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Colloid cyst of the third ventricle.
Experience of total endoscopic excision
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Colloid cyst of the third ventricle. Experience of total endoscopic excision in 7 cases

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ABSTRACT

Background: In the past, microsurgical resection was considered the gold standard treatment for colloid cysts. The endoscopic approach is gaining popularity and has been recognized as a safe and effective alternative to open surgery.

Aims: To evaluate our results, safety and efficacy of the endoscopic approach

Materials and methods: This retrospective study included seven patients with colloid cysts who underwent endoscopic resection between May 2020 and April 2022. Patient records, radiological images, and surgical notes were assessed. Follow-up data, including clinical and radiological details, were retrieved. Postoperative Computed tomography (CT) was performed, and magnetic resonance imaging (MRI) was performed in all patients.

Result: Seven patients aged range 27-56 years 4 males and 3 females underwent endoscopic resection of the tumor during the study period. All patients presented with headaches. The mean diameter of the cyst was 10.6(range 8 -14mm), and the mean operating time was 126(range 100 -180 min). All patients underwent the single burr hole and single port technique. Six patients underwent transforaminal surgery and one patient underwent trans-septal corridor. GTR was achieved in six patients. One patient underwent near-total resection with coagulation of the capsule. None of the endoscopic procedures was converted to open resection. No patient had a recurrence, and the mean follow-up period was 24.3 (range 16 to 36 months). There were no deaths during the follow-up period. No residual cysts were observed on postoperative MRI in any patient.

Conclusion: Endoscopic excision of colloid cysts is an effective and safe alternative method. Although the follow-up time was short, the residual cyst wall remained asymptomatic without any evidence of growth after near excision and coagulation of the wall.

INTRODUCTION

Colloid cysts are rare benign tumors arising from the third ventricular roof attached to the tela choroidea, in proximity to the interventricular foramen of Monro (FOM), and are believed to have a neuroectodermal origin.¹⁻³ These cysts are surrounded on either side by pillars of the fornix. These lesions are often incidentally found on imaging performed to evaluate various neurological symptoms such as headache, nausea, and/or vomiting; hence, it has been difficult to define management

Keywords
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protocols for these lesions. In most cases, these lesions remain silent and the patient remains asymptomatic; however, because of their close proximity to FOM, they can clinically present with the features of obstructive hydrocephalus, rapid clinical deterioration, and in severe cases sudden death⁴⁻⁵.

On imaging, cysts are well defined, smooth, spherical ovoid masses filled with gelatinous and mucinous fluid. Most cysts are hyperdense on CT. MRI is the preferred modality to investigate colloid cysts and may have variable appearances, with approximately two-thirds of cysts appearing hyperintense on T1. Most cysts appear isointense to hypointense on T2/FLAIR with slight rim enhancement on contrast and do not exhibit diffusion restriction.

The location of the tumour in the centre and in close proximity to critical neurovascular structures makes surgical management technically difficult. In asymptomatic patients, observation with serial neuroimaging can be performed, and in a few cases, spontaneous resolution of colloid cysts has been reported in the literature⁷⁻⁹. Symptomatic cases require surgery as soon as possible after cyst-related symptoms have been identified. Patients with acute symptoms and rapid neurological decline associated with these lesions should undergo CT immediately, and depending on the presence of hydrocephalus, bilateral EVDs should be placed before surgery. Various surgical modalities, such as bilateral shunting in acute cases, stereotactic cyst aspiration in few cases, transcranial approaches, including transcortical and transcallosal approaches, and the recent endoscopic approach to cyst excision¹⁰⁻¹²

Dandy in 1921, using a posterior transcallosal approach, successfully removed colloid cyst⁶

Both microsurgical techniques; “transcortical” and “transcallosal” combined to their different extensions through the choroidal fissure can be used to access this deep part within the diencephalic region without significant morbidity or mortality¹³.

