© Borgis New Med 2025; 29(1): 22-26 DOI: https://doi.org/10.25121/NewMed.2025.29.1.22

Malwina Wojtas[1], Maria Wolniewicz[2], *Lidia Zawadzka-Głos[2]

Overuse of topical steroidal drops in the external auditory canal leading to fungal otitis externa and persistent perforation – a case report and literature review

Nadmierne stosowanie miejscowych kropli sterydowych do przewodu słuchowego zewnętrznego prowadzące do grzybiczego zapalenia ucha zewnętrznego i trwałej perforacji – opis przypadku i przegląd literatury

[1]Student Medical Club of Pediatric Otolaryngology "Otorhino", Department of Pediatric Otorhinolaryngology, Medical University in Warsaw
Head of Club: Maria Wolniewicz, MD
[2]Department of Pediatric Otorhinolaryngology, Medical University in Warsaw
Head of Department: Associate Professor Lidia Zawadzka-Głos, MD, PhD

Keywords:

steroidal overuse, steroidal drops, ear drops, fungal otitis externa, post-inflammatory perforation

Summary

Otitis externa is a condition frequently encountered in pediatric population with the highest incidence observed in children aged 5-14 years old. Predisposing factors are improper auricular hygiene as well as prolonged moisture exposure of the auditory ear canal and immunodeficiency. Patients may present with symptoms like otalgia, fever, itching, or hearing impairment. Most cases of otitis externa are caused by bacterial infections. For localized and diffused types, antibiotic therapy is advised, whereas in case of a necrotizing type, hospitalization and broad-spectrum antibiotic administration is necessary. However, otitis externa can also be caused by fungal pathogens, usually in immunodeficient patients or undergoing long-term antimicrobial therapy. Untreated otitis externa may lead to complications, like narrowing of the external auditory canal, perforation of the tympanic membrane and permanent hearing impairment. A crucial element of the treatment is not only effective pharmacotherapy, but also avoidance of water exposure and thorough professional cleaning of the auditory ear canal. Patients are recommended to refrain from any activities leading to ear moisture and to minimize auditory ear canal trauma. After completing antibiotic therapy, complying to aforementioned recommendations is advised until full recovery.
In this article we would like to present the problem of otitis externa and its treatment, important in everyday pediatrics' practice, as well as a literature review concerning possible complications of this entity and consequences of improper treatment, like fungal otitis externa and tympanic membrane perforation that happened in our case. As an illustration, we would like to present a case of a girl who independently begun topical steroid treatment of a suspected otitis externa (she made an analogy to her previous illness, but this time without otoscopy and specialist consultation). Her self-administered therapy led to a severe sequence of complications that could have easily been prevented with a professional intervention.

Słowa kluczowe:

nadużywanie sterydów, krople sterydowe, krople do uszu, grzybicze zapalenie ucha zewnętrznego, perforacja pozapalna

Streszczenie

Zapalenie ucha zewnętrznego to schorzenie często spotykane w populacji pediatrycznej, z najwyższą zapadalnością obserwowaną u dzieci w wieku 5-14 lat. Czynnikami predysponującymi są niewłaściwa higiena ucha środkowego, a także długotrwałe narażenie przewodu słuchowego na wilgoć i niedobór odporności. Pacjenci mogą zgłaszać objawy, takie jak: ból ucha, gorączka, swędzenie lub upośledzenie słuchu. Większość

