



Original Research

## Improved Outcomes in the First 72 Days of Medical Management of Cerebral Abscess in Post-Traumatic Patients

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### ABSTRACT:

**Objective:** We studied the results of medical and surgical management of cerebral abscesses in post-traumatic patients after road traffic accidents (RTA).

**Material and Methods:** It is a comparative observational study of 40 patients in Lahore General Hospital/Punjab Institute of Neurosciences (PINS), Lahore. Our patients were presented with fever, vomiting, headache, fits, etc.

**Results:** The age range of our patients was 15-60 years. The mean age of our patients was 40 years, we gave medical management along with bed rest to all 40 patients (100%) for 3 weeks. Anti-epileptic, mannitol, antibiotics, and painkillers were the medication that was given. Our 30 (75%) patients who were managed medically, had headaches, and vomiting which did not resolve for we had to operate on the patients. Surgical management was done in 10 (25%) patients. Surgical excision was done in 9 (97%) patients and burr hole evacuation was done in 1 (3%) patients. All patients who recovered from medical management are those who were treated within 1<sup>st</sup> week after the occurrence of cerebral abscess.

**Conclusion:** The results of medical management of cerebral abscess are better than surgical management if patients are treated during the first week after the occurrence of cerebral abscess. With good antibiotics etc.

**Keywords:** Cerebral Abscess, conservative management, Surgical Management.

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### INTRODUCTION

Abscess formation within the brain parenchyma is called cerebral abscess. It results from an infectious or traumatic process.<sup>1</sup> There are three different ways by which cerebral abscess can form in the brain. First is direct local spread, second is hematogenous spread and third is contagious spread. The most common way is hematogenous spread. Lung infections i.e. bronchiectasis can be causes of cerebral abscess. Infection from heart

and abdominal infections can spread by hematogenous spread. Any infection in which bacteremia occurs can be spread by hematogenous spread.<sup>2</sup> Causes of contiguous spread are otitis media and mastoiditis, paranasal sinus infection, infection from sinuses, and dental infection.<sup>2</sup>

Cerebral abscesses can be caused by direct instillation of pathogens from trauma and neurosurgical procedures.<sup>2</sup> Common pathogens causing cerebral abscesses are *Staphylococcus* and *Streptococcus*.<sup>8,14</sup> Cerebral abscess is divided into four stages depending upon histological findings i.e., early cerebritis, late cerebritis, early capsular, and late capsular stage. Clinical features of cerebral abscess depend upon the location of the abscess within in brain. Common clinical manifestations of cerebral abscess are; headache, mental status changes, focal neurologic deficits, pain, fever, seizures, nausea and vomiting, and nuchal rigidity.<sup>5</sup>

To evaluate a patient having cerebral abscess following tests are performed; complete blood count, erythrocyte sedimentation rate, serum C-reactive protein, serologic test, Blood cultures, Rarely, Computed Tomography, Magnetic Resonance Imaging (MRI), Diffusion-weighted magnetic resonance imaging, Proton MR Spectroscopy.<sup>1,3,4,6,7,9,10</sup> Medical management for cerebral abscesses can be considered for deep-seated, abscesses less than 2 cm in size, cases of coexisting meningitis, multiple abscesses, and with comorbidities. For gram-positive bacteria; third-generation cephalosporin or penicillin G are given, for *staph aureus*, *staph epidermidis* vancomycin, linezolid, trimethoprim-sulfamethoxazole, or daptomycin can be given. For fungal infections, Amphotericin B, Voriconazole can be given, and for *toxoplasma gondii* infection pyrimethamine and sulfadiazine can be considered.<sup>12,13,15</sup> The surgical Approaches included bur hole Aspiration, and for excision of loculated multiple abscesses craniotomy was used.<sup>11</sup>

## MATERIAL AND METHODS

### Study Design

We used a comparative observational study for 40 patients in the Neurosurgery Department from 16/10/20 to 5/2/23 (2 years & 4 months).

### Inclusion Criteria

In our study midline shift was less than 5 mm, there was no gender discrimination, the size of the plain CT brain was less than 2 cm, few patients had co-morbidities patients had GCS more than 12/15 and all patients had a history of trauma.

### Exclusion Criteria

In our study patients who had ages above 60 years less than 15 years and patients who had GCS below 12/15 were not included in the study.

### Data Collection

All the data of patients was put on a designed proforma for research data collection.

### Data Analysis

We used SPSS version 22 for data analysis.

## RESULTS

### Age Incidence

Following is the age incidence given below in Table 1. The mean age was 40 years.

**Table 1:**

Age	No.	Frequency
15 – 30	20	50%
31 – 40	12	80%
41 – 50	5	92.5%
51 – 60	3	100%

### Gender Incidence

In our study, 10 (25%) female patients while 30 (75%) male patients were included.

## Size of Cerebral Abscess

Our included patients had the size of cerebral abscess less than 2 cm on the CT brain with contrast.

**Table 2:**

Gender	No.	Frequency
female	10	25%
Male	30	100%

**Table 3:**

Size	No.	Frequency
Less than 2 cm	40	100%
Greater than 2 cm	0	0%

## Management Technique

In this study, forty patients who had cerebral abscesses were admitted through OPD Emergency in The Punjab Institute of Neurosciences, PINS, Lahore. After admission workup for cerebral abscess was done and medical management of all patients was started to see outcomes. Antibiotics were started and clinical response was monitored. For those patients in which no improvement occurred after antibiotics, blood cultures were performed to see antibiotic sensitivity and specificity.

