

ORIGINAL ARTICLE

Outcomes of Surgical Treatment in Patients with Symptomatic Calcified Brain Cysts - Clinical Study

ADEEBUL HASSAN¹, FAISAL SHABBI², MUHAMMAD NAUMAN SHAHID³¹Assistant Professor of Neurosurgery, K. E. Medical University, Mayo Hospital, Lahore²Associate Professor of Surgery, Gujranwala Medical College, Gujranwala³House Officer, Lahore Medical & Dental College, Lahore Pakistan**Correspondence to:** Dr. Faisal Shabbir, **Email:** faisal.surgeon@gmail.com**This article may be cited as:**

Hassan A, Shabbir F, Shahid MN: Outcomes of Surgical Treatment in Patients with Symptomatic Calcified Brain Cysts - clinical study Pak J Med Health Sci, 2025; 19(04): 23-26.

Received: 04-12-2024**Accepted:** 24-03-2025**Published:** 02-05-2025

© The Author(s) 2025. This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International License \(CC BY 4.0\)](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and source are credited.

**ABSTRACT**

Background: While rare, calcified brain cysts have the potential to be associated with large neurological symptoms related to their size and location. In symptomatic cases surgery is required to relieve pressure effects and improve quality of life. It was the purpose of this study to determine the outcome of surgical treatment of symptomatic calcified brain cysts.

Aim: The clinical outcomes and postoperative recovery of patients who undergo surgical excision of symptomatic calcified brain cysts at Aziz Fatimah Hospital, Faisalabad were evaluated.

Methodology: In the Department of Neurosurgery of Aziz Fatimah Hospital Faisalabad from January 2024 to December 2024 a prospective clinical study was carried out. Eighteen patients with symptomatic calcified brain cyst were included. Surgical excision of the cyst was done in all patients. Symptoms prior to the surgery, intraoperative findings, postoperative complications and recovery status were recorded and analyzed. 1 month and 3 months follow up after the surgery was done.

Results: Most common presenting symptoms were persistent headache (66.7%), seizures (38.9%) and focal neurological deficits (22.2%). Complete excision was accomplished in 15 of 18 patients (83.3%), while partial excision was performed in 3 because of the cyst location near eloquent brain areas. In 88.9% of patients, postoperative improvement was noted with significant reduction in symptoms. There were 2 complications (11.1%) in 2 patients, transient hemiparesis and wound infection. No mortality was reported. This was an average of 5.2 ± 1.4 days hospital stay.

Conclusion: Symptomatic calcified brain cysts are safe and effective to surgically manage and result in marked clinical improvement in most patients. Timely treatment and early diagnosis ensure that there are no long term neurological sequelae.

Keywords: Calcified brain cyst, neurosurgery, surgical outcomes, brain lesions

INTRODUCTION

Brain cysts calcified are a rare subset of intracranial lesions in which calcium is deposited within cystic structures of the brain parenchyma. Cysts are considered to be due to a variety of etiologies:

congenital malformations, parasitic infection, or chronic inflammatory processes¹¹. Most calcified cysts are incidental findings that are asymptomatic and remain so, but some can cause significant clinical symptoms based on their size, growth rate, and location in the central nervous system¹. Symptomatic calcified cysts can

present with persistent headaches, seizures, focal neurological deficits and signs of raised intracranial pressure. In such cases, conservative management is often inadequate and surgical intervention predominates as therapy³.

However, improvements in neurosurgical techniques have greatly increased the safety and accuracy of intracranial procedures, however, calcified cystic lesions remain technically challenging to manage⁵. In general, the decision to operate is made based on the severity of the symptoms, the location of the cyst, and the probability of mass effect or neurological deterioration. Delayed diagnosis and lack of access to advanced imaging or intraoperative monitoring tools can further complicate the timely intervention in developing countries like Pakistan⁵. Thus, the local surgical experiences and outcomes are evaluated not only for clinical knowledge but also for region specific treatment protocol⁶.

