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ORIGINAL ARTICLE

Endoscopic transchoroidal and transforaminal approaches for resection of third ventricular colloid cysts

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Abstract To review our experience over 10 years in endoscopic resection of third ventricular colloid cysts, describing the details of the transventricular–transchoroidal approach used in selected patients. This series included 24 patients with colloid cysts of the third ventricle treated in our department between October 2001 and January 2013 using an endoscopic approach. Clinical presentation, preoperative radiological findings, endoscopic technique employed, and complications were assessed in all patients. The mean length of patient follow-up was 5.16 years. The most common symptom was headache (75 %). The average size of the resected colloid cysts was 16.25 mm, the maximum diameter measured in cranial magnetic resonance imaging. Resection was transforaminal in 16 cases (66.7 %), transchoroidal in 7 (29.17 %), and transseptal in 1; macroscopically complete resection was achieved in 23 of 24 procedures (95.8 %). Complications included three intraventricular hemorrhages, four memory deficits (two of them transient), one case of temporary potomania, two soft tissue infections, and one meningitis. There were no statistically significant differences between the route of resection and number of complications. The Glasgow Outcome Scale at 1 year after surgery was 5 in 82.6 % of the patients. A transventricular endoscopic approach allows macroscopically complete resection of third ventricle colloid cysts in most cases. The option of opening the choroidal fissure (transventricular–transchoroidal approach) during the procedure can address third ventricle colloid cysts that do not emerge sufficiently through the foramen of Monro without increasing procedure-related morbidity.

Keywords Colloid cyst · Neuroendoscopy · Transchoroidal approach

Introduction

Colloid cysts (CC), first described by Wallman in 1858 [26], are a group of benign cystic tumors typically located in the region of the foramen of Monro. They represent 0.5–1 % of all intracranial tumors [2, 14, 22] and 15–20 % of intraventricular tumors [16]. Lesions frequently debut with obstructive hydrocephalus, which has been linked to cases of sudden death, and may present with neurological and/or neuropsychological deficits without associated hydrocephalus or may be diagnosed incidentally [17, 18, 22]. Since the first endoscopic treatment of colloid cysts conducted by Powell et al. in 1983 [19], this technique has become the therapeutic approach of choice of many authors.

Material and methods

We conducted a retrospective review of 24 patients who underwent endoscopic CC resection in the Neurosurgery Department at Carlos Haya Hospital in Málaga, Spain,

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between October 2001 and January 2013. All patients had preoperative magnetic resonance imaging (MRI), video recording of the endoscopic procedure, detailed clinical history on admission, mean follow-up of 5.16 years, and brain MRI 1 year after surgery, except the last patient in the series with less than 1 year clinical follow-up. All data were collected and analyzed jointly by two neurosurgeons in our department.

The following variables were evaluated: main symptom that prompted the diagnosis, maximum diameter of lesion on MRI, signal intensity of cyst content on T1- and T2-weighted sequences, cyst density on computed tomography (CT) scan, preoperative Evans' index, resection route (transforaminal or transchoroidal), macroscopic degree of resection according to surgical report and video recording of the intervention (complete vs. incomplete), premammillary ventriculostomy and/or septostomy during the same procedure, intraoperative incidents, operative time, need for external ventricular drainage, need for ventriculoperitoneal shunt, postoperative radiological and/or clinically significant complications, length of hospital stay after surgery, resection grade based on Boogaarts' radiological classification [4], and Evans' index and postoperative Glasgow Outcome Scale (GOS) score after 1 year follow-up.

All data were collected and analyzed with G-Stat 2.0.1 statistical software.

Endoscopic technique All procedures were performed under general anesthesia, with the head in a neutral, flexed position and held in place with a Mayfield head clamp. Two types of 8 and 6 mm rigid endoscopes with one-working channel and 0º viewing angle by Storz® GAAB (Tuttlingen, Germany) and Aesculap® MINOP (Tuttlingen, Germany) were used. In 20 cases, a single 1-cm frontal precoronal burr hole was made 3 cm from the midline, in 3 cases a 2 cm precoronal burr hole, and in another case the site was located with neuronavigation. The right side was chosen whenever this provided the correct approach to the lesion, depending on asymmetries in ventricular size or lateralization of the CC toward the foramen of Monro. The endoscope was stabilized manually by an assistant. During the procedure, we used a Storz® irrigation pump with Ringer solution for periodic irrigation. The procedures performed with the endoscope were coagulation of the cyst capsule, puncture and aspiration of content, and en bloc resection of the lesion. Endoscopic septostomy was performed posterior to the anterior septal vein, with coagulation and subsequent dilatation of the stoma using a no. 4 Fogarty balloon catheter. Ventriculostomy through the floor of the third ventricle was performed in two patients after resection of the colloid cyst, by mechanical perforation with a coagulator of the premammillary membrane, behind the infundibulum, and dilatation with a no. 4 Fogarty balloon catheter with endoscopic exploration of the prepontine cistern to ensure Liliequist membrane fenestration. In addition, dissection maneuvers were performed to open the choroidal fissure in seven selected cases. The process was aided by neuronavigation in one case.

