Introduction:
Colloid cysts are thin-walled, spherical cysts composed of a collagenous capsule, an underlying epithelium, and a gelatinous center of variable viscosity. The cysts are usually attached to the anterior aspect of the velum interpositum or to the choroid plexus of the third ventricle near the foramina of Monro.

The average patient age was 39 years old (range, 14-61 years) at the time they underwent surgery. Gender distribution was 10 females and 10 males. Another series included five males and two females ranging in age from 14 to 57 years (mean 40 years). Another series, included 13 males and 6 females, mean age was 35 years (Range 19-56). The male to female ration was 1.5:1.

There have been a small number of reports describing of Colloid Cysts in other locations, including the septum pellucidum, frontal and parietal lobes, fourth ventricle, brainstem, cerebellum, olfactory groove, optic chiasm, pituitary gland, and suprasellar region. Some authors speculated that the points of origin of these

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cysts should be at areas away from the foramina of Monro and at which some anatomical “windows” exist that are devoid of compact, closely apposed fornical structures. Sign and symptoms of colloid cysts include intermittent headache (10 patients), nausea (3 patients), short-term memory loss (4 patients), coma (2 patients), gait disturbance (3 patients), blurred vision (2 patients), and mental status changes (3 patients).

In another series, headache was the most common presenting symptom in this series, being a primary complaint for 8 of the 12 patients. Headache was predominant symptom in 97 out of 150 patients and followed by papilledema in 76 patients. Direct visualization of a colloid cyst using a modern rigid endoscope was performed for the first time by Guiot et al. in 1963. Treatment considerations include conservative management, serial radiographic studies, ventricular shunting of the hydrocephalus, and direct surgical obliteration by microsurgical technique or endoscopic procedure. We have used the endoscopic approach for this series of patients but we were prepared to convert to microsurgery if it was necessary.

Shunting is less satisfactory for several reasons: 1) bilateral obstruction of the foramen of Monro requires a bilateral ventricular catheter or a unilateral ventricular catheter associated with septum pellucidum fenestration; 2) shunts are susceptible to malfunction, which may lead to severe symptoms in such noncommunicating hydrocephalus; 3) this noncurative treatment may lead to insidious growth of the cyst to considerable dimensions, causing irreversible memory disturbances. Therefore, in our series we had approached the tumour endoscopically through the translaminar transventricular transforaminal route and excised the tumour. VP shunt was reserved for patients in whom hydrocephalus was present after surgery.

Materials and method:
This is an observational and prospective study carried out on 7 patients in NINS&H from Jan 2016 to Mar 2019. Five patients were male and two patients were females. Four of seven patients presented to us with headache and two patients had visual disturbances. Colloid cysts were identified using MRI imaging or CT scan of brain. After proper evaluation surgery was done. Patient was placed in supine position with head in the midline elevated 40°. The right lateral ventricle was approached through the right Kocher’s point. Then endoscopic transventricular transforaminial excision of the colloid cyst was done. The rigid endoscope Lotta ventriculoscope (Karl Storz SE & Co. KG) was used. The cyst would be dull yellow colored and occupied the the foramen of Monro. After puncture, there would be colloid material coming out (fig 1). This would be sucked out. Then the cyst wall was gently excised. In all cases after tumour excision, endoscopic third ventriculostomy was done.

Post operative an EVD was placed using Chhabra® VP shunt system. It was closed on 2nd POD and if patient was asymptomatic then it was taken off. If symptoms of raised ICP were seen then CT scan was done. If there was ventriculomagaly in the CT scan then VP Shunt was placed.

Results:

Table-I

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Age</th>
<th>Sex</th>
<th>Features of raised ICP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
<td>M</td>
<td>Present</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>M</td>
<td>Absent</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>F</td>
<td>Present</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>M</td>
<td>Present</td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td>M</td>
<td>Absent</td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>F</td>
<td>Present</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>M</td>
<td>Absent</td>
</tr>
</tbody>
</table>

From the above table we can see that five patients were male and two patients were female. Most patients aged from 35 to 45 years. Three patients did not have signs of raised intracranial pressure.

