Clinical Overview:

- H. zoster oticus (omitted)
- Malignant external otitis (briefly)
- Clinical presentations - acute
  - Acute diffuse external otitis ("Swimmer's ear")
  - Furunculosis of the ear canal
  - Fungal external otitis
- Clinical presentations - chronic
  - Chronic purulent external otitis
  - Chronic eczematoid external otitis
- New drugs
  - Fluoroquinolones
  - Azoles
- Granular myringitis
- Bullous myringitis
- Infections of the pinna
- Malignant external otitis (necrotizing external otitis)
- Prevention
- Supplementary reading

Clinical Presentations:

Acute diffuse external otitis
Presents as rapid onset of an earache, with marked tenderness of the ear and the external auditory meatus swollen almost completely shut. It is usually impossible to see the eardrum unless one gingerly inserts the smallest ear speculum. Tuning fork tests will usually reassure the examiner that the middle ear is not involved in the disease. The patient has been swimming, and developed itching in one or the other ear, whereupon he scratched it, and began to notice increasingly severe pain in that ear. Home remedies failed to offer relief and he seeks medical attention for the pain.

The external auditory meatus is swollen closed, very tender, not erythematous, and usually without any evidence of otorrhea. There is often a tender infra-auricular lymphnode present, and the postauricular crease is red and a little swollen. The presence of an enlarged and tender postauricular node will sometimes prompt the referring physician to send the patient to you with a diagnosis of "mastoid."

Treatment is directed at relieving the patient's pain, by prescribing opiates (codeine, and occasionally, meperidine) and inserting a wick moistened with an antimicrobial/corticosteroid eardrop. The patient is instructed to keep the wick moist with the prescribed drops, and to remove the wick in 2 days, returning to your office a day later for followup exam, and most importantly, to begin a program of prophylaxis.

It has been my experience that if the patient fails to return for the second phase of the treatment, prophylaxis, he will most assuredly blame you for the inevitable reoccurrence of his ear infection.

In severe cases, a diminishing dose of prednisone (Medrol dosepak) will accelerate the resolution of the inflammation and give the patient relief of his pain within twelve hours of the first dose. The prednisone is supplemented by a prescription for a broad spectrum orally administered antibiotic, to reduce the risk of the infection spreading beyond the ear canal.

**Furunculosis of the ear canal**

Presents as a painful tender ear canal, which looks quite normal except perhaps for a fulness at 12 o'clock, which is exquisitely tender, to any pressure from the aural speculum. As the furuncle matures, a localized redness with a yellow center will appear, indicating that the mini-abscess is about to drain spontaneously. Treatment with standard topical antimicrobial ointments (Polysporin, Bacitracin) will often suffice. Occasionally, however, it is necessary to incise the furuncle, giving prompt and effective relief. Some form of local anesthesia is necessary before making the incision, however. The condition rarely recurs.

**Fungal external otitis**

As many as 61 different fungal species have been identified in cases of external otitis, but the most common are Candida and Aspergillus. Fungi were identified in more than 9% of 12000 cases of external otitis in one study. Penicillin species are sometimes found as well. Many cases are actually mixed fungal and bacterial infections, usually S. aureus, Psuedomonas species and Proteus species. Often the symptoms are indistinguishable from bacterial external otitis.
Physical presentation is that of a red canal, somewhat swollen and tender, with white, black, gray, or brown debris deep within the canal, usually right up against the drum, having been driven there by the patient's attempts at cleaning the canal with q-tips. Sometimes the fungal growth can be mistaken for the cotton tip of a q-tip itself.

The disorder fails to respond to the usual antibacterial topical medications, and that is often the physician's first clue to the diagnosis. Laboratory identification of the fungi is of questionable benefit, for antifungal sensitivity tends to be inconsistently related to fungal species.