For endoscopic resection of CC of the third ventricle, two endoscopic approaches were used: the first approach was *transventricular–transforaminal*, with resection through the foramen of Monro, which is the natural route of entry into the third ventricle. We use this approach for lesions that protrude sufficiently into the lateral ventricle (Fig. 1a). The second is the *transventricular–transchoroidal* approach, in which the choroidal fissure is opened endoscopically to access the third

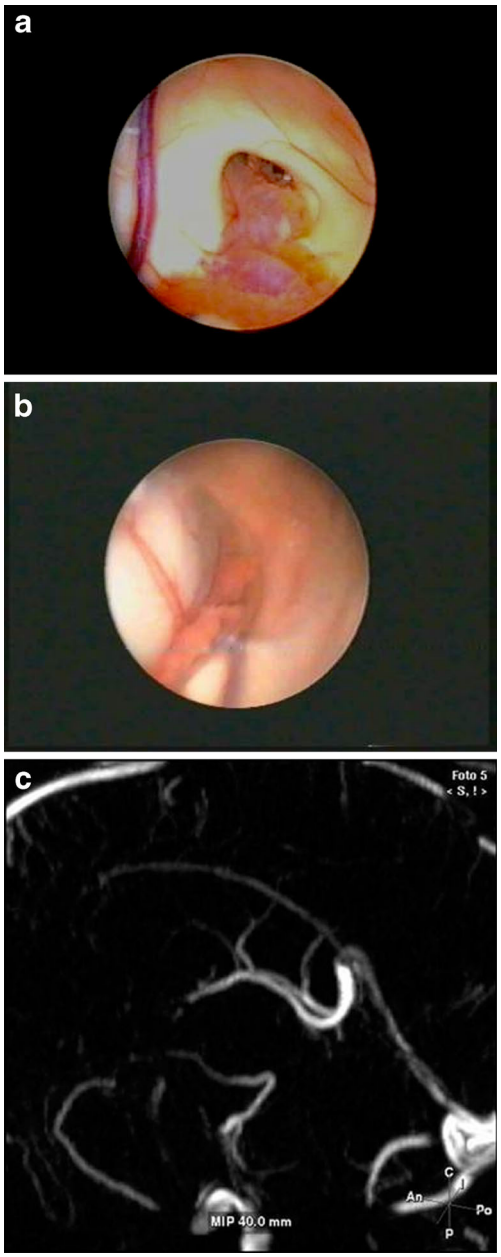

Fig. 1 **a** Intraoperative endoscopic image of a colloid cyst protruding through the third ventricle, secondary to transforaminal resection; **b** intraoperative endoscopic image of a colloid cyst that does not emerge through the foramen of Monro, secondary to transchoroidal resection; **c** MR angiography image, sagittal cross section, showing the deep vein anatomy

ventricle. We use this approach in cases with a small foramen of Monro or with a colloid cyst that protrudes minimally into the lateral ventricle (Fig. 1b). Preoperative magnetic resonance (MR) angiography can be useful to determine the arrangement of the septal–thalamostriate vein complex (Fig. 1c), to evaluate the possibilities for opening the choroidal fissure (Fig. 2) depending on the location of the confluence of the two veins into the internal cerebral vein, with respect to the foramen of Monro [25]. Colloid cyst resection technique is the same in both approaches and consists of four steps: the first step comprises coagulation of the capsule and adhered choroid plexus and, to the extent possible, dissection of the capsule from adjacent structures (anterior pillar of fornix, septal–thalamostriate vein, choroid plexus) (Fig. 3a). The second step involves opening the capsule and intracapsular evacuation of cyst content using a rigid suction device connected to forced aspiration. The capsule must be emptied as completely as possible to enable subsequent manipulation (Fig. 3b, c). Third, the capsule is grasped using grasping forceps and applying slow, progressive, 360°-twisting in a counterclockwise direction until detachment of capsule is achieved (Fig. 3d). The fourth step is en bloc removal of the lesion together with the endoscope, since the cyst will not fit through the working channel (Fig. 3e, f).

