Otogenic brain abscess – a case report
Usznopochodny ropień mózgu – opis przypadku

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ABSTRACT: Introduction: Otogenic intracranial complications – although less common than in the past – should always alert otolaryngologists and other specialists, including those in the field of outpatient healthcare. Due to their life-threatening consequences, early detection and appropriate management, including surgical treatment, are crucial for a prompt recovery.

Aim: Below we present a case of a patient in whom the brain abscess has progressed despite the surgical treatment, and describe lateral petrosectomy adopted in the management after unsuccessful radical mastoidectomy and brain abscess drainage.

KEYWORDS: brain abscess, cholesteatomatous chronic otitis media, otogenic intracranial complications, petrosectomy

INTRODUCTION

Otogenic brain abscesses, classified as intracranial complications, are one of the most serious complications of chronic and acute ear infections. In about 55% of cases, the lesion is located within the temporal lobe with cerebellar locations accounting for another 28% of cases. In more than 88% of patients diagnosed with otogenic brain abscess, medical history reveals ipsilateral chronic otitis media, including cholesteatomatous otitis media in about one half of these cases [1, 2]. As reported by the patients, the most common complaints associated with this pathology include headache, diminished sense of well-being, nausea and vomiting. Notable findings in physical examinations include fever, meningeal symptoms, deviations in neurological examinations dependent on the abscess location or on the increase of intracranial pressure, and deviations in ophthalmological examinations, such as optic disc swelling [3]. According to Duarte et al. [1], the percentage of patients with severe pain or advanced neurological symptoms decreased significantly with CT scans being introduced to the diagnostics protocols in ear diseases. Modern imaging techniques shorten the time required to make an accurate diagnosis, thereby facilitating detection of less advanced and low-symptomatic lesions. For the same reason, and due to the easy access to broad-spectrum antibiotic therapy, mortality rates due to these complications have decreased dramatically to values of several percent over the last 40 years [1]. Notably, individuals with concomitant diseases, immune deficiencies and immunosuppressants included in treatment regimens are more prone to develop intracranial complications [4].

Next to Proteus mirabilis, the most commonly detected pathogens include Streptococcus spp. and Staphylococcus spp., although sterile cultures with no pathogen growth being observed despite properly collected microbial assay materials were also reported [5].

CASE REPORT

A 21-year-old female patient was admitted to the Department of Neurosurgery of the University Clinical Center of the Medical University of Warsaw due to an otogenic abscess located within the left temporal lobe. The onset of medical problems had taken place about 2 months earlier and had included pain and hemopurulent...
exudate from the ear. Three days after the onset of symptoms, the patient reported at the hospital at the place of her residence to receive conservative treatment. Ear pain has subsided following the treatment; however, patient experienced increasing headaches. On the 11th day of treatment, the patient was admitted to the Department of Neurology due to severe headache. Features of bacterial meningitis were identified in cerebrospinal fluid collected by lumbar puncture. The patient was diagnosed with otogenic meningitis, and vancomycin, ceftriaxone, and metronidazole were prescribed on an empirical basis. The patient was transferred to the Department of Otolaryngology where she was qualified for emergency surgical treatment due to complications of otitis media. The CT scan suggested lesions within the temporal lobe located above inflamed temporal bone with signs of bone destruction. Presentation confirmed the purulent exacerbation of chronic cholesteatomatous otitis media—pressurized pus outflow was observed following the opening of the mastoid process, with a specimen being collected for a culturing assay (result: sterile). Radical mastoidectomy was performed including the excision of cholesteatoma filling the epitympanum and entering the process via the aditus ad antrum. Destruction of auditory ossicles and tegmen tympani was confirmed. In addition, meningeal bulging due to destruction of middle cranial fossa wall was observed. An MRI scan was commissioned and performed on the following day after the surgery, revealing the presence of an abscess forming within the basal part of the left temporal lobe, with no signs of intracranial air (Fig. 1.).

Increase in inflammatory parameters was observed in the course of hospitalization at the Department of Otolaryngology, and meropenem was included in the treatment regimen. In addition, patient reported experiencing severe pain which did not respond to non-opioid analgesics. An organized abscess within the temporal lobe was visualized in biphasic MRI scan on day 10 after the surgery (Fig. 2.).

The patient was transferred to the Department of Neurosurgery where left-sided temporal craniectomy was performed with irrigating drainage being installed within the left temporal lobe abscess and antibiotic therapy including vancomycin, ceftriaxone, and meropenem being continued. On the 6th day after the surgery, the patient returned to the Department of Otolaryngology where antibiotic therapy was continued. Starting from day 14 after abscess decompression, increasing swelling was observed within the left temporal region. Follow-up CT scan revealed a recurrent abscess of the left temporal lobe and the patient was referred to the Department of Neurosurgery of the Medical University of Warsaw. On admission, the patient remained in logical verbal contact with aphasic speech disorders and no other abnormalities in neurological examination. The patient reported blurred and double vision. Dilated fundus examination revealed elevated disc of the second cranial nerve, with disc boundaries being slightly blurred. Other findings included left-sided hearing loss. In the left-hand temporal region, a sloshing fluid reservoir could be palpated. Following consultation at the Department of Otolaryngology, Head and Neck Surgery, the patient was qualified for two-stage surgical treatment including left-sided petrosectomy with the middle cranial fossa plasty and drainage of the left temporal lobe abscess.

