Petrositis as a complication of otitis media with effusion – a case report

Zapalenie kości skroniowej jako powikłanie wysiękowego zapalenia ucha środkowego – opis przypadku

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Article history: Received: 20.04.2018 Accepted: 27.05.2018 Published: 30.06.2018

ABSTRACT: Authors presented a case of 15-year-old girl diagnosed with otitis media with effusion complicated by petrositis. Otitis media with effusion is not a common cause of petrositis. The condition occurs mostly in adults, rarely in pediatric population. Patients with suspected petrositis require magnetic resonance and computed tomography imaging. Conservative treatment is not sufficient when symptoms appear. Surgical treatment is essential in order to complete removal of inflamed tissues. A few surgical approaches are recommended (e.g. middle fossa approach).

KEYWORDS: otitis media with effusion, petrositis, postoperative management


SŁOWA KLUCZOWE: wysiękowe zapalenie ucha, zapalenie kości skroniowej, postepowanie operacyjne

INTRODUCTION

Otitis media with effusion (Otitis media secretoria, OMS) is an inflammatory disease of the middle ear characterized by accumulation of exudate in air spaces, without accompanying symptoms of acute otitis media and with preserved eardrum [1]. This form of inflammation is characterized with retention of serous effusion - rare, watery; mucous effusion - thick, dragging; or mucopurulent effusion. The clinical division of OMS comprises acute otitis media with effusion with duration up to 3 weeks, subacute otitis media with effusion - duration from 3 weeks to 3 months and chronic otitis media with effusion with duration above 3 months.

Chronic otitis media may be a consequence of acute otitis media or occur without a documented infectious episode. In each case, factors predisposing to OMS should be assessed, including defects of the palate and craniofacial structures, allergic diseases, paranasal sinuses inflammation, impaired nasopharyngeal patency as a result of swollen tonsil [2].

Chronic OMS increases risk of structural lesions in the tympanic membrane and middle ear - constant negative pressure is the cause of retraction pockets, ear drum atelectasis and chronic otitis media cholesteatomatosa. Exudative otitis media is treated via ventilation drainage. Adenotomy is recommended in coexistence of additional symptoms in the form of nasal obstruction, chronic nasopharyngeal inflammation.
Patient 1. 15 hospitalized in the Department of Otolaryngology of the Medical University of Warsaw for surgical treatment with initial diagnosis of petrous pyramid tumor on the left side. Course of disease: child treated at home due to recurrent episodes of upper respiratory tract infection, recurrent acute ear infections. After each episode of acute otitis, persistent conductive hearing loss was found in the left ear due to presence of exudate. Exudative ear infection treated conservatively with variable efficacy. In view of the persistent exudate, the child was referred to one of the centers for surgical treatment, namely ventilatory drainage of left ear; the procedure was performed in 2013. During hospitalization, adenotomy and tonsillectomy were not performed. After surgery, there was intensified pyorrhoea from the operated ear, which resolved only after removal of drainage and pharmacological treatment. There was another episode of hearing impairment and another ventilation drainage in 2014 due to symptoms of exudative ear infection. After treatment, there was severe pyorrhoea once again and it was treated conservatively. In 2014, there was another episode of exudative ear infection despite pharmacological treatment. The previous course of disease and variable effectiveness of treatment constituted the basis for magnetic resonance. The result of test indicated the possibility of a proliferative process within the petrous pyramid: a defect in the upper wall of the pyramid with contrast enhancement of cerebrospinal meninges without signs of brain infiltration (Fig.1). In the face of recurrent OMS episodes and lack of progress in treatment, the patient reported to the Otolaryngology Clinic of the Medical University of Warsaw.

When the patient was admitted in a good general condition, she complained mainly of moderate hearing loss, periodic twinging and aching of the left ear, moderate headaches. Neurological examination showed no deviations from the normal condition.

Laryngological examination showed: medium-sized tonsils, symmetrical, with features of chronic inflammation, nasopharynx with signs of enlarged adenoid, nasal patency preserved. Right ear: wide ear canal, normal; tympanic membrane preserved in its entirety, without retraction pockets, with reflex. Left ear: wide ear canal, tympanic membrane preserved in its entirety, with signs of atrophy (condition after multiple drainage), non-transparent, with signs of congestion along the handle of malleus, with signs of deposits of fluid behind preserved tympanic membrane. Otoscopic examination showed no abnormal tissue behind tympanic membrane. Pre-operative tone audiometry was performed (Fig. 4).

CT scan of temporal bones showed complete filling of mastoid cells, extensive destruction of bone lamella. Visible destruction of side wall of appendix and extensive destruction of roof (Fig. 2, 3).

Due to the size of process, surgery was planned for two simultaneous surgical approaches - access through middle cranial fossa and access via antromastoidectomy with histopathological perioperative examination of collected material. Temporal craniotomy of 3x3cm made it possible to identify further topographic points, including greater petrosal nerve, superior semicircular canal, facial nerve, and middle meningeal artery. Frontal surface of petrous pyramid was revealed as well as fragile tumor of gray-red color imposing damage near the tympanic cavity. Radical removal of tumor residues from ma-
did not show signs of exudative otitis media. Otoscopic examination did not show deviations from the normal condition, control auditory examination was done - tonal audiometry (Fig. 5).