Results

Twenty-four patients underwent endoscopic resection for third ventricular colloid cysts between October 2001 and January 2013 in the Department of Neurosurgery at the Carlos Haya University Hospital, Málaga. There were 17 men and 7 women, aged between 15 and 73 years (mean, 39.6 years). The most common symptom in the series was headache (18 patients, 75 %), followed by memory disorders (6 patients, 25 %), nausea-vomiting (5 patients, 20.1 %), visual disturbances (4 patients, 16.7 %), and dizziness (4 patients, 18 %). A summary of all symptoms recorded is shown in Table 1. One patient underwent surgery with no symptoms after a previous incomplete resection at another center.

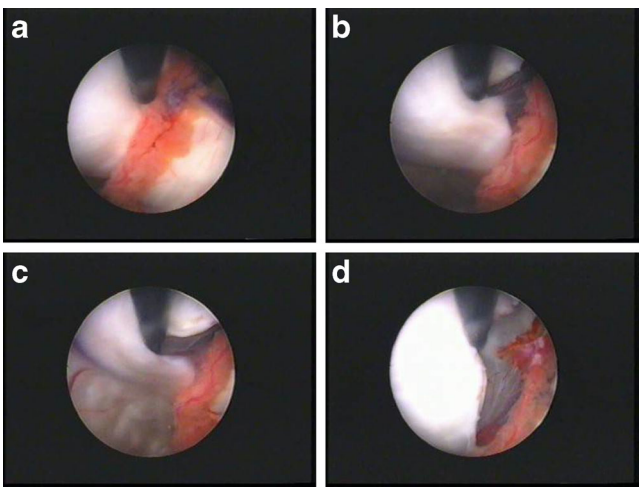

Fig. 2 **a** Progression of coagulator through choroidal fissure; **b**, **c** choroidal fissure dissection maneuvers; **d** choroidal fissure opening, notice the exposure of the surface of the colloid cyst

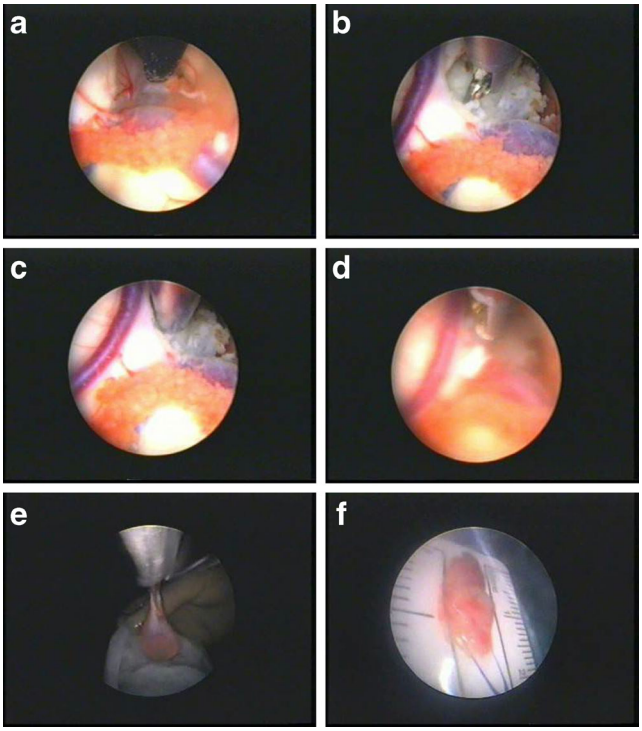

Fig. 3 **a** Dissection of structures adjacent to the cyst capsule; **b**, **c** capsule opening, manipulation, and aspiration of cyst content; **d** torsion maneuvers with grasping forceps; **e**, **f** en bloc resection of the lesion

Radiological presentation All patients underwent preoperative brain MRI. The size on cranial MRI of the 24 colloid cysts removed ranged between 10 and 35 mm (mean, 16.25 mm). Most common signal intensities of the lesions on MRI were: 9

Table 1 Symptoms registered in the series of 24 patients

Symptom	Number of patients	Percentage
Headache	18	75
Memory disorder	6	25
Nausea and/or vomiting	5	20.1
Visual disturbances	4	16.7
Dizziness	4	16.7
Impaired consciousness level	2	8.3
Gait instability	2	8.3
Chronic hydrocephalus	2	8.3
Syncope	1	4.2
Incidental finding	1	4.2
Seizures	1	4.2

hyperintense on T1 and hypointense on T2 (37.5 %), 6 isointense on T1 and hyperintense on T2 (25 %), and 3 isointense on T1 and hypointense on T2 (12.5 %). The summary of signal intensities is shown in Table 2. Only seven patients had preoperative cerebral CT; six cysts were hyperdense and one cyst was isodense with respect to the brain parenchyma. The preoperative Evans' index ranged between 0.25 and 0.41 (mean, 0.34).