przypadków zapalenia ucha zewnętrznego jest spowodowana infekcjami bakteryjnymi. W przypadku postaci miejscowej i rozlanej zalecana jest antybiotykoterapia, natomiast w przypadku postaci martwiczej konieczna jest hospitalizacja i podawanie antybiotyków o szerokim spektrum działania. Zapalenie ucha zewnętrznego może być jednak również wywołane przez patogeny grzybicze, zazwyczaj u pacjentów z niedoborami odporności lub poddawanych długotrwałej terapii przeciwdrobnoustrojowej. Nieleczone zapalenie ucha zewnętrznego może prowadzić do powikłań, takich jak: zwężenie przewodu słuchowego zewnętrznego, perforacja błony bębenkowej i trwałe uszkodzenie słuchu. Kluczowym elementem leczenia jest nie tylko skuteczna farmakoterapia, ale także unikanie kontaktu z wodą i dokładne, profesjonalne oczyszczenie przewodu słuchowego. Pacjentom rekomenduje się powstrzymanie się od wszelkich czynności powodujących wilgoć w uchu oraz minimalizowanie urazów przewodu słuchowego. Po zakończeniu antybiotykoterapii zaleca się przestrzeganie powyższych zaleceń aż do pełnego wyzdrowienia.
W niniejszym artykule chcielibyśmy przedstawić problem zapalenia ucha zewnętrznego i jego leczenia – istotny w codziennej praktyce pediatrycznej, a także przegląd literatury dotyczący możliwych powikłań tej jednostki chorobowej i konsekwencji nieprawidłowej terapii, takich jak grzybicze zapalenie ucha zewnętrznego i perforacja błony bębenkowej, do których doszło w naszym przypadku. Jako ilustrację chcielibyśmy przedstawić przypadek dziewczynki, która samodzielnie rozpoczęła miejscowe leczenie sterydami z powodu podejrzenia zapalenia ucha zewnętrznego (porównała swoją poprzednią chorobę, ale tym razem bez otoskopii i konsultacji ze specjalistą). Samodzielne leczenie doprowadziło do szeregu poważnych powikłań, którym można by łatwo zapobiec dzięki interwencji lekarza.

Introduction

Otitis externa is a common disease affecting skin and subdermis of the external auditory canal. It can be classified into 3 types: localized, diffused and necrotizing (1-3).

Localized type known as furuncle is a bacterial folliculitis. It can be found only in cartilaginous distal third of the external auditory canal, where the hair is present (4). It is usually caused by *Staphylococcus aureus* (5). Symptoms include localized edema, erythema and white, purulent point in the center. Typically, patients complain of otalgia and pain while palpating the tragus (5). Treatment includes topical antibiotics, such as mupirocin, clindamycin and fusidic acid (6).

Diffused type occurs in both, distal and proximal parts of the auditory canal. It is colloquially called the 'swimmers' ear (7), due to its main predisposing factor – prolonged water exposure. Patients from the regions with high humidity levels and professional swimmers are at risk groups (8). Increased moisture in the auditory ear canal promotes local skin maceration which in effect alters the pH level. When the layer of cerumen is removed by water, it no longer serves as a protective barrier. Any alteration of the epidermal lipid layer, like eczema, trauma, e.g. caused by self-cleaning can also lead to the otitis externa (8). Symptoms include otalgia, auricular tenderness, feeling of 'fullness' in the ear and hearing impairment. In otoscopic examination skin of the auditory ear canal is swollen and reddened. Occlusion of its lumen caused by edema and masses of keratinized, exfoliating epidermis may hinder visualization of the whole length of the canal and tympanic membrane (9). Typically, the edema is concentric. Auricular edema, tenderness in the postauricular region, regional lymphadenopathy and fever may also be observed in cases of diffused otitis externa. The most common pathogens include *Pseudomonas aeruginosa* (even up to 80% cases), followed by *Proteus mirabilis* and *Klebsiella pneumoniae* (7, 10). Otomycosis, a fungal otitis externa, is less frequently observed. Patients with immunosuppression, either drug-induced or disease-induced (e.g. diabetes), are a predisposed group. Pathogens cultured from the swabs usually comprise of *Candida* and *Aspergillus* species (10).

Necrotizing type, known as otitis maligna, can be found in immunosuppressed patients and is caused by *Pseudomonas aeruginosa*. Patients usually complain of a severe otalgia with associated purulent discharge. Otoscopy reveals a significant narrowing of the external auditory canal's lumen which indicates massive swelling of its walls. Destructive nature of this entity can result in nerve palsies (especially facial nerve palsy), brain abscesses and parotitis spread through direct continuity (10). Hospitalization is required in most cases and intensive antimicrobial therapy is crucial (10).

Case report

An 11-year-old girl presented to the outpatient paediatric otorhinolaryngological clinic by the university hospital with the feeling of 'fullness and wind' in her right ear that appeared 2 weeks earlier, right before family holidays in Greece (including a flight).

