

Clinical evidence in the management of swimmer's ear

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"Swimmer's ear" or acute otitis externa is a common condition involving the exterior part of the ear, including the ear canal and the pinna. Inflammation and pain are the main features, with bacterial infection mainly due to *Staphylococcus aureus* and *Pseudomonas aeruginosa*. It can easily be treated in its uncomplicated stage, and the symptoms usually do not last for more than 72 hours. Management ranges from primary care to a specialist otolaryngological intervention. Several nonpharmacological treatments, in addition to various pharmacological options, are employed in the treatment and prevention of swimmer's ear. These treatments range from simple, adequate and appropriate ear cleaning, to topical antibiotics, corticosteroids and analgesics. Severe cases may require systemic antibiotics, oral anti-inflammatory drugs and even opioid analgesics.

Keywords: acidifying antiseptics, antibiotics, corticosteroids, otitis externa, swimmer's ear

Introduction

"Swimmer's ear" or acute otitis externa is a term that is used commonly by medical practitioners and patients. It refers to an inflammatory condition of the external auditory canal, with anatomical regions which may stretch distally to the pinna and proximally to the tympanic membrane of the ear.¹ The prevalence in swimmers is approximately five times more than that in non-swimmers, with an annual incidence of approximately 1% and an overall lifetime incidence of 10%.² It occurs mostly during spring and summer, with age peaks at 7–12 years, and decreases after the age of 50 years. Continuous or prolonged exposure to water dissolves oil and wax in the ear canal, which results in dry, fissuring skin, thereby effectively obliterating the ear's natural defense mechanism against microorganisms. Minor trauma from vigorous or inappropriate ear cleaning could also be an associated cause.

Swimmer's ear presents with a sudden onset of otalgia, pruritis, canal oedema and erythema, and is often accompanied by otorrhea and hearing loss. A classical finding of severe tenderness with movement of the pinna is characteristic of this condition. Furthermore, it can be classified as mild (minimal canal oedema with minor discomfort and pruritis); moderate (partly occluded canal with intermediate pain and pruritis); and severe (completely occluded ear canal with intense pain, fever, erythema and lymphadenopathy).³

Bacterial causes are responsible for the majority of acute cases. A recent study conducted in South Africa showed that *Pseudomonas aeruginosa* (33%) and *Staphylococcus aureus* (24%) were the main organisms responsible for otitis externa.⁴ *Proteus mirabilis* (5%) and fungal elements (5%) were identified as additional culprits. This correlates well with the findings in the literature from international studies of a prevalence of *P. aeruginosa* of 38%, and *S. aureus* of 17%.⁵ However, a third

of all cases are attributed to polymicrobial Gram-positive and Gram-negative colonisation, which includes *Escherichia coli*, *Enterobacter cloacae*, *Haemophilus influenzae*, *Klebsiella pneumoniae* and *Alcaligenes faecalis*. Viral infections (herpes simplex and herpes zoster) account for a much smaller percentage.⁶

Non-infective causes are less frequent and present as chronic otitis externa. These include allergic contact dermatitis (e.g. secondary to otic agents and soap), eczematous dermatitis (atopic dermatitis), irritant contact dermatitis, psoriasis, seborrheic dermatitis, acne vulgaris and systemic lupus erythematosus.

Clinical pharmacology and practice guidelines

Various guidelines for the management of acute otitis externa are published and updated on a regular basis by different otolaryngology authorities worldwide.¹ A shared commonality in these guidelines includes the appropriate diagnosis of acute otitis externa, the provision of adequate pain relief, and the rational prescribing of topical or systemic antibiotics. In addition, the treatment should include cleaning the ear canal, avoiding aggravating factors (protecting the ear from additional moisture or further mechanical injury), and considering alternate diagnoses in unresponsive cases.⁷

Topical anti-infective agents

First-line therapy with antiseptics is still preferred to antibiotics in uncomplicated and mild cases of local external ear infections.⁸ These agents possess bacteriostatic and fungistatic properties, and render the ear canal less habitable to microorganisms. In addition, they may also loosen impacted debris, and reduce swelling and inflammation (when present) in mild cases of swimmer's ear. Various acidifying ear drop formulations can be used, which are normally freshly prepared by a pharmacist. These formulations include 1% acetic acid in distilled water, 1%

acetic acid in 90% alcohol and distilled water, and 2% boric acid in 90% alcohol and distilled water. Clioquinol (3%) in cream or an ointment base can be used as an alternative to the droplet form.

