

## Surgical Outcome of Otogenic Brain Abscess in Chronic Suppurative Otitis Media

HABIB-UR-REHMAN,<sup>1</sup> FAZAL-I-WAHID,<sup>1</sup> MUMTAZ ALI<sup>2</sup>

Nadir Khan,<sup>1</sup> Khalid Mehmood,<sup>2</sup> Muhammad Javaid<sup>1</sup>

<sup>1</sup>Department of ENT, Head and Neck Surgery and <sup>2</sup>Neurosurgery  
Postgraduate Medical Institute, Lady Reading Hospital, Peshawar-Pakistan

### ABSTRACT

**Objective:** To determine the surgical out come of otogenic brain abscess in chronic suppurative otitis media.

**Material and Methods:** This descriptive study was conducted at the departments of ENT, Head, Neck Surgery and Neurosurgery Postgraduate Medical Institute (PGMI) Lady Reading Hospital Peshawar from June 2004 to May 2009 with a total duration of five years. The diagnostic criteria were detailed history, thorough Neuro-otological examination and radiological investigations. These patients were admitted into ENT Department and they were put on quadruple therapy. CT scans were performed on emergency basis and as the patients were diagnosed as having otogenic brain abscess urgent evacuation of abscess was done by neurosurgeon. All the patients with established brain abscess were included in this study while those patients having small multiple abscesses, early cereberitis and non otogenic brain abscesses were excluded from study. A well informed consent was taken from patient explaining the procedure, its risks, benefits and associated complications. The abscesses were primarily treated by neurosurgeons and the ears were later on treated by ENT surgeons. There was neither intra operative nor postoperative complication.

**Results:** This study included 22 patients in the age range of 12-51 years with mean age 25 years. Sixteen were male and six were female, with female to male ratio 1 : 2.6. These patients presented with history of discharging ear, headache, vomiting and disorientation. The signs of disease in these patients were granulation tissues/cholesteatoma in ear and papilloedema. CT scans were performed in all 22 cases (100%) while MRI in 10 cases (45.45%). There were single brain abscess in 14 cases (63.63%) while 8 cases (44.45%) having multiple brain abscesses. Mainly abscess were found in temporal region followed by cerebellar. The patients with chronic ear disease were treated by radical mastoidectomy and modified radical mastoidectomy after treating the brain abscess by Neurosurgeon. The Neurosurgical procedures performed were capsulotomies in 13 cases (59.09%), Bur hole aspiration in 7 cases (31.81%) and Trans mastoid excision in 2 cases (9.09%). These patients were followed for 3 months having CT scan with contrast with bone window.

**Conclusion:** We concluded from our study that otogenic brain abscess is a life threatening complication, so early identification with help of CT scan and prompt surgical intervention with appropriate treatment of middle ear (primary disease) is essential for better outcome.

**Key Words:** Brain abscess, Chronic otitis media, Intracranial complications, Capsulotomy, Craniotomy.

### INTRODUCTION

Antibiotic had played a major role in reducing complications due to Otitis Media over the last 50 years.<sup>1</sup> But still the incidence of intracranial otogenic compli-

cations is high and life threatening. Brain abscess is the second most common intracranial complications after meningitis. In children otogenic causes constitute 25% of the abscesses, whereas in adults they constitute

50%.<sup>1,2</sup> Chronic otitis media with cholesteatoma and/or granulation tissue are usually resulting in otogenic complication.

Brain abscess is associated with high morbidity/mortality rate ranging from 7-60%.<sup>1, 3</sup> Long standing chronic suppurative otitis media with granulation tissues and cholesteatoma leading into brain abscess as major complication.<sup>1-3</sup> CT Scan has dramatically increased the diagnostic rate of intracranial abscess even at the early stage of its formation. It is now well established that selection of treatment modality depends on the stage of evolution of the abscess.<sup>4-6</sup>

Treatment of a brain abscess includes aspiration of the pus or excision of the abscess accompanied by parenteral antibiotic therapy. Empirical medical therapy should be reserved for patients who are extremely ill to undergo any form of intervention. Small abscesses and lesions in the cerebritis stage respond well to medical therapy alone.<sup>7,8</sup>

Most complication arises from chronic rather than acute otitis media. Factors causing complications include high virulence of organism, presence of chronic systemic diseases, and resistance of the organism to antibiotics.<sup>9,10</sup> Currently, brain abscess accounts for 6-66.4% of otogenic intra cranial complications.