Lucente FE (Otolar. Clin N.A. v20 no6 Dec 1993 995-1006) collected 15 species of yeast and fungi from patients with external otitis during the course of one year. He obtained antifungal sensitivities on these specimens, using clotrimazole, nystatin, tolnaftate, amphotericin B, miconazole, natamycin, and flucytosine. Clotrimazole consistently had the largest zone of inhibition against common fungi. Nystatin, amphotericin B, miconazole, and natamycin were also effective, but to a lesser extent. Only clotrimazole and miconazole showed antibacterial effects against Staphylococcus epidermidis and aureus.

The common otic preparations (Vosol, Cortisporin, 95% ethyl alcohol), were generally not effective in vitro. Thimerasol (Merthiolate) was effective against all yeasts, fungi, and bacteria except enterococci (but the FDA has forbidden its use and I have to get it from Mexico.) Thimerasol was the only nonantimicrobial agent showing good effectiveness.

Some agents are effective because of their action on host tissues rather than any intrinsic fungistatic properties. Keratolytic agents may treat or prevent fungus infections by encouraging desquamation of infected epidermis.

Another study (Lawrence TL - Lscope 88;1755-1760: 1978) showed that thimerasol and metacresyl acetate (Cresatin) were effective in vitro, while clotrimazol and nystatin were ineffective.

Lucente has sometimes had to use systemic antifungals such as ketoconazole and fluconazole in addition to topical treatment, but he recommends obtaining the help of an infectious disease specialist who is familiar with the side effects of these drugs. He suggests a treatment protocol for recurrent itching of the ears, which is rather involved, and he cautions against using certain of the antifungals in ears in which there is a perforation of the eardrum. Metacresyl acetate and acetic acid preparations, both of which contain propylene glycol, have caused profound hearing loss in guinea pigs (47 dB); clotrimazol to a lesser extent (17dB), and tolnaftate not at all.

Remember to use your dermatologist for difficult cases, especially for identification of specific fungi and suggestions for appropriate treatment.

**Chronic purulent external otitis:**

Seen in old men who habitually "clean" their ears with cotton wool wound on the end of a toothpick or wooden match, and they do it all day long. It is characterized by an ear canal devoid of wax, with glistening, slightly pink canal skin, without any edema, and with an intact eardrum.
One searches in vain for a perforation in the thickened eardrum for there is a small meniscus of blue-green pus lying in the inferior quadrant of the typanomeatal sulcus, and the drum moves normally. Audiometry usually shows only a sensorineural loss consistent with presbycusis.

The patient is usually brought in by a younger relative, concerned about the possibility of "infection" and a ready witness to his habit of continually poking things in his ears. Treatment is based on convincing the patient to quit "cleaning" his ears, and clearing the Ps. aeruginosa infection with a topical preparation. Followup examination is essential, for reinforcement of your instructions to the patient, and for control of the itching which accompanies the condition and probably precipitated the chronic infection.

**Chronic eczematoid external otitis**

Frequently seen in older women of all races, presenting as a distressingly persistent itching of the ear canals, and often preceding an acute diffuse external otitis, perhaps several episodes of this. The opening of the canal is red, scaly, dry, and often one can see a tiny fissure at 12 o'clock just at the opening. The remainder of the canal is generally free of wax, or with only small amounts of dry, crumbly cerumen, and very little evidence of inflammation. The ear does not discharge, but the erythema and scaling can sometimes extend into the cavum conchae. There is little pain, but the appearance of excoriation about the meatus attests to the intensity of the itching.

It is sometimes difficult to distinguish this condition from psoriatic or seborrheic disease, except that eczematoid external otitis exists without concomitant lesions elsewhere. Treatment with hydrocortisone cream initially, and PSS ointment prophylaxis, is almost always effective. If treatment fails, or if the lesion extends beyond the cavum conchae, consultation with a dermatologist is a good idea. The literature seems to suggest that the condition represents a chronic form of otomycosis, but evidence for this is unclear. In any event, the keratolytic action of salicylic acid can be expected to render the outer layers of the epithelium less hospitable to fungal growths.

**New Drugs**

**Fluoroquinolones:**

These are a relatively new class of antimicrobial agents. They:
1. offer an oral alternative to standard parenteral therapy for necrotizing ("malignant") external otitis.
2. possess long serum halflives, a high degree of bioavailability, and a broad spectrum of activity against many gram negative and gram positive organisms.

