

Otogenic Brain Abscess Management

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Objective: To present our experience with the management of Otogenic Brain Abscess and compare it with the current concept of treatment.

Setting: ENT Department, King Fahd Hospital of the University.

Method: Over five years (1998-2003) six patients with otogenic brain abscess were admitted in ENT and Neurosurgery ward for management. Patients were thoroughly investigated, treated with antimicrobial drugs and surgical evacuation.

Results: Main complaints were: severe headache, vomiting, somnolence, imbalance and deafness. Main findings were bilateral or unilateral tympanic membrane perforation, foul smelly discharge, granulation tissue, retraction pocket, hearing loss, nystagmus, and hemipareses. Four had temporal lobe abscess, one cerebellar and one parietal. Their abscesses were evacuated through transcranial (4) or transmastoid (2) approach.

Conclusion: Otogenic brain abscess is still common complication of chronic ear disease. Radical mastoidectomy (RM) with transmastoid drainage in addition to the proper antimicrobial is the first line of treatment before attempting craniotomy or burr hole for evacuation.

Bahrain Med Bull 2005;27(1):

Antibiotic had played a major role in reducing complications of Otitis Media over the last 50 years. But in spite of this advantage, intracranial otogenic complications incidence are still high and still life threatening. Brain abscess is still the second most common intracranial complications after meningitis. In children otogenic causes constitute 25 % of the abscesses, whereas in adults they constitute 50%^{1,2}. Chronic otitis media with cholesteatoma and/or granulation tissue are usually the cause. Brain abscess is still associated with high morbidity/mortality rate ranging from 7-60%^{1,3}. In developing countries with high incidence of cholesteatoma, brain abscess is not a rare complication¹. CT-scanning is the best diagnostic tool available⁴. The first line of treatment is antibiotic, followed immediately by surgical evacuation of the abscess and cleansing the sources of infection¹.

The aim of our study is to present our experience with the management of otogenic brain abscess and compare it with the current concept of treatment.

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METHODS

During five years (1998 – 2003) six patients with Otogenic Brain Abscess were admitted to Neurosurgery and ENT wards for management. On admission, patients had ENT, Neurosurgical and Neurological examinations. Patients had CT scanning of the brain and middle ear with or without contrast, and their hearings have been assessed audiologically. Patients were seen by the Neurosurgeon and Ophthalmologist. Ears were checked microscopically and were swabbed for culture and sensitivity (C/S). Neurosurgeons evacuated four of the abscesses through a craniotomy or Burrhole. The source of infection was cleansed later through a radical mastoidectomy. The other two were evacuated by the ENT-Surgeon through the radical mastoid cavity. After completing the radical mastoidectomy the defects at the tegmen antri and Trautmann's triangle were identified, cleaned and the abscess was evacuated using a big gauge needle. Finally, the cavity was washed with hydrogen peroxide and the entrance area cauterized to keep it open for some time (Fig.1,2). Patients seen before 1990 have been treated conservatively using intravenous penicillin, gentamycin, chloramphenicol, metronidazole and phenytoin as anti epilepticum. After 1990, third and fourth generation cephalosporin, metronidazole, lasix and steroid were used. Antibiotics were used for 4-12 weeks. Success of treatment was monitored through weekly CT- scanning. Patients were followed up for 1-2 years.



Figure 1. Pre-operative CT scan



Figure 2. Post-operative CT scan (white arrow pointing at collapsed abscess capsule)

RESULTS

Six patients with the primary diagnosis of Brain Abscess were admitted to the Neurosurgery and ENT wards for management during five years period (1998 – 2003), five males and one female. Their age ranged between 12-51 years with a mean of 25 years. Fifty percent were younger than 15 years. Their chief presenting symptoms were severe headache, vomiting and fever (Table 1). Their main findings were bilateral/unilateral ear discharge, perforations, cholesteatoma and granulation tissues (Table 2). Brain and ear CT scans with or without contrasts showed disclosed left sided temporal lobe abscess in four, right temporo-parietal abscess in one and left sided cerebellar abscess in one. In addition, they showed bony defects in the tegmen antri in five cases and Trautman's triangle in one. They have been thought of as the route of infections. All CTs of middle ear showed signs of chronic otitis media with cholesteatoma. Five ear swabs grew proteus, streprococcus, E. coli, Bacteriod species and one grew pseudomonas and klebsiella. Patients responded very well to the antibiotic

treatment. Patients tolerated the surgical procedures and their condition improved. The patients stayed in hospital under treatment as long as needed (10-30 days). No mortality rate was recorded.