In her medical history, about 2 months before, she was diagnosed with right-sided bacterial otitis externa by a paediatrician and topical drops with fludrocortisone, gentamicin and neomycin (Dicortineff) were prescribed. Water avoidance and resignation from headphones' usage were also advised. On a follow-up visit satisfactory healing

was stated. A month later, she attended sports' camp with daily horseback riding and swimming classes. During this trip a discomfort in her right ear appeared, like the one a month before. At that point she decided to introduce treatment on her own, using the same eardrops as earlier (she had one bottle 'just in case', prescribed by her mother – a medical doctor), without medical consultation or caregivers' knowledge. She continued sports activities, and experienced partial improvement. She informed her mother about her condition when an additional symptom occurred – the 'feeling of wind'. It was a day before planned holiday in Greece. They decided to enjoy their holidays avoiding water and administering the eardrops topically. The level of discomfort remained unchanged throughout the time. They didn't search for a specialist consultation until they returned home.

During otorhinolaryngological consultation her general state was good. She had no fever, experienced no dizziness. There was no evident leakage from the ear canal, but she felt 'fullness' and moisture in the ear canal, together with 'wind feeling'. She had insignificant medical history and no chronic diseases. Clinical examination revealed narrowed external auditory canal with exfoliating epidermis and whitish masses, slightly painful during examination, together with partially visible due to the oedema, disfigured tympanic membrane of the right ear, which was pale, but thickened with an overgrown mass. A suspicion of tympanic membrane perforation was stated due to the 'feeling of wind', confirmed on a control after 1 week, as the introduced treatment reduced the narrowing of the auditory canal and enabled better visualization of the tympanic membrane (fig. 1). Right auricle and post-auricular region were normal. Left ear was normal. Facial nerve function was symmetrical. Other elements of otorhinolaryngological examination were insignificant. After collecting a swab, the right external ear canal was thoroughly cleaned. Based on the clinical appearance and medical history of prolonged topical steroid therapy a suspicion of fungal otitis externa was raised. She was prescribed topical antifungal drops (Fungotac, Clotrimazole) together with boric acid to clean and disinfect the external ear canal. The treatment lasted 3 weeks, for the first 2 weeks with higher dosage of antifungal drops, and then the third week with reduced dosage (as a 'maintenance therapy'). Throughout the therapy the patient was controlled multiple times, the external auditory canal was getting broader, local secretion and exfoliation were diminishing and tympanic membrane started to get more translucent – all described as satisfactory healing. Unfortunately, a perforation of the tympanic membrane was proved and persisted (this occurred as a complication of fungal otitis externa). Therefore, she was registered for further check-ups to control the perforation and chances for spontaneous closure. First check-up was planned after 6 months (fig. 2). At that time, the perforation remained similar-sized/slightly bigger, but definitely with less thickened edges – the risk of its persistence and possible treatment of closure with myringoplasty were discussed, but the waiting time until final decision was set as 18 months.

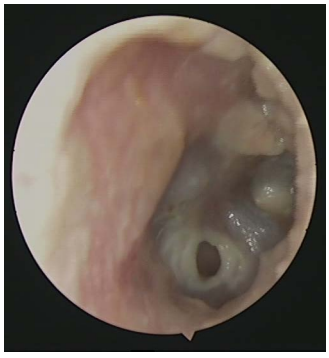

Fig. 1. Otoscopic examination of the right ear, fungal otitis externa with tympanic membrane involvement: after 1 week of topical antifungal treatment – broader auditory canal enabling visualization of the tympanic membrane, but still slightly narrowed, with reddish skin, yellow-whitish masses on the surface (fungal discharge/elements together with ear drops), thickened tympanic membrane, tympanic membrane perforation on the border of inferior quadrants with thickened edges

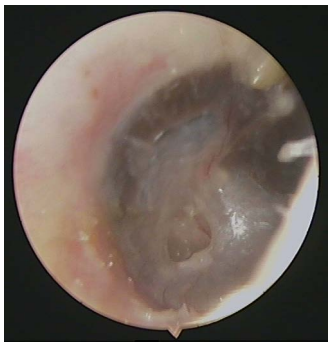

Fig. 2. Otoscopic examination of the right ear, fungal otitis externa with tympanic membrane involvement: about 6 months after competition of antifungal treatment – normal auditory canal, translucent, but slightly dull, persistent perforation of a similar size/slightly bigger, but definitely with less thickened edges

