Results of Comparison of Burr Hole Evacuation Versus Surgical Excision of Multiloculated Subdural Empyema

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ABSTRACT

Objectives: We studied the results of comparison of burr hole evacuation versus surgical excision of multiloculated subdural empyema.

Material and Methods: A total of 40 patients were admitted with the disease. We will analyze the results of 20 patients. It is a comparative observational study of 20 patients treated at the Punjab Institute of Neurosciences (PINS), Lahore. Presenting complaints of patients were fever, vomiting, headache, fits, etc.

Results: The age range was 15 – 60 years. The mean age was 36 years. Medical management was given to 20 patients (100%) for 3 weeks. All patients were advised to take complete bed rest for 3 weeks. Anti-epileptic, Mannitol, antibiotics, and painkillers were the medications that were given. In this study, we will focus on the 20 patients treated surgically, and the analysis of 20 patients will be presented in complete detail. Our 10 (50%) patients were managed by burr hole evacuation of multiloculated subdural empyema. Surgical excision was done in 10 (50%) patients with multiloculated subdural empyema. Burr hole evacuation was done in patients who were old and unfit for surgery. Recurrence occurred in 5 (25%) patients who underwent management with burr hole evacuation and 1 (5%) patient in the excision group.

Conclusion: The results of surgical excision of multiloculated subdural empyema are better than burr hole evacuation if the patient is for surgical excision.

Keywords: Multiloculated Subdural Empyema, Burr Hole Evacuation, Surgical Excision,

INTRODUCTION

Intracranial focal collection of purulent material located between the dura mater and the arachnoid mater is called subdural empyema.\(^1\) Mainly subdural empyema is located in the brain and is less likely in the spine too. Subdural empyema can cause symptoms by compression...
of surrounding structures and by causing inflammation as well. Subdural empyema spreads rapidly through the subdural space. Falx and foramen magnum prevent the spread of subdural dural empyema. Subdural empyema can be bilateral but usually unilateral.

Cerebral edema and hydrocephalus, cerebral infarction, and meningitis may also be present with subdural empyema. Subdural empyema can occur as a complication of paranasal sinusitis, otitis media, or mastoiditis.

It can also occur as a result of direct extension from an intracerebral abscess. Rarely, it can occur from hematogenous spread.

Subdural empyema occurs in middle age. It is more common in males. If features of encephalopathy coma or comorbidities are present then there is a poor prognosis.

Clinical features of subdural empyema are; fever, headache, confusion, drowsiness, stupor, or coma, hemiparesis or hemiplegia, seizure, nausea or vomiting, blurred vision, and speech difficulty.

Common causative organisms are streptococci, staphylococci, Haemophilus influenza, and Streptococcus pneumoniae. For diagnosis different investigations are being done; CBC, erythrocyte sedimentation rate, blood culture, MRI brain, and CT scan brain.

Treatment of subdural empyema includes antibiotic therapy as soon as possible with broad coverage for anaerobes, staphylococci, and aerobic streptococci. It may be adequate for small subdural empyema (i.e. < 1.5 cm diameter). There are two ways by which surgical intervention can be performed one is burr hole evacuation and the second is a craniotomy with the goal of excision. The surgical approaches include burr hole and craniotomy for loculated multiple abscesses.

MATERIAL AND METHODS
Study Design
A comparative observational study was done for 40 patients treated at the Punjab Institute of Neurosciences from 16/10/20 to 28/2/23. We will discuss surgical cases in detail below.

Inclusion Criteria
In our study there was no gender discrimination, patients with multiloculated subdural empyema, thickness more than 1 cm, midline shift was less than 5 mm, had GCS 15/15 were included in the study.

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

Data Collection
The patient data was collected through a proforma.

Data Analysis
We used SPSS version 22 for data analysis.

RESULTS
We will mainly focus on the surgical cases ahead.

Age Incidence
Following is the age incidence given below in Table 1. The mean age was 36 years.

<table>
<thead>
<tr>
<th>Age</th>
<th>No.</th>
<th>%</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-30 years</td>
<td>10</td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td>30-40</td>
<td>5</td>
<td>50</td>
<td>65%</td>
</tr>
<tr>
<td>41-50</td>
<td>2</td>
<td>25</td>
<td>90%</td>
</tr>
<tr>
<td>51-60</td>
<td>20</td>
<td>100</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
<td>100%</td>
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</table>
Gender Incidence
Out of 20 patients, there were 5 (25%) male patients and 15 (75%) female patients (Table 2).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>75%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
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</table>

Thickness of Subdural Empyema:
Our included patients had a thickness of subdural empyema greater than 1 cm on the CT brain with contrast (Table 3).

<table>
<thead>
<tr>
<th>Size</th>
<th>No.</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Less than 1 cm</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Greater than 1 cm</td>
<td>20</td>
<td>100%</td>
</tr>
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</table>

Management Technique
In one year duration, forty patients who had subdural empyema were admitted through OPD at the Punjab Institute of Neurosciences, PINS, Lahore. After admission workup 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. For symptomatic patients despite antibiotics surgery was planned. Half of the patients responded to the medical management while 20 were operated on (Table 4).

