

# Arachnoid Cyst: A Solitary Intracranial Cyst in the Occipital Lobe of the Cerebrum in a Cadaver

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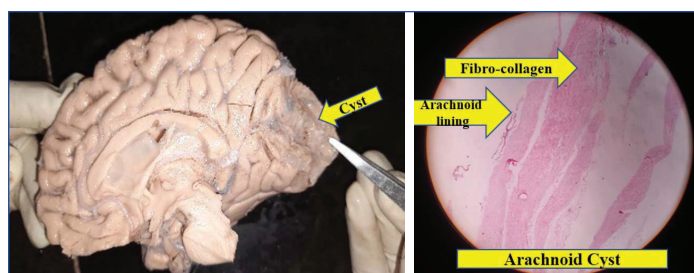
## ABSTRACT

Cyst is a closed sac, having distinct envelop; they may be filled with air, fluid, semi-solid material etc. Often cyst is a self-limiting and uneventful condition; they may get resolve with some time duration. If they fail to self-limit by themselves, depending on its size and location it needs timely surgical intervention. A cerebral cyst is a lesion with fluid filled sac in the brain. It may be benign, or malignant. This may be filled with blood, pus, Cerebrospinal Fluid (CSF), etc. Intracranial arachnoid cysts are congenital lesions of an arachnoid membrane which accounts for 1% of cases of intracranial space occupying lesions. Clinically, a brain cyst may remain silent, often it is an accidental finding on radiological investigations which are correlated in the patients with a history of vague neurological complaints. Often, headaches are a chronic complaint presented with underlying causative factors ranging from psychological stress to severe neurological deficits. The primary brain cyst that exists congenitally by birth will have no definite causality; a secondary brain cyst may exist with diversified aetiological factors including trauma. Elucidation of chronic symptoms dominated with migraine-like headache is very much essential; despite showing a good relief with a palliative treatment it will warrant clinicians to rule out cerebral cystic lesions. Such accidental findings during the dissections set as a natural cadaveric illustration, which build curiosity, and motivation among preclinical student learning from the point of integration of basic subjects. One such case of the cerebral cyst was found during the dissection in the Department of Anatomy, JSS Medical College, Mysuru, Karnataka, India. The present case is of a 70-year-old male cadaver diagnosed with the arachnoid cerebral cyst along with other varieties of cystic brain swellings.

**Keywords:** Cerebral cyst, Migraine, Psychology

## CASE REPORT

The dissection of a 70-year-old male cadaver was conducted in the Department of Anatomy, JSS Medical College, Mysuru, Karnataka, India. The whole brain was removed from the cranial cavity. Later meningeal coverings of the brain were studied and dissected completely. The external brain surface was exposed, and its features were studied, and it is followed by sagittal section of the brain made by cutting through the corpus callosum. Later, a small swelling about 4x3 cm was recognised on the right cerebral hemisphere of the brain [Table/Fig-1]. It was in the region of the posterior pole of the cerebral hemisphere occupying the posteromedial aspect of the occipital lobe. The swelling was whitish, filled with a transparent fluid, which drained on excision. Histopathological examination under Haematoxylin and Eosin (H&E) staining, showed thick densely arranged fibro-collagen connective tissues and its walls were lined by meningothelial cells. It was confirmed as arachnoid cystic lesion of the brain [Table/Fig-2].



[Table/Fig-1]: Gross appearance of cyst.

[Table/Fig-2]: Histopathology of cyst (H&E-4X). (Images from left to right)

## DISCUSSION

A cerebral cyst is a lesion with a fluid filled sac in the brain which may be benign or malignant. A cyst may be filled with blood, pus, CSF, etc. Based on the underlying factors of origin of cysts, they are seen as congenital cysts, vascular cysts, haemorrhagic cysts, traumatic

cysts, infectious cysts, etc. A cyst has a distinct membrane and is separated from nearby tissue. Varieties of nervous system cysts of developmental origin are encountered like epidermoid, colloid, arachnoid, neurenteric, ependymal, glial, Rathke's cyst, etc. Benign cysts are recognised through advanced neuroimaging methods, but the malignant change in the brain cysts is a rare phenomenon [1,2].