Discussion

Diffused and necrotizing type of otitis externa are treated with antimicrobials and daily debridement of the external auditory canal. Thorough cleaning improves effectiveness of the therapy through increased penetration of the drops into the canal wall (direct contact). Since *Pseudomonas aeruginosa* is the most common pathogen causing diffused otitis externa, topical fluoroquinolone (ciprofloxacin or ofloxacin) or aminoglycoside (7, 11) is a gold standard with cure rate of over 80% in 10-day therapy (12). Oral antimicrobials are not recommended as a first line treatment (7), and are reserved for refractory cases. Analgetic treatment include NSAIDs as well as opioids depending on the pain's intensity (7). When an oedema, significantly narrowing the lumen of the external auditory canal, is observed, topical

steroids, namely fludrocortisone or hydrocortisone, can be instilled to enhance healing and relieve symptoms (3).

Necrotizing type, as more aggressive, faster-progressing and leading to serious complications, requires urgent treatment. Complications-free patients can be treated in an outpatient clinic with oral ciprofloxacin. Nevertheless, when symptoms deteriorate intravenous antibiotic is obligatory (13). Systemic antibiotics, as a recommended empirical therapy, include ciprofloxacin, ceftazidime, aztreonam, gentamycin and tobramycin, covering most prevalent etiology – *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Proteus mirabilis* (13). Swab collection is crucial for the identification of a specific agent and initiation of an appropriate treatment or modification an already introduced one, based on the antibiogram results. The choice of oral antibiotics in young patients is especially restricted, as fluoroquinolones known for their antipseudomonal activity are contraindicated in the population due to their potential risk of growth cartilage damage (14). So, if topical treatment is unsatisfactory, intravenous treatment with ceftazidime is recommended.

Patients with severe course of the necrotizing otitis externa must be hospitalized due to the need of intravenous drug administration, frequent aural toilet and specialist monitoring of the disease's course (13). Surgical treatment is an ultimate step and is performed only in cases refractory to conservative treatment (13).

Fungal otitis externa is treated with topical antifungals, including clotrimazole and bifonazole (15).

Untreated otitis externa may lead to a series of serious complication, such as myringitis, auricular cellulitis, perichondritis, facial cellulitis and systemic toxicity. Finally, it may progress to chronic otitis externa with external auditory canal stenosis and temporal bone osteomyelitis (11).

Our patient's first episode of otitis externa was treated in accordance with the guidelines. She was prescribed topical aminoglycosides – neomycin and gentamicin in combination with the steroid – fludrocortisone. It is essential to avoid water during healing process (10), however our patient did not adhere to doctor's recommendations, what led to the disease recurrence. Not only medications are important in the therapy, but also thorough auricular toilet. Our patient did not perform proper cleaning of the external auditory canal causing the buildup of cerumen and exfoliated epidermis. She was a healthy, immunocompetent girl with no predisposing factors of otomycosis. However, prolonged steroid use and debris from macerating infected skin promoted growth of fungi.

Tympanic membrane perforation in the course of fungal otitis externa is a rare complication, but the most frequent among all types of otitis externa. According to various reports its incidence is up to 16.67% (16). It results through direct fungal spread along adjacent tissues to the tympanic membrane (16). Its pathophysiology is attributed to avascular necrosis of the tympanic membrane due to mycotic thrombosis in the adjacent blood vessels (17). However, it is said that tympanic membrane perforations of a fungal etiology usually close upon an appropriate antifungal treatment. Rarely, fungal otitis externa may progress into an invasive stage, particularly in immunodeficient patients. In these cases, aggressive systemic antifungal treatment is necessary, and this condition is associated with a high mortality rate (18).

