

MANAGEMENT OF SUPRATENTORIAL BRAIN ABSCESS

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ABSTRACT

Objectives: To analyze the management out come of symptomatic supratentorial brain abscess by burr hole aspiration.

Material and Methods: This descriptive study with 40 cases of symptomatic unilocular supratentorial pyogenic brain abscess was conducted at Department of Neurosurgery, Hayatabad Medical Complex, Peshawar from February 2006 to January 2008. Patients having history of headache for more than 14 days and diagnosed with contrast enhanced CT scan were included in the study. All patients were continued on antibiotic and were followed weekly for 1st month then monthly till the CT brain showed abscess resolution or no response to treatment was found. The data was recorded and analyzed using SPSS version 13.0.

Result: The longest diameter on preoperative CT scan was measured in all patients, which ranged from 2.3cm to 4.1cm, with a mean of 3.39cm \pm 0.5. Male to female ratio was 2:1 and mean age was 12.6 \pm 9.7. Out of 40 patients, 13(32.5%) patients required aspiration only once, 18 (45%) required twice and 9 (22.5%) patients for three times. All patients were followed for period of 3 to 7 months; the mean follow up period was 4.4 months \pm 1.033. The treatment was successful in 95% patients as only two patients (5%) did not show any response to treatment and required further excision.

Conclusion: Burr hole aspiration is a reasonably good method to treat symptomatic unilocular supratentorial brain abscess that is larger than 2cm.

Key words: Burr hole aspiration, Brain abscess, Excision, Supratentorial brain abscess, Capsulotomy.

INTRODUCTION

The incidence of brain abscess varies from 8-10% of all intracranial space occupying lesions in the developing countries reported by Osenbach, Loftus and Sharma.^{1,2} Though potentially curable, brain abscess remains a diagnostic and therapeutic challenge.² The post CT scan era there are major advances in the diagnosis and management of brain abscesses, with a corresponding improvement in the survival rate in developed countries.² With the advancement in technology and development of stereotactic endoscopic technique in the treatment of brain abscess the mortality and morbidity are very low^{3,4} but these facilities are far from the reach of poor and developing countries and the mortality and morbidity is still high in under developed countries.

Clinically, brain abscess presents with features of rapidly expanding intracranial mass lesion i.e. raised intracranial pressure (ICP) in the

form of constant progressive headache refractory to therapy, vomiting, papilloedema, focal deficits, convulsions, meningism and altered sensorium.² The classical triad of headache, focal neurological deficits and fever is found in 25% cases only.¹ A brain abscess should be suspected in cases of increasing intracranial pressure combined with focal neurological signs or epileptic seizures, even with no apparent sign of infection.⁵ The duration of symptoms is usually less than 2 weeks, with rapid onset and progression. Immunocompromised patients may have an insidious onset. Lumbar puncture prior to CT scan as part of diagnostic process remains pointless, hazardous and should be avoided. CT facilitates early detection, exact localization, and accurate characterization, determination of number, size and staging of the abscess. It also detects hydrocephalus, raised ICP, edema and associated infections like subdural empyema, ventriculitis and thus helps in treatment planning. It is invaluable in assessment of

adequacy of treatment and sequential follow up.

Unilocular brain abscess can be treated by intravenous antibiotics, aspiration or excision. Ortega-Martinez⁶ reported that burr hole aspiration is technically easily and effectively treat most supratentorial brain abscesses. Despite the most commonly used surgical technique, still there is no standard consensus when these abscesses should be tapped or when it should be treated with intravenous antibiotics alone without further aspiration. In order to investigate we evaluated the treatment of 40 patients over a period of 2 years (from February 2006 to January 2008) at our department.

MATERIAL AND METHODS

This was a descriptive study conducted on 40 patients of brain abscesses treated in Department of Neurosurgery in PGMI/ Hayatabad Medical Complex between February 2006 and January 2008 after the approval of ethical committee in the institute.

Patient consecutively admitted to the ward having history of headache for more than 14 days and diagnosed with unilocular supratentorial brain abscess on contrast enhanced CT scan were included in the study. Asymptomatic patients with unilocular supratentorial brain abscess less than 2cm in greatest diameter, cerebellar, brainstem, tubercular, fungal, post traumatic, multilocular pyogenic brain and patients with coagulopathy were excluded.

Protocol for Management of Patients: A standard protocol was developed and was followed on all patients describe below.