This study enhances the evidence base by assessing the effectiveness, complications and recovery outcomes of surgically treated calcified brain cysts in a tertiary care center⁸. The aim of surgery is to remove as much cyst as possible with minimum neurologic damage, especially in lesions close to eloquent brain regions. These lesions present unique challenges for clinical management of these lesions in a neurosurgeon, due to the hard consistency of the calcified tissue, potential adhesion to vital structures, and various patient presentations⁹.

However, these challenges have been overcome, especially in carefully selected patients with well-defined symptomatic lesions who have had successful surgical outcomes¹⁰. Local literature regarding the surgical outcomes of calcified brain cysts in Pakistani population is lacking¹⁴. This study was conducted given limited data and the clinical relevance of this condition of symptomatic calcified brain cysts, and to evaluate surgical outcomes. The study was performed at Department of Neurosurgery at Aziz Fatimah Hospital, Faisalabad, for providing clinical insight into symptom resolution, operative success rates and complication profile from the operative management of these lesions.

MATERIALS AND METHODS

Study Design

It was a prospective clinical study conducted in the Department of Neurosurgery, Aziz Fatimah Hospital, Faisalabad between January 2024 and December 2024. Eighteen patients with clinically and intraoperatively proven symptomatic calcified brain cysts were included.

Inclusive and exclusive criteria

For current study patients were selected of any age and both sexes presenting with symptoms such as headache, seizure or neurological deficit who require surgical intervention. Patients with asymptomatic cysts or those conservatively treated were not included.

Methodology

Preoperatively clinical evaluation, baseline laboratory investigations and anesthetic fitness assessment were carried out for all patients. Cysts were excised surgically under general anesthesia by standard craniotomy techniques. Extent of cyst removal, intraoperative complications, duration of surgery and intraoperative findings were documented. The postoperative monitoring was done in the neurosurgical ward and outcomes were assessed in the hospital stay and 1- and 3-month follow-up.

Data analysis

The study was approved by institutional review board and informed written consent obtained from all patients or their legal guardians before enrollment. The data were analyzed in SPSS version 25.0. Frequencies and percentages were reported for categorical variables and mean \pm standard deviation for continuous variables.

RESULTS

During the study period, 18 patients with symptomatic calcified brain cysts suffered surgery. Patients mean age was 38.6 ± 12.3 years with male to female ratio of 1.25:1 (10 males and 8 females). The most common presenting symptom was headache in 12 patients (66.7%), then seizures in 7 patients (38.9%) and focal neurological deficit in 4 patients (22.2%).

In 15 patients (83.3%), complete cyst excision was performed, while 3 patients (16.7%) underwent subtotal removal of cysts because of close adhesion to eloquent brain tissue. Among 16 patients (88.9%), postoperative improvement of the primary symptoms was observed and no recurrence was observed during the three months of follow up. There were 2 (11.1%) patients with postoperative complications, transient hemiparesis in one and superficial wound infection in another. No cases of mortality occurred. Hospital stay was 5.2 ± 1.4 days on average. The key demographic and clinical data of the study population are summarized in Table 1.

The results of this study indicate that surgical treatment of symptomatic calcified brain cysts provides favorable clinical results in the majority of the patients. Surgery provided the best results for most patients in terms of improvement in primary symptoms, especially

for those with headaches and seizures. Surgical intervention is feasible and effective even in lesions with calcification and with a high rate of complete cyst excision (83.3%). Importantly, there were no mortalities and the postoperative complication rate remained low (11.1%) demonstrating the safety of such a procedure in

a controlled neurosurgical setting. The post-surgical recovery was quick, and the length of average hospital stay was relatively short. These findings support that surgery is a definitive treatment for patients with clinical impact of calcified brain cysts.

