

# External Ear Disorders

Last updated: May 11, 2019

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## OBSTRUCTIONS

### CERUMEN (EARWAX) IMPACTION

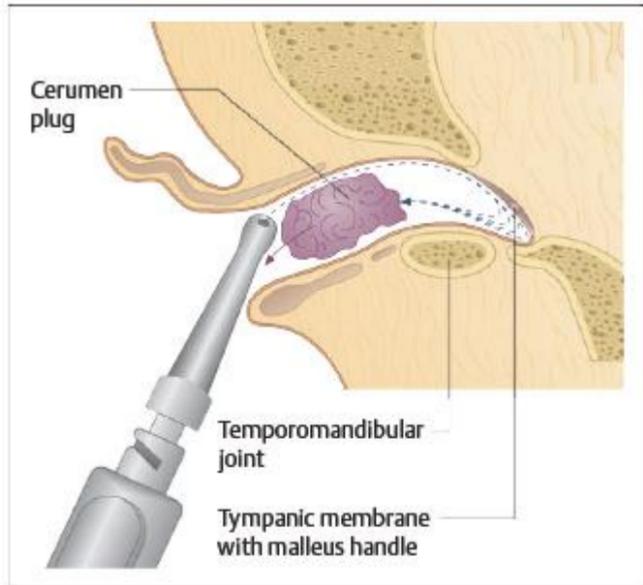
- cerumen accumulation that **causes symptoms** and / or **prevents ear examination**.
- N.B. definition of cerumen impaction *does not require complete obstruction!*

**Cerumen (earwax)** - naturally occurring substance that cleans, protects, and lubricates external auditory canal and is expelled by self-cleaning mechanism.

- affects in USA - 10% children, 5% healthy adults, 57% older persons in nursing homes, 36% those with mental disabilities.
- **symptoms** – itching, otalgia, odor, discharge, tinnitus, fullness, cough, temporary **conductive hearing loss**.
- N.B. patients must not remove earwax (using cotton-tipped swabs or oral jet irrigators).
- evaluate patients with **hearing aids** for cerumen impaction q 6-12 months (cerumen can cause feedback, reduced sound intensity, or damage to hearing aid).
- **complication** – infection.

### TREATMENT

- removal by:
  - a) **IRRIGATION** (*contraindicated in positive otologic history*, esp. otorrhea or TM perforation – water may exacerbate chronic otitis media!); direction of jet must be backward & upward; pressurized irrigation entails risk of trauma!
  - b) **SPECIALTY INSTRUMENTS** (blunt curette, loop, hook, probe, forceps, suction) - preferred for narrow / distorted ear canals\*, TM perforation or tube, immune deficiency, diabetes mellitus.
    - \*binocular microscope with microinstrumentation may be needed
  - c) **EAR CANDLING** - **ineffective** and potentially **dangerous**.



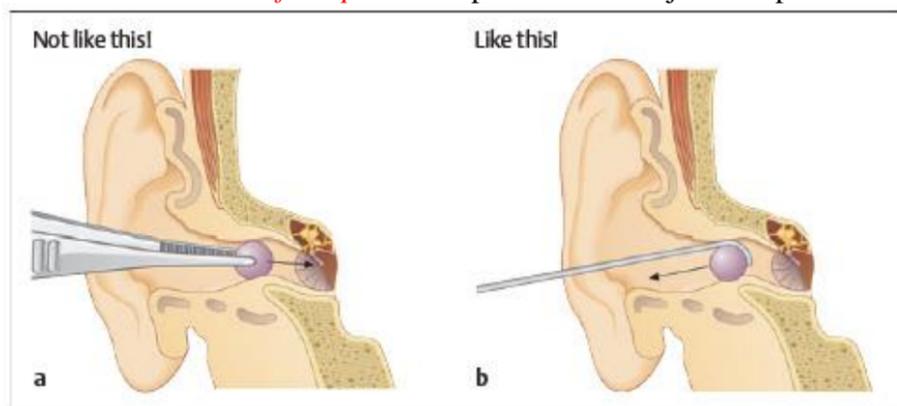
The diagram shows a transverse section through the ear canal. The irrigation jet is directed posteriorly and superiorly.

Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>

- **ceruminolytics (cerumen solvents)** are most effective when instilled 15-30 minutes before treatment; long term use (e.g. olive oil drops daily for 4 days, followed by irrigation) is not recommended (frequently causes maceration and allergic reactions).
  - no specific ceruminolytic agent has been found to be superior in clinical trials.
- **complications of treatment** (0.1%) - ear canal laceration, infection, hearing loss, otitis externa, pain, syncope, dizziness.

### FOREIGN BODY

- children, mental handicaps.
- if present for long time, may cause discharge.
- best **removed** by raking it out with **blunt hook** or **suction tip**.
  - **forceps** tend to push smooth objects deeper into canal!



**a** A foreign body should not be extracted with tweezers or forceps, as it may slide deeper into the ear.  
**b** During examination with a microscope, a small blunt hook is positioned behind the foreign body and can extract the object without danger to the tympanic membrane or middle ear.

Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>

- foreign body lying **medial to isthmus** is difficult to remove without injuring tympanic membrane and ossicular chain!
- metal and glass beads can sometimes be removed by irrigation; **HYGROSCOPIC** foreign body (e.g. bean) swells when water is added to it, complicating its removal.

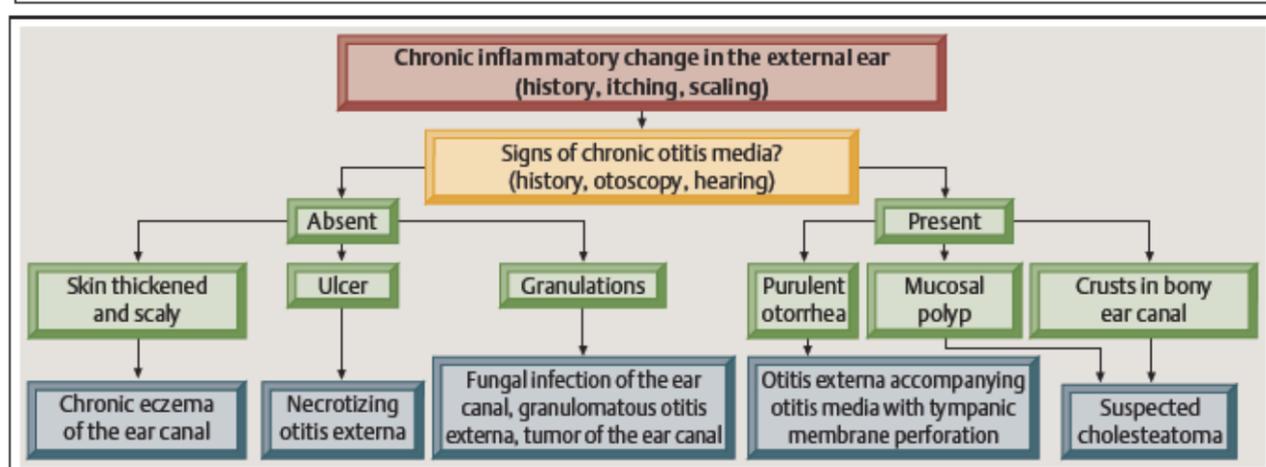
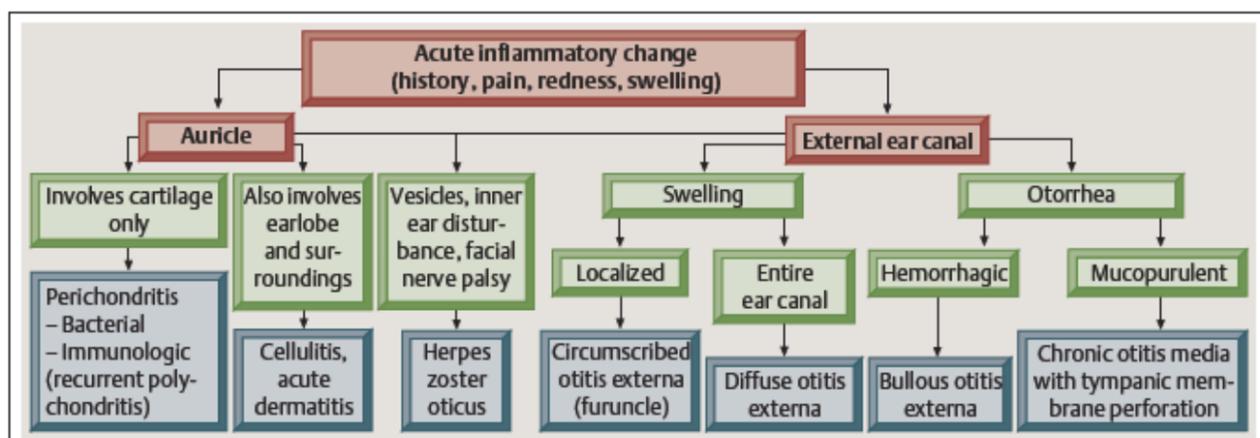
- use general anesthetic:
  - a) when child is uncooperative
  - b) when mechanical problem makes removal difficult.
- **insects** are most annoying while alive (may cause pain) - filling canal with **mineral oil** (or **lidocaine solution**) kills insect (immediate relief), and facilitates its removal with forceps.
- after removal, **antibiotic + steroid** drops prevent infection and reduce inflammation.

