

OTOGENIC BRAIN ABSCESS ; AN AUDIT OF TWENTY ONE CONSECUTIVE CASES

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ABSTRACT

O togenic brain abscesses imply accumulation of pus in the brain originating from inflammatory process in the middle ear cavity. **OBJECTIVES:** The aim of the study was to investigate mechanisms of development, diagnostic methods and treatment of otogenic brain abscesses. Twenty one patients suffering from otogenic brain abscesses. **SETTING:** Nishtar Hospital Multan in the department of Otorhinolaryngology and Neurosurgery. **PERIOD:** From June 1996 to December 1999. **PATIENTS & METHODS:** Detailed history and physical examination were followed by CT scan with contrast enhancement. Burr hole aspiration, craniectomy and craniotomy are the procedures employed according to individual needs. After aspiration, the pus was subjected to microscopy for AFB and culture and sensitivity. Histopathology of the abscess was performed whenever available. **RESULTS:** Sixteen of the twenty one patients were males and five females. Mean age at presentation was 20.7 years [ranging from 7 to 60]. Headache (100%), vomiting 100% and ear discharge 100% were the commonest symptoms while fever 95%, drowsiness 48% and papilloedema 29% were the commonest signs. Temporal lobe abscesses were diagnosed in thirteen 62% and an abscess in posterior fossa was present in eight patients 38%. Aspiration of pus through a brain cannula after making a burr hole was tried in all the patients but eight patients underwent craniotomy/craniectomy for excision of abscess wall after repeated aspirations failed to lead to complete resolution on follow up scans. Bacteriology was positive in twelve of twenty one (57%) patients. Staph aureus was detected in three (14%), E coli in three (14%), pseudomonas in two (9.5%), streptococci in two (9.5%), B. Proteus in one patient (5%) and aspergillus fumigatus in one (5%) patient. After improvement in their clinical status, seventeen patients were referred to the department of ENT for mastoidectomy. One patient suffering from cerebellar abscess died on third post operative day and one with a temporal extradural abscess did not improve after repeated aspirations and died within thirty days of operation. Both of these patients were comatosed (GCS below 7) at the time of admission. The mortality in this study was 9.5%. Level of consciousness at the time of admission was the most significant factor affecting the outcome. **CONCLUSIONS:** Advances in the microbial isolation methods, specificity of antimicrobial agents and earlier diagnosis by CT scan have contributed to an improved outcome for this dreaded disease.

INTRODUCTION

Otitis media, acute or chronic is a potentially dangerous disease, which may lead to fatal complications. Meningitis is the most common intracranial complication followed by otogenic brain abscesses while lateral sinus thrombosis is fairly uncommon. Mortality from otogenic brain abscesses remains relatively high¹.

Otogenic brain abscesses imply accumulation of pus in the cerebrum or cerebellum developing after encephalitis caused by pyogenic micro organisms originating from the inflammatory process in the middle ear cavity. This is a severe otogenic complication with high mortality. Even with modern therapeutic measures, mortality remained high, about (40%)¹. Otogenic brain abscesses are a significant cause of mortality and morbidity in developing countries. Usually these occur either by distant thrombophlebitis of cerebral veins or by direct extension in an unsafe type of chronic suppurative otitis media². The aim of this study was to investigate the mechanisms of development, diagnostic methods and treatment of the otogenic brain abscess.

MATERIAL AND METHODS

Twenty one patients, including sixteen males and five females presented at Nishtar Hospital Multan in the department of Neurosurgery and ENT from June 1996 to Dec 1999. Detailed history and physical examination were followed by CT scan with contrast enhancement. In our study serial scans were performed on most patients to assess the results of treatment.

Burr hole aspiration, craniectomy and craniotomy were the procedures employed according to individual needs. After aspiration the pus was subjected to microscopy for AFB and culture and sensitivity. Histopathology of the abscess wall was performed whenever available.

RESULTS

The results of this study of 21 consecutive patients suffering from otogenic brain abscess and presenting at the department of Neurosurgery and ENT from Jun 1996 to Dec 1999 are depicted in Table 1-5.

Table 1. Age incidence

Age (years)	No of patients
0-10	5
11-20	8
21-30	3
31-40	4
41-50	0
51-60	1

Table 2. Clinical presentation

Symptoms & Signs	No of patients	%age
Headache	21	100%
Vomiting	21	100%
Fever	20	95%
Fits	11	52%
Unconsciousness	10	48%
Focal weakness	10	48%
Ear discharge	21	100%
Papillo edema	6	29%
Pupil difference	6	29%
Visual impairment	14	67%
Cranial nerve involvement	10	48%
Cerebellar signs	6	29%
Signs of meningeal irritation	4	19%

Table 3. Operative procedures

Type of operation	No of Patients
Single burr hole aspiration	11
Multiple burr hole aspirations	2
Craniotomy/craniectomy	8