The use of acidifying antiseptic agents should be avoided if the tympanic membrane is known or suspected to be non-intact. Skin irritation, hypersensitivity reactions and contact dermatitis are the most common side-effects of locally applied antiseptic agents. Therapy should be continued for a week, after which those patients whose symptoms have not resolved should be changed to a combination antibiotic-corticosteroid regimen. The preventative use of topical acidifying agents or 70% alcohol can also be considered in children who are prone to swimmer's ear.⁹

Topical antibiotics

Although topical antibiotics have a very high efficacy of between 29% and 63% in the treatment of otitis externa, their routine and indiscriminant use should be avoided.¹⁰ There is increasing concern about resistance and potential treatment failure, especially when these agents are used chronically.¹¹ Topical antibiotics providing coverage against *P. aeruginosa* and *S. aureus* should be considered in cases when there is only mild inflammation with obvious infection. Quinolones (ofloxacin and ciprofloxacin) are equally effective compared to the aminoglycosides (tobramycin and gentamycin) in treating *P. aeruginosa* and *S. aureus*, whereas neomycin only exhibits activity against *S. aureus*, and polymixin B against *P. aeruginosa*. Neomycin is commonly combined with polymixin B in otological preparations for this reason.

It is advisable to avoid the use of aminoglycosides in cases where a non-intact tympanic membrane is present as these agents are known to be a potential cause of iatrogenic hearing loss and balance dysfunction. It was shown in a recent retrospective study in the USA that aminoglycosides were responsible for 47% of civil litigation cases, where drugs were implicated as the causative factor.¹² The fluoroquinolones are more suitable when tympanic membrane perforation is suspected, but may cause local irritation and allergic dermatitis.¹³

Systemic antibiotics

Systemic antibiotics are only indicated in severe cases of otitis externa, when the infection has spread beyond the external ear

canal, or signs of deep tissue infection (cellulitis) are present. Oral therapy, with ciprofloxacin and/or ceftazidime, for at least 10 days, is recommended. Systemic therapy should be given for 3–6 weeks in cases of necrotising external otitis.¹⁴

Topical corticosteroids

Topical glucocorticoids decrease pain and inflammation. These agents are useful in reducing pruritis and swelling in the absence of a suspected infection. Therefore, they are used to control eczematous conditions of the external ear, including otitis externa. Various corticosteroids are available as either topical drops or in cream and ointment form. The most commonly used otological topical corticosteroids include hydrocortisone, prednisolone, betamethasone, dexamethasone and flumethasone (in order of increasing potency).⁸ These topical agents are generally well tolerated, but should not be used in the presence of viral or fungal infections, especially in children, as the risk of exacerbating the condition is increased.⁹

Antibiotic-corticosteroid combinations

Several combination antibiotic-corticosteroid preparations are available. However, it was indicated in a recent meta-analysis that none of the specific combination therapies was superior to the rest.⁸ The presence of severe inflammation with infection and dermatitis necessitates the use of these agents. Their use should be limited and discouraged in the absence of a proper diagnosis.

Analgesics

Topical analgesics and local anaesthetics are of limited use, and might only demonstrate some benefit in mild cases of the disease. Oral nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, still remain the most effective way of managing pain associated with otitis externa. Opioid analgesics are reserved for patients with severe pain which has not responded to topical treatment or systemic NSAIDs.

Currently available topical preparations in South Africa for the treatment of otitis externa are detailed in Table I.

Conclusion and recommendations

"Swimmer's ear" or acute otitis externa is a common condition that affects many people annually. The treatment of uncomplicated

Table I: Currently available topical preparations in South Africa for the treatment of otitis externa

	Composition	Dosage	Pack size	SEP
Topical anti-infective agents				
Compounded mixtures	Acetic acid 1%	4-6 drops, 2 times daily	100 ml	N/A
	Acetic acid 1% in 90% alcohol		100 ml	
	Boric acid 2% in 90% alcohol		100 ml	
	Clioquinol 3%		100 g	
Topical antibiotics				
Ciloxan® (Alcon Laboratories)	Ciprofloxacin 3 mg/ml	2 drops, 4 hourly	5 ml	R147.76
Exocin® (Allergan)	Ofloxacin 3 mg/ml	1 drop, 4 times daily	5 ml	R68.35
Octin® (Cipla Medpro)			5 ml	R53.18
Tobrex® (Alcon Laboratories)	Tobramycin 3 mg/ml	2 drops, 4 hourly	5 ml	R98.66

