



## COLLOID CYST;

### A RETROSPECTIVE ANALYSIS OF SIXTY CASES AT A LARGE TERTIARY CARE CENTRE IN KARACHI, PAKISTAN.

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**ABSTRACT... Context:** Colloid cyst is a rare tumour of the brain that has a good outcome upon surgical removal. **Aims:** We present the outcome of surgical management of colloid cyst at our setup based on the experience of last ten years. **Study Design, Setting and Period:** The type of study is a retrospective review of cases of third ventricular colloid cyst operated at the Department of Neurosurgery, Civil Hospital Karachi, Pakistan, from January 2005 to December 2015. **Methods and Material:** The patient's data including the clinical records, radiographic data, operative and follow up notes were studied. The patient population was divided into groups based upon the size of the cyst. The surgical approaches utilized were the transfrontal transventricular and transcallosal approach. All the patients also underwent a series of tests to determine the function of the somatosensory, motor and memory functions both pre and post operatively and upon follow up. **Statistical analysis used:** Data was analyzed using SPSS version 23. Mean and standard deviation was used for continuous variables, while frequency and percentage was used for categorical variables. **Results:** The study population n= 60 patient, n= 36 males and n= 24 females. The size distribution of the cyst was, n= 4 (6.66%) were less than 1.5cm, n=47 (78.33%) were 1.5-3cm and n=9 (15%) were >3cm. Headache was the most common presenting complaint. Papilledema was observed in 71.66% of the patients, while memory changes were observed in 8.33% of the patients. The surgical excision of the cyst was performed in n= 52, patients while ventriculoperitoneal shunt was performed in n= 8 patients. **Conclusions:** According to the results of our study the transcallosal approach, is a safe technique, in which the neurological damage is limited due to minimal callosotomy and manoeuvring of the fornix.

**Key words:** Colloid Cyst; Headache; Hydrocephalus; Surgical Excision; Third Ventricle.

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## INTRODUCTION

The colloid cysts of the third ventricle make up to 1% of the intracranial tumours<sup>1</sup>, surgical removal of this benign tumour has been a constant challenge for neurosurgeons worldwide. with advances in the field of radiology diagnosis of colloid cysts have become very accurate.<sup>2,3</sup> The advances in surgical techniques have significantly reduced the mortality and morbidity of the patients with colloid cysts. The colloid cysts can be diagnosed in any age group but they show signs and symptoms after the third decade of life, and are more common in the male population. The patients typically present with signs and symptoms of hydrocephalus, headache (severe, intermittent, short duration, located frontally,

change with posture) gait problems, dementia and loss of consciousness. They might have a benign course and resolve spontaneously, or may lead to fatal complications associated with rapid neurological deterioration and sudden death, so early diagnosis and treatment is of prime importance.<sup>1,4,5,6,7,8</sup> The various surgical options available include invasive and minimally invasive techniques such as transcortical and transcallosal approach and stereotactic aspiration and endoscopic excision respectively. In this study we present the outcome of surgical management of colloid cyst at our setup based on the experience of ten years. Our aim for the study was to share our experience to fellow neurosurgeons.

## Subjects and Methods

The type of study is a retrospective review of all the cases of third ventricular colloid cyst that were operated upon at our setup from January 2005 to December 2015. The study was approved by the hospital ethics committee. Patient information including the clinical records, radiographic data, operative and follow up notes were studied thoroughly. All the patients (in case of patient being unable to do so, their next of kin). In case of old patients who did not sign consent form prior to the procedure they were contacted via telephone or through letters and signed a duly informed consent to partake in the study and have the data published, care was taken to maintain anonymity of all the patients. The diagnosis of the colloid cyst was made by its classic location, signal intensity and appearance on the radiographic images. The size of the colloid cyst was measured by noting its breadth length and height parameters as seen by the three cross sectional images obtained by a CT scan (or using the MRI/CT scan software to calculate an estimated size where such a modality was available for our use). The patient population was divided into three groups based upon the size of the colloid cysts as observed on computer tomography and magnetic resonance imaging (CT and MRI, whenever feasible) findings such as, small (size of less than 1.5cm), medium (size between 1.5 and 3cm) and large (size greater than 3 cm) respectively. The two main surgical approaches utilized were the transfrontal transventricular (performed via the middle frontal gyrus of the non dominant lobe of the brain) and transcallosal approach (having a callosal incision of maximum 2.5cm and average of 1.5 cm). All the patients also underwent a series of tests to determine the function of the somatosensory, motor and memory functions, mini mental state examination was also performed on all the patients both pre and post operatively and on follow up. Data was analyzed using SPSS for windows version 23. Mean and standard deviation was used for continuous variables, while frequency and percentage was used for categorical variables.