## Outcomes

Following were the outcomes of our study.

**Table 4:** Management Technique.

Outcome	No,	Percentage
Medical	10	25%
Surgical excision	29	97.5%
Burr hole evacuation	1	2.5%
Total	40	100%

In our study 10 (25%) patients were female and the rest 30 (75%) were male. All patients had a history of head injury. The age range of 15 – 60 years was included in the study.

Our all patients had the size of cerebral abscesses of less than 2 cm on CT brain plain and IV contrast. Investigations we performed were baselines, MRI brain plain, and with IV contrast. ESR and CRP were also performed. The response of patients was monitored by clinical response and radiology. Post-operatively, CT brain plain and with IV contrast was performed immediately after the operation and also after 6 weeks.

Initially, all patients were managed medically to see the response. Some patients come from remote areas for follow-up. So, they cannot come in time. Medical treatment was started immediately after admission. Firstly empiric treatment started and response was monitored. Antibiotics, antifungals, anti-tuberculosis, and steroids were given. Out of our 40 (100%) patients, 10 (25%) were cured by medical management. Out of 30 (75%) patients, 20 (50%) patients presented within a week after trauma & presented with symptoms of a cerebral abscess. Rest, 10 (25%) patients presented after more than 2 weeks duration. In these 30 (75%) patients, empirical treatment did not prove fruitful. So, we have to perform blood cultures to determine the proper medicines for these patients.

Our 30 (75%) patients were not cured by initial medical management. We managed them surgically. In 29 (72.5%) patients, surgical excision was performed. In 1 (2.5%) burr hole aspiration was performed because the patient was having single pus cavity.

Our 40 (100%) patients had a history of road traffic accidents. After RTA they were operated on due to head injury. Our 30 (75%) patients were operated on for acute subdural hematoma while our remaining 10 (25%) patients were operated on for depressed fracture. All patients were managed and then discharged. On follow-up, they developed a cerebral abscess.

In our study, 20 (50%) patients were between age 15 – 30 years, 12 (30%) patients were in range of 31 – 40 years, 5 (12.5%) patients were in range of 41 – 50 years and 3 (7.5%) patients were in

range of 51 – 60 years.

Comorbidities that were present in 10 (25%) patients were hypertension (HTN) and diabetes mellitus (DM). All were managed accordingly. We followed all patients for 3 months through OPD.

## DISCUSSION

Miranda et al, in 2013 studied the current management of brain abscesses. They said that medical management can be given for 2 to 3 weeks and surgical management should be given to abscesses having a size greater than 2 cm.<sup>10</sup> This is similar to our study.

Moorthy et al, in 2008 overviewed the management of brain abscesses, highlighting their experience in managing these lesions in patients with cyanotic heart disease, stereotactic management of brain abscesses, and management of abscesses in immunosuppressed patients. He advocated conservative management in deep-seated smaller than 2 cm, which is similar to our study protocol. Campioli et al, in 2021 said that combined surgical and medical treatment with antimicrobial therapy may cure the infection with avoidance of permanent neurologic deficits,<sup>3</sup> will also opt for a small procedure.

Lu et al, in 2006 reviewed the medical and surgical management of brain abscesses and compared the results of different methods of treatment. Treatment of brain abscesses requires a combination of antimicrobial agents, surgical intervention, and eradication of the primary foci of infection.<sup>7</sup> Which is similar to our study. Muzumdar et al, in 2011 said that intracranial abscess is a formidable entity. Despite the advent of newer antibiotics and surgical strategies, the overall outcome and quality of life issues in brain abscess patients remain a continuous challenge for the neurosurgical community.

## RECOMMENDATIONS

Quite a frequent number of cases of post-traumatic cerebral abscess can be resolved by medical management by treating them early with empirical antibiotics & other medical management measures.

## ADVANTAGES

There are good outcomes and lesser hospital stays if the cerebral abscess is treated medically during the first week of onset of symptoms for cerebral abscess.

## LIMITATIONS

In our society, there is less compliance and less awareness among patients about cerebral abscesses.

## CONCLUSION

In our study, 75% of cases of post-traumatic cerebral abscess were resolved by conservative management if treated during the first week after the onset of symptoms of abscess.

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## Additional Information

**Disclosures:** Authors report no conflict of interest.

**Ethical Review Board Approval:** The study conformed to the ethical review board requirements.

**Human Subjects:** Consent was obtained by all patients/participants in this study.

**Conflicts of Interest:**

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

**Financial Relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

**Other Relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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## AUTHORS CONTRIBUTION

S. No.	Author's Full Name	Intellectual Contribution to Paper in Terms of:
1.	Rana Zubair Mahmood	Study design and methodology.
2.	Mukhtiar Ahmed Lakho	Literature review and referencing.
3.	Muhammad Ajmal Khan Ayaz	Final review and approval.
4.	Shahzeb Ahmad	Data collection and calculations.
5.	Usama Mansoor	Interpretation of results.
6.	A.M. Yasin Khan	Analysis of data.
7.	Muhammad Anwar	Overall supervision & performed surgery.