Table 4: Management technique.

<table>
<thead>
<tr>
<th>Group</th>
<th>Management</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>Medical management</td>
<td>20</td>
<td>50%</td>
</tr>
<tr>
<td>Group B</td>
<td>Surgical management</td>
<td>20</td>
<td>50%</td>
</tr>
<tr>
<td>Gross</td>
<td>Total</td>
<td>40</td>
<td>100%</td>
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Surgical Procedure
Following were surgical procedures in this study.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No.</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burr hole evacuation</td>
<td>10</td>
<td>50%</td>
</tr>
<tr>
<td>Surgical excision</td>
<td>10</td>
<td>100%</td>
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Outcome
In 5 (25%) patients recurrence occurred in the burr hole group while in 1 (5%) patients recurrence occurred in those who underwent surgical excision.

DISCUSSION
Patients in the age range of 15 – 60 years were included in the study and their mean age was 36 years. Of these patients 5 (25%) patients were male and the rest 15 (75%) were female. All patients were presented with subdural empyema. Our all patients had a thickness of subdural empyema greater than 1 cm on plain CT brain and IV contrast. The investigations we performed were baselines, MRI brain plain, and 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, antifungal, anti-tuberculosis, and steroids were given. Out of our 20 (100%) patients, no (00%) were cured by medical management. Out of 20 (100%) patients, 10 (50%) patients were presented with symptoms of fits and hemiparesis after subdural empyema. Rest, 10 (50%) patients were presented with headache, nausea, vomiting and fever. In these 10 (50%) patients, empirical treatment did not prove fruitful. So, we have to perform blood cultures to determine the proper medicines for these patients.

Our 5 (25%) patients had a history of road traffic accidents, 10 (50%) patients had a history of otitis media, and 5 (25%) patients had a history of cardiac problems. After RTA patients were operated on due to head injury. Our 3 (15%) patients were operated for acute subdural hematoma while our remaining included 2 (10%) patients were operated for depressed fracture. All patients were managed and then discharged. On follow-up, they developed subdural empyema.

In our study, 2 (10%) patients were between the ages of 30 – 40 years, 5 (25%) patients were in the range of 41 – 50 years, and 5 (25%) patients were in the range of 51 – 60 years. Only three (15%) patients were in the range of 15 to 30 years of age. In 5 (25%) patients recurrence occurred in the burr hole group while in 1 (5%) patients recurrence occurred in those who underwent surgical excision. Comorbidities that were present in our included patients were hypertension (HTN), IHD, and diabetes mellitus (DM). All were managed accordingly. The follow-up duration in our study was 3 months through OPD.

De Bonis et al, in 2009 studied that an adequate treatment strategy should be selected on a case-by-case basis, especially for patients with a massive CNS involvement, where management represents a challenge.16 Pompucci et al, in 2007 reviewed that spinal subdural empyema and brain subdural empyema are not always the same, as in our case, two different entities. Prompt diagnosis and treatment constitute the major variables affecting outcome.17 Oliveira-Monteiro et al, in 2002 stated that features of subdural empyema can be relatively non-specific. Successful outcomes can be achieved when it is diagnosed and treated earlier.18 Yilmaz et al, in 2006 said that craniotomy and excision should be preferred as the recurrence rate is less as compared with burr hole surgery which has a recurrence high as compared to craniotomy.19 Oleinikov et al, in 2022 studied that children with infratentorial subdural empyemas can be treated successfully.18

RECOMMENDATIONS
Surgical excision of subdural empyema is better than burr hole evacuation if empyema is multiloculated in nature.

ADVANTAGES
There are good outcomes of craniotomy with excision and there is less hospital stay.

LIMITATIONS
Patients show less compliance and there is also less awareness in our community for diseases.

CONCLUSION
In our study, recurrence did not occur in 95% patients who underwent surgical excision. So it is better than burr hole evacuation of subdural empyema.

REFERENCES


Additional Information

Disclosures: Authors report no conflict of interest.

Ethical Review Board Approval: The study was 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.

Financial Relationships: None.

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Data Availability Statement: The data supporting the study's findings are provided at the request of the corresponding author.

AUTHORS CONTRIBUTION

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Author’s Full Name</th>
<th>Intellectual Contribution to Paper in Terms of:</th>
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<tbody>
<tr>
<td>1.</td>
<td>Rana Zubair Mahmood</td>
<td>Study design and methodology.</td>
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<tr>
<td>3.</td>
<td>Muhammad Ajmal Khan Ayaz</td>
<td>Final review and approval.</td>
</tr>
<tr>
<td>4.</td>
<td>Shahzeb Ahmad</td>
<td>Data collection and calculations.</td>
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<tr>
<td>5.</td>
<td>Usama Mansoor</td>
<td>Interpretation of results.</td>
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<tr>
<td>6.</td>
<td>A.M. Yasin Khan</td>
<td>Analysis of data.</td>
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<tr>
<td>7.</td>
<td>Muhammad Anwar</td>
<td>Surgery &amp; overall supervision.</td>
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