatment Options in Arachnoid Cysts in Children

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Introduction

The neurosurgical treatment of middle fossa arachnoid cysts is controversial, which is demonstrated by the analysis of these four papers. Unlike QA suprasellar, where the indication is neuroendoscopic treatment, in the middle QA fossa there isn't a gold standard.

In the four analyzed works, different neurosurgical techniques were developed, but all provided satisfactory results and similar complication rate.

1) MICROSURGICAL KEYHOLE APPROACH FOR MIDDLE FOSSA ARACHNOID CYST FENESTRATION

Levy ML, Wang M, Aryan HE, Yoo K, Meltzer H.
Neurosurgery. 2003 Nov;53(5):1138-44; discussion 1144-5.

Information

The authors makes a retrospective review between 1994 and 2001 of data for 50 children who underwent keyhole microcraniotomy for fenestration of symptomatic middle fossa arachnoid cysts, the goal was to create communications between the cyst cavity and basal cisterns with microsurgical dissection.

The average age at the time of surgery was 68 +/- 57.2 months.

Indications for surgery was intractable headaches (45%), increasing cyst size (21%), seizures (25%), and hemiparesis (8%).

The symptoms most likely to improve were hemiparesis (100%) and abducens nerve palsies. Headaches (67%) and seizure disorders (50%) were less likely to improve.

82% of patients decreases the cyst size in imaging studies. 18% of those patients, demonstrated complete cyst effacement. Two patients required shunting after craniotomy (4%).

Complications was spontaneously resolving pseudomeningocele (10%), transient cranial nerve III palsy (6%), cerebrospinal fluid leak (6%), subdural hematoma (4%), and wound infection (2%).

Analysis
The authors report the steps of the surgical technique used and focused on the advantage of cyst make new place moving brain parenchyma and the access to different structures.

To compare with endoscopy they highlight the benefits of control of the area with surgically craniectomy (bleeding can be more easy controlled, open procedures permit bimanual manipulation and stereoscopic observation gives the surgeon superior depth perception) and the keyhole is as small as the craniectomies required for endoscope placement.

The advantages over shunting mention the risk of lifelong shunt dependence, with the potential for occlusion and infections.

Size reduction (82%) and decrease of symptoms (95%) are encouraging, but just disappeared 18% of cysts.

2) THE PARALLEL USE OF ENDOSCOPIC FENESTRATION AND A CYSTOPERITONEAL SHUNT WITH PROGRAMMABLE VALVE TO TEAT ARACHNOID CYSTS: EXPERIENCE AND HYPOTESIS

Mottolese C, Szathmari A, Simon E, Ginguene C, Ricci-Franchi AC, Hermier M.
J Neurosurg Pediatr. 2010 Apr;5(4):408-14.

Information

Between 1996 and 2005, the authors treated 35 patients with an arachnoid cyst using endoscopic fenestration and placing a programmable shunt. The patients' ages (70% boys and 30% girls) ranged from 2 months to 16 years old.

Of the cyst, 22 (62.9%) were localized in the sylvian fissure, 3 (8,6%) were in the suprasellar region, and 10 (28.6%) were in the posterior fossa.

After surgery, when the MR showed the disappearance of the cyst, the opening pressure of the shunt was gradually increased, and when was attained, shunt removal was planned for at least 6 months later.

The cyst disappeared in 60% of the cases, and a significant reduction in initial volume was observed in 14 patients (40%). In 54% of the cases it was possible to remove the shunt, and there was no recurrence of the cyst, and all the patients have a complete remission of clinical symptoms.

Analysis

This article demonstrate that combining the use of endoscopic fenestration and a programmable cystoperitoneal valve could make it possible to remove the valve, thus providing the opportunity to avoid the shunt dependence, at least a 60 percent of cases. The mean of time to complete disappearance was 4 year. Also the cerebral expansion was observed in all patient in this series.

3) ENDOSCOPIC TREATMENT OF MIDDLE FOSSA ARACHNOID CYST: A SERIES OF 40 PATIENTS TREATED ENDOSCOPICALLY IN TWO CENTRES

Spacca B, Kandasamy J, Mallucci CL, Genitori L.
Childs Nerv Syst. 2010 Feb;26(2):163-72.

Information

Between 2001 and 2007 the data of 40 patients (mean age 7.8 years) were retrospectively reviewed with prospective follow-up (mean 21 months). They were treated for middle fossa arachnoid cyst with endoscopic fenestration in two centers of pediatric neurosurgery in Italy and United Kingdom.

