

Original Article**Endoscopic Transventricular Approach to Third Ventricular Colloid Cyst***¹Amr K. Elsamman* and ²Lamiaa I.A. Metwally*Departments of ¹Neurosurgery and ²Radiology, Cairo University**ABSTRACT****Received:**

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Background: Colloid cysts typically presents with manifestations of increased intracranial pressure due to association with obstructive hydrocephalus. Many management options exist including expectant observation, ventriculo-peritoneal (v/p) shunt, microsurgical resection and endoscopic transventricular cyst excision. Endoscopic approach brings together the value of resection and the avoidance of complications of open techniques. **Objective:** Assessment of the efficacy and safety of endoscopic approach to colloid cysts. **Patients and Methods:** Twelve cases of colloid cysts were operated upon by endoscopic technique using the uniportal approach in the period between 2004 and 2015. **Results:** Seven females and five males were included. Headache was the most common symptom followed by memory disturbance. Total resection was achieved in 50% of the endoscopic cases. In one case we had to shift to microsurgery due to hard contents. One case had symptomatic recurrence requiring surgery. Temporary postoperative memory affection occurred in four cases (30%). Four patients (30%) needed postoperative V/P shunt. **Conclusion:** Endoscopic approach to colloid cyst is safe, effective and with relative low morbidity.

INTRODUCTION

Colloid cysts are cystic lesions located at the anterior part of third ventricle, close to the foramen of Monro. The cysts are believed to be derived from either primitive neuroepithelium of the tela choroidea or from endoderm¹. Patients may remain asymptomatic for long time while some can present with paroxysmal headache, gait disturbance, nausea, vomiting, behavioral changes, weaknesses of lower limbs, impaired memory, new learning disability and rarely sudden death. Computed tomography is usually the first diagnostic investigation and usually reveals a well-defined round or oval hyperdense nonenhancing lesion. The MRI signal intensity of colloid cysts is extremely variable, with any combination of T1 and T2 signal intensities. Management options include ventriculo peritoneal shunt insertion, endoscopic and microsurgical resection².

The goals of surgical procedures are to achieve a complete resection avoiding potential long-term recurrence along with CSF pathway restoration with minimal morbidity and mortality².

PATIENTS AND METHODS

This study included twelve patients with third ventricular colloid cysts. The only inclusion criterion was the presence of dilated ventricles to allow for the endoscopic approach.

All patients were operated upon in Cairo University Hospitals by the author.

***Corresponding Author:**

Amr K. E Elsamman

Department of Neurosurgery, Cairo University Hospital

Email: aa.samman@kasralainy.edu.eg; Tel: +01227364056

Patients had detailed history taking, thorough neurological examination, and radiological studies including preoperative computed tomography (CT) and MRI of the brain. Immediate postoperative CT was done on the second day of surgery and MRI is usually done six weeks following surgery.

The surgical technique starts by tapping the ventricle with a cannula prior to introducing the endoscope. A soft ventricular catheter can be passed into the ventricle that can subsequently be used for tracking. The endoscope is introduced along the catheter tract. The catheter serves as a continuous marker to the ventricle allowing repeated endoscopic entries.

A more anterior approach can be used to better tackle the adhesions of the cyst to the roof of the third ventricle, however, not too anterior to prevent easy passage through the Foramen of Monro (FM). Usually, 3-5 cm anterior to the coronal suture will suffice for this purpose and neuronavigation can be of great help to choose the ideal entry point. All cases were prepared to shift the procedure to microsurgery in the occasion of impossible endoscopic resection due to hard contents.

The usual approach was the transforaminal route, in case of retroformainal location of the cyst, a transeptal interforaminal approach is used.

Initially the soft cyst contents are aspirated followed by resection of the capsule as much as possible with coagulation of the part not amenable for resection.

Following resection, an external ventricular drain (EVD) is left for 2-3 days to drain bloody cerebro spinal fluid (CSF) and to measure the intra cranial pressure to decide the need for permanent ventriculo-peritoneal shunt.