The brain cystic metastatic lesions are often accompanied by co-morbidities with the patients surviving from a long term illness like cancer, where the radiological investigation Magnetic Resonance Imaging (MRI) was found to be a good choice to characterise and diagnose the lesions [3]. Arachnoid cyst is one such cerebral cystic lesions anatomically connected with the arachnoid mater of the cerebral meninges [4]. Hence, such nervous system anomalies in the dissecting cadavers are the real motivator of application of knowledge of basic medical subjects in the direction of clinical case understanding.

Intracranial arachnoid cysts are congenital lesions of arachnoid membrane which accounts for 1% of cases of intracranial space occupying lesions. It contains CSF lined by arachnoid cells with collagen fibres in its wall [5]. Incidence of arachnoid cysts is not only attributed to the brain but can also be seen with the spinal cord. They can be seen extradural or intradural in location. A rare case of the extradural arachnoid cyst was noticed in a young girl aged 13 years without a history of trauma or co-morbidities. It was a protrusion of the arachnoid mater through the defective outer covering of duramater. Clinically, it was manifested with progressive paraesthesia, deep sensory loss, clonus, etc. Radiological investigations were suggestive of significant compression at thoracic spine T6-T9 levels. The compression was relieved by laminectomy with a good prognosis [6].

Retrospective review of some cases of arachnoid cysts have revealed the history of trauma during infancy, they have recalled their past incidences of head injury by falling, slipping, motor vehicle accidents, etc. Most of these arachnoid cysts were seen in the suprasellar region of the middle cranial fossa or posterior cranial fossa of the cranial cavity [7].

The cerebral cysts may show their adverse impact on childhood learning, which can jeopardise potential student academic milestones. A prospective follow-up case-series study was conducted on a paediatric patient age group between 6-13 years with cerebral temporal arachnoid cyst. These patients were having clinical symptoms attributing to neurological, neuro-ophthalmic, and neuropsychiatric findings. The suitable patients who had undergone open micro neurosurgical fenestration were evaluated for postoperative cognitive changes. A follow-up study was conducted for one year, the neuropsychological assessment targeting the language articulation, visual ability and verbal memory was done by using a standard evaluation scale, indicating the benefit of early surgical intervention [8]. Among different varieties of brain cysts, the gliopendymal cyst is one of the rare varieties of benign malformation. It was seen in a 10-year-old child with the main symptom of headache along with epileptic seizures. Interestingly, it was associated with dysgenesis of the corpus callosum of the brain noticed under MRI scan [9].

Cerebral cyst with brain developmental malformation may show an impact on the functional and cognitive abilities of an individual. Extracerebral cysts occupies various sites in the cavity of the skull. A rare case of a right gliopendymal cyst was unusually recognised as an interesting finding on radiological examination. It was located at the cerebellopontine angle causing the compression of the brain stem along with the right glossopharyngeal nerve [10].

Arachnoid cyst may exist without neurological signs and symptoms showing the involvement of nerves. The patient's higher brain functions may remain intact. A case of a 14-year-old child was presented with the symptoms of headache, vomiting; physical examination was showing no abnormal motor and sensory disabilities. On radiological examinations, they found a retro-cerebellar arachnoid cyst in the posterior cranial fossa [11]. In connection with choroid plexus, a spatial cyst can be appreciated in the ventricular cavity of the brain as choroidal fissure cyst which exists independently as a small bubbling and arises in connection with the choroidal plexus away from the brain parenchyma. The choroidal cysts can be differentiated well from other lesions. These types of cysts may be appreciated incidentally as an unusual radiological finding, generally with no clinical manifestations [12]. Depending on the location and size of the brain cyst, its symptoms may attribute to cerebral compression causing sensorimotor deficit, or it may be of non specific in nature like headache, dizziness, etc. Postoperatively, cyst depression has resulted in improvement in neurocognitive skills like learning, memory, psychomotor ability, and visual perception etc., [13].

Among different types of headaches, cluster headache is a primary symptom with vague and unknown underlying clinical pathology. It requires prompt and appropriate management thorough clinical evaluation to rule out conditions like cerebral cyst [14]. The arachnoid cyst may exist as, complete communicating, incomplete communicating, and non communicating in its presentation. Its diagnostic evaluation can be done through Magnetic Resonance

Cisternography (MRC) by using intrathecal dye injection, which plays an important role in surgical management [15]. Confirmed cases of arachnoid cysts can be handled surgically with a procedure of fenestration, cystic peritoneal shunting, and cysto atrial shunting. All these surgical procedures are equally beneficial in taming the condition by manipulating the cystic volume reduction [16].