## RESULTS

The study population consists of n= 60 patient, of

which n= 36 (60%) were males and n= 24 (40%) were females, the male to female ratio was 1.5 to 1, the majority of the patients were in their third and fourth decades of life having a mean age of 35 years with a standard deviation of 11 years and a range from 10 to 68 years. The size distribution of the cyst was as follows, n= 4 (6.66%) patients had a cyst of less than 1.5cm, n=47 (78.33%) of the patients had a cyst between 1.5 and 3cm in size and n=9 (15%) of the patients had a cyst of greater than 3cm in size. The average duration of the symptoms was 8 months with a range from 1 week to 4 years duration, the most common presenting complaints of the patient population are listed in Table-I. Headache was the most common presenting complaint in 93.33% of the patients which was often associated with nausea and vomiting, and in about 2% of the patient population variation of the headache with posture was noted. Papilledema was observed in 71.66% of the patients, while memory changes were observed in 8.33% of the patients. N= 2, who had normal pressure hydrocephalus had signs and symptoms of progressive dementia, gait disturbances, and urinary incontinence. N= 3 patients presented to us in an unconscious state and they failed to recover and expired. All the patients underwent CT and MRI imaging as done whenever feasible, for findings refer to Table-II. The density of the colloid cyst was found to be varying, with most commonly hyper dense areas, iso and hypo densities were also observed. The range of the MMSE was between 27 and 30, the mean MMSE score pre op was 28.3 and post op mean MMSE was found to be 28.12 respectively. Moderate to severe hydrocephalus was found in n=40 patients. The surgical excision of the cyst was performed in n= 52 (in which n=46 patients had no prior surgery while n=6 patients had prior shunt procedure performed) patients while ventriculoperitoneal shunt was performed in n= 8 patients respectively. The operating techniques utilized were the transfrontal transventricular approach (also known as transcortical or simply transfrontal approach) through the middle frontal gyrus in n= 18 patients, while in n= 34 patients the excision was by transcallosal route the standard practice was to rupture the cyst wall after exposure, the jelly-like cyst contents were

evacuated and then the cyst wall was excised by gentle dissection.

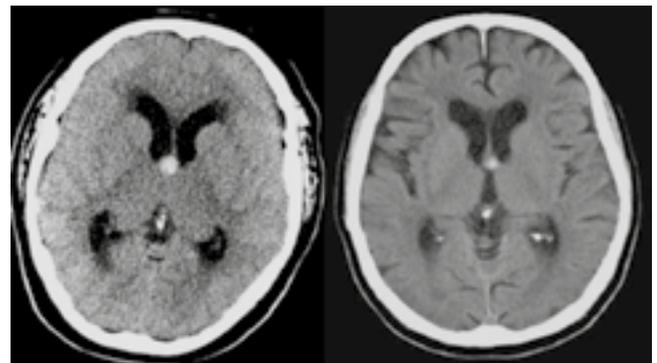
Characteristics	Number of patients	Percentage
<b>Size of colloid cyst</b>		
<1.5 cm	4	6.66%
Between 1.5cm and 3.0cm	47	78.33%
>3.0cm	9	15%
<b>Gender</b>		
Male	36	60%
Female	24	40%
<b>Clinical features (Symptoms)</b>		
Headache	56	93.33%
Ataxia	15	25%
Diminished vision	12	20%
Papilledema	43	71.66%
Urinary incontinence	10	16.66%
Short term memory deficits	5	8.33%
Cranial nerve paresis	5	8.33%
Seizures	3	5%
Coma	3	5%
Hemiparesis	1	1.66%
Normal pressure hydrocephalus	2	3.33%
<b>Surgical Approaches</b>		
Transfrontal-transventricular	18	34.61%
Transcallosal	34	65.38%
<b>Complications</b>		
Cortical venous damage	8	13.33%
Cerebrospinal fluid leak	6	10%
Meningitis	4	6.66%
Seizures	6	10%
Intracerebral hematoma	2	3.33%
Shunt block	3	5%
Wound infection	3	5%
Expired	4	6.66%