Topical corticosteroids				
Maxidex® (Alcon Laboratories)	Dexamethasone 1 mg/ml	3-4 drops, 2-4 times daily	5 ml	R133.19
Betnesol® (Aspen Pharmacare)	Betamethasone sodium phosphate 0.1%	2-3 drops, 2-3 hourly	5 ml	R148.71
Dilucort® (Aspen Pharmacare)	Hydrocortisone 0.5%	Apply twice daily	25 g cream	R30.16
Bilocort® (Akacia)	Hydrocortisone 1%		25 g cream	R9.91
Procutan® (MSD)			20 g cream	R203.70
Stopitch® (AI Pharm)			20 g cream	R24.41
Adco-Betamethasone® (AI Pharm)	Betamethasone valerate 0.1%	Apply 1-3 times daily	15 g cream	R15.42
Betnovate® (Sekpharma)			15 g cream 30 g cream	R27.24 R28.48
Lenovate® (Aspen Pharmacare)			15 g cream 500 g cream	R18.81 R627.34
Persivate® (Aspen Pharmacare)			15 g cream 500 g cream	R15.39 R513.09
Advantan® (Bayer)	Methylprednisolone 0.1%	Apply 1-3 times daily	20 g cream and ung 50 g cream and ung	R146.35 R365.87
Antibiotic-corticosteroid combinations				
Sofradex® (Sanofi-Aventis)	Framycetin sulphate 5 mg/ml Gramicidin 0.05 mg/ml Dexamethasone 0.5 mg/ml Phenyletanol 0.5%/ml	2-3 drops, 3-4 times daily	8 ml	R120.09
Otosporin® (Aspen Pharmacare)	Polymixin B sulphate 10 000 u/ml Neomycin sulphate 3 400 u/ml Hydrocortisone 10 mg/ml	3-4 drops, 3-4 times daily	10 ml	R93.18
Cilodex® (Alcon Laboratories)	Ciprofloxacin 3 mg/ml Dexamethasone 1 mg/ml	4 drops, 2 times daily	5 ml	R204.10
Betnesol-N® (Aspen Pharmacare)	Betamethasone sodium phosphate 0.1% Neomycin sulphate 0.35%	2-3 drops, 2-3 hourly	5 ml 10 ml	R118.21 R236.40
Locacorten Vioform Eardrops® (Pharmaco)	Flumethasone pivalate 0.2 mg/ml Clioquinol 10 mg/ml	2-3 drops, 2 times daily	7.5 ml	R131.00
Maxitrol® (Alcon Laboratories)	Polymyxin B 6 000 u/ml Dexamethasone 1 mg/ml Neomycin 3500 u/ml	1-2 drops, 6 times daily Apply 3-4 times daily	5 ml 3.5 g ung	R137.14 R140.67
Tobradex® (Alcon Laboratories)	Dexamethasone 1 mg/ml Tobramycin 3 mg/ml	1 drop, 4 hourly	5 ml 3.5 g ung	R153.50
Topical analgesics				
Aurone® (Aspen Pharmacare)	Phenazone 50 mg/ml	5-10 drops, 2 hourly	15 ml	R46.57
Covancaïne® (AI Pharm)	Sulphacetamide sodium 100 mg/ml Phenazone 50 mg/ml Benzocaine 10 mg/ml Urea 120 mg/ml	5 drops, 1-4 hourly	20 ml	R41.17
Adco-Otised® (AI Pharm)	Phenazone 50 mg/ml Benzocaine 10 mg/ml Glycerine 1.185 g/ml	2-3 drops, 4 hourly	15 ml	R8.41

N/A: not applicable, SEP: single exit price [as listed in the *Monthly Index of Medical Specialties*. 2015;55(4)], ung: ointment

conditions can be managed at primary care level. Cleaning of the ear canal, including the removal of impacted cerumen, is the first step in its management. This facilitates healing, and improves the penetration of eardrops into the area of inflammation.¹⁵

Topical therapy with non-antibiotic preparations containing acidifying agents, with or without corticosteroids, is indicated for mild cases. Moderate and severe disease warrants the additional inclusion of a topical antibiotic, while the placement of a wick

should be considered in severe cases only. This will allow medication to reach the medial aspect of the ear canal. Systemic antibiotics should only be prescribed in immunosuppressed patients, or when a deeper infection spreading beyond the ear canal is present. The use of systemic NSAIDs is preferred to topical analgesics and local anaesthetics owing to their limited efficacy. All cases of malignant or necrotising otitis externa should be referred to an otolaryngologist.¹⁶

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