2. MATERIAL AND METHODS

The current work is a retrospective analysis of patients who underwent endoscopic colloid cystectomy of the third ventricle in a tertiary care hospital during a 2-year period from May 2020 to April 2022. A total of 7 patients were included. Files were reviewed for preoperative data such as patient demographic age, gender, clinical manifestations,

and radiological data. Radiological data included pre- and postoperative computed tomography (CT) and magnetic resonance imaging (MRI) of the brain to determine cyst size, site, and density, as well as the status of ventricle dilatation (Fig 1). Intraoperative difficulty and extent of resection were noted. All patients were followed up clinically at 6 weeks, 3 months, and 6 months after discharge and then yearly. Postoperative MRI was performed after 3 months.



Fig 1 : Preoperative images showing a well circumscribed ovoid hyperdense lesion at the foramen of monro in a computed tomography scan (A) and hypointense lesion located near the foramen of Monro in the anterior third ventricle with mild hydrocephalus in the magnetic resonance imaging (B and C).

ENDOSCOPIC APPROACH

The coronal images of the MRI were helpful in deciding the side of approach, and in our study, all patients were approached from the right lateral ventricle. Careful study of the sagittal and coronal MR images was conducted to define the relationship of the cyst with respect to the ventricular structures. After undergoing general anesthesia, the patients were placed in the supine position on a doughnut with head elevation of 10°–30°. Mid-sagittal MRI and neuro-navigation were used to plan the burr hole placement and endoscopic trajectory for optimal visualization of the colloid cyst. It was paramount to target the center of the cyst while avoiding the fornix, septal, and internal cerebral veins. Generally, the burr hole corresponded to 3-4 cm away from midline and 3-4 cms anterior to the coronal suture in the precoronal area.

The surgery was performed using rigid 0-degree endoscopes (Karl Storz, Tuttlingen, Germany with a 6.5 mm outer diameter. A single port was used in all patients. After coagulating the underlying pia with monopolar cautery, free hand cannulation of the lateral ventricle was performed using an endoscopic sheath and obturator. The obturator was removed during lateral ventricle cannulation, and an endoscope was introduced to visualize anatomical landmarks such as the foramen of Monro (fig 2),

thalamostriate vein, septal vein, and choroid plexus. In most cases, the colloid cyst bulged through the foramen of Monro into the ipsilateral lateral ventricle. The cyst capsule was coagulated, and using a thin catheter through the neuroendoscope working channel, the cyst contents were aspirated, followed by cyst excision. Meticulous hemostasis was achieved in all cases, and wound closure was performed after insertion of the surgical gel foam. During the postoperative period, all patients received antibiotics according to the institutional protocol. Plain CT was performed on the same day to rule out any hematoma. The ventricular drain, if placed, was first clamped and then removed after 24 h when the CSF became clear.

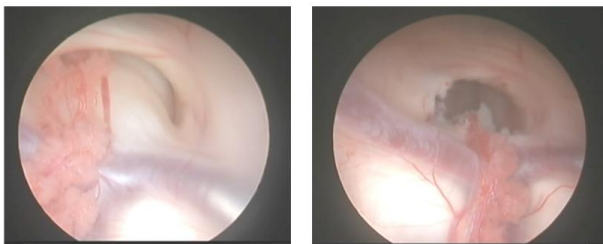


Fig 2: Endoscopic resection of the colloid cyst seen at the foramen of monro (A) before and (B) after total excision

RESULTS

This was a retrospective study of seven patients (4 males and 3 females), with age range 26 -57 years (table 1). Headache was present in all patients. Other symptoms included vomiting in 4, blurred vision in 1, and urinary incontinence in one patient.

The mean cyst diameter was 10.6 mm (range 8-14mm). All colloid cysts were associated with hydrocephalus. All patients underwent right-sided burr hole. Six patients underwent transforaminal and one underwent trans septal approach. GTR was achieved in six patients, whereas one patient had near total excision of the cyst with coagulation of the nubbin of the cyst wall.

