INTRACRANIAL COMPLICATIONS OF CHRONIC SUPPURATIVE OTITIS MEDIA

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Abstract. Twenty-nine patients with chronic suppurative otitis media with intracranial complications are reviewed. The complications occurred predominantly in yong patients with a mean age of 17 years. The most common complication was brain abscess (n = 20). The others were meningitis (n = 3), subdural abscess (n = 3), perisinus abscess (n = 2) and otitic intracranial hypertension (n = 1). The common pathogens were Gram-negative bacilli, especially *Proteus* and anaerobic organisms, respectively. The mortality rate was 7%.

INTRODUCTION

In the antibiotic era with effective antimicrobial agents, the incidence of chronic suppurative otitis media (CSOM) has declined. As a result, intracranial complications of this condition are now rare, so that primary care physicians are not familiar with these complications, leading to difficulty in their early diagnosis and appropriate treatment.

The purpose of this report is to review the clinical manifestations, clinical course and treatment of the intracranial complications of CSOM which give some pointers for the management of these complications.

MATERIALS AND METHODS

From April 1983 to December 1991, 29 patients with a diagnosis of CSOM and intracranial complications were reviewed. These complications were meningitis (positive bacterial culture or polymorphonuclear leukocytes in cerebrospinal fluid), brain abscess, perisinus abscess, sinus thrombosis, subdural empyema and otitic increased intracranial pressure (otitic hydrocephalus).

RESULTS

Of the 29 patients, 20 patients had brain abscess (1 patient had combined brain abscess and epidural abscess). Three patients had acute bacterial meningitis, three had subdural abscess. Perisinus abscess and otitic increased intracranial pressure were found in 2 and 1 cases respectively. Mastoidectomy was performed in all cases.

Brain abscess

Of 20 cases, 15 were males and 5 were females. Age incidence ranged from 5-25 years with a mean of 16 years. The main presenting symptoms were headache (100%) and fever (95%). Duration of symptoms before admission ranged from 3-30 days with a mean of 13 days. The other neurological complications are summarized in Table 1. Two patients had only fever and stiffneck without other neurological signs. Diagnosis of brain abscess based on computerized tomography (CT) in 17 patients, angiogram in 2 patients and isotope brain scan in 1 patient. The size of abscess ranged from 2.8-6 cm with a mean of 4.3 cm. All brain abscesses were on the same side as the ear disease. Eleven abscesses were temporal and 9 were intracerebellar. Of the 9 patients with intracerebellar abscess, only 1 case had cerebellar signs (ataxia). Pus specimens, obtained by aspiration in 17 patients, were noted to have a foul smell in 9 cases. The results of culture of the pus are summarized in Table 2. Anaerobic cultures were done in 3 patients with positive culture in 1 case *(Peptostreptococcus)*. Of the clinical course, 5 patients were treated as acute meningitis before admission; with intravenous penicillin and chloramphenicol in 3 cases and intravenous penicillin, chloramphenicol

Table 1

Neurological complications of 20 patients with brain abscess.

Complication	No. affected
Stiffneck	13 (65 %)
Convulsion	8 (40 %)
Alteration of consciousness	7 (35 %)
Papilledema	7 (35 %)
Cranial nerve palsy	4 (20 %)
Hemiparesis	2 (10 %)
Ataxia	1 (5 %)

Table 2

Bacteriological results of pus culture in 17 patients.

Organism		No. of patients
Single		14 (82.3 %)
Gram	negative	11
	- *Proteus*	9
	- *Pseudomonas*	1
	- *Citrobactor*	1
Gram	positive	3
	- *Enterococcus*	1
	- *Streptococcus* gr D, not *Enterococcus*	1
	- *Staphylococcus epidermidis*	1
Mixed		2 (11.7 %)
	- *Proteus* + *Enterococcus*	1
	- *Pseudomonas* + *Providencia*	1

and gentamicin in 2 cases, but the symptoms were worse. Four patients had focal cerebritis on the first CT scan and were treated with intravenous penicillin and chloramphenicol. Their symptoms did not improve and repeated CT scan revealed abscess formation. 18 patients were cured (treated by antimicrobial drugs and surgical removal of abscess in 11 cases, by antimicrobial drugs only in 7 cases) and 2 died from brain herniation.

Meningitis

Of 3 patients, 2 were males and 1 was female, aged 18, 39, and 12 years, respectively. They presented with fever, headache and stiff neck. Two patients had clouding of consciousness and 1 case had mild papilledema. Cerebrospinal fluid (CSF) examinations were typical for acute bacterial meningitis. Duration of symptoms before admission were 2, 1 and 6 days. On CSF culture, 2 cases yielded no growth and *Proteus* was cultured in 1 patient. Failure of initial treatment with intravenous penicillin and chloramphenicol in 2 patients was noted and the cases were cured with anti-Gram negative drugs.