Surgical treatment Endoscopic approach was from the right in 20 procedures (83.3 %). A transforaminal route was chosen in 16 cases (66.7 %), transchoroidal in 7 (29.17 %), and in 1 transseptal, achieving macroscopically complete resection in 23 of 24 procedures (95.8 %). During the same surgical procedure, septostomy was performed in 11 cases and premammillary ventriculostomy in 2 cases. Septostomy was performed prior to colloid cyst resection in cases with ventricular asymmetry, as prophylaxis for possible unilateral ventricular dilatation. Ventriculostomy was performed after colloid cyst resection in cases where there was possible obstruction of the aqueduct of Sylvius by cystic content or blood clot during resection maneuvers. Two patients required preoperative external ventricular drainage for impaired level of consciousness secondary to hydrocephalus. In three procedures, coagulation of the anterior septal vein was necessary, which had no clinical significance, in two cases due to its presence in the route of approach and in the other due to rupture during endoscopic maneuvers. No patients required permanent CSF diversion after surgery. Average endoscopic resection time was 43.9 min. Average length of hospitalization after surgery was 8.2 days.

Complications Postoperative complications were recorded as follows: three cases of intraventricular hemorrhage, one of which required temporary external ventricular drainage; four cases of memory deficits, of which two were transient and two permanent; one case of temporary potomania; two cases of surgical wound infections; and one case of meningitis successfully treated with antibiotics. There were no statistically significant differences between route of resection and number of complications.

Table 2 Radiological intensities of the 24 colloid cysts on MRI

T1 intensity	T2 intensity	Number of patients	Percentage
Hyperintense	Hyperintense	1	4.17
Hyperintense	Isointense	2	8.33
Hyperintense	Hypointense	9	36.5
Isointense	Hyperintense	6	25
Isointense	Isointense	2	8.33
Isointense	Hypointense	3	12.5
Hypointense	Hypointense	1	4.17

Follow-up The mean clinical and radiological follow-up of the sample was 5.6 years (range of 6 months to 11 years). Twenty-three patients underwent at least one MRI at 1 year after treatment (the only patient without a control MRI was the one operated on 6 months prior to time of writing). Using the resection appearance scale proposed by Boogaarts [4], 22 patients had a grade A (95.65 %) and 1 patient had a grade C (4.3 %). The Glasgow Outcome Scale at 1 year from treatment in the 23 patients who completed follow-up showed a score of 5 in 19 patients (82.6 %), 4 in 3 patients (13.04 %), and 3 in 1 patient (4.3 %). There were no relapses in patients with a grade A resection and the patient with a grade C resection showed no regrowth. Figure 4 shows preoperative and postoperative MRIs 1 year after surgery in a patient belonging to the grade A group. The average postoperative