Table 1. Patients chief complaints at time of admission

Patient No.	Chief Complaints
1.	Fever, headache, vomiting, right ear discharge, dizziness, hearing loss
2.	Fever, vomiting, headache, left ear discharge, hearing loss
3.	Headache, vomiting, fever, bilateral ear discharge, hearing loss
4.	Headache, left ear discharge, vomiting, fever, dizziness, hearing loss
5.	Headache, fever, neck stiffness, vomiting, hearing loss, left ear discharge
6.	Severe headache, drowsiness, left ear discharge, vomiting

Table 2. Patients main findings

Patient No.	Main findings at time of Admission
1	Left hemiparesis, ear discharge, conductive hearing loss, cholesteatoma, granulation, perforation.
2	Nystagmus, meningeal signs, ear discharge, perforation, conductive hearing loss, cholesteatoma
3	Left hemiparesis, left facial palsy, ear discharge, perforation, granulation, cholesteatoma, conductive hearing loss
4	Confusion, ataxia, nystagmus, foul smelly discharge, tongue hemi-paresis, conductive hearing loss, neck stiffness
5	Meningeal signs, ear discharge, conductive hearing loss, cholesteatoma, perforation.
6	Drowsiness, ear discharge, cholesteatoma, left perforation, conductive hearing loss, right radical mastoid cavity

DISCUSSION

Brain abscess is one of the life threatening complications of chronic otitis media in particular cholesteatoma^{4,5}. All the patients in this study presented with headache and vomiting¹⁻³. The presence of these symptoms in association with cholesteatoma is very suggestive of intracranial complications⁶. Otogenic brain abscess affects usually children more than adults^{1,2}. Sennoroglu et al, Nesic et al found high incidence of brain abscess in children and young patients^{1,7}. Males are 4-8 time more affected than female as shown by Kempf et al, Nesic et al, Kurien et al^{4,7,8}. In the present study fifty percent of patients were younger than 15 year and the mean age was 25 years with male to female ratio of 5:1.

In this study, the diagnosis of Brain Abscess was established by CT scanning. CT scanning with and without contrast is the best diagnostic tool and best monitor of treatment in Brain Abscess². Its use had reduced the morbidity/mortality rate markedly. It is not only a guide to the location and size of the abscess, but also locates the defects in the tegment and trautman's

triangle²⁻⁴. Brain Abscess are located at the same side as the diseased ear¹. Temporal lobe (cerebral) and cerebellum are the two common location for otogenic brain abscess. Deric et al found 28 cerebral and one cerebellar abscess, whereby Sennoroglu et al found 54% cerebral and 44% cerebellar abscess^{1,2}.

In this study we found five cerebral (temporal and temporo-parietal) and one cerebellar abscess. All otogenic brain abscesses resulted from chronic otitis media with cholesteatoma and/ or granulations^{2,4}.

The most common cause of brain abscess is direct extension of infection through a bony defect, in the tegment antri (in case of cerebral abscess) or in trautman's triangle (in case of cerebellar abscess)^{1,9}.

Proteous and anaerobe species were the most common organism cultured from the ears and from the abscesses. Sennoroglu et al, Chen et al, and Qureshi et al showed in their studies that proteous, streptococci and anaerobe species were the most common organism in Brain Abscess^{1,5,10}. Successful management of otogenic brain abscess should include local drainage of the abscess, administration of systemic antibiotic and cleansing of primary focus of infection. Medical treatment should start first empirically and later to be modified according to the results of C/S. In addition, steroid, anti edema and anti epileptic drugs should be used^{1,4}. The surgical treatment of brain abscess is very controversial. In general neurosurgeons prefer to drain the abscess through a burr hole and some time through a craniotomy with abscess excision. Once the patient's condition stabilized, the source of infection has to be eradicated through a radical mastoidectomy^{4,11,12}. Unfortunately, this approach is causing trauma to healthy brain tissue and spreading the infection to healthy brain areas⁷. On the contrary, ENT surgeon drain their abscess through the radical mastoid cavity following the route of infection using aspiration technique. By doing so they are combining two procedures in one; draining and cleansing^{1,11}. Four cases in this study were drained by neurosurgeon through a burr hole and/or craniotomy. The other two were drained transmastoid by ENT surgeons.

Post-operative follow up is very important and CT is the method of choice². In our department immediate radical mastoidectomy and drainage of the abscess through the dura is the standard procedure to treat otogenic brain abscess. Through this technique we had no mortality and very mild morbidity rate^{1,3,11}. This approach shortened the hospital stay and is cost effective.

CONCLUSION

This study showed that brain abscess is still a life threatening complication of chronic otitis media in particular cholesteatoma. CT has been proven to be the best diagnostic tool. The use of anti-microbial concurrently with surgical evacuation of the abscess and cleansing of the source of infection are accepted standard of management. Radical mastoidectomy with transmastoid drainage in addition to antimicrobial treatment is the first line of treatment before attempting craniotomy or burr hole for evacuation.

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