

# Endoscopic Treatment of Arachnoid Cyst

Y. R. Yadav, Vijay Parihar and Pushpraj Bhatele

**Abstract** *Introduction* The surgical options for symptomatic arachnoid cysts are shunting, endoscopic fenestration, and craniotomy with fenestration. The endoscopic procedure has been found to be minimally invasive, safe, and effective. Results of endoscopic treatment of 21 patients of arachnoid cyst in vicinity to cistern or ventricle are described. *Material and Methods* All except one of the symptomatic arachnoid cysts with raised intracranial pressure were operated by endoscopic procedure. One patient of convexity cyst without any adjoining cistern/ventricle was excluded from study. Gaab 6-degree rigid telescope was used. Burr hole was made keeping in mind the straight trajectory between the cyst and cistern/ventricle. A minimum of 1 cm hole was made in all the cases. Third ventriculostomy was also done for associated hydrocephalus in quadrigeminal arachnoid cyst. Both the procedures could be done by single burr hole placed about 3–4 cm anterior to coronal suture. *Results* This is a prospective study of 21 arachnoid cysts. There were 6, 8, 5, and 2 cases of vermian, quadrigeminal region, sylvian fissure region, and cerebello-pontine region arachnoid cyst respectively. Symptomatic improvement occurred in 20 cases, while one infant with quadrigeminal arachnoid cyst required a ventriculo-peritoneal (VP) shunt. There was no mortality or any other complication except 3 cases of CSF leak, which stopped in 7 days time in two cases. Third ventriculostomy was done in the same sitting in 8 cases of quadrigeminal region arachnoid cyst. Follow-up ranged from 6 to 54 months. *Conclusion* Endoscopic treatment of arachnoid cyst with an adjoining cistern or ventricle is safe and effective. Third ventriculostomy can be done in the same sitting.

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## Introduction

The optimal surgical treatment for symptomatic arachnoid cysts is controversial. Therapeutic options include cyst shunting [1–5], endoscopic fenestration [6–11], and craniotomy for fenestration [12–14]. Endoscopy is having an increasingly prominent role in neurosurgery. The endoscopic procedure has been found to be minimally invasive, safe, and effective as compared to the traditional surgical craniotomy [15–20]. We are reporting our experience of endoscopic treatment of 21 arachnoid cysts.

## Material and Methods

All the symptomatic patients of arachnoid cysts except one were operated by endoscopic procedure between Jan 2004 and Feb 2008. One patient of convexity cyst without any adjoining cistern/ventricle was managed by cystoperitoneal shunt was excluded from study. There were a total of 21 patients. Detailed history and thorough physical examination was done. CT scans were done in all the cases. MRI scans were done in 19 cases. Gaab 6-degree rigid telescope (Karl Storz Germany) was used. Burr hole was placed at most superior point on the skull. This prevents entry of air in the cyst cavity. Presence of air in cyst cavity hampers proper visualization. Burr hole margins were drilled in such a way as to allow straight trajectory from the cyst to the cistern or the ventricle. Cruciate incision was made in the dura mater as small as possible but sufficient enough to pass a telescope. Hitch stitches taking dura mater and arachnoid cyst were applied to prevent separation of dura mater from bone. This also prevents separation of dura mater from cyst wall. Large-sized dural incision should be avoided as it allows entry of air which hampers proper endoscopic visualization. Cyst wall adjoining the cistern or the ventricle was coagulated and cut to make free communication taking care not to injure any vessel or cranial nerve. Communication between cyst and cistern is usually made parallel to the vessel or nerve. A minimum of 1 cm hole was made in all the patients.

## Results

This was a prospective study of 21 arachnoid cysts. There were 14 male patients. There were 6 cases of inferior vermian region, 8 cases of quadrigeminal region, 5 of sylvian fissure region, and 2 of cerebello-pontine region cysts. Symptomatic

improvement occurred in 20 cases after endoscopic treatment while one infant with quadrigeminal region arachnoid cyst required a ventriculo-peritoneal (VP) shunt. There was no mortality or any other complication except CSF leak in three patients. CSF leak stopped in two cases within 7 days' time. These patients required 2–3 ventricular taps. The third infant with quadrigeminal region arachnoid cyst required VP shunt. Hospital stay ranged from 4 to 12 days with an average of 5.4 days. Mean operating time was 50 min ranging from 40 to 90 min. The third ventriculostomy was done in the same sitting in 8 cases of quadrigeminal region arachnoid cysts; all these cases were associated with hydrocephalus. Both the procedures could be done by single burr hole placed about 3–4 cm anterior to coronal suture. There was gross ventriculomegaly in all these children. Minimum of 1 cm hole was made in all the cases taking care not to injure cranial nerve and vessel.