**Table-I. Various characteristics of the patients of colloid cyst operated at our setup.**

Radiographic findings	Number of Patients	Percentage
<b>Computer Tomography Findings</b>		
Hyperdense	45	75%
Hypodense	7	11.66%
Isodense	8	13.33%
<b>Magnetic Resonance Imaging (T1 weighted image)</b>		
Hyperintense	28	46.66%
Hypointense	7	11.66%
Isointense	25	41.66%
<b>Magnetic Resonance Imaging (T2 weighted image)</b>		
Hyperintense	30	50%
Hypointense	7	11.66%
Isointense	23	38.33%

**Table-II. Radiographic findings in the patient population.**

The most common complication observed was cortical venous damage n= 8, patients who had this damage and developed limb weakness, other complications were cerebrospinal fluid leak and meningitis (n= 6 and n=4 patients respectively). N= 6 patients had seizures, while n=2 patients had Intracerebral hematoma, n=3 patients had shunt block, and n=3 patients had wound infection as complications. N= 4 patients died during our care (n= 2 after venous infarct, n=2 with meningitis), while all the patients who were brought in a comatose state did not survive. One comatose patient died in the emergency department, one of them died after shunt procedure and the last one expired post colloid surgery due to complications of the pulmonary system. At follow up CT scans were performed on all the patients, n=1 patient showed recurrence of the symptoms post surgery. The cyst was re excised, and follow showed complete resolution of the hydrocephalus in all the patients. N= 10 patients suffered from recent memory loss (n= 5 has preoperative memory deficits, while n=4 had postoperative deficits), of which n=1 patient had permanent memory loss, all other had a transient loss of memory. The transient loss of memory was more evident in the initial weeks following the surgery, was more for recent events, and resolved after 6 months post surgery. The behavioural symptoms noted in patients with normal pressure hydrocephalus resolved after surgery.



**Figure-1. CT scans showing colloid cysts from two different patients.**

**DISCUSSION**

Colloid cysts have a benign histology, unclear origin, pronounce presentation and different available options for treatment, it is more prevalent in males as compared to females.<sup>1,3,10</sup>



**Figure-2. T1 Weighted sagittal section MRI showing colloid cyst of the third ventricle.**

In our study we found that majority of our patients belonged to the third and fourth decade of life which is also similar to other studies.<sup>10</sup> The first documented case of colloid cyst was observed in 1858, and since after that time there has been controversy regarding its origin<sup>11</sup>, various authors have reported different sites of origin.<sup>12,13,14</sup> Colloid cyst produces non localizing symptoms with increase in the intracranial pressures such as visual disturbance, vomiting, gait ataxia and paroxysmal headaches associated with change in head position.<sup>1,4,5,6,7,8</sup> N= 2 patients in our study had normal pressure hydrocephalus, which shows rapid neurological deterioration after a lumbar puncture and may even lead to death, hence early detection and treatment of colloid cysts is important in such patients. All the patients who were admitted in a comatose state had large colloid cysts, and expired eventually. There is evidence of memory loss post operatively in patients with colloid cyst and this deficit is more pronounced for recent memories.<sup>16,17</sup> In our study the memory loss was permanent in n=1 patient, while the rest had a transient memory loss (n=9), this loss of memory could be due to stretching of the fornix by the colloid cyst, the patient with the permanent memory loss had a large colloid cyst as did the other patients who demonstrated