RESULTS

This study is a retrospective one conducted in Cairo University Hospitals in the period between 2004 and 2015. Twelve cases were studied including seven females and five males. The mean age ranged between eighteen and forty nine years. The main presenting symptom was headache, which was present in 100% of cases. Memory disturbance was present in three cases representing 25%. All cases (100%) had hydrocephalic changes, among them, two cases (16.6%) had asymmetrical ventricular dilatation (right lateral ventricle bigger than the left). The size of the cysts varied between 12 and 26 mm with a mean value of 18.4 mm. Their appearance on MRI was similar in 10 cases (83.3%) as hyperintense on T1 weighted images and hypointense on T2 weighted images with no contrast enhancement. The other two cases showed uncommon variable appearances on MRI.

Eleven cases were operated upon by endoscopic approach through right frontal lobe. One case was approached through the left frontal lobe due to asymmetrical dilatation of the lateral ventricle, having a left lateral ventricle larger than the right. In seven cases, the burr hole was placed on Kocher's point (one of them on the left side), however in the last five cases, the burr hole was placed 3-5 cm anterior to the coronal suture with the aid of neuronavigation (**Fig. 1**)

Intraoperative verified gross total excision was achieved in six of the twelve cases (50%). Another one case was totally resected, however, intraoperative shift to microsurgery was done after initial endoscopic exploration and trial of cyst aspiration. The contents were hard in consistency; hence the decision was made for en block microsurgical resection. In the other five cases, maximal debulking and aspiration of the content was followed by coagulation of the remaining part of the capsule. The causes of incomplete capsule resection were either posterior extension of the cyst, adherence to vascular structures or wall of the third ventricle.

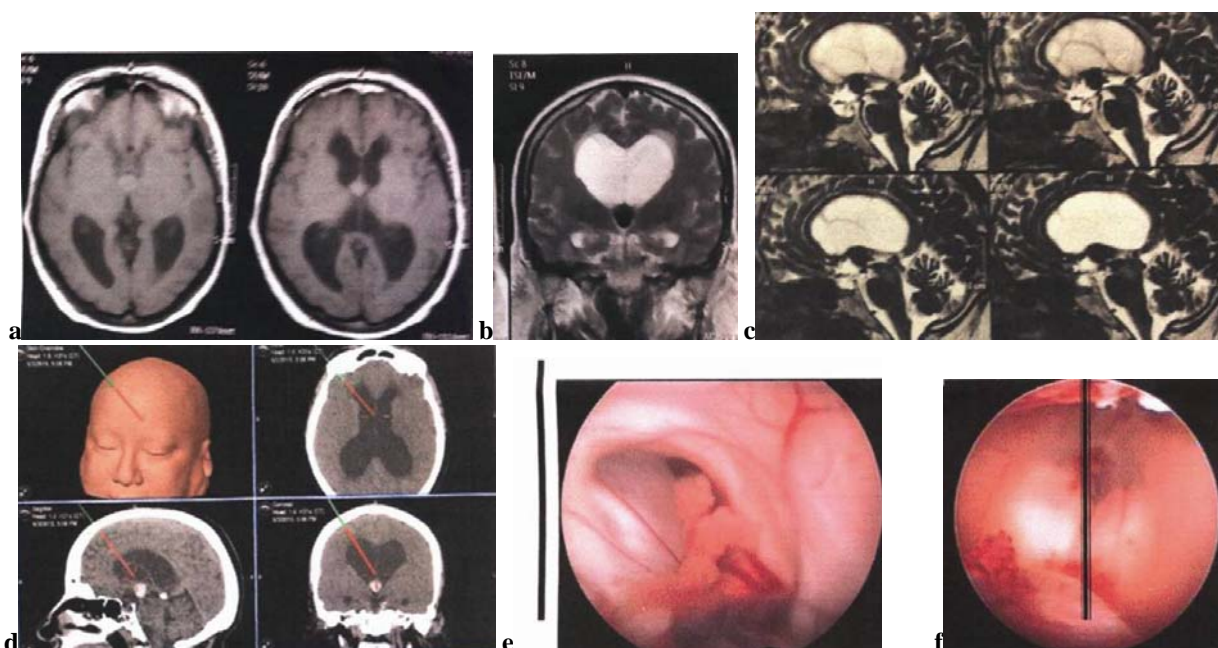


Fig 1 a-f: a-d: axial preoperative, coronal T2 pre operative, sagittal T2 preoperative and navigated trajectory of colloid cyst. e: preoperative endoscopic view of the cyst through foramen of Monroe, f: view of the floor of the third ventricle following resection.