## EXTERNAL OTITIS

- *infectious dermatitis of* **EAR CANAL**

- a) LOCALIZED (**furuncle**); usually due to *S. aureus*
- b) DIFFUSE, affecting entire canal (**diffuse external otitis**).

- predisposing causes are **swimming** (so called *swimmer's ear*), forceful **cleaning** of ear, **trauma**.
- dermatologic persons (allergies, psoriasis, eczema, seborrheic dermatitis) are particularly prone.
- normally, ear canal cleanses itself by moving desquamated epithelium, as on conveyor belt, from tympanic membrane outward;  
cotton applicators interrupt self-cleansing mechanism; debris and cerumen trap water allowed into canal → skin maceration sets stage for invasion of pathogenic bacteria.



Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>>

### CLINICAL FEATURES

- itching, **pain** (worse on jaw movement), foul-smelling **discharge**.
- hearing loss (if canal becomes swollen or filled with purulent debris).
- **tenderness** on traction of **pinna** and on pressure over **tragus** (vs. in otitis media).
- **OTOSCOPY** - skin of ear canal is red, swollen, littered with moist, purulent debris.



Typical bullae with acute inflammation in herpes zoster oticus. The 56-year-old man also displayed clinical signs of vestibular nerve dysfunction and facial nerve palsy.

Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>>

### TREATMENT

#### Diffuse external otitis:

- 1) infected debris is gently and thoroughly removed from canal with suction or dry cotton wipes.
- 2) topical 2% **acetic acid**
- 3) topical **antibiotics** (**NEOMYCIN + POLYMYXIN B**) + **corticosteroids** (1% **HYDROCORTISONE**)
- 4) ANALGESIC (up to narcotic!)
- 5) spreading cellulitis → **systemic antibiotics**.

**Furuncles** - allow to drain spontaneously (incision may lead to spreading perichondritis of pinna!!!).

- **oral antistaphylococcal antibiotics** (topical antibiotics are ineffective!).
- analgesics.
- dry heat.

### PREVENTION

- irrigating ears with 1:1 mixture of rubbing **alcohol** (helps remove water) and **vinegar** immediately after swimming.

## PERICHONDRIITIS

- *infection of* **PERICHONDRIUM OF PINNA**

- etiology - trauma, insect bites, incision of superficial infections of pinna; usually Gr- rod.  
N.B. external ear is most common (88%) site of **relapsing polycondritis** (systemic autoimmune disease).
- cartilage blood supply is provided by perichondrium.
- pus accumulates between cartilage and perichondrium → **avascular necrosis** → **deformed pinna**.
- clinical course indolent, long-lasting, destructive.

### TREATMENT

- wide **incision** and suction **drainage** (to approximate blood supply to cartilage).
- **systemic antibiotics**.

## MALIGNANT EXTERNAL OTITIS

- ***Pseudomonas* (95%) OSTEOMYELITIS of ear canal and temporal bone.**

### CLINICAL FEATURES

- a) 90% - **elderly** (> 60 yrs) **diabetics**.
- b) young **immunosuppressed** (e.g. AIDS) patients.
- 50% cases have been reported to be preceded by **traumatic aural irrigation!**
- begins as EXTERNAL OTITIS that progresses into SKULL BASE OSTEOMYELITIS.
  - 1) persistent severe deep-seated **earache**
  - 2) foul-smelling purulent **otorrhea**
  - 3) **marked tenderness** in soft tissue between mandible ramus and mastoid tip.
  - 4)  $\pm$  **conductive hearing loss**
  - 5) **CN7 ( $\pm$  other nerves) paralysis** in severe cases.