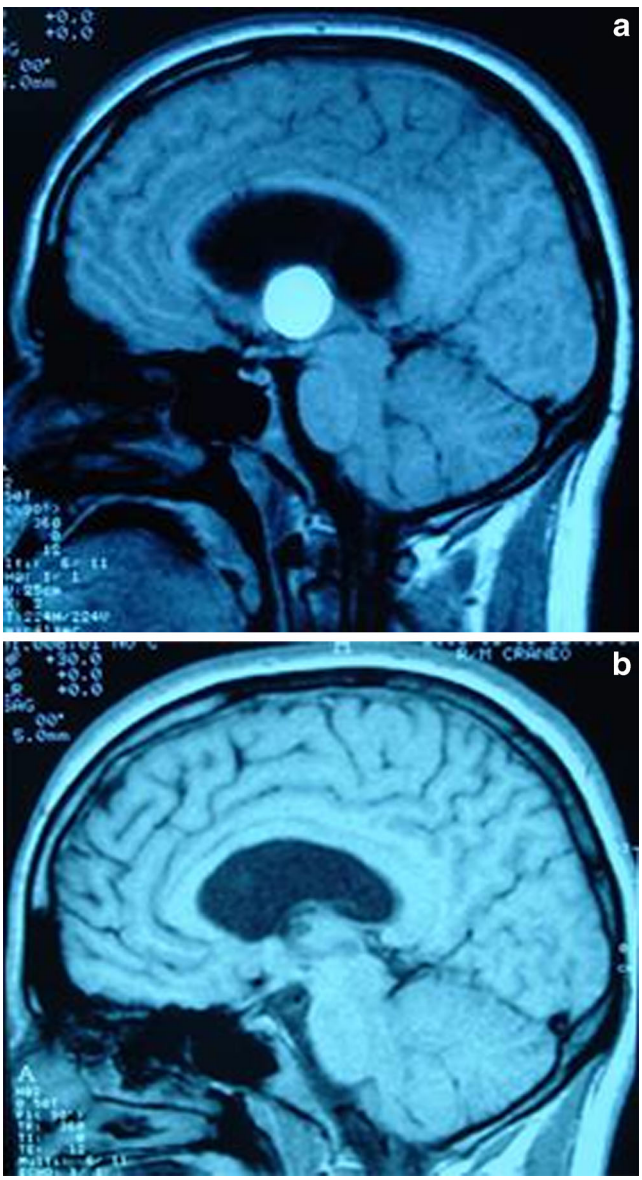

Fig. 4 **a** Preoperative sagittal T1-weighted MRI; **b** postoperative sagittal T1-weighted MRI, grade A resection can be seen

Evans' index at 1 year after surgery was 0.306. A summary of results is shown in Table 3.

Discussion

The first paper on endoscopic aspiration of a CC was written by Powell et al. in 1983 [19]. Since then, there has been an increasing number of articles on this form of endoscopic treatment [1, 5, 11, 13, 24]. Use of the endoscope is supported due to shorter operating time, lower complication rates related to a smaller cortical incision, and lower risk of seizures. In a review of the literature since 1994, we observed that transient memory loss is the most frequent complication (5 %), followed by aseptic meningitis (1.8 %), and transient hemiparesis (1.8 %).

Although use of the endoscope seemed promising, the recurrence rate was the main concern. It must be kept in mind that the first operations were performed at a time when the endoscope was just emerging in the field of neurosurgery. Some authors questioned whether the cyst capsule should be excised completely [5, 21]. In a review of the literature, we found that total or subtotal resection seemed possible in 64.9 % of cases assessed (137 of 211) [1, 5–8, 11–13, 15, 21, 23, 24], in a follow-up range of 10 to 64 months. This view has changed over time, and in recent years, we have seen great progress in endoscopic techniques and in the experience of different working groups such that, today, third ventricle CC is one of the main indications for endoscopic resection. Gone are doubts regarding the effectiveness of this technique for CC resection and its comparison with open surgery [8]. The evolution of resection rates over time is promising, with rates having increased progressively to about 90 % in recent years. This is due not only to our own progress along the learning curve but also to the development and availability of endoscopes and instruments specific to neurosurgery.

Despite this positive data, there is still debate regarding the best form of treatment. Microsurgery is based on the transcortical or transcallosal approaches to the third ventricle. Both have advantages over endoscopy in complicated situations, especially in control of bleeding. However, they are more invasive than endoscopy. The transcallosal approach has the potential morbidity associated with anterior callosotomy, and the transcortical approach with greater injury to the cortex and increased risk of seizures. Endoscopy is less invasive, but the main disadvantage is control of bleeding. For adequate control of bleeding in endoscopic surgery, an irrigation pump with Ringer solution for periodic irrigation is essential for rinsing and subsequent evacuation through the outflow working channel of the endoscope. A focal point of our work is endoscopic resection of lesions that extend toward the rear of the third ventricle using a transchoroidal approach. In our view, endoscopic surgery is superior only once the learning curve is achieved, since the potential morbidity and potential failure rate can be high in inexperienced hands. Our series is a good example, in line with publications in recent years, that in experienced hands, endoscopy permits complete resections of colloid cysts with low morbidity.

Some authors also state that a conservative policy can be advocated for lesions smaller than 7 mm in diameter. In our department, we carry out clinical and radiological follow-up of patients with small colloid cysts (under 10 mm), without hydrocephalus, and those with no documented symptoms (mainly incidental findings). If there is radiographic evidence of ventricular asymmetry or there is doubt as to whether the cyst could have caused an obstruction and transient hydrocephalus, surgery is proposed to the patient, taking into account that there are cases of sudden death in the literature [22].