There were five available as of 1993:
ciprofloxacin (Cipro), enoxacin (Penetrex), lomefloxacin HCl (Maxaquin), norfloxacin (Noroxin), and ofloxacin (Floxin). Under development are perfloxacin, fleroxacin, and sparfloxacin.

These agents are most active against aerobic gram negatives bacilli, and Ps. aeruginosa is very susceptible to ciprofloxacin. The activity of quinolones against gram positive organisms is more variable. Cipro is moderately active against staphylo cocci, including methicillin-resistant S.
 aureus. Recently, however, resistance of staphylococci to Cipro has increased, and resistance emerges readily during treatment with Cipro alone. Many hospitals report that more than 90% of MRSA strains are resistant to Cipro. Resistance has also been reported in occasional strains of Ps. aeruginosa.

The fluoroquinolones display linear pharmacokinetics and reach peak serum concentrations 1 to 3 hours after oral administration. Food delays absorptions and causes lower and later serum concentration peaks. In general quinolones have long half lives and are not extensively bound to serum proteins.

Studies of ciprofloxacin in gram negative osteomyelitis have reported 75% cure rates with an oral dose of 750 mg. b.i.d. but a rise in the MIC of several quinolones against Ps. aeruginosa has been seen during therapy.

For malignant external otitis the customary treatment has been long-term IV antibiotic therapy. Recent studies have demonstrated a cure rate of about 90% in patients treated with ciprofloxacin, making it the treatment of choice for this infection.

The most common side effect is GI toxicity, noted in about 3 to 7% of patients. Antibiotic-induced colitis had been reported but is rare. CNS effects occur in about 1 to 4%, with more than 1% suffering serious complications including hallucinations, depression, and seizures. These effects may be seen after only a few days of therapy.

Azoles:

There are about half a dozen such antifungal medications which have shown effectiveness against aspergillus species. The include clotrimazole (Lotrimin, available otc as drops), ketoconazol, fluconazole, miconazole, intraconazole, enilconazole, oxiconazole, and saperconazole. My recent experience includes three cases which failed usual therapy of gentian violet, tincure of merthiolate, and repeated cleaning of the canal. One cleared on oral ketoconazole 200 mg b.i.d., another (a nurse in our Derm department) on topical miconazole, and one on topical clotrimazole (Lotrimin,) which is available over the counter.

Published reports, however, indicate that the therapeutic efficacy of azole antifungal agents such as clotrimazol, miconazole and ketoconazole against various forms of aspergillosis is highly questionable. The antifungal effects are inconsistent and there are no large scale trials of these drugs. Fluconazole and Itraconazole may offer greater promise, however.

Amphotericin B was found to be a useful alternative in the therapy of aspergillus otomycosis when applied topically as a 3% solution. With other antibiotics such as oxytetracycline-polymyxin, a 70% cure rate was achieved.

Granular myringitis

This is a form of otitis externa which is characterized by localized chronic inflammation of the lateral surface of the pars tensa of the tympanic membrane, with persistent incompletely
epithelialized granulation tissue over the involved area. It is poorly understood and has received little attention in the literature. For this reason, incidence is difficult to estimate. Toynbee was the first to record a description of granular myringitis in 1860.

It can occur as a primary acute or chronic myringitis, or as a sequel to acute diffuse external otitis or a perforation of the eardrum. Proteus and Psuedomonas species are the most commonly cultured organisms, similar to the flora of otitis externa and chronic otitis media. In short, there is no evidence that any particular type of bacterial or fungal infection is associated with granular myringitis.