Table 4. Bacteriology

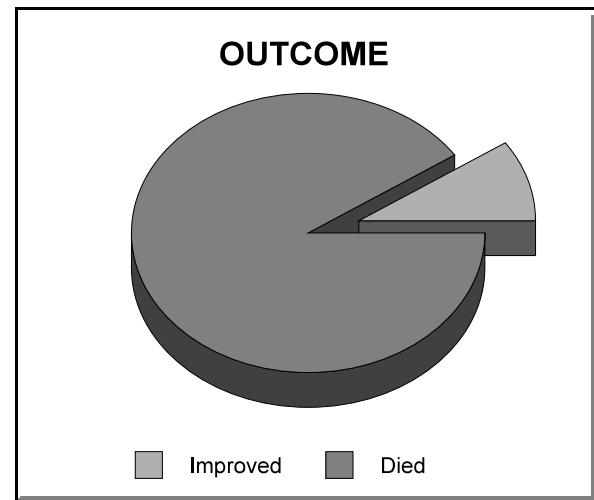
Type of organisms	No of patients	%age
Staph aureus	3	14%
E.Coli	3	14%
Strepto coccus	2	9.5%
Pseudomonas	2	9.5%
Aspergillus	1	5%
B. Proteus	1	5%
No growth	9	43%

Table 5. Stay in Neurosurgery department

No of weeks	No of patients
Upto 1	5
1 - 2	8
2 - 3	7
3 - 4	1

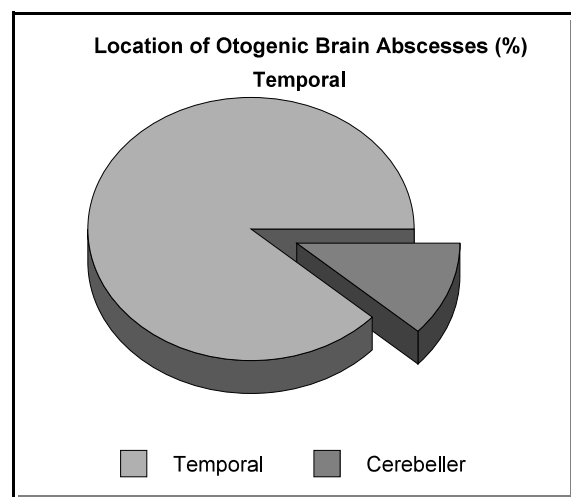
Sixteen of the twenty one patients were males and five females. Thirteen patients were below twenty years of age (table 1). Commonest presenting symptoms were headache, vomiting, fever and ear discharge (table 2). Temporal lobe abscesses were diagnosed in thirteen patients while the rest had an abscess in cerebellum (Fig 1). Burr hole aspiration was the operative procedure employed in thirteen patients while eight patients had to undergo craniotomy / craniectomy (table 3).

Average stay of patients in the department of neurosurgery was two weeks (Table 5). One patient



suffering from cerebellar abscess died on third post operative day and one with a temporal extradural abscess did not improve after repeated aspirations and died within thirty days of operation. Both of these patients were comatose (GCS below 7) on admission. The mortality in this study was 9.5% (Fig 2).

DISCUSSION



Ear infection is the most common cause of brain abscess. A suppurative process in the ear has access

to the central nervous system by direct extension or through preformed pathways, either developmental, traumatic or pathologic, or by retrograde spread along the thrombophlebitic vein⁴. The annual risk of otogenic abscess of the brain is 1 per 1000 adults with active chronic otitis. The incidence of abscess is significantly higher in certain age groups i.e 1 per 200 between the ages of 20 and 40¹. In our study sixteen patients (76%) were below thirty years of age.

Otogenic brain abscesses almost always develop in the temporal lobe or the cerebellum of the same side as the infected ear from which they emanate. They are found in the temporal lobe approximately twice as frequently as in the cerebellum. In children, 25% of all brain abscesses are otogenic, while in adults, with a greater predominance of chronic ear disease, the proportion of brain abscesses caused by ear infection is nearly 50%³.

In the present study there were thirteen patients (62%) suffering from temporal lobe abscess while eight patients (38%) presented with cerebellar abscess. Although temporal lobe abscesses are more common than cerebellar abscesses, the converse was found to be true in a series of 10 cases including eight cases of cerebellar abscesses and two cases of temporal lobe abscesses in the paediatric age group⁵.

Headache (100%), vomiting (100%) and ear discharge (100%) were the commonest symptoms while fever (95%), drowsiness (48%), and papilloedema (29%) were the commonest signs in the present study. In another study, headache, (92%), fever (91%), vomiting (68%) were the most common symptoms. In a retrospective study of 59 patients with the diagnosis of brain abscess of bacterial source the most common symptom was headache (76%) and the most common abnormality in physical examination was deterioration in the level of consciousness (61%)⁶.

Computerized tomographic scanning with and without intravenous contrast enhancement is without question the most important investigation in the diagnosis of brain abscess⁷. In our study CT scan with contrast was the mainstay of diagnosis, serial studies were performed when required.