In our series, we achieved total resection in 23 of 24 cases (95.83 %), with a follow-up of 6–120 months. For stratification according to degree of resection, we followed the classification proposed by Boogaarts et al. [4] defining three groups: complete resection (group A), remnants of capsule (group B), and residual cyst (group C). In group C patients,

Table 3 Summary of 24 patients

Patient	Age (years)	Sex	CC size (mm)	Endoscopic approach	Boogaarts (1 year FU)	GOS (1 year FU)	Total FU (years)
1	36	M	15	TF	A	5	11
2	40	M	20	TF	A	4	10
3	45	F	10	TF	A	5	9
4	43	M	15	TF	A	5	8
5	45	M	16	TF	A	5	7
6	42	M	10	TF	A	4	7
7	50	M	20	TF	A	5	7
8	37	F	25	TC	A	5	6
9	39	F	12	TC	A	5	6
10	33	F	14	TF	A	5	6
11	46	M	31	TS	C	3	6
12	57	M	20	TC	A	5	6
13	37	M	12	TF	A	5	6
14	44	F	10	TF	A	5	5
15	15	M	16	TC	A	5	5
16	39	M	14	TF	A	5	5
17	26	M	14	TC	A	5	3
18	45	M	11	TF	A	5	3
19	30	M	12	TF	A	5	3
20	25	M	15	TF	A	5	2
21	31	F	10	TF	A	5	1
22	52	M	18	TC	A	5	1
23	73	M	35	TF	A	4	1
24	21	F	15	TC	A	–	<1

Total series arranged by treatment date

M male, *F* female, *CC* colloid cyst, *TF* transforaminal, *TC* transchoroidal, *TS* transseptal, *FU* follow-up, *GOS* Glasgow Outcome Scale

although residual tumor is small, close follow-up is mandatory (annual). Patients in groups A and B require initial annual monitoring, but after 2 years, less frequent monitoring appears justified, although recurrences have been reported up to 9 years after surgery. In our series, we proposed annual follow-up visits for groups A and B during the first 5 years, with a final visit at 10 years after surgery, and indefinite annual review in group C (one case).

The *transchoroidal approach* from the lateral ventricle is a route to the third ventricle used in microsurgical removal of tumors in this ventricle. The two possible pathways to access the choroidal fissure from the lateral ventricle are either transcallosal or frontal transcortical [20], although most authors use the transcallosal–transchoroidal approach [3, 9, 10, 27]. In the endoscopic transchoroidal approach from the lateral ventricle, the choroid fissure is opened with grasping forceps or with the coagulator introduced into the working channel of the endoscope through small medial to lateral movements performed en bloc with the endoscope (Fig. 2). We opened the choroidal fissure as wide as possible (Video 1), taking into account the size of the CC and the placement of the anterior septal–thalamostriate vein complex. In this regard, and according to the study published by Türe et al. [25], in just under 50 % of the cases the confluence of the anterior septal vein and the thalamostriate vein is at their junction with the internal cerebral vein located relatively posterior to the foramen of Monro (venous distribution types IB, IIA, and IIB), which facilitates maneuvers to open the choroidal fissure without needing to coagulate and section the anterior septal vein. In the remaining 50 %, confluence occurs adjacent to the foramen of Monro (venous distribution type IA), such that coagulation and section of the anterior septal vein is necessary before opening the choroidal fissure, to avoid inadvertent rupture of the septal–thalamostriate internal cerebral vein complex. Opening the choroidal fissure through the tenia of the fornix [20], between the choroid plexus and the body of the fornix, provides excellent exposure of the third ventricle and adhesions that may exist between the CC and the internal cerebral vein, as well as the area of its insertion into the roof of the third ventricle, which is always more difficult to control using the classic transforaminal access. Control over these structures (body of fornix, internal cerebral vein, choroid plexus) which are usually intimately related to the cyst capsule is much greater through the transchoroidal route than through the classic transforaminal route. In our experience, this does not increase procedure-related morbidity. One of the potential disadvantages of the transchoroidal approach is possible injury to the anterior septal vein or the internal cerebral vein during dissection or damage to the choroid plexus and fornix body. This could cause bleeding making it unfeasible to continue with endoscopic surgery. Although, in our experience, we had only one case of anterior septal vein rupture that was resolved with coagulation and section, with no clinical consequences for

Fig. 5 Rigid suction device designed by the authors

the patient. In two other procedures, coagulation of the anterior septal vein was necessary, due to its presence in the route of approach, again with no clinical consequences (Video 2).

We placed a frontal burr hole 1–2 cm in front of the coronal suture (approximately 10 cm up from the nasion) to avoid damage to the anterior column of the fornix. An extreme anterior burr hole placement can provide easier access to the posterior portion of the third ventricle; however, the increased manipulation and traction on the anterior column of the fornix can lead to cognitive and memory sequelae.

We use neuronavigation (one case in our series) to aid in localizing the ventricle only when there is no ventricular dilatation at the time of surgery. Once inside the ventricle, it is relatively easy to identify the choroid plexus, the choroidal fissure, and the foramen of Monro and neuronavigation is no longer needed.