Otogenic complications can be classified as either intracranial or extracranial. Intracranial complications include meningitis, extradural abscess, brain abscess, lateral sinus thrombosis, and hydrocephalus while extracranial complications include subperiosteal abscess, labyrinthitis, mastoiditis, facial paralysis, and perichondritis.<sup>5,11,12</sup>

### MATERIAL AND METHOD

This descriptive study was conducted at the departments of ENT, Head, Neck Surgery and Neurosurgery Postgraduate Medical Institute (PGMI) Lady Reading Hospital Peshawar from June 2004 to May 2009 with a total duration of five years. Majority of the patients belonged to lower and middle class of society. The diagnostic criteria were detailed history, thorough Neuro-otological examination and radiological investigations. CT scans were performed in all cases and MRI where it needed. These patients were admitted into ENT Department and they were put on quadruple therapy. CT scans were performed on emergency basis and as the patients were diagnosed as having otogenic brain abscess they were discussed with neurosurgical colleagues and patients were shifted to Neurosurgical Department for urgent evacuation of abscess. All the

patients with established brain abscess were included in this study while those patients having small multiple abscesses, early cerebritis and non otogenic brain abscesses were excluded from study. A well informed consent was taken from patient explaining the procedure, its risks, benefits and associated complications. The brain abscesses were evacuated by capsulotomy, bur hole aspiration and Tran mastoid excision. These patients were shifted back to ENT department after dealing with brain abscess for treating the ear disease properly by ENT surgeons. There was neither intra operative nor postoperative complication and they were kept in three monthly follow up scheme having CT scans with contrast with bone window and they were observed for minimum of 6 months. They are disease free so far.

### RESULTS

This study included 22 patients in the age range of 12-51 years with mean age 25 years. Sixteen were male and six were female (Graph 1) with female to male ratio 1 : 2.6. These patients presented mainly with complaints of discharging ear, headache, vomiting and disorientation. The signs of disease in these patients



Graph 1: Sex – wise distribution of patients (n = 22).

were granulation tissues / cholesteatoma in ear and papilloedema (Table 1).CT scans were performed in all 22 cases (100%) while MRI in 10 cases (45.45%). There were single brain abscess in 14 cases (63.63%) while 8 cases (44.45%) having multiple brain abscesses. Mainly abscess were found in temporal region followed by cerebellar (Table 2). The patients with chronic ear disease were treated by radical mastoidectomy and modified radical mastoidectomy. Three patients (16.7) were re-operated due to recollection of abscess. The reason was improper procedure on 1<sup>st</sup> attempt. The Neurosurgical procedures performed were capsulotomies in 13 cases (59.09%), Bur hole aspiration in 7 cases (31.81%) and Trans mastoid excision in 2 cases (9.09%). These patients were followed for 3 monthly having CT scan with contrast with bone window.



Fig. 1: Post Op Case of Brain Abscess with surgical scars.

Table 1: Clinical Features of patients with brain abscess (n = 22).

S. No.	Symptoms	No. of Cases	Percentage
1.	Discharging Ear	22	100%
2.	Headache	20	90.90%
3.	Impaired Hearing	15	68.18%
4.	Ataxia	07	31.81
	<b>SIGNS</b>		
1.	GranulationTissue / Cholesteatoma	22	100%
2.	Papilloedema	19	86.36%
3.	Nystagmus	04	18.18%

Table 2: Lobes wise distribution of otogenic brain abscess.