## CONCLUSION(S)

The cerebral cortex plays an important role in the higher functions of the brain. It is distributed with vast somesthetic and motor functional areas occupying the occipital lobe of the cerebral hemisphere. It is an important site of primary and secondary cortical visual sensory areas. It is prone to show adverse clinical events like vascular impairment, trauma, tumour, cyst, etc. Among them cerebral cysts are often incidental radiological findings, their clinical manifestations depending on their location and size. Early clinical signs and symptoms of suspected cerebral cysts need to be screened thoroughly; it requires an early surgical decompression that can further improve overall neurological and psychological abilities especially in individuals in younger age groups.

## REFERENCES

- [1] Epelman M, Daneman A, Blaser SI, Ortiz-Neira C, Konen O, Jarrin J, et al. Differential diagnosis of intracranial cystic lesions at head US: Correlation with CT and MR imaging. *Radiographics*. 2006;26(1):173-96.
- [2] Sundaram C, Paul TR, Raju BV, Ramakrishna Murthy T, Sinha AK, Prasad VS, et al. Cysts of the central nervous system: A clinicopathologic study of 145 cases. *Neurol India*. 2001;49:237-42.
- [3] Sharma V, Prabhaskar K, Noronha V, Tandon N, Joshi A. A systematic approach to the diagnosis of cystic brain lesions. *South Asian J Cancer*. 2013;2(2):98-101.
- [4] Rabiei K, Tisell M, Wikkelsø C, Johansson BR. Diverse arachnoid cyst morphology indicates different pathophysiological origins. *Fluids Barriers CNS*. 2014;11(1):5.
- [5] Iglesias JR, Sanjuanbenito L, Martinez-Cubells J, Lousa M, Redondo C. Intracerebral arachnoid cyst containing choroid plexus: Case report. *Acta Neurochir*. 1981;58(3-4):229-34.
- [6] de Oliveira F, Leira F, Braga L, Zamprogno P, Aversa A, Guimarães R, et al. Extradural arachnoid cyst—Case report and literature review. *Interdisciplinary Neurosurgery*. 2021;23.
- [7] Choi JU, Kim DS. Pathogenesis of arachnoid cyst: Congenital or traumatic? *Pediatr Neurosurg*. 1998;29:260-66.
- [8] Sandvik U, Adolfsson T, Jacobson DN, Tedroff K. Cognition in children with arachnoid cysts. *J Clin Med*. 2020;9(3):850.
- [9] Mustapha O, Allali N, Latifa C, El haddad S. Epilepsy as a presentation of a neuroglial cyst associated with dysgenesis of corpus callosum in a child. *Case Reports in Radiology*. 2021;2021:6675071.
- [10] Monaco P, Filippi S, Tognetti F, Calbucci F. Gliopendymal cyst of the cerebellopontine angle. *J Neurol Neurosurg Psychiatry*. 1995;58(1):109-10.
- [11] Ravikanth R. Retrocerebellar arachnoid cyst of the posterior fossa presenting with headache. *BLDE University Journal of Health Sciences*. 2019;4(1):28-29.
- [12] Altafulla JJ, Suh S, Bordes S, Prickett J, Iwanaga J, Loukas M, et al. Choroidal fissure and choroidal fissure cysts: A comprehensive review. *Anat Cell Biol*. 2020;53(2):121-25.
- [13] Soukup VM, Patterson J, Trier TT, Chen JW. Cognitive improvement despite minimal arachnoid cyst decompression. *Brain Dev*. 1998;20(8):589-93.
- [14] Edvardsson B, Persson S. Cluster headache and arachnoid cyst. *Springerplus*. 2013;2(1):4.
- [15] Tan Z, Li Y, Zhu F, Zang D, Zhao C, Li C, et al. Children with intracranial arachnoid cysts: Classification and treatment. *Medicine (Baltimore)*. 2015;94(44):e1749.
- [16] Choi JW, Lee JY, Phi JH, Kim SK, Wang KC. Stricter indications are recommended for fenestration surgery in intracranial arachnoid cysts of children. *Childs Nerv Syst*. 2015;31:77-86.

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### PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jul 24, 2021
- Manual Googling: Nov 11, 2021
- iThenticate Software: Dec 23, 2021 (4%)

### ETYMOLOGY: Author Origin

### AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Jul 23, 2021**  
Date of Peer Review: **Aug 20, 2021**  
Date of Acceptance: **Nov 11, 2021**  
Date of Publishing: **Jan 01, 2022**