In our opinion, one of the essential instruments for endoscopic resection of CC is the *rigid suction device*. In our department, we work with a device we developed called "Arriba" (Fig. 5). Through a small opening in the CC capsule, we introduce the suction cannula, with a blunt tip to avoid injury, which is then connected to a forced vacuum aspiration system. Using this method, we can evacuate the maximum cyst content, relatively independent of its consistency, and thus achieve optimal emptying to allow subsequent manipulation and removal of the entire capsule. Suction should always be activated with the aspirator tip fully within the cyst, to avoid possible injury to adjacent structures. It is important to note that the suction device should be rigid and inflexible, since flexible devices become uncontrollable when connected to suction. We cannot guide them and the suction pressure can change the direction of the cannula, causing unintentional injuries to adjacent areas, such as the columns of the fornix or the venous system adjacent to the foramen of Monro. Obviously, the more solid the CC content, the more complicated its aspiration and therefore the more complicated the resection. The only case in our series with subtotal resection was a large CC, but more importantly, containing an especially solid content and difficult to aspirate, which made fragmentation and piecemeal extraction necessary. For this reason, we believe that one of the key points for successful endoscopic surgery is, specifically, the complete aspiration of colloid cyst contents. If this fails, we can most likely only achieve partial resections.

Conclusion

Neuroendoscopic management is suitable for resection of third ventricular colloid cysts, offering a high percentage of complete resections and minimal morbidity. It is important to emphasize the surgical technique, which is based on vacuum aspiration of CC content, allowing subsequent manipulation of solid residues and capsule with ease. The transventricular–transchoroidal endoscopic approach is a variation rarely described in endoscopic surgery that should be considered in cases with small foramen of Monro or colloid cysts that protrude minimally into the lateral ventricle.

References

1. Abdou MS, Cohen AR (1998) Endoscopic treatment of colloid cysts of the third ventricle: technical note and review of the literature. J Neurosurgery 89:1062–1068
2. Antunes JL, Louis KM, Ganti SR (1980) Colloid cysts of the third ventricle. Neurosurgery 7:450–455
3. Apuzzo MLJ, Chikovani OK, Gott PS, Teng EL, Zee CS, Giannotta SL et al (1982) Transcallosal, interfornicial approaches for lesions affecting the third ventricle: surgical considerations and consequences. Neurosurgery 10:547–554
4. Boogaarts HD, Decq P, Grotenhuis JA, Le Guérinel C, Nseir R, Jarraya B et al (2010) Long-term results of the neuroendoscopic management of colloid cysts of the third ventricle: a series of 90 cases. Neurosurgery 68:179–187
5. Decq P, Le Guérinel C, Brugieres P, Djindjian M, Silva D, Kéravel Y et al (1998) Endoscopic management of colloid cysts. Neurosurgery 42:1288–1294
6. Grondin RT, Hader W, MacRae ME, Hamilton MG (2007) Endoscopic versus microsurgical resection of third ventricle colloid cysts. Can J NeurolSci 34:197–207
7. Hellwig D, Bauer BL, Schulte M, Gatscher S, Riegel T, Bertalanffy H (2003) Neuroendoscopic treatment for colloid cysts of the third ventricle: the experience of a decade. Neurosurgery 52:525–533
8. Horn EM, Feiz-Erfan I, Bristol RE, Lekovic GP, Goslar PW, Smith KA et al (2007) Treatment options for third ventricular colloid cysts: comparison of open microsurgical versus endoscopic resection. Neurosurgery 60:613–620
9. Kasowski HJ, Piepmeier JM (2001) Transcallosal approach for tumors of the lateral and third ventricles. Neurosurg Focus 10:E3
10. Kasowski HJ, Nahed BV, Piepmeier JM (2005) Transcallosal transchoroidal approach to tumors of the third ventricle. Neurosurgery 57:361–366
11. Kehler U, Brunori A, Gliemroth J, Nowak G, Delitala A, Chiappetta F et al (2001) Twenty colloid cysts: comparison of endoscopic and microsurgical management. Minim Invasive Neurosurg 44:121–127
12. King WA, Ullman JS, Frazee JG, Post KD, Bergsneider M (1999) Endoscopic resection of colloid cysts: surgical considerations using the rigid endoscope. Neurosurgery 44:1103–1109
13. Lewis AI, Crone KR, Taha J, van Loveren HR, Yeh HS, Tew JM Jr (1994) Surgical resection of third ventricle colloid cysts: preliminary results comparing transcallosal microsurgery with endoscopy. J Neurosurg 81:174–178
14. Little JR, MacCarty CS (1974) Colloid cysts of the third ventricle. J Neurosurg 40:230–235
15. Longatti P, Godano U, Gangemi M, Delitala A, Morace E, Genitori L et al (2006) Cooperative study by the Italian neuroendoscopy group on the treatment of 61 colloid cysts. ChildsNervSyst 22:1263–1267
16. Maeder PP, Holtas SI, Basibüyük LN, Salford LG, Tapper UA, Brun A (1990) Colloid cysts of the third ventricle: correlation of MR and CT findings with histology and chemical analysis. AJNR 11:575–81
17. Pollock BE, Huston J 3rd (1999) Natural history of asymptomatic colloid cyst of the third ventricle. J Neurosurg 91:364–369
18. Pollock BE, Schreiner SA, Huston J 3rd (2000) A theory on the natural history of colloid cysts of the third ventricle. Neurosurgery 46:1077–1081