## Discussion

The natural history and pathogenesis of arachnoid cyst remain poorly defined. Arachnoid cysts are commonly thought to arise from either congenital defects or trauma. There are reports of the spontaneous development of arachnoid cyst [6, 21]. Although most arachnoid cysts remain static fluid-filled compartments throughout life, some of them can be enlarged, exerting a mass effect on adjacent neural structures [22, 23]. There are reports of spontaneous disappearance of a suprasellar arachnoid cyst [24, 25]. These cysts may rupture producing subdural hygroma or chronic sub dura hematoma [26]. MR CSF flow imaging with a phase contrast cine sequence can be a reliable alternative to invasive CT cisternography for the functional evaluation of arachnoid cysts [27]. Optimal treatment guidelines are not yet established [24]. Alaani et al. [28] suggested a conservative management approach to the majority of these cysts as the cysts may not show change in size on repeated MRI scan and the patients' symptoms may not progress over the period of follow-up.

The preferred treatment for symptomatic arachnoid cysts is surgery. The indications for surgery are the presence of progressive hydrocephalus or intracranial hypertension [29]. The cystoperitoneal shunt was associated with clinical improvement in most cases [1]. Cysto ventricular shunting was also found to be simple as well as effective and reliable [2]. Shunt dependency and slit ventricle syndrome after cystoperitoneal shunting was found to be a real problem [5, 30, 31]. Insertion of an internal shunt from the cyst to the subdural compartment is also considered as a valuable alternative in the treatment of arachnoid cysts [3]. Arachnoid cysts can be successfully treated with a cystoperitoneal shunting with a programmable valve [4, 5]. Microsurgical keyhole fenestration was also found to be a safe and effective surgical procedure for the treatment of arachnoid cysts [12–14, 32]. Factors that influence outcome are the rate of volume reduction and cyst location [32]. Results are good if the cyst is in vicinity of the cistern/ventricle.

Endoscopic procedures were found to be safe and effective in our series also. Another advantage of this procedure is that third ventriculostomy can be done in

the same sitting. In some cases hydrocephalus could be due to co-existing aqueductal stenosis, apart from the pressure due to cyst. Many researchers also advocated the endoscopic procedure as the primary procedure in arachnoid cysts in most cases because it is a minimally invasive procedure. The traditional surgical treatment can be performed without additional risk if endoscopic surgery fails [33–37]. Cerebro-spinal fluid leak was the only complication in this series. Results of endoscopic treatment of suprasellar arachnoid cysts were very good [38–45]. The outcome of endoscopic treatment of quadrigeminal cistern region arachnoid cyst was also good [46–48]. Similar good results in other location cysts like cerebello-pontine angle and posterior fossa cysts were also observed [28]. Abbott [49] and Strojnik [22] also predicted that most of the arachnoid cysts will be managed endoscopically in the future.

Endoscope-controlled microsurgery is a valid minimally invasive procedure for treating superficially located intracranial arachnoid cysts [50]. Arachnoid cyst can be successfully treated with the help of navigation. As the anatomical landmarks are not visible in some cases, navigated endoscopic procedures help in correct placement of communications between cyst and ventricle or cistern [38, 51].

Although endoscopic management of arachnoid cyst [6–11, 52], hydrocephalus [53–56], brain abscess [57, 58], intra ventricular hemorrhage [59], atlanto-axial dislocation [60], deep intra cerebral hematoma [61], and trigeminal neuralgia [62] is becoming the preferred and effective method because of its minimal invasive nature and safety, it also has some limitations. Normal anatomical landmarks are not visible, so the orientation may be a problem in some cases. Navigation is very helpful in such cases. Follow-up is short in this study. This procedure may be possible if cyst is not in the vicinity to cistern or ventricle. Straight trajectory is needed for rigid scope, which may be difficult in some cases, to make communication between the cyst and cistern or the ventricle. This problem can be overcome by flexible endoscope. Air can enter inside the superficial cyst which may hamper proper visualization.

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