Inflammation is generally chronic, and confined to the outer epithelial and underlying fibrous layers of the drum. These layers become replaced by a proliferating granulation tissue, beginning as a localized patch, which may extend over the surface of the drum. The predominant symptom is scanty foul-smelling otorrhea. Many patients are asymptomatic, without pain or significantly diminished hearing. There may only be a feeling of fulness in the ear. The tympanic membrane is usually obscured by purulent discharge with the granulation tissue peeping through. It lacks the mucous quality of otorrhea from an otitis media with perforation of the TM. In granular myringitis, there is no perforation to be found, whether by visual, pneumatic, or tympanometric examination. The rest of the TM is remarkably normal although there may be one or two dilated feeding vessels supplying the granulation tissue. Further, the skin of the canal and the external meatus is free of any inflammatory reaction.

Treatment generally includes careful and repeated cleaning of the surface of the eardrum, with application of anti-Psuedomonal medication supplemented by a corticosteroid. Failure to resolve suggests a fungal etiology, and insufflation of clotrimazole powder over the surface of the drum has proved successful. There is rarely an indication for cautery of the granulation tissue, for one risks creating a perforation of the drum where before there had been none. One author recommends only a 0.5% solution of formalin applied to the granulation for no more than 1 or 2 minutes.

**Bullous myringitis**

Onset is characterized by sudden onset of ear pain, usually in the middle of the night, with tinnitus and stuffiness in that same ear. After a few hours of increasing stabbing pain, the patient notices bloody discharge from the ear and calls the doctor. Diagnosis can be made over the phone by inquiring about the presence of Quinn's sign, or "burpotalgia." The patient experiences a sharp pain in the ear when he hiccups, or burps. The diagnosis can be confirmed by asking whether the pain diminished upon the appearance of the bloody discharge, and the patient will so indicate, saying that he phoned you more from fear of the significance of the bloody drainage, than from the pain itself.

Treatment is directed at relieving pain by mild narcotics, and at precluding a common sequel, acute otitis media, by prescribing an oral antibiotic preparation, typically an erythromycin, based on the assumption that Mycoplasma pneumonia is implicated in the disease.
Rarely, the patient will develop a persistent middle ear effusion, and even more rarely, will complain of vertigo during the weeks following the episode of ear pain and drainage. Typically, however, recovery is complete and rapid, without recurrence or sequellae.

**Acute inflammations of the pinna**

These include acute perichondritis, cellulitis, and erysipelas, and present with a bright red, swollen, hot, painful pinna, in an otherwise healthy individual. Perichondritis can, of course, follow trauma or surgical intervention and must be anticipated in such patients. Spontaneous appearance is more common, however, in my experience. Also, experience has indicated the wisdom of investigating the patient and his immediate family for the presence of diabetes mellitus, whether in the overt or latent form. I advise not just a fasting blood glucose, but a complete glucose tolerance test, to unmask this disease.

Otherwise, treatment is directed toward the likely responsible organisms, Ps. aeruginosa, and beta-hemolytic streptococcus, and should be vigorous and prompt. Hospitalization and intravenous administration of antimicrobials is to be considered if oral dosage fails to evoke rapid improvement.

**Malignant external otitis ("necrotizing external otitis")**

Two things bring this condition to mind immediately, first, the failure of the pain of acute external otitis to subside, and second, the appearance of granulation tissue at the junction of the cartilagenous and bony parts of the ear canal (the "isthmus.")

The pain is typically constant, deep, unremitting, and disruptive of nocturnal repose. It awakens the patient from sleep, and is controlled only with difficulty. If it persists for more than a week, and if the patient is elderly, diabetic, or immunocompromised, malignant external otitis must be presumed.

Treatment has in the past required intravenous administration of anti-psuedomonal antimicrobials, while watching for symptoms of the onset of osteomyelitis of the temporal bone. Treatment of osteomyelitis of the skull base is to be left for another lecture. It is the earliest stage of the disease of malignant external otitis which concerns us today. In past years I have treated a few cases with intramuscular colistimethate 150 mg. IM q 12 hours, supplemented with Colimycin S otic drops, being careful to watch for the side effects of this drug, which include renal impairment and neurologic symptoms such as circumoral paresthesias and disequillibrium. Currently, oral ciprofloxacin has been used in doses of 750 mg. q 12 hours with success in up to 90% of cases. One must remember, however, that ciprofloxacin has not been approved for patient under 18 years of age, for pregnant or lactating women. Also, serious, even fatal reactions have been reported with concurrent administration of theophylline (cardiac arrest, seizure, status epilepticus, and respiratory failure.) Pseudomembraneous colitis is another reported adverse effect of this drug.