Subdural abscess

Of 3 patients, 1 was male and 2 were females, aged 20, 8 and 22 years, respectively. The clinical manifestations were fever, headache, stiff neck and papilledema in all cases with durations of 30, 3 and 9 days. One patient had drowsiness and one had a seizure. The lesions were located in temporal, parietal and posterior fossa areas, respectively, diagnosed by CT scan in 2 cases and operation in 1 case. The pathogens were *Proteus* in 1 case, Gram positive cocci in 1 case and not recorded in 1 case. All were cured with surgical drainage and appropiate antibiotics.

Perisinus abscess

There were 1 male and 1 female with this entity, aged 18 and 12 years, respectively. Both had duration of symptoms for 7 days with fever, stiff neck. One case had papilledema. Diagnosis was based on samples obtained during mastoidectomy. Pus culture revealed mixed infection in 1 case *(Pseudomonas* and *Enterococci)* but was not recorded in the second case. Both were cured.

Otitic increased intracranial pressure

One 25-year-old man presented with headache without fever for 3 weeks. He had bilateral papilledema and unilateral 6th cranial nerve palsy. CT scan of the brain was normal. CSF analysis revealed only high initial opening pressure (380 mm H_2O). His symptoms and signs returned to normal

by repeated lumbar puncture to relieve intracranial pressure.

DISCUSSION

Intracranial complications of CSOM continue to occur and continue to be serious (Lund, 1978; Gower and McGuirt, 1983; Lampe and Edwards, 1984). Spread of infection from the ear to the CNS can follow a number of possible routes:1) by extension through bone that has been demineralized during acute infection, or has suffered resorption by cholesteatoma or osteitis in chronic destructive disease; 2) by dispersal of infected clots within small veins through bone and dura to venous sinuses; 3) via normal anatomical pathways, such as the labyrinth, the endolymphatic channel; 4) via developmental or traumatic bony defects (Ludman, 1987).

Intracranial complications of this entity should be devided into 2 main categories : intracranial suppurative collection (epidural and subdural abscess, perisinus abscess, brain abscess) and meningitis. The princriples of treatment, common to all intracranial complications, include early definitive diagnosis, appropriate systemic antibiotic therapy, neurosurgical intervention for complications and treatment of the ear lesion.

Our study reveals that the clinical manifestations of the 2 categories are not definitely differentiated. The common etiologic organisms in these complications are Gram negative bacilli, especially *Proteus,* which differs from acute otitis media. *Hemophilus influenzae* is a common pathogen when the ear infection is acute (Gower and McGuirt, 1983). Anaerobic organisms also play an important role when there is evidence of foul smelling pus. Empiric antibiotics with intravenous penicillin and chloramphenicol are not effective. Close monitoring of clinical response after antibiotic treatment is important and when the clinical signs are not improved, intracranial suppurative collection should be investigated.

For these reasons we suggest that in CSOM patients with fever, headache and abnormal neurological signs, CT scan of the brain should be performed first to rule out intracranial collection. If CT scan is negative mass lesions, lumbar puncture should be done for diagnosis of meningitis or otitic intracranial hypertension. If CT scan is positive for suppurative collection, immediate neurosurgical intervention (aspiration, drainage) should be done, pus specimens being sent for staining, cultures for aerobic and anaerobic bacteria. While waiting for laboratory results, antibiotics must be used in large doses to cover anaerobic and Gram negative bacteria. Chloramphenicol is not recommended for treatment of Gram negative infections except for *H. influenzae* (Cherubin *et al,* 1981). Changes should be based on clinical responses and determined by bacteriological reports. If the clinical are not improved after appropriate antibiotic treatment, CT scan should be repeated. In the case of brain abscess, some patients can be cured with medication alone, without surgical removal (Kaplan, 1985; Chun *et al,* 1986; Wispelwey and Scheld, 1987), as evidenced also in our data. Treatment of CSOM involves the eventual need for some form of mastoidectomy. Generally it is advisable to wait unit the intracranial complications have been controlled. However, deterioration of the complications, despite appropriate antibiotic therapy can impose the need for earlier intervention. In the case of otitic intracranial hypertension, treatment to reduce the raised intracranial pressure includes repeated lumbar punctures, the use of steroids, diuretics and hyperosmolar dehydrating agents. Theco-peritioneal shunting may occasionally be needed (Hall and Colman, 1987; Ludman, 1987).

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