Based on the independent radiologist opinion of CT brain of patients, brain abscess size was measured in its greatest diameter on 1st post admission day. Weight appropriate triple intravenous antibiotic regime was started on 1st post admission day, antibiotic included were Penicillin G, Ceftriaxone and metronidazole. Patients were immediately schedule for burr hole aspiration. During operation abscess cavity was

aspirated and purulent material obtained was sent to laboratory to identify the pathogenic organism and to know its sensitivity to antibiotic. A draining catheter was left in the abscess cavity and was fixed to the skin and covered with a semi-permeable (opside) dressing. A repeated aspiration of brain abscess was done on alternative day under General Anesthesia, if the repeated CT brain shows brain abscess diameter more than 2 cm in longest diameter.² If the size of abscess was less than 2cm the draining catheter was removed and antibiotics were change according to the culture and sensitivity report and patient were followed weekly for the 1st months with a repeated CT scan of brain and then monthly till the abscess cavity had resolved. Or no response to treatment was found.² All patients were continued on intravenous antibiotic for 2-4 weeks and then on oral antibiotic for 4 – 6 week. Any brain abscess that increased in size in the 1st couple of week after the last aspiration or any abscess that failed to shrink by 30 day after the last aspiration was were considered not responder to treatment and scheduled for secondary excision².

All patients were scheduled for follow up as per protocol and the data about the gender, age, predisposing factor for abscess, clinical presentation, location of abscess cavity, brain abscess size before, after aspiration last aspiration, the number of times of aspiration, any post operative complication, culture sensitivity report, out come in term of complete resolution or failure and duration of follow up were collected and analyzed using SPSS version 13.0.

RESULTS

During the study, 40 patients with supratentorial brain abscesses were treated at our institute. These patients included 27 male and 13 female, male to female ratio was 2:1, with a mean age of 12.6 years and a standard deviation of 9.70. All patients demonstrated pyogenic supratentorial brain abscesses on contrast enhanced CT scans. The causative factors are described in the table 1.

On presentation, patient's major symptom

Table 1: Predisposing Factor for Brain Abscess

S/No	Predisposing factors of brain abscess	No of Patients	% of Patients
1	Otitis Media	28	70%
2	Infected Tooth	3	7.5%
3	Congenital Heart diseases	4	10%
4	Unknown Causes	5	12.5%

was headache in 87% patients, 39 % patients have neurological deficits only 26% patients have fever. Glasgow coma scale of patient is given table 2.

Table 2: Glasgow Coma

S.No	Glasgow Coma Scale	No of Patient	% of patients
1	12 -13	6	15%
2	14 -15	34	85%

Contrast enhanced CT was performed in all patients, revealed temporal lobe abscess in 60% patients, 17% in frontal lobe, 10% parietal lobe and 3% occipital lobe. The diameter of brain abscesses before starting any treatment ranged from 2.3cm to 4.1cm, the mean was 3.39cm and standard deviation was 0.5. All patients admitted were scheduled immediately for burr hole aspiration. Out of 40 patients, 13(32.5%) patients required aspiration only once, 18 (45%) patients needed aspiration twice and 9 (22.5%) need aspiration for 3 times. Size of brain abscess before and after aspiration and it response to treatment are analyzed in the table 3 and 4.

Table 3: Pre-operative and Post operative size of Brain Abscess

	Total No of Patients	Minimum size	Maximum size	Mean & Standard Deviation
Pre-operative	40	2.3cm	4.1cm	3.39 ±.5022cm
Post operative	40	0.5cm	1.9cm	1.1725 ±.4057cm

Table 4: Response to Treatment

	Frequency	Percent
No successful treatment and needed excision	2	5.0
Yes, Successful	38	95.0
Total	40	100.0

The treatment was successful in 95% (38) patients as only 5% (2) patients did not respond to treatment and required further excision.

The culture of the pus aspirated from brain abscess was carried out in all patients. Only 72.5% (29) patients had positive culture report and 27.5% (11) had no identified pathogens. 56% (14) patients had positive culture for streptococcus. 28% (7) patients had positive culture for Staphylococcus Aureus. 16% (4) patients has mixed group of organisms.

The mean follow up period was 4.4 months ranged from 3 months to 7 months with standard deviation 1.033. There was no mortality recorded in our study. 82.5% patients have no clinical deterioration postoperatively. The rate of

morbidity was 12.3%. The analysis of post operative complication is given in table 5.

Table 5: Post operative complication

	Frequency	Percent
Dizziness	4	10.0
No post operative complication	33	82.5
Seizure	3	7.5
Total	40	100.0

DISCUSSION

The treatment of brain abscess is quite controversial.³ Successful non-surgical management of brain abscess is currently being reported by Heineman⁷ and Obana⁸. Rosenblum³ and Black⁹ advocated surgery especially in larger brain abscess because of the drawbacks of non-surgical management. Various surgical procedures have been advocated for the management of brain abscess with variable results^{3,7,10}.