S. No.	Site of Abscess	No. of Cases	Percentage
1.	Temporal Lobe	11	50.00%
2.	Cerebellar Lobe	06	27.27%
3.	Parietal Lobe	05	22.72%

## DISCUSSION

Brain abscess continues to be an important cause of hospital admissions and mortality in developing

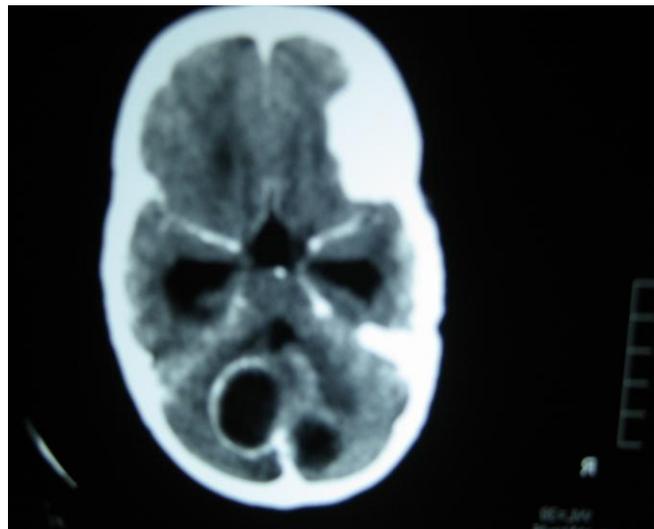
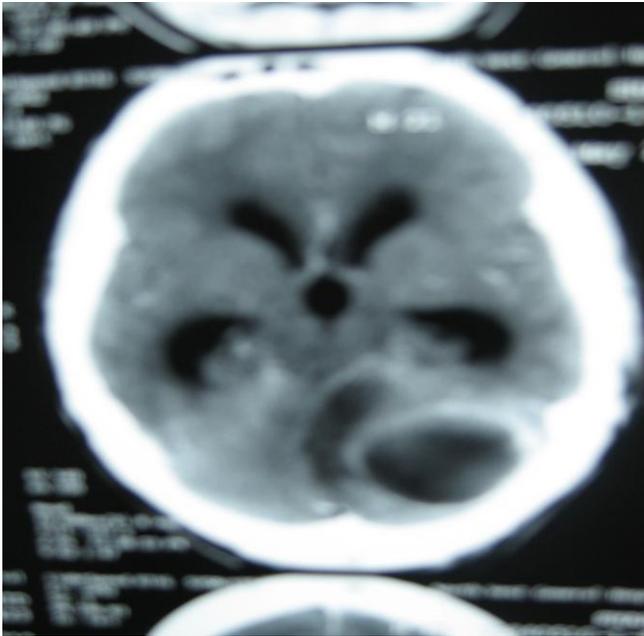


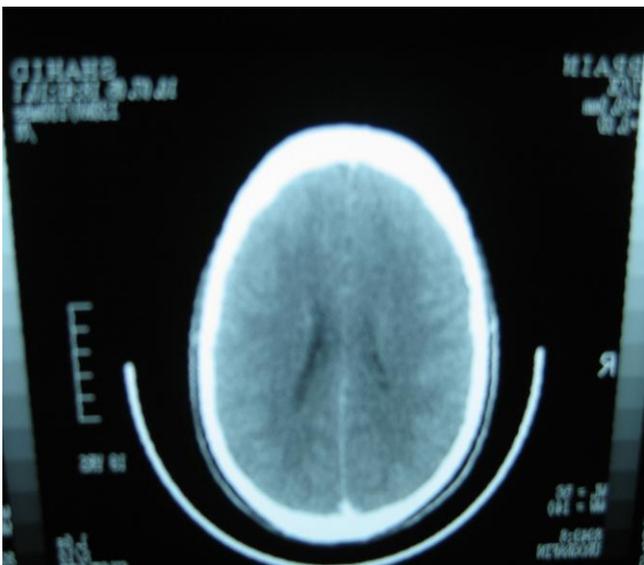
Fig. 2: CT scan of brain and skull base axial view with contrast showing multiple abscesses involving cerebellum with dilated ventricles.

countries, particularly due to late diagnosis, resistance of organisms and changing microbial flora. The most common organisms reported have been streptococci, staphylococci and aerobic organisms.<sup>8,9</sup> The widespread use of broad-spectrum antibiotics has not only changed the clinical presentation of intracranial complications of middle ear infections, it has even reduced their incidence in developing country. In recent years, middle ear infection as the source of intracranial supuration has declined in advanced countries but still in developing country like Pakistan a large number of

otogenic brain abscesses can be come across as we studied, which probably reflects upon the inadequate and delayed treatment.<sup>10,11</sup>



