

External Ear Disorders

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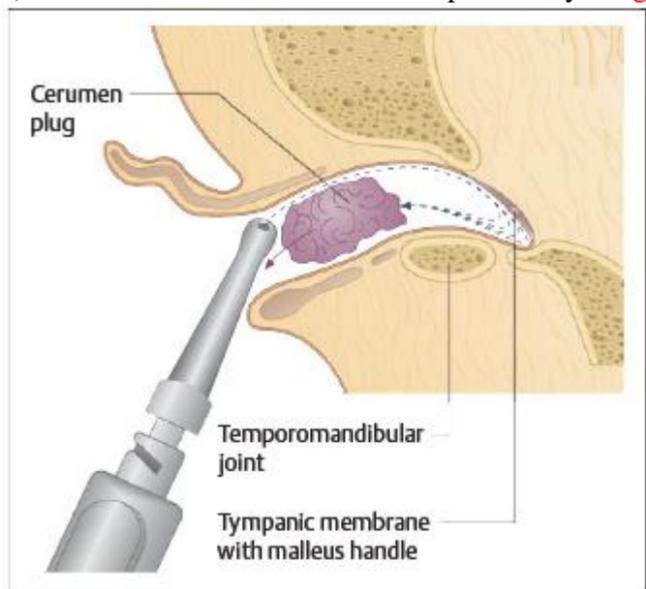
OBSTRUCTIONS

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**.

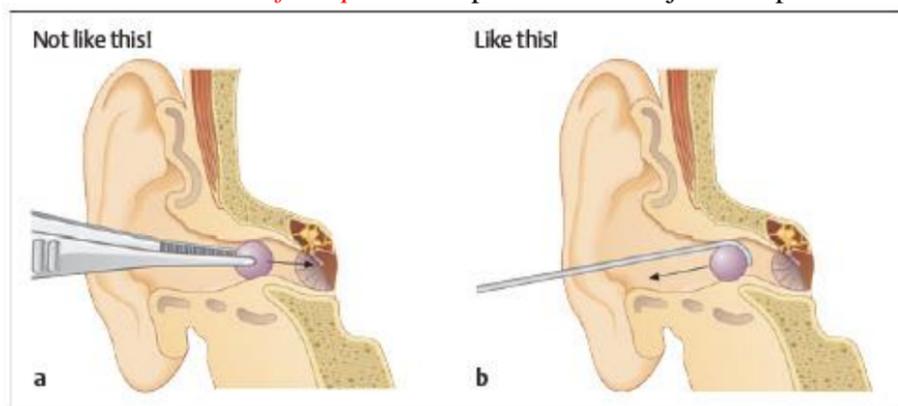


The diagram shows a transverse section through the ear canal. The irrigation jet is directed posteriorly and superiorly.
 Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>

- **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.

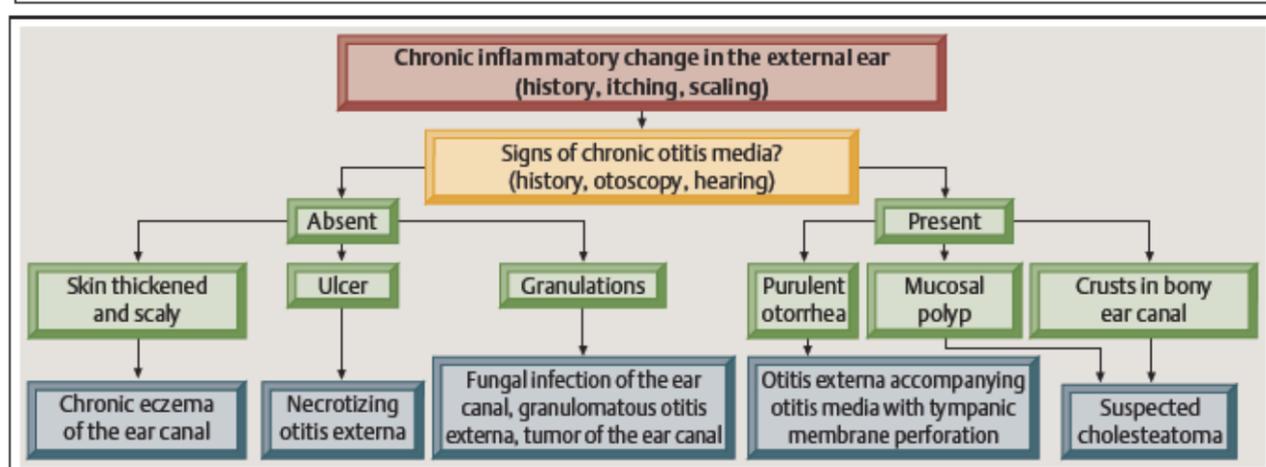
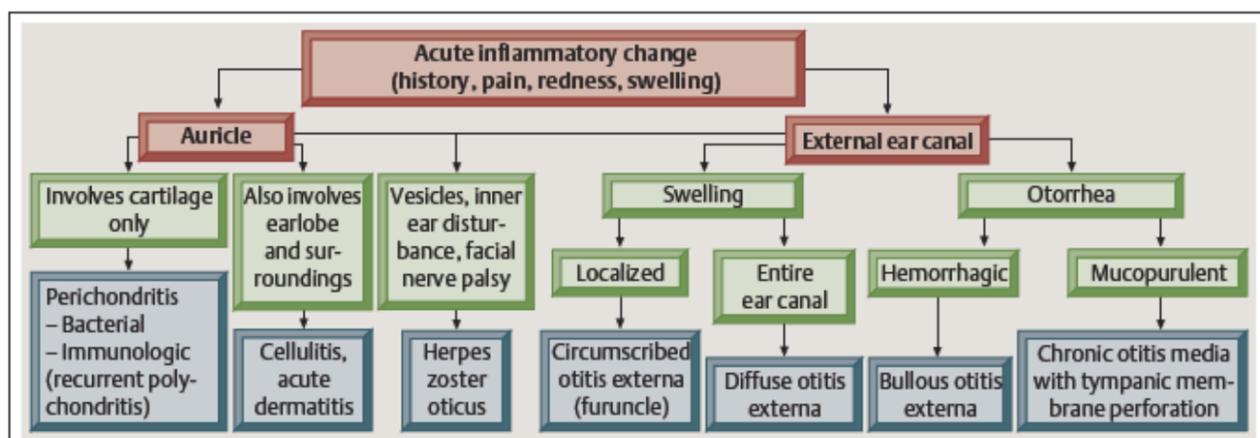
- use general anesthetic:
 - a) when child is uncooperative
 - b) when mechanical problem makes removal difficult.
- **insects** are most annoying while alive (may cause pain) - filling canal with **mineral oil** (or **lidocaine solution**) kills insect (immediate relief), and facilitates its removal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