Otogenic brain abscesses were the commonest (26%) cause of multiple pyogenic brain abscesses in a study of thirty eight patients by Sharma & Khosla.⁸ The abscesses were invariably large in size. The pus was sterile on culture in 11 (29%) patients, while staphylococcus aureus was the commonest organism grown in 9 (24%). Aspiration of the pus was required as a life saving measure to control raised intracranial pressure, in 29 (76%) patients. Twelve (32%) of these patients underwent secondary excision of the abscess capsule⁸. In our study, bacteriology was positive in twelve of twenty one (57%) patients. Staph aureus was detected in three (14%), E coli in three (14%), pseudomonas in two (9.5%). Streptococcus in two (9.5%), B. Proteus in one (5%) and Aspergillus in one (5%) patient. According to Harold Ludman, in otogenic brain abscesses, the bacterial flora is a complex mixture of aerobes and obligate anaerobes: Anaerobic streptococci are the commonest organisms while pyogenic staphylococci are also common³. In a study of brain abscesses from Spain, anaerobic and microaerophilic streptococci were the bacteria recovered most frequently while in otogenic abscesses gram-negative aerobic bacteria were isolated most commonly. While streptococcus pneumoniae is the most common cause of bacterial meningitis in adults, cases of pneumococcal brain abscess have rarely been reported. A case of otogenic brain abscess caused by S. pneumoniae was reported in a patient who was receiving ciprofloxacin for the empirical treatment of otitis media. This study was done in Canada, alongwith review of 23 additional cases⁹.

Single burr hole aspirations were curative in 11 of our 21 patients while multiple aspirations were

performed in two. Eight patients had to undergo craniotomy / craniectomy as repeated aspirations failed to lead to complete resolution of abscess on serial scans. Seventeen patients were referred to the department of ENT for mastoidectomy. Thirty cases of patients with otogenic brain abscess (OBA) who received mastoid radical operations were treated simultaneously by means of packing draining via the approach of the mastoid operative cavity. 26 cases of those were cured. The operative procedure was found fit for the great majority of otogenic brain abscesses¹⁰.

In a retrospective study from Belgrade, comprising 42 patients presenting with otogenic brain abscess (28 cerebral and 14 cerebellar) from 1973 to 1995, medical records of the studied patients were analysed for the occurrence of the disease, diagnosis and mode of therapy. Meningitis was present in 20 patients with cerebral abscess (71%) and in 5 (33%) patients with cerebellar abscess. Meningitis and lateral sinus thrombosis were more commonly associated with cerebellar abscess (40%) than with cerebral abscess 10%(1). In a study of thirty patients, from Singapore there were 7 female and 23 males. The predisposing factors identified were otogenic infections in 10 (33%) cases, paranasal sinus infection in two cases (7%) and congenital heart disease in 6 cases (20%). All cases underwent aspiration or excision of the abscess. Repeat operations were carried out if the abscess reaccumulated. A total of 49 aspirations and 16 excisions were performed¹¹.

In a study of brain abscesses from Singapore, twenty five patients (84%) made a good recover, three patients (10%) were moderately disabled, one patient (3%) was severely disabled and one patient (3%) died. There was no postoperative haemorrhage or wound infections. Two patients (7%) developed hydrocephalus and three (10%) had seizures postoperatively. In a retrospective study from Belgrade, out of the 28 patients with cerebral abscess 5 (18%) died while 3 (29%) patients died

out of 14 patients with cerebellar abscess. In another study the overall mortality was 32% with failure to control intracranial and systemic infection as the major causes of mortality⁸. Although there has been an improvement in the outlook as a result of early recognition by CT scanning, better understanding of the bacteriology, and the addition of steroids to the treatment regimen to control cerebral oedema, 14% mortality was described in a report by Fischer, McLennan & Suzuki³. In our study one patient suffering from cerebellar abscess died on 3rd postoperative day as his glassgow coma scale at admission was six with lateralising signs and stertorous breathing. Another patient suffering from temporal extradural abscess who was having glassgow coma scale six, died during 4th week of admission despite repeated aspirations, intravenous antibiotics according to culture and sensitivity and intensive therapeutic care. In a Spanish study, clinical, microbiological, therapeutic and prognostic characteristics of brain abscesses were analyzed as well as the influence of CT in their evolution, the introduction of CT decreased mortality (40% in group A versus 23.5% in group B) and also sequelae (86.6% in group A versus 57.6% in group B)⁶.

CONCLUSION

Although the morbidity and mortality rates are high for patients with brain abscess, advances in the microbial isolation methods, specificity of antimicrobial agents, and earlier diagnosis by CT scans have all contributed to an improved outcome for this dreaded disease. Level of consciousness at the time of admission was the most significant factor affecting the outcome. Surgery has a definite therapeutic and life saving role in the management of otogenic brain abscesses.

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**Keep your face to the sunshine and
you cannot see the shadow.**

Helen Keller