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Original Research

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 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,

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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

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of surrounding structures and by causing inflammation as well.^{1,2,5,7,14} 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.^{1,2,5,7,14}

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.¹³

It can also occur as a result of direct extension from an intracerebral abscess. Rarely, it can occur from hematogenous spread.^{15,16,17,18}

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.^{9,10,13}

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.^{11,12} For diagnosis different investigations are being done; CBC, erythrocyte sedimentation rate, blood culture, MRI brain, and CT scan brain.^{3,5,6,8,13}

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).^{3,10,14,19} 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 bur hole and craniotomy for loculated multiple abscesses.^{4,5,6,14,19}

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 1: Age Incidence.

Age	No.	%	Frequency
15-30 years	10	15	15%
30-40	5	50	65%
41-50	2	25	90%
51-60	20	10	100%
Total	20	100	100%

Gender Incidence

Out of 20 patients, there were 5 (25%) male patients and 15 (75%) female patients (Table 2).

Table 2: Gender Incidence.

Gender	Number	Frequency
Male	5	25%
Female	15	75%
Total	20	100%

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 3: The thickness of the empyema.

Size	No.	Frequency
Less than 1 cm	0	0%
Greater than 1cm	20	100%

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.

Group	Management	Number	Percentage
Group A	Medical management	20	50%
Group B	Surgical management	20	50%
Gross Total		40	100%

Surgical Procedure

Following were surgical procedures in this study.

Table 5: Surgical Group (B).

Outcome	No.	Frequency
Burr hole evacuation	10	50%
Surgical excision	10	100%

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

1. Carr TF. Complications of sinusitis. American Journal of Rhinology & Allergy. 2016;30(4):241-245.

2. Arbune M, Baroiu L, Marcu T, Lungu M. Conservative Treatment of Subdural Empyema: a Complication of Odontogenic Sinusitis. *Romanian Journal of Infectious Diseases*. 2018;21(3):111-114
3. Brouwer MC, Van de Beek D. Management of bacterial central nervous system infections. *Handbook of Clinical Neurology*. 2017;140:349-364.
4. Feuerman T, Wackym PA, Gade GF, Dubrow T. Craniotomy improves outcome in subdural empyema. *Surgical Neurology*. 1989;2(2):105-110.
5. French H, Schaefer N, Keijzers G, Barison D, Olson, S. Intracranial subdural empyema: a 10-year case series. *Ochsner Journal*. 2014;14(2):188-194.
6. Mattogno PP, La Rocca G, Signorelli F, Visocchi, M. Intracranial subdural empyema: diagnosis and treatment update. *Journal of Neurosurgical Sciences*. 2019;63(1):101-102.
7. Dabdoub CB, Adorno JO, Urbano J, Silveira EN, Orlandi BMM. Review of the management of infected subdural hematoma. *World Neurosurgery*. 2016;87:663-e1.
8. Zimmerman RD, Leeds NE, Danziger A. Subdural empyema: CT findings. *Radiology*. 1984;150(2):417-422.
9. Chen CY, Huang CC, Chang YC, Chow NH, Chio CC, Zimmerman RA. Subdural empyema in 10 infants: US characteristics and clinical correlates. *Radiology*. 1998;207(3):609-617.
10. Ena J, Dick RW, Jones RN, Wenzel RP. The epidemiology of intravenous vancomycin usage in a university hospital: a 10-year study. *JAMA*. 1993;269(5):598-602.
11. JA DT, Abadín JR G. Subdural empyema due to *Mycoplasma hominis* after a cesarean section under spinal anesthesia. *Revista Espanola de Anestesiologia y Reanimacion*. 2005;52(4):239-242.
12. Dwarakanath, S., Suri, A. and Mahapatra, A.K. Spontaneous subdural empyema in falciparum malaria: a case study. *Journal of Vector Borne Diseases*. 2004;41(3/4):80-82.
13. Foerster BR, Thurnher MM, Malani PN, Petrou M, Carets-Zumelzu F, Sundgren PC. Intracranial infections: clinical and imaging characteristics. *Acta Radiologica*. 2007;48(8):875-893.
14. Krauss WE, McCormick PC. Infections of the dural spaces. *Neurosurgery Clinics of North America*. 1992;3(2):421-433.
15. Mauser HW, Van Houwelingen HC, Tulleken CA. Factors affecting the outcome in subdural empyema. *Journal of Neurology, Neurosurgery & Psychiatry*. 1987;50(9):1136-1141.
16. De Bonis, P., Anile, C., Pompucci, A., Labonia, M., Lucantoni, C. and Mangiola, A. Cranial and spinal subdural empyema. *British Journal of Neurosurgery*. 2009;23(3):335-340.
17. Pompucci A, De Bonis P, Sabatino G, Federico G, Moschini M, Anile C, Mangiola A. Cranio-Spinal Subdural Empyema due to *S. Intermedius*: a Case Report. *Journal of Neuroimaging*. 2007;17(4):358-360.
18. Oliveira-Monteiro JP, Duarte-Teles AL, Silva-Goncalves ML, Carmo-Fonseca MJ. Subdural empyema secondary to sinusitis: four pediatric cases. *Revista de Neurologia*. 2002;35(4):331-336.
19. Yilmaz N, Kiyamaz N, Yilmaz C, Bay A, Yuca SA, Mumcu C, Caksen H. Surgical treatment outcome of subdural empyema: a clinical study. *Pediatric neurosurgery*. 2006;42(5):293-298.

Additional Information

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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.

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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	Surgery & overall supervision.