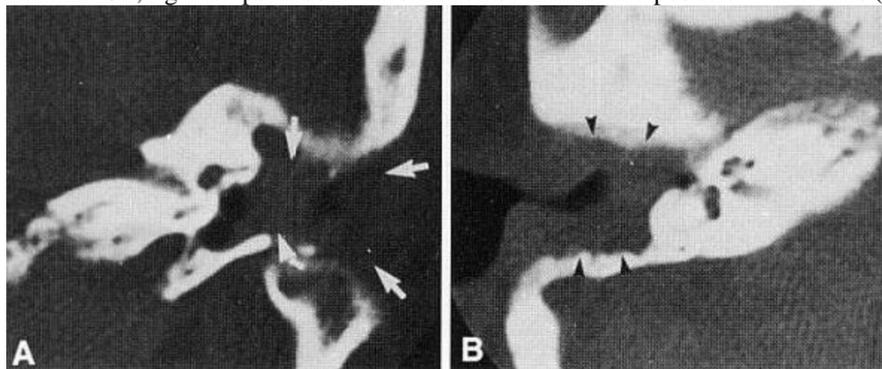
- fever is uncommon
- **osteomyelitis spreads along skull base** and **may cross midline!**
- MALIGNANT (without a/b) - aggressive clinical behavior (\rightarrow **purulent meningitis**), poor treatment outcome (poorer in AIDS than in diabetes), high mortality (40-50%; < 10% with appropriate antibiotics).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

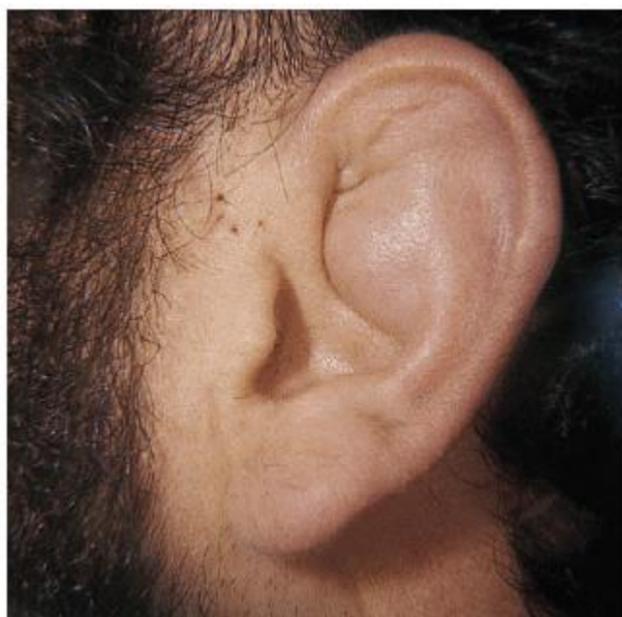
- **diabetes control**
- **antipseudomonal IV antibiotic therapy** (6-12 weeks):
 - a) **FLUOROQUINOLONE**
 - b) 3rd generation **CEPHALOSPORIN**
 - c) semisynthetic **PENICILLIN + AMINOGLYCOSIDE**.
- aural toilet, **hyperbaric oxygen therapy**.
- **response** should be evaluated with **Ga-67 scan** 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.

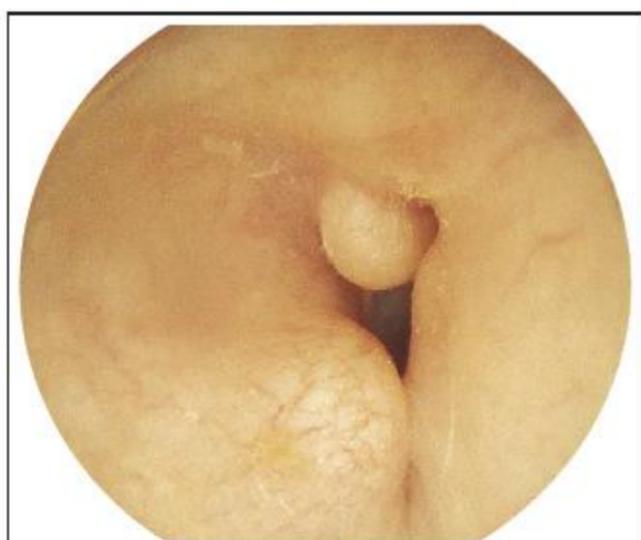
FRACTURES

- 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.