Postoperative MRI showed residuals in only four out of five subtotal resection cases owing to the small residual left with capsule coagulation.

The follow up period ranged between fourteen and hundred and twenty one months with a mean value of sixty nine months. Two patients had lost follow up. In the remaining ten cases, there was only one case of symptomatic residual growth requiring re-surgery five years after first surgery, which was done by an endoscopic approach. Total resection was not possible

as well, however, maximal debulking with near total resection of the capsule was achieved. The usual two approaches were the trans foraminal approach (nine cases including the case of microsurgery) and the transseptal interforaminal approach in case of retroforaminal (three cases) (**Fig 2**). In all cases, postoperative external ventricular drain was left to measure the pressure and drain bloody CSF off the ventricles. The drain was routinely removed in 2-3 days. In this series, three patients needed permanent CSF

diversion by Ventriculo-Peritoneal Shunt. Only one case had aseptic meningitis, which was treated by a brief course of steroids. Short-term memory deficits were encountered in four cases representing 30%. It showed spontaneous improvement in few weeks.

DISCUSSION

Many management options in colloid cysts exist including: observation, stereotactic aspiration,

microscopic or endoscopic resection and shunt surgery (bilateral or unilateral with septostomy).¹

Patients may remain asymptomatic but some of them may deteriorate. Small asymptomatic lesions of less than 1 cm without ventriculomegaly may be observed. Spontaneous resolution of colloid cyst has been reported. Such patients should be carefully observed by periodical clinical and radiological assessment³. Although sudden death has been reported, it is less likely in cysts measuring less than 1 cm diameter⁴.

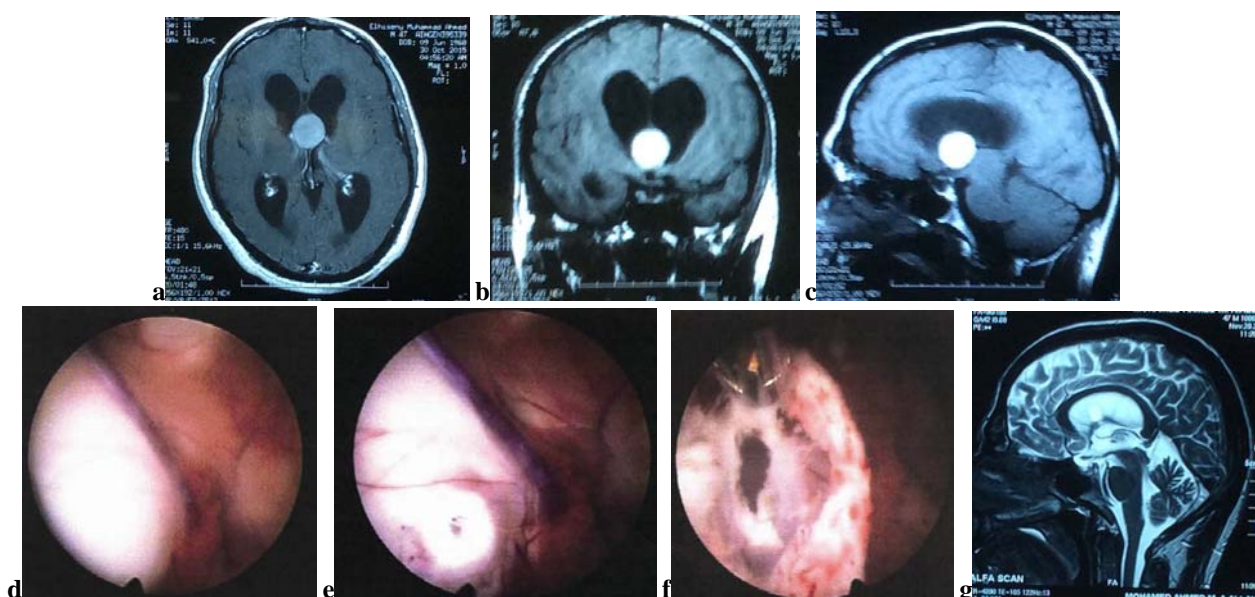


Fig. 2 a-g: a-c: preoperative axial, coronal & sagittal MRI of colloid cyst. d: intraoperative retroforaminal location of cyst, e: transseptal, interforaminal approach, f: complete resection of cyst and capsule, g: early postoperative MRI.