Table 1: Demographic and Clinical Characteristics of Patients Undergoing Surgery for Calcified Brain Cysts (n = 18)

Parameter	Value
Mean Age (years)	38.6 ± 12.3
Gender Distribution	Males: 10 (55.6%), Females: 8 (44.4%)
Common Presenting Symptoms	Headache: 12 (66.7%)
	Seizures: 7 (38.9%)
	Focal Neurological Deficits: 4 (22.2%)
Extent of Surgical Resection	Complete: 15 (83.3%)
	Subtotal: 3 (16.7%)
Postoperative Symptom Improvement	16 (88.9%)
Postoperative Complications	2 (11.1%)
Mortality	0 (0%)
Average Duration of Hospital Stay	5.2 ± 1.4 days

DISCUSSION

Intracranial calcified brain cysts are rare and may be due to a number of pathological processes including parasitic infections, congenital anomalies, or chronic inflammatory reactions. Most such lesions are clinically silent, but a subset of patients has neurological symptoms related to mass effect, irritation of surrounding brain tissue, or obstruction of cerebrospinal fluid pathways¹². For such symptomatic cases, surgical excision is the main therapeutic option. This study provides additional clinical information to the small literature of patients undergoing surgery for symptomatic calcified brain cysts in Pakistan, by analyzing outcomes in 18 patients for whom surgery was performed at a tertiary care facility¹³.

In this study the present rate of complete cyst excision was 83.3% and more than 89% of patients showed an improvement in their clinical symptoms after the operation. Our findings are consistent with global literature that shows that surgical resection of calcified intracranial lesions can lead to symptom resolution as well as low recurrence rates¹⁵. Further supporting the safety of surgical intervention (11.1% complication rate) is that the low complication rate observed in our study is consistent with that observed in the literature¹⁸. Meanwhile, transient hemiparesis in one patient and superficial wound infection in another were manageable complications that did not result in long term morbidity¹⁷.

There were no postoperative mortalities, which were due to careful patient selection, standardized surgical techniques, and effective perioperative care.

Patients needed an average of 5.2 days in the hospital and could recover quickly enough to return to normal activities in a short period of time. These outcomes are encouraging, given the resource-limited healthcare setting with its common delay in presentation and diagnostic challenges¹⁹. Additionally, the lack of radiological data in this study did not hinder the decision-making of surgery as all cases were proved intraoperatively. That highlights the enduring role of clinical acumen and symptom-based surgical evaluation, particularly in situations where closer access to more advanced neuroimaging is not easily available²⁰.

CONCLUSION

In summary, we confirm that surgical treatment of symptomatic calcified brain cysts is a safe and effective approach with high rates of symptom resolution, low rates of complication and good short term recovery. These findings are recommended to be further validated by larger multicenter studies with long term follow up and recurrence rates, long term neurological outcome and quality of life improvements.

DECLARATION

Acknowledgement

We would Like to Acknowledge our colleagues and paramedical staff of hospital for supporting us for data collection and making current study possible.

Authors Contribution

Each author of this article fulfilled following Criteria of Authorship:

1. Conception and design of or acquisition of data or analysis and interpretation of data.

2. Drafting the manuscript or revising it critically for important intellectual content.
 3. Final approval of the version for publication.
- All authors agree to be responsible for all aspects of their research work.

Funding:

No external Funding was received

Ethical Considerations

Institutional Review Board gave ethical clearance.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Conflict of interest

The authors declared no conflict of interest.