transient memory loss. On plain CT scan the density of colloid cyst is variable, being iso or hypodense to the surrounding parenchyma, and might have a centre of higher density, which could be due to the cholesterol content and viscosity of the fluid of the colloid cyst.<sup>2,3</sup> The hyperdense cysts are difficult to aspirate, because of the high viscosity of the fluid they contain. According to Donaldson this viscosity is due to the sodium, calcium and magnesium content of the mucin content of the cyst, while Mader et al suggest that the viscosity is due to the cholesterol content<sup>3,18</sup> On MRI imaging most colloid cysts show hyperintensity on T1 weighted and T2 weighted images and Ahmedi et al proposed that cysts that are hypointense on T1 weighed images and hyperintense on T2 weighted images are easy to aspirate.<sup>19</sup> Prophylactic treatment of small colloid cysts is still debatable, in our study the patients with small incidentally detected colloid cysts remained asymptomatic without any intervention for a period of three years of follow up after which they were lost to follow up, however it is recommended that patients having a colloid cyst of greater than 1.5cm should be considered for surgical excision, as they might become symptomatic and even fatal in some cases.<sup>17</sup> According to Macdonald et al younger patients need to be operated upon as the chances of their colloid cysts becoming symptomatic is high.<sup>20</sup> The transcallosal approach is a procedure of choice for neurosurgeons in this part of the globe, in which the avoidance of cortical incision minimizes the risk of seizures. The most devastating complication of this technique is venous infarct secondary to cortical vein occlusion and may cause significant neurological damage. Occasionally thrombosis may also occur in the superior sagittal sinus due to retraction.<sup>21,22,23</sup> Some patients also demonstrate disconnection syndrome, which is dependent upon the site and length of the corpus callosum incision made. A large incision results in severe impairment of the interhemispheric neuronal connections such as transfer of sensory, motor and tactile information. According to Jeeves et al<sup>24</sup> they observed impairment of tactile information and sparing of visual information in patients who had incisions at the anterior and mid corpus callosum, an incision of less than 2.5 cm

in the anterior body of the corpus does not cause any disconnection disease, we did not have any patients who had this complication in our study. The second approach used in our study is the transcortical transventricular approach which involves incision made in the brain parenchyma and has complications of seizures, difficulty in maintaining exposure in small ventricles, in our study this approach was used in n=18 patients, and the most frequent complication was seizures. Solaroglu et al treated 26 patients with this technique and observed a good outcome and the most common complication being onset of seizures in 2 patients.<sup>22,25,26</sup> According to Camacho et al the incidence of seizure using this procedure is from 11 to 13%<sup>27</sup> In our study n=8 patients underwent shunt procedure before cyst excision, because of hydrocephalus which completely resolved after excision of the cyst. According to Hall et al, they observed that hydrocephalus persisted after aspiration and or after removal of the colloid cyst, but we did not find such effect in our patient population.<sup>28</sup> The mortality rate in patients with colloid cyst according to Hernesniemi et al was 13% while in our study the mortality rate was found to be 6.66%.<sup>29</sup> We did not perform the other newer surgical techniques such as endoscopic removal of the colloid cyst as ours is a Public Hospital and we do not currently have the instruments necessary to perform the other technique of colloid cyst excision.

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### PREVIOUS RELATED STUDY

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3	Muhammad Imran	Literature review, write-up, analysis.	
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5	Qazi M. Zeeshan	Write up, Analysis	
6	M. Sheraz Raza	Data collection and analysis drafting, corresponding author	
7	Junaid Ashraf	Literature review, write up, analysis, proof reading.	