Ventriculo-peritoneal shunt draining from single or both ventricles can be used as a management option especially in a cyst associated with hydrocephalus in poor surgical risk patient.

The stereotactic technique can be used when patients are not medically fit. Such techniques are associated with high recurrence rate. Partial cyst wall disruption and aspiration of contents may offer an advantage over simple stereotactic aspiration alone in limiting recurrence⁵. Surgical resection basically should be carried out in cysts measuring over 1 cm, symptomatic patient, enlarging cyst, or cases with associated hydrocephalus require surgical treatment^{3,4}.

Microscopic transcortical or transcallosal approaches are used to remove colloid cysts. Transcallosal approach is a direct and safe way to treat third ventricular colloid cyst especially when there is no ventriculomegaly⁶. The key to minimize complications from this approach is to limit anterior callosotomy, this does not result in disconnection syndromes or behavioral disturbance. Good long-term cognitive performance can be achieved with 1 cm or less callosal incision along with the meticulous dissection around the fornix in microsurgical approach.⁶

In microscopic transcortical transforaminal resection, precisely placed small cortical opening with planned trajectory to the foramen of Monroe with or without neuronavigation, using standard microsurgical instruments can provide safe and effective management of colloid cysts.²

This technique is good when lateral ventricles are dilated.⁷ Advantages over the transcallosal approach are the simple, shorter route to the ventricle, more flexibility and maneuverability during surgery and less danger to cognitive functions by traversing the corpus callosum.⁷

Endoscopic trans-ventricular resection represents a fine balance between the morbidity of open surgery and the low efficacy of needle aspiration. Lewis and Kohler have compared craniotomy and endoscopic procedures for colloid cyst resection and have found shorter operative times and hospital stay in patients undergoing endoscopic surgery.⁸ The efficacy of neuro-endoscopic techniques for colloid cyst resection has been well established in several studies. Transcallosal microsurgical resection continues to be benchmark against which all other operative techniques are compared. However, technically, the endoscope may

have several advantages over the microscope. Rapid improvement in endoscopic instrumentation is further increasing the versatility of the endoscope. Endoscope offers superior illumination, greater magnification and enhanced visualization of the ventricular anatomy. With angled endoscopes, it is possible to see the roof of the third ventricle and thus the point of attachment of the colloid cyst aiding in radical excision of the cyst. Such a view of the third ventricular roof is often not possible even with the direct transcalsal approach unless an interforaminal corridor is used. This procedure is associated with risk of damage to the bilateral fornices. The transcortical, transventricular approach overcomes this disadvantage but then again involves excessive manipulation of the fornix to visualize the roof of the third ventricle. Furthermore, colloid cysts are not tumors but developmental lesions and cure may be achieved even if a small residue is left behind, provided that the wall of the cyst is adequately opened up so as not to allow entrapment and cystic recollection.^{1,2}

Lewis and Kohler have compared craniotomy and endoscopic procedures for colloid cyst resection and have found shorter operative times and hospital stay in patients undergoing endoscopic surgery.⁹

In this series, total resection was possible in 50% of the cases, this coincides with results from Mishra et al.¹⁰ It is worth mentioning that the achievement of total resection was not only determined by the consistency of the contents or by the location of the cyst, but also with the level of experience of the surgeon. The total resection cases were the last done in this series.

In the cases with small residual, the need for a redo surgery is unlikely to happen especially with proper coagulation of the capsule (only one case in our series with a follow up period between fourteen and hundred and twenty one months). Many other reports support these findings.¹⁰⁻¹²

Short-term memory affection was observed in 30% of our cases. It only lasted for few weeks postoperatively. Similar results were found in series by Mishra et al.¹⁰

In the first seven cases, the burr hole was located at Kocher's point (one of them on the left side). In the last five cases, the entry was modified to a more anterior burr hole dictated by the neuronavigation to have a better vision and control of the roof of the third ventricle where the cyst attachment is. We had the hairline as our most anterior limit to prevent cosmetic dissatisfaction of the patient. Many authors advocate the same principle.^{1,2,13}

CONCLUSION

Endoscopic resection of colloid cysts represents a valid option in treatment of this much debated disease with good efficacy and relatively low morbidity.

Disclaimer:

The authors have nothing to disclose and state no conflict of interest.

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