*Pain is out of proportion to physical examination findings!!!*

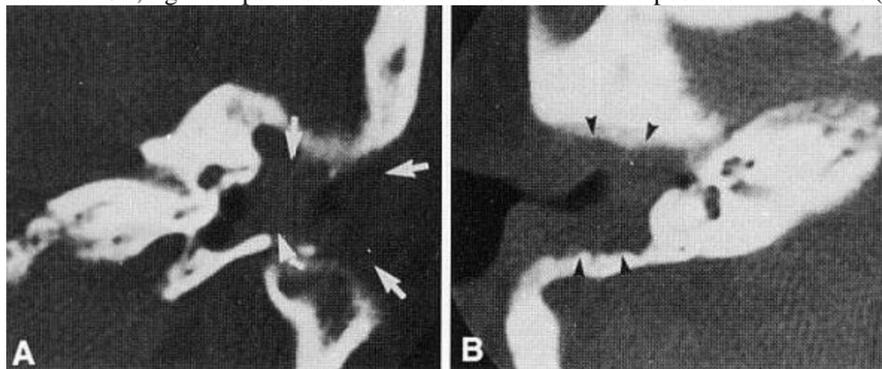
- fever is uncommon
- **osteomyelitis spreads along skull base** and **may cross midline!**
- MALIGNANT (without a/b) - aggressive clinical behavior ( $\rightarrow$  **purulent meningitis**), poor treatment outcome (poorer in AIDS than in diabetes), high mortality (40-50%; < 10% with appropriate antibiotics).
- 9-27% can recur (as long as one year after treatment is completed).

### DIAGNOSIS

- **OTOSCOPY:**
  - **granulation tissue** in ear canal (granulation tissue **at floor of osseocartilaginous junction** is virtually pathognomonic).
  - may reveal **exposed bone**.
  - tympanic membrane is usually intact.
- **imaging:**
  - a) fine-cut **CT** of skull base and temporal bone (30-50% of bone destruction is required to detect osteomyelitis by CT!).
  - b) **gadolinium-enhanced MRI** provides poor bone resolution.
  - c) **RADIOSCANS** (very sensitive but not specific; application of SPECT improves poor spatial resolution) - Technetium Tc 99 methylene diphosphonate, Gallium citrate Ga 67, Indium In 111-labeled leukocyte.
- **BIOPSY** of ear canal (to differentiate from malignant neoplasm + to identify causative organism).
- **ESR**  $\uparrow\uparrow\uparrow$  can be used to support clinical diagnosis since acute external otitis or ear canal malignancy do not cause elevation!

**A:** Coronal CT, left temporal bone - inflammatory mass (*arrows*) has destroyed ossicles and walls of external canal.

**B:** Axial CT, right temporal bone - destruction of anterior and posterior canal walls (*arrows*).



### TREATMENT

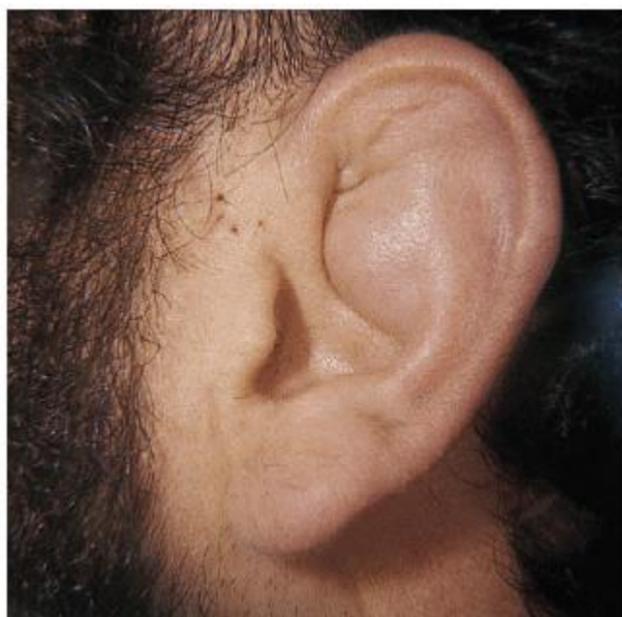
- **diabetes control**
- **antipseudomonal IV antibiotic therapy** (6-12 weeks):
  - a) **FLUOROQUINOLONE**
  - b) 3<sup>rd</sup> generation **CEPHALOSPORIN**
  - c) semisynthetic **PENICILLIN + AMINOGLYCOSIDE**.
- aural toilet, **hyperbaric oxygen therapy**.
- **response** should be evaluated with **Ga-67 scan** q4-6 weeks during treatment;
  - CT / MRI cannot determine osteomyelitis resolution!;
  - antibiotics are continued for 1 week after Ga-67 scan becomes normal.
- **surgery** is usually not helpful or necessary (reserved for granulation tissue and bony sequestra).