At the first stage, carried out by the ENT team, lateral petrosectomy was performed. Retroauricular incision along the surgical scar revealed process cavity filled with granulation and scar tissue. A bone defect of the middle cranial fossa, filled with scar tissue adherent to the dura bulging into the process cavity, was detected. Malacic brain tissue was visualized through the defect within the dura (Fig. 3.). Material for microbiological assay was collected from the dural defect region. After removal of scar tissue and granular tissue, meningoencephalic hernia was retracted. A fragment of cartilage was collected from the auricle to fill in the middle cranial fossa defect in order to prevent subsequent bulging (Fig. 4.). Postoperative cavity was filled with adipose tissue collected from the abdomen. At the second stage, the neurosurgical team performed a revision surgery of abscess cavity by temporal craniectomy.

No postoperative complications, either systemic or local, were observed; patient experienced no fever, no signs of facial nerve paresis or new neurological symptoms. In the light of negative results of culture tests, intravenous antibiotic therapy using vancomycin and ceftriaxone was continued. A follow-up contrast-enhanced magnetic resonance was performed on the first day after the surgery (Fig. 5., 6.). The patient, presenting in good overall and local condition, was transferred to the Department in Neurosurgery for surgical management.

DISCUSSION

In addition to cerebral and cerebellar abscesses, intracranial complications of otitis media include meningitis (the most common complication), epidural abscess, subdural empyema, sigmoid
Lateral petrosectomy is widely used to treat chronic granulomatous or cholesteatomatous otitis media and complications thereof. Indications for lateral petrosectomy include the cholesteatoma of the temporal bone pyramid with its accompanying consequences, namely deep neurosensory hearing loss, labyrinthine damage and fistula to the inner ear, meningoencephalic herniation of the middle cranial fossa, and facial nerve paresis or paralysis [11]. In the case of intracranial complications of otitis media, the technique is useful when the previous surgical treatment did not suppress the growth of complications or when complications recurred following previous treatment. In some reported cases, purulent lesion recurrence was observed following abscess drainage and subsequent radical ear surgery, leading to a decision to perform lateral petrosectomy which afforded remission of lesions in follow-up CT scans. Sinus thrombosis, and, in rare cases, otogenic hydrocephalus. The above complications may occur simultaneously, and meningitis may be a harbinger symptom of a forming abscess. In addition to medical history and physical examination, imaging studies such as computed tomography of head with particular focus on temporal bone structures and contrast-enhanced MRI head scan, are crucial for the diagnosis. The authors unanimously believe that in the case of otogenic nature of the lesion being suspected and confirmed by an imaging study, surgical treatment should be undertaken immediately to eliminate the source of neuroinfection [6, 8–10]. Chronic cholesteatomatous otitis is reported to be the most common cause of otogenic intracranial complications [6]. Available publications also suggest that although radical mastoidectomy is the most common procedure to eliminate the source of infection, under certain circumstances some ENT surgeons may decide upon performing lateral petrosectomy [1, 7–9]. Lateral petrosectomy is widely used to treat chronic granulomatous or cholesteatomatous otitis media and complications thereof. Indications for lateral petrosectomy include the cholesteatoma of the temporal bone pyramid with its accompanying consequences, namely deep neurosensory hearing loss, labyrinthine damage and fistula to the inner ear, meningoencephalic herniation of the middle cranial fossa, and facial nerve paresis or paralysis [11]. In the case of intracranial complications of otitis media, the technique is useful when the previous surgical treatment did not suppress the growth of complications or when complications recurred following previous treatment. In some reported cases, purulent lesion recurrence was observed following abscess drainage and subsequent radical ear surgery, leading to a decision to perform lateral petrosectomy which afforded remission of lesions in follow-up CT scans.
scans [8]. Lateral petrosectomy may also be an effective solution to the problem of recurrent otogenic cerebrospinal meningitis [7]. It should be noted that the therapeutic success of lateral petrosectomy depends on radical removal of cholesteatomatous and inflammatory lesions. The technique facilitates successful meningeal plasty of the middle or lower cranial fossa as filling the postoperative cavity with adipose tissue collected from the abdomen promotes vascularization, prevents liquor rhria, and provides support for the material used for reconstruction [11]. In the case of indications for neurosurgical intervention, the usual scheme involves otological surgery and neurological surgery being performed under single general anesthesia as this is considered less burdensome for the patient. Separate performance of both procedures is usually due to the presence of inadequately developed abscess with concomitant intense ear inflammation [6].

Diffusion-weighted magnetic resonance imaging (DWI MRI) scan with non-EPI (echo planar imaging) and b1000 settings is recommended to assess the perioperative area for potential cholesteatoma recurrence. Authors agree that the first follow-up imaging scan should be acquired 6 months after the surgery, with opinions regarding subsequent assessments varying between individual studies: subsequent follow-up scans should be acquired every 1–3 years with possible modifications upon the emergence of symptoms, and the overall duration of the follow-up period is recommended to be as long as 10 years [10, 12].

CONCLUSIONS

1. Chronic cholesteatomatous otitis media is the most common cause of otogenic brain abscesses;
2. Intracranial otogenic complications confirmed in imaging studies require immediate surgical treatment to eliminate the cause of neuroinfection;
3. Radical mastoidectomy is the most common procedure. Lateral petrosectomy is an alternative approach facilitating radical elimination of lesions and prevention of further complications;
4. A follow-up DWI MRI scan is required in patients who had been subjected to lateral petrosectomy in order to rule out recurrent cholesteatoma.

REFERENCES