All patients had a unilateral cyst (28 left side and 12 on the right side).

The authors divided the clinical presentation into five categories: focal neurology (20%), intracranial hypertension (37.5%), skull deformity (22.5%), functional symptoms (27.5%) and others like dizziness (17.5%). They related their specify surgical technique.

A satisfactory outcome was obtained in 92.5%, a complete resolution of the pre-operative sign and symptoms in 62.5% and a significant improvement in 30%. The most likely symptom to improve was headache 93.3%.

The cyst disappeared completely in 5 patients (12.5%), 24 (60%) showed a reduction in size and were unchanged in 9 patients (22.5%). Two patients demonstrated a small increase in size but they were completely asymptomatic.
Four patients (10%) required further surgical treatment. Four patients experienced a post-traumatic intracystic bleeding after surgery.

Analysis

The authors recommend the endoscopic approach as the fist line management to the middle fossa arachnoid cyst, offers comparable results to shunts and craniotomy in term of symptom control, they obtained a good clinical outcome with complete recovery or significant improvement in 37 patients (92.5%).

Compared to open craniotomy, endoscopic fenestration is performed though a single burr hole. Compared with cyst shunting, obviating the requirement for an implant device with the inherent risks (infections and mechanical dysfunctions). The main complication was subdural hygroma (12.5%) and requiring surgical treatment with subduro-peritoneal shunt.

The rate of complete radiological resolution of the cyst is probably lower than in the other alternatives techniques.

4) LIMITS OF ENDOCOPIC TREARTMENT OF SYLVIAN ARACHNOID CYST IN CHILDREN

Di Rocco F, R James S, Roujeau T, Puget S, Sainte-Rose C, Zerah M.
Childs Nerv Syst. 2010 Feb;26(2):155-62.

Information

The authors present their experience in the endoscopic treatment of the sylvian arachnoid cyst, focusing on the limits and complications of this approach.

17 children (mean age 4.4 years)have been treated using a purely temporal endoscopic approach on between 2006 and 2008. The preoperative evaluation consisted in MRI. Clinical signs and symptoms were headaches in 9 children, macrocrania in 8, temporal bulging in 3, mental retardation in 2, and seizures in 2. Four children had already been operated.

The cysto-cisternostomy is performed between the optic nerve and the carotid artery and/or between the carotid artery and the oculomotor nerve and/or under the third nerve.

An early postoperative ct scan was performed in all cases. Patients are systematically controlled 3 and 6 months and 1, 2, and 3 years after surgery.
In the immediate postoperative time, 3 children worsened with intracranial hypertension. The imaging control showed an ipsilateral hemispheric subdural collection. A subdural-peritoneal shunt was placed and removed 6 month later.
The mean follow-up period was 23 month. The headaches had all disappeared postoperatively. The head circumference growth stabilized or returned to the normal rates. The antiepileptic treatment of the 2 epileptic patients could be reduced. The psychomotor development improved in one of the two children. A radiological reduction of the cyst was found in all but 6 children whose cyst volume was unchanged.

Analysis

The endoscopic techniques have been successfully used in arachnoid cyst in others locations. In the authors serial was no need to change for an endoscopically assisted microsurgery. The endoscope offers the advantage of a close and precise visualization of the stomia. The main limitation of the procedure is anatomical due to the relation of the cyst with the basal cisterns and to the temporal lobe displacement. Other limitation is that a bleeding can rapidly and dramatically reduce the vision, consequently complicating or making impossible to continue the procedure. This technique avoids an excessive drainage of the cyst fluid which, together with the minimal opening of the superficial cyst wall, may reduce the incidence of symptomatic subdural CSF collection and the use of CSF shunting devices.

Discussion

In our experience, the surgical indication is reserved only for symptomatic patients, we disagree with preventive surgery.

With regard to surgical treatment, our choice is microsurgery, due with this technique we increased QA fenestration and communication with the cisterns, better control of hemostasis and allows the coagulation of intracystic veins, thus reducing the risk of intracystic hematoma. In the isolated neuroendoscopic treatment ,the reduction index of the QA is lower (probably due to the smaller size made in the fenestrations), and is more difficult to control haemostasia.

When in a given pathology there are different treatment options, it means that there isn´t an ideal option. Treatment selected depends on the personal experience of each surgeon.

In the rare cases of giant QA with midline distortion, we consider as a validate option the placement of cysto peritoneal shunt with external adjustable valve.