**Prevention:**
The ear canal is self-cleaning, and except in those patients who suffer from cerumen impactions, needs no attention whatever. It is difficult to convince many patients of this, and they persist in "cleaning" their ear canals with cotton-tipped applicators, regarding normal earwax as "dirty." I challenge them by asking if they clean their eyeballs, and I explain the function of ear wax as "nature's flypaper" with emphasis on the discomfort of having an arthropod enter the ear canal.

For those who swim, or who allow water to enter their ear canals when showering I recommend a preparation called Swimear, available in 2 oz. bottles at most drugstores, and consisting of isopropyl alcohol 95% in anhydrous glycerin, and costing $3.50. For those who experience discomfort upon instilling alcohol into the ear canal, I suggest Star-otic, a 1/2 oz. bottle containing modified Burow's solution (aluminum acetate, acetic acid, and boric acid in propylene glycol, costing $4.00. Both of these are available without prescription.

A somewhat simpler but equally effective treatment for retained water in the ear canal is 95% ethyl alcohol, costing $4.29 for 240 ml, $7.69 for 480 ml, and $17.00 per liter, available at package stores and sold under the name of Everclear. The disadvantage, of course, is that the patient may find a use for this preparation other than otic prophylaxis. (While on the subject of cost of medications, a 5 ml bottle of gentamicin ophthalmic costs $12.00 and a 10 ml bottle of generic cortisporin otic drops costs $16.00.

All patients recovered from acute diffuse otitis externa, as well as those with chronic eczematoid external otitis should be taught to insert PSS ointment (phenol, sulfur precipitate, salicylic acid; 3% of each, in petrolatum 120 gm.) twice daily, and oftener as needed for itching. I teach them to apply it with the back of the little fingernail, just at the orifice of the ear canal, and to massage the tragus briefly and gently, to spread the preparation. Under no circumstances are they to apply it with Q-tips. Often I will direct the pharmacist to dispense two such jars of ointment, one for the home, the other for the office, toolbox, purse, or briefcase. This has had dependably good effect in preventing recurrences of the acute form of the disease, and gives prolonged relief from itching. For those few patients who have not sufficiently recovered from the acute inflammation, and in whom the PSS ointment causes discomfort, I recommend hydrocortisone cream for a week or two, then back to the PSS ointment, to control itching (and to prevent the patient from being driven to scratching his ear again.)

Discussion by James R. B. Hutchinson, M.D., Atlanta, Georgia

Cresatin was a favorite medication, mainly due to its wonderful medicinal aroma. Merck removed it from the market years ago when the FDA said there were no studies to show efficacy. Merck said that since their sales were only 30 gallons worldwide, it was not worth doing studies on it. I found that cleaning, cortisone, and topicals were usually effective. The most unusual treatment of which I am aware was that used as a preventive by the late Lloyd Storrs of Lubbock, Texas. He collected earwax from his patients and used it on those lacking sufficient wax. After recovery from infections this was often the case. He claimed that it was effective.

Supplementary reading:


St. Georgiev, Vassil: Respiration; 59: 303-313; December 1992 (azoles and other antifungals)

Stoney, Philip et al.; Jour. Otol.; 21:2; 1992; 129-135 (granular myringitis)

Sable, Carole A. et al.; Geriatrics; 48:6; 41-51; June 1993 (fluoroquinolones)

Linstrom, C. J., and Lucente, F. E. in Bailey, B. J. "Head and Neck Surgery - Otolaryngology" Ch. 117; Lippincott; 1993 (outstandingly thorough and up-to-date review of the entire subject)

Smith P. G. and Lucente, F.E. in Cummings, C. W. "Otolaryngology - Head and Neck Surgery" Ch. 153; C.V. Mosby Co.; 1986 (treatment algorithm for necrotizing ("malignant") otitis media)