**DISCUSSION**

The most common consequence of acute otitis media is conductive hearing loss resulting from the retention of exudative fluid behind the preserved tympanic membrane. In most cases, it is transient, but in some cases, it requires long-term treatment due to recurrent disease and potential complications of otitis media [4]. Indications for ventilation drainage of the ear include recurrent acute otitis media: 3 episodes within 6 months or 4 relapses per year; exudative ear infection in children treated for 3 months, with conductive hearing loss, cochlear reserve of 20–30 dB and presence of type B tympanogram; occurrence of

![Fig. 3. CT examination, axial projection. Extensive destruction of roof in left petrous pyramid.](image)

![Fig. 4. Pre-operative hearing test - tonal audiometry.](image)

![Fig. 5. Postoperative hearing test - tonal audiometry. Test was performed one month after surgery.](image)
retraction pockets resulting from prolonged negative pressure in tympanic cavity; Eustachian tube dysfunction manifested by hearing loss, vertigo, dizziness, tinnitus, without retention of secretion in the tympanic cavity [4,5].

Properly performed ventilation drainage reduces incidence of acute ear inflammation, improves aeration of the middle ear and evens out pressure in the tympanic cavity, influences regression of symptoms and improves hearing with a long-lasting effect, prevents recurrence of exudate in the ear and prevents the disease from becoming a chronic process.

Type of drain used (long-term and short-term ventilation), selection of surgical technique (classical and laser paracentesis) should in each case be done based on individual recommendations [6].

Particularly noteworthy are cases of recurrent exudative inflammation with signs of persistent pyorrhoea after ventilation drainage. Purulent exudate with pain behind the eyes and radiating towards the temple, the parietal region, intensifying especially in the evening and at night, photophobia, weakness and reversal of conjunctival and corneal reflexes may be associated with irritation of trigeminal ganglion and suggest development of intraoral defects, including petrositis. At present, this disease entity is rarely diagnosed due to efficacy of pharmacological treatment in inflammatory conditions within the middle ear [7].

In the observed group of 291 children with OMS, Valtonen et al. [8] concluded the necessity of repeated ventilation drainage due to relapse of symptoms in 5% of cases, and in 3.2% it was necessary to insert the ventilation tube three times. It was noted that the group of children with exudative inflammation and history of prior drainage were more likely to suffer from pyorrhoea than the group of children after drainage due to recurrent episodes of acute otitis media. Occurrence of pyorrhoea after the first drain was the reason for faster elimination of the subsequent drain and necessity to perform the procedure once more.

One of the most frequent complications of ventilatory drainage is otopyorrhoea, occurring secondary to upper respiratory tract infections, or as a result of the infection passing through the ventilation tube. In the group of children analyzed by Valtonen et al. [8], despite repeated drainage and persistent pyorrhoea with symptoms of developing mastoiditis in 3 (1.1%) patients, broad antromastoidectomy was necessary.

Recurrent chronic otitis media with effusion and ventilatory drainage performed over three times is an indication for antromastoidectomy with posterior tympanotomy and repeated insertion of drainage for 1-3 months. The period of postoperative observation should be 3 years [9]. Based on their own observations, Long et al. [10] conclude that the symptoms of recurrent OMS that persist longer than 2 years as well as 3 or more procedures of ventilatory drainage done in the past are an indication for antromastoidectomy with repeated insertion of ventilation drainage. Observation time after surgery should be between 3 and 6 months.

The presented case of a 15-year-old girl with chronic pyorrhoea, recurrent after each ventilation drainage of the middle ear, indicates low effectiveness of subsequent treatments, while pharmacological treatment only slowed down the dynamics of the disease process, failing to eliminate the root cause of developing inflammation of the temporal bone. Access through middle cranial fossa allowed for removal of inflammatory lesions within the petrous apex, and simultaneous antromastoidectomy enabled radical removal of inflamed lesioned tissue in the mastoid process.

Suspicion of developing complications requires imaging tests. The characteristic feature in CT examination will be the breakdown of air cells’ spongy substance in temporal bone. T1 magnetic resonance imaging contrast is important for assessing the development of intracranial complications. Differential diagnosis of temporal bone inflammation requires consideration of a number of pathologies, including cholesterol granuloma, congenital cholesteatoma, angiomyoneuroma of jugular bulb, mucosal cyst of petrous apex (rare) and skull base tumors, including chondrosarcoma, chordoma, and metastases [7].

**SUMMARY**

Chronic otitis media with effusion is a rare cause of development of petrositis. Petrositis occurs sporadically in children, mostly in the older age group. Pyorrhoea, pain located behind the eyes and radiating towards the temple, pain in the parietal region, intensifying especially in the evening and at night, photophobia, weakness and abolition of conjunctival and corneal reflexes may be associated with irritation of trigeminal ganglion and suggest inflammation of petrous pyramid. In any case of suspected inflammation of temporal bone, it is necessary to perform radiological examinations: MR, CT.

In the case of developed symptoms of osteitis, application of solely pharmacological treatment is not effective. Surgical treatment with the use of various surgical approaches, ensuring radical removal of inflammatory lesions, including access through the middle cranial fossa is necessary.
References


Word count: 2000  Tables: –  Figures: 5  References: 10

Access the article online: DOI: 10.5604/01.3001.0012.0985  Table of content: https://otorhinolaryngologypl.com/issue/11162

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Competing interests: The authors declare that they have no competing interests.

Cite this article as: Bartoszewicz R., Karchier E., Niemczyk E., Sokolowski J., Niemczyk K. Petrositis as a complication of otitis media with effusion – a case report, Pol Otorhino Rev 2018; 7(2): 55-59