## TRAUMA

**Anesthesia** - raise wheal with **LIDOCAINE** (without EPINEPHRINE!!!) about entire base of ear - anesthetizes all but external canal and concha (require direct infiltration).

### SUBPERICHONDRIAL HEMATOMA

- blunt trauma to pinna.
- pinna becomes shapeless, reddish purple mass.
- **avascular cartilage necrosis** may occur.
- "**cauliflower ear**" (wrestlers, boxers) results from **organized, calcified hematoma**.
- **treatment** - promptly **evacuate** clot through incision (or aspirate with 18 G needle) + **approximate** skin and perichondrium to cartilage with suction drainage or pressure bandage for 5-7 days (to keep cartilage close to its blood supply).
  - often reaspiration is necessary.



### LACERATIONS

- managed surgically:

- skin margins are sutured (sutures should not extend into cartilage!).
  - use absorbable sutures on medial surface (to avoid having to bend ear back to remove those sutures).
- *if cartilage is involved*, minimal debridement and approximation of cartilage and perichondrial layer with fine absorbable suture should precede skin closure.
  - if there is skin loss, small amount of cartilage may be removed to allow skin coverage.
  - if skin loss is significant, remaining cartilage is removed and saved in subcutaneous pocket for later use.
- *all significant ear injuries should be splinted* following repair: wet (benzoin-impregnated) cotton balls are packed about ear to give support; ear and head are then wrapped with circumferential protective dressing.
  - N.B. ear should not be bandaged against skull without padded splinting (→ severe pain, cartilage necrosis).
- **staphylocidal antibiotic!** (relative avascularity of cartilage - risk of smoldering chondritis).
- **EXTERNAL CANAL** lacerations - managed by *microscopically* placing any skin flaps in their normal position, *packing* ear canal, administering *topical antibiotic* drops.

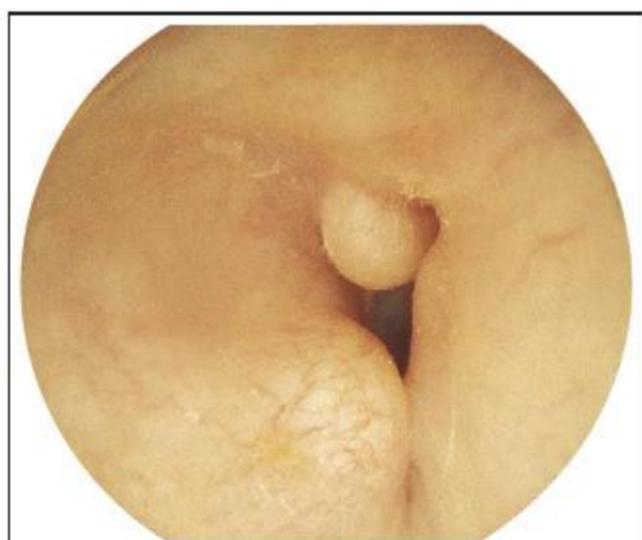
**FRACTURES**

- forceful **blows to mandible** may be transmitted to anterior wall of ear canal.
- displaced fragments (may cause canal stenosis) must be **reduced / removed**.