19. Powell MP, Torrens MJ, Thomson JL, Horgan JG (1983) Isodense colloid cysts of the third ventricle: a diagnostic and therapeutic problem resolved by ventriculoscopy. Neurosurgery 13:234–237
20. Rhoton AL Jr (2003) The lateral and third ventricles. Neurosurgery 51:s207–271
21. Rodziewicz GS, Smith MV, Hodge CJ Jr (2000) Endoscopic colloid cyst surgery. Neurosurgery 46:655–660
22. Ryder JW, Kleinschmidt-DeMasters BK, Keller TS (1986) Sudden deterioration and death in patients with benign tumors of the third ventricle area. J Neurosurg 64:216–223
23. Schroeder HW, Gaab MR (2002) Endoscopic resection of colloid cysts. Neurosurgery 51:1441–1444
24. Teo C (1999) Complete endoscopic removal of colloid cysts: issues of safety and efficacy. Neurosurg Focus 6:e9
25. Türe U, Yasargil MG, Al-Mefty O (1997) The transcallosal–transforaminal approach to the third ventricle with regard to the venous variations in this region. J Neurosurg 87:706–715
26. Wallman H (1858) Third ventricle colloid cyst and choroid plexus lipoma (German). Virchows Arch (PatholAnat) 11:385–388
27. Wen HT, Rhoton AL Jr, de Oliveira E (1998) Transchoroidal approach to the third ventricle: an anatomic study of the choroidal fissure and its clinical application. Neurosurgery 42:1205–1217

Comments

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Colloid cysts are a rare entity with an incidence around 2 % of all intracranial tumors. The different surgical approaches in treatment of this pathology range from shunting the concomitant hydrocephalus to free-hand or stereotactic aspiration of the cyst contents. Microsurgical resection using either the transcallosal or the transcortical–transventricular approach was the operative state of the art over years. In the last decade, however, neuroendoscopy increasingly have been used for treatment of colloid cysts. In this paper, Dr. Ibáñez-Botella and colleagues give an excellent overview about the indications, operative technique, results, and side effects using the endoscopic transchoroidal and transforaminal approaches for resection of third ventricular colloid cysts. In their study, 24 patients underwent endoscopic colloid cyst resection, 16 patients were treated by choosing the transforaminal route, 7 by transchoroidal, and 1 by transseptal approach. It was possible to remove 23 cysts completely. However, there was a considerable number of complications. In my opinion, this is due to a more radical operative technique to achieve the complete resection of the cyst, which is actually not necessary. Even if there are some remnants of the cyst wall, the possibility of a cyst recurrence is rather unlikely (1). Another point of controversy in literature is the cyst contents. If the preoperative CCT or MRI shows hard contents or calcifications, the surgeon should be able to choose a suitable approach so that he can intraoperatively switch over from endoscopical to microsurgical technique (2). A time-consuming piecemeal resection is not appropriate and can create an aseptic ventriculitis. Finally, it is doubtful which size of colloid cysts can cause a sudden death, even cysts with a diameter smaller than 10 mm can do so, which raises the question, if a prophylactic cyst resection is indicated.

In conclusion, Dr. Ibáñez-Botella and colleagues show in their study impressively, that endoscopic approaches for resection of colloid cysts are standardized and represent a serious alternative to microsurgical techniques in the hands of experienced neurosurgeons. However, a competition between the two different operative strategies is not advisable, they should be complementary.

References

1. Hellwig D, Bauer BL, Schulte DM et al. (2003) Neuroendoscopic treatment for colloid cysts of the third ventricle: the experience of a decade. Neurosurgery 52:525–533

2. Tirakotai W, Hellwig D, Bertalanffy H et al. (2007) The role of neuroendoscopy in the management of solid or solid-cystic intra- and periventricular tumours. Childs Nerv Syst 23(6): 653–658