Fig 1: Distribution of signs and symptoms.
Table-II

*Intraoperative complications.*

<table>
<thead>
<tr>
<th></th>
<th>Fornix contusion</th>
<th>Memory impairment</th>
<th>Intraoperative bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Absent</td>
<td>4</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

Table-III

*Post operative complication:*

<table>
<thead>
<tr>
<th></th>
<th>Aseptic meningitis</th>
<th>Post operative</th>
<th>VPS</th>
<th>Remnant of tumour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Absent</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
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Table-IV

*Follow ups*

<table>
<thead>
<tr>
<th></th>
<th>After six months</th>
<th>After one year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrence</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Remnant</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Visual improvement</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

Fig.-2: *Intraperative photographs showing A) colloid cyst at the Foramen of Monro B) colloid material coming out of the cyst C) floor of the 3rd ventricle can be seen through the foramen of Monroe D) another colloid cyst covered by Choroid plexus.*
Discussion:

Our patients were followed up with MRI examination. Some had residual colloid cyst (five patients) without any clinical problems. In a series, CT scan was used for follow up\textsuperscript{5}. Short-term follow-up studies have shown that cyst remnants usually do not cause clinical problems requiring surgical action\textsuperscript{2}. Even after one year, there were only 4 patients who had asymptomatic remnants of the cyst.

We have used the Lotta rigid neuroendoscope (Karl Storz\textsuperscript{®}). This gave us the benefit of using the total diameter of the sheath. The rigid endoscope allowed the use of the entire inner diameter (approximately 6 mm) of the endoscopic sheath. This enables effective tissue resection\textsuperscript{11}. The surgical techniques were used to endoscopically resect a colloid cyst include: (1) trans-foraminal, and (2) trans-septal approaches\textsuperscript{12}. We used transforaminal approach for all patients in our series.

Unlike the transcortical and transcallosal approach, in the endoscopic approach residual cysts are common\textsuperscript{13}. This has to be accepted by the surgeon and the patient. In a series it was also reported remaining of cyst wall in 3 patients\textsuperscript{2}. This is mainly due to adherence of the cyst wall with tela choroidae.

![Fig.-3: Preoperative T2 weighted MRI showing a colloid cyst at the foramen of Monro](image)

But the cysts were totally drained. In our series, four patients had residual cyst wall after one year and they were followed up.

Most of the patients were shunt dependent in our series. We had to place VP shunt in six patients as they had developed hydrocephalus after surgery. In one series, patients were VP shunt-dependent because of aseptic meningitis after the endoscopic procedure\textsuperscript{14}. In another series, one patient needed shunt\textsuperscript{9}. Some of our patients had aseptic meningitis (5 cases), which resolved without any sequelae.

The main concern was intraoperative bleeding from the cyst wall. It would obscure the vision and therefore, would increase operative time. After bleeding, we would wait patiently while irrigation was going on. It would take 5-10 minutes for the CSF to be adequately clear for proceeding to the next step. In two cases, part of the capsule was left behind for safety of the patient. These patients were regularly followed up for recurrence.

Fornix preservation in neuroendoscopy is critical. Contusions of any extent occur in 16.4% of complex neuroendoscopic procedures, the most frequent intraoperative complication, and most are clinically silent\textsuperscript{15}. So, fornix injury is to be avoided during
endoscopy, as this result in recent memory loss. We were very careful during surgery. Three patients had some stretching of the fornix without any discontinuity. Fortunately, these patients had no memory impairment.

**Conclusion:**
Gross total resection of colloid cyst should be the goal of endoscopic surgery in accordance with microsurgery. Complete removal is not always possible in the endoscopic approach. Therefore, the patients should always be followed up regularly for early diagnosis of recurrence of colloid cyst or any symptoms of raised intracranial pressure.

**References:**