**TUMORS**

**Sebaceous cysts, osteomas, exostoses, keloids** may occlude ear canal:

- 1) retention of cerumen → conductive hearing loss.
  - 2) retention of water → external otitis.
- excision is treatment of choice.



Hyperostoses and exostoses of the left auditory canal. A typical, spherical exostosis is visible superiorly, and the ear canal is markedly narrowed inferiorly by hyperostoses.

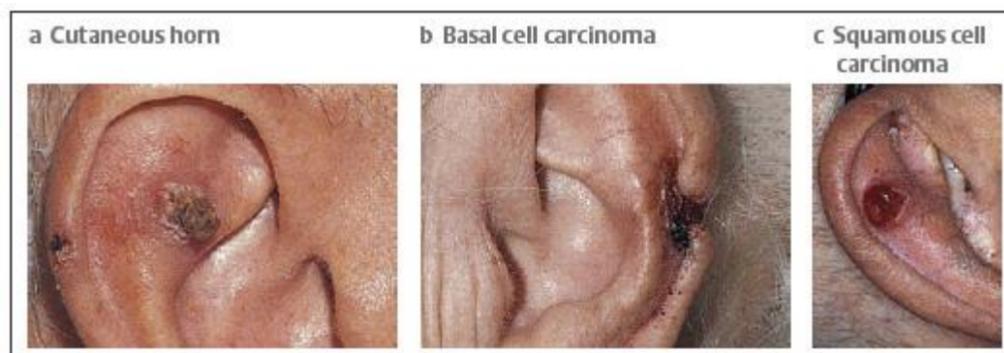
Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>

**Ceruminomas** arise in outer third of ear canal.

- appear benign histologically, but *behave in malignant manner* - should be excised widely.

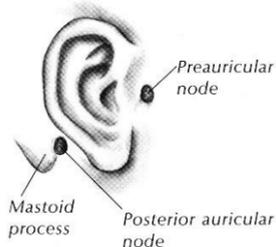
**Basal cell, squamous cell carcinomas** on *pinna* after regular sun / radiation exposure; in *ear canal* after persistent inflammation in chronic otitis media.

- EARLY LESIONS - cautery and curettage or radiation therapy.
- ADVANCED LESIONS:
  - pinna* → **V-shaped excision**.
  - ear canal* → resection:
    - tumor 5 mm lateral to eardrum → **external canal excision**;
    - tumor impinges on eardrum without middle ear invasion → **lateral temporal bone resection**;
    - tumor invades middle ear → **total en bloc temporal bone resection**.
- **cartilage invasion** makes radiation therapy less effective and surgery preferred treatment.



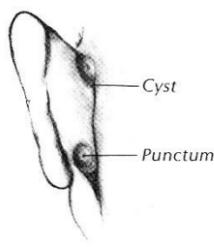
Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>

**LYMPH NODES**



Small lymph nodes just anterior to the tragus or overlying the mastoid process are quite common. Although sometimes visible, they are best detected by palpation.

**SEBACEOUS CYSTS**



Sebaceous cysts are common, especially behind the ear. They are characteristically *in* rather than beneath the skin and often show a central black dot or punctum which identifies the opening of the blocked sebaceous gland.

**KELOID**



A keloid, which is a nodular, hypertrophic mass of scar tissue, may develop in an ear-lobe pierced for earrings. Keloids are especially common in black people.

**TOPHUS**



Tophi are deposits of uric acid crystals characteristic of gout. They appear as hard nodules in the helix or antihelix. They occasionally discharge white chalky crystals.

**DARWIN'S TUBERCLE**



A small elevation in the rim of the ear, a Darwin's tubercle is a harmless congenital variation from normal—the equivalent of the tip of a mammalian ear. It should not be mistaken for a tophus.

**CHONDRODERMATITIS HELICIS**



This entity is characterized by a small, chronic, painful, tender nodule in the helix of the ear. It usually affects men, involving the right ear more often than the left. It may be confused with a tophus or skin cancer. Biopsy is important.

Source of picture: Barbara Bates "A Guide to Physical Examination", 3<sup>rd</sup> ed. (1983); J.B. Lippincott Company; ISBN-13: 978-0397543991 >>

BIBLIOGRAPHY for ch. "Otology" → follow this [LINK](#) >>

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**Viktor's Notes<sup>SM</sup> for the Neurosurgery Resident**  
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