The mean operating time for the procedure was 126 min (range 100 -160 mins). Septostomy to gain biventricular access was performed in one patient. At the end of the procedure, while separating the cyst from the fornices, intraoperative bleeding was the most common intra operative event and was controlled by prolonged irrigation with Ringer's Lactate solution. Intraventricular drains were used in 3 patients with minor persistent ooze and removed 24 hrs after surgery. All patients underwent post

operative CT scan on same day to rule out any hematoma. Following surgery, headache improved in all patients. Vomiting, blurring of vision, and urinary incontinence improved in all. The postoperative hospital stay ranged from 4 to 8 days. The mean follow-up was 24.3 months (range 12- 36). Follow-up imaging was available in all patients, and none of the patient had residual cyst (fig 3). They are under regular follow-up and were asymptomatic till the last visit.

Table 1.

Serial no	Age (yrs)/sex	Size of cyst (mm)	Associated hydrocephalus	Surgical excision	Operative time (min)	Follow up (months)	Outcome
1	34 /m	12	yes	Total excision	140	12	improved
2	27 /f	9	yes	Total excision	120	30	improved
3	50 /m	11	yes	Total excision	110	24	improved
4	43 /f	14	yes	Near total excision	160	28	improved
5	28 /m	10	yes	Total excision	130	22	improved
6	56 /f	8	yes	Total excision	100	36	improved
7	36 /m	10	yes	Total excision	120	18	improved

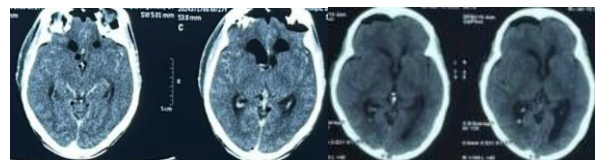


Fig 3 : Post operative images of 2 patients showing gross total excision of the colloid cyst by right side trans foraminal route

DISCUSSION

The best modality to treat this benign disease is debatable, and while deciding the surgical approach, one has to consider the risks associated with radical surgical resection against the chance of recurrence. The endoscopic approach has proven to be a good alternative to microsurgical techniques with good long-term results.¹⁶⁻¹⁷ We were able to manage all the cases with a single port, but some authors have used a bi-port technique.¹⁸ We also used neuro navigation

in all of our cases as an intraoperative adjunct because it helped us to better determine the burr hole site and trajectory. It is paramount to study the preoperative images to define the position of the cyst in relation to the foramen of Monro and the roof of the third ventricle.

Hoffman et al. (27) reported that the sensitivity of postoperative MRI is not sufficient and that it is imperative to consider direct intraoperative inspection to accurately predict the extent of resection. The major reason supporting this finding is that cyst wall remnants identified intraoperatively do not necessarily appear on postoperative imaging.

In our study, we also considered the intraoperative completeness of cyst excision and cyst wall with no observable portion of cyst wall to consider GTR. We achieved a GTR in 6 (85.7%) cases, which is similar to other published studies, such as that achieved in 78% patients by Mishra et al¹⁸; and in 96.9% patients by Engh et al.²⁴ In our study, no patient required conversion to open craniotomy because of excessive bleeding or poor visualization of the colloid cyst, which proves the safety and applicability of the endoscopic technique. Most cases of bleeding were easily controlled with Ringer's lactate solution. The average hospital stay in our study was 6.2 days; the average operative time was 126 min, which is similar to other similar studies. There were no deaths in our series; similar results were observed in other series¹⁹⁻²³. There was no recurrence during the follow-up period.

CONCLUSION

Thought the endoscopic colloid cyst excision requires a steep learning curve and radical resection demands certain degree of technical skill and experience with the endoscope it is a very effective and safe method. Although the limitation of our study is short follow up period the residual cyst wall remained asymptomatic without any evidence of growth after near total excision and coagulation of the wall.

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