Conclusions

Otitis externa is a common disease in pediatric and otorhinolaryngological everyday's practice, especially in summer months. When properly diagnosed and treated most cases heal quickly, without serious complications. However, as shown in our case, inappropriate treatment and malpractice can potentially lead to an unexpected event sequence. Our patient shortly after recovery from the first episode of otitis externa began activities involving water in her external auditory canal and that is why her primary problem reoccurred. Moreover, she tried to relieve otalgia on her own with steroid drops changing the flora of the auditory ear canal skin making it prone to fungal infections. This example highlights the importance of compliance and education of paediatric patients and their caregivers. Patient's education is the key factor in the treatment and prevention of otitis externa. Doctors should always explain proper administration of the ear drops, together with instructions to avoid in-ear-headphones, swimming or other activities to prevent auditory ear canal from moisture.

Conflict of interest
Konflikt interesów

None
Brak konfliktu interesów

References/Piśmiennictwo

1. Centers for Disease Control and Prevention (CDC): Estimated burden of acute otitis externa--United States, 2003-2007. MMWR Morb Mortal Wkly Rep 2011; 60(19): 605-609.
2. Wiegand S, Berner R, Schneider A et al.: Otitis Externa: Investigation and Evidence--Based Treatment. Dtsch Ärztebl Int [Internet]. 2019 Mar 29. https://www.aerzteblatt.de/10.3238/arztebl.2019.0224.
3. Niemczyk K (red.): Wykłady z otolaryngologii. MediPage, Warszawa 2012.
4. Iwaszkiewicz J, Zawistowski S, Krzyształowicz F et al. (red.): Anatomia człowieka. T. 5: Układ nerwowy obwodowy, układ nerwowy autonomiczny, powłoka wspólna, narządy zmysłów. Wyd. III. PZWL, Warszawa 1989.

Correspondence
Adres do korespondencji

*Lidia Zawadzka-Głos
Klinika Otolaryngologii Dziecięcej
Warszawski Uniwersytet Medyczny
ul. Żwirki i Wigury 63A, 02-091 Warszawa
tel. +48 (22) 317-97-21
laryngologia.dsk@uckwum.pl

submitted/nadesłano:
08.01.2025
accepted/zaakceptowano do druku:
30.01.2025

5. Ong YK, Chee G: Infections of the external ear. Ann Acad Med Singapore 2005; 34(4): 330-334.
6. Lin HS, Lin PT, Tsai YS et al.: Interventions for bacterial folliculitis and boils (furuncles and carbuncles). Cochrane Database Syst Rev 2021; 2(2): CD013099.
7. Rosenfeld RM, Schwartz SR, Cannon CR et al.: Clinical Practice Guideline: Acute Otitis Externa. Otolaryngol Head Neck Surg 2014; 150(1 Suppl.): S1-S24.
8. Russell JD, Donnelly M, Mcshane DP et al.: What causes acute otitis externa? J Laryngol Otol 1993; 107(10): 898-901.
9. Long M: Otitis Externa. Pediatr Rev 2013; 34(3): 143-144.
10. Ostrowski VB, Wiet RJ: Pathologic conditions of the external ear and auditory canal. Postgrad Med 1996; 100(3): 223-237.
11. Kaushik V, Malik T, Saeed SR: Interventions for acute otitis externa. Cochrane Database Syst Rev 2010; (1): CD004740.
12. Bhattacharyya N, Kepnes LJ: Initial Impact of the Acute Otitis Externa Clinical Practice Guideline on Clinical Care. Otolaryngol Head Neck Surg 2011; 145(3): 414-417.
13. Al Aaraj MS, Kelley C: Necrotizing (Malignant) Otitis Externa 2023 Oct 29. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 32310598.
14. Patel K, Goldman JL: Safety Concerns Surrounding Quinolone Use in Children. J Clin Pharmacol 2016; 56(9): 1060-1075.
15. Vennewald I, Klemm E: Otomycosis: Diagnosis and treatment. Clin Dermatol 2010; 28(2): 202-211.
16. Koltsidopoulos P, Skoulakis C: Otomycosis with Tympanic Membrane Perforation: A Review of the Literature. Ear Nose Throat J 2020; 99(8): 518-521.
17. Ho T, Vrabec JT, Yoo D, Coker NJ: Otomycosis: clinical features and treatment implications. Otolaryngol Head Neck Surg 2006; 135(5): 787-791.
18. Viswanatha B, Sumatha D, Vijayashree MS: Otomycosis in immunocompetent and immunocompromised patients: comparative study and literature review. Ear Nose Throat J 2012; 91(3): 114-121.