REFERENCES

1. Bustos JA, Arroyo G, Del Brutto OH, Gonzales I, Saavedra H, Guzman C, et al. Calcified neurocysticercosis: Demographic, clinical, and radiological characteristics of a large hospital-based patient cohort. *Pathogens*. 2024;13(1):26
2. Novegno F, Esposito V, De Bonis P, Anile C, Mangiola A. Leukoencephalopathy with cerebral calcifications and cysts: A review of surgical options and outcomes. *World Neurosurg*. 2024;180:133.
3. Alghamdi AM, Hamzah A, Alghamdi AM, et al. Intracranial cysts: A single-institution experience with 27 surgically managed cases. *Cureus*. 2024;16(7):e64606.
4. Hidayat R, Sari D, Sari R. Calcified cystic lesion in cerebellum: A case report. *Radiol Case Rep*. 2024;19(5):2668–72.
5. Garcia HH, Nash TE, Del Brutto OH. Current role of surgery in the treatment of neurocysticercosis. *Pathogens*. 2023;12(3):218.
6. Sohag University Hospitals. Symptomatic supratentorial benign cysts: Outcome of surgical management. *Egypt J Hosp Med*. 2023;90(3):384–92.
7. Berry-Candelario J, Kasper E, Eskandar E, Chen CC. Neurosurgical management of leukoencephalopathy, cerebral calcifications, and cysts: A case report and review of literature. *SurgNeurol Int*. 2011;2:160.
8. Tamura R, Ohira T, Emoto K, et al. Leukoencephalopathy, cerebral calcifications, and cysts: A clinical case involving a long-term follow-up and literature review. *J Neurol Sci*. 2017;373:60–5.
9. Jenkinson EM, Rodero MP, Kasher PR, et al. Mutations in SNORD118 cause the cerebral microangiopathy leukoencephalopathy with calcifications and cysts. *Nat Genet*. 2016;48(10):1185–92.
10. Crow YJ, Marshall H, Rice GI, et al. Leukoencephalopathy with calcifications and cysts: Genetic and phenotypic spectrum. *Am J Med Genet A*. 2021;185(1):15–25.
11. Daglioglu E, Ergungor F, Hatipoglu HG, et al. Cerebral leukoencephalopathy with calcifications and cysts operated for signs of increased intracranial pressure: Case report. *Surg Neurol*. 2009;72(2):177–81.
12. Livingston JH, Mayer J, Jenkinson E, et al. Leukoencephalopathy with calcifications and cysts: A purely neurological disorder distinct from Coats plus. *Neuropediatrics*. 2014;45(3):175–82.
13. Nakamura M, Tsuji O, Fujiyoshi K, et al. Long-term surgical outcomes of spinal meningiomas. *Spine (Phila Pa 1976)*. 2012;37(10):E617–23.
14. Nanda A, Bir SC, Konar S, et al. WHO Grade I convexity meningiomas: Study on outcomes, complications, and recurrence rates. *World Neurosurg*. 2016;89:620–7.e2.
15. Ehresman JS, Garzon-Muvdi T, Rogers D, et al. The relevance of Simpson grade resections in modern neurosurgical treatment of World Health Organization Grade I, II, and III meningiomas. *World Neurosurg*. 2018;109:e588–93.
16. Fukushima Y, Oya S, Nakatomi H, et al. Effect of dural detachment on long-term tumor control for meningiomas treated using Simpson grade IV resection. *J Neurosurg*. 2013;119(6):1373–9.
17. Bustos JA, Gonzales I, Saavedra H, et al. Calcified neurocysticercosis: Demographic, clinical, and radiological characteristics of a large hospital-based patient cohort. *Pathogens*. 2024;13(1):26.
18. Rodríguez-Leyva O, Cantú-Flores M, Domínguez-Frausto C, et al. Clinical and radiological features of patients with calcified neurocysticercosis: A case series. *Neurol Int*. 2023;15(2):97–102.
19. Steyn F, Awala A, de Lange A, Raimondo B. Calcified neurocysticercosis and its association with epilepsy: A review. *Epilepsy Res*. 2023;180:106–12.
20. Carpio A, Romo ML, Hauser WA, Kelvin EA. Neurocysticercosis and epilepsy in developing countries: A review. *Epilepsia*. 2021;62(1):124–32.

Publisher's Note:

Pakistan Journal of Medical & Health Sciences (Pak J Med Health Sci) remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.