Brain abscess was diagnosed with help of Computer Tomography of Brain.^{2,5,11} but the role of CT scan in follow up in protocol was not describe by Iqbal el al⁵ and Bhandra AA¹¹.

Ortega-Martinez⁶ have suggested that burr hole drainage-aspiration should be used as the first mode of treatment due to its advantage of shorter admission time together with its high efficacy and low morbidity. Our study support Singh et al¹² that capsular brain abscess located superficially can be safely aspirated with burr hole aspiration but no guide line available in other series^{5,11}. Our study lack experience in multiloculated brain abscess which were excised in other studies^{5,11}. but our study support that brain abscess of size 2cm and more can be aspirated safely while no detail available in other studies^{11,12,13,14}.

The mortality in management of brain abscess ranged from 5 to 50%.^{3,10,11} Duma *et al*⁴ reported zero percent mortality in their series of 29 cases treated by image guided stereotactic aspiration. Beside lack of image guide stereotactic aspiration our study show no mortality and the morbidity rate as low as 12.3% in contrast to near 30% morbidity recorded in other series⁵.

The main cause of death in most series was the rupture of abscess cavity into the ventricles due to delay in repeating aspiration and increase in the surrounding edema leading to abrupt herniation reported by Britt¹⁰. The proliferation of bacteria within the central core of necrotic material is said to be one of the causes of increase in the surrounding edema.¹⁵ In our series, both the risks were eliminated by repeated elective

aspiration of abscess. Follow up CT scan showed reduction in the size of abscess cavity, fragmentation of the capsule and decrease in the surrounding edema.

Multiple dose administration of antibiotics and prior drainage of pus significantly increased the antibiotic concentration within the abscess cavity^{16,17,18}. This supports our proposal of repeated elective aspiration of pus and multiple dose administration of antibiotics. Hence, this procedure is recommended in patients with capsular stage of pyogenic brain abscess, as the primary operative treatment, because of its low mortality and morbidity.

CONCLUSION

Burr hole aspiration is a reasonably good method to treat symptomatic unilocular supratentorial brain abscess that is larger than 2cm. Repeated aspiration should be done on alternate day till their cavity size is reduced to less than 2cm in largest diameter. Once diameter of brain abscess is less than 2cm, it should be treated only with antibiotics for 6 to 8 weeks.

REFERENCES

1. Osenbach RK, Loftus CM. Diagnosis and management of brain abscess. *Neurosurg Clin N Am* 1992;3:403-20.
2. Sharma BS, Gupta SK, Khosla VK. Current concepts in the management of pyogenic brain abscess. *Neurol India* 2000;48:105-11.
3. Rosenblum ML, Mampalam T, Pons V. Controversies in the brain abscess management. *Clin Neurosurg* 1986;33:603-32.
4. Duma CM, Kondziolka D, Lunsford LD. Image guided stereotactic treatment of non-AIDS-related cerebral infection. *Neurosurg Clin N Am* 1992;3:291-302.
5. Iqbal Z, Yasin M, Rafique S, Afzal M. Treatment of Brain abscess. *Pak J Neurol* 1998;4:42-6.
6. Ortega-Martinez M, Cabezudo JM, Fernandez-Portales I, Gomez-Perals L, Rodriguez-Sanchez JA, Garcia-Yague L, et al. Pyogenic brain abscesses: experience with 60 consecutive cases. *Neurocirugia (Astur)* 2006;17:23-33.
7. Heineman HS, Braude AI, Osterholm JL. Intracranial suppurative disease: early presumptive diagnosis and successful treatment without surgery. *JAMA* 1971;218:1542-7.
8. Obana WG, Rosenblum ML. Non-operative treatment of neurosurgical infection. *Neurosurg Clin N Am* 1992;3:359-73.
9. Black P, Graybill JR, Charache P. Penetration of brain abscess by systemically administered antibiotics. *J Neurosurg* 1983;38:705-9.
10. Britt RH, Wilkins RH, Rengachary SS. Brain abscess. In: Wilkins RH, Rengachari SS, editors. *Neurosurgery*. New York: McGraw-Hill Book Company; 1985. p. 1928-56.
11. Bhand AA. Brain Abscess – diagnosis and management. *J Coll Physicians Surg Pak* 2004;14:407-10.

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