**Fig. 3:** Pre op CT scan showing CP angle Brain Abscess with hydrocephalus.



**Fig. 4:** Post operative Ct scan after Capsulotomy showing no abscess and hydrocephalus has been resolved.

Capsulotomy and excision is usually reserved for abscesses that enlarge after 2 weeks of antibiotic therapy. Craniotomy is also recommended for multi-

loculated abscesses and larger lesions with significant mass effect. There are certain advantages of excision of a brain abscess, the risk of repeated collection of pus is eliminated, and hence the expense involved in repeated imaging is saved. The duration of hospitalization is also reduced.<sup>12,13</sup>

Trans-mastoid approach to otogenic abscess offers several advantages over the conventional two-stage method of dealing with this problem. The primary focus of infection is eradicated along with the secondary complications in a single approach. This spares the patient the added morbidity caused by two separate incisions and also reduces the mortality, recurrence of abscess and complication.<sup>9,11</sup>

Brain abscess is the otogenic complication of otitis media, which is very severe and also difficult to treat. Initial management consists of stabilization of the patient. Management requires a combined neurosurgical and otologic approach, along with the use of large doses of systemic antibiotics.<sup>4,12,14</sup> The standard approach for otogenic intracranial abscess is craniotomy and excision of abscess followed by a mastoidectomy performed as a second procedure.<sup>14,15</sup> Surgery of the abscess includes aspiration through a burrhole or formal craniotomy, open drainage, or total excision. However recently the advantages of combining these two procedures into a single approach have been reported in the literature.<sup>5,16</sup>

All the patients in our study presented with headache and vomiting. The presence of these symptoms in association with cholesteatoma is very suggestive of intracranial complications. Otogenic brain abscess affects usually children more than adults.<sup>17</sup> We also found otogenic brain abscess in children than adults which is comparable to the studies of Sennoroglu et al and Nestic et al, they found high incidence of brain abscess in children.<sup>1,7</sup> Males are 4-8 time more affected than female as shown by Kempf et al, Nestic et al, Kurien et al.<sup>4,7,8</sup> CT scanning with and without contrast is the best diagnostic tool and best monitor of treatment in Brain Abscess as adopted in our study.<sup>2</sup> 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 cranium. In our study temporal lobe abscess was more (61%) than cerebellar abscess which also reported by other authors. Deric et al found 28 cerebral and one cerebellar abscess, whereby Sennoroglu et al found 54% cerebral and 44% cerebellar abscess.<sup>7,18,19</sup> In our study all otogenic brain abscesses resulted from chronic otitis media with cholesteatoma and/ or granulations

which are keeping with national and international studies.<sup>7,8</sup> 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 traushman's triangle (in case of cerebellar abscess).<sup>1,9</sup>

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.<sup>1,4</sup> 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.<sup>4,11,12</sup>

Sharma et al. have highlighted the role of minimally invasive procedures like stereotactic aspiration or lavage with endoscopic stereotactic evacuation in the treatment of abscesses, even if the lesions are multiloculated. Several other authors have recorded the utility of stereotactic techniques in the management of brain abscesses.<sup>10,18</sup> There are several advantages of stereotactic aspiration. Stereotactic aspiration is appropriate for small, deep seated abscesses because it provides a direct and rapid access to the abscess through a predetermined route. Therefore, it is ideal for management of abscesses in the thalamus, basal ganglia, or brainstem but unfortunately this facility is not available in our set up.

## CONCLUSION

We concluded from our study that brain abscess is a life threatening complication of chronic otitis media. Identification and prompt clinical and surgical intervention with appropriate treatment of the middle ear (primary disease) is essential for better outcome. CT with contrast has been proven to be the best diagnostic tool. The use of anti-microbial concurrently with surgical evacuation of the abscess is the accepted standard of management.

*Address for correspondence:*

*Dr. Habib-ur-Rehman Afridi*

*Senior Registrar*

*ENT, Unit, LRH, Peshawar*

*Contact No. 091-9211430 (Ext. 3065)*

*Mobile No: 03339104578*

*E-Mail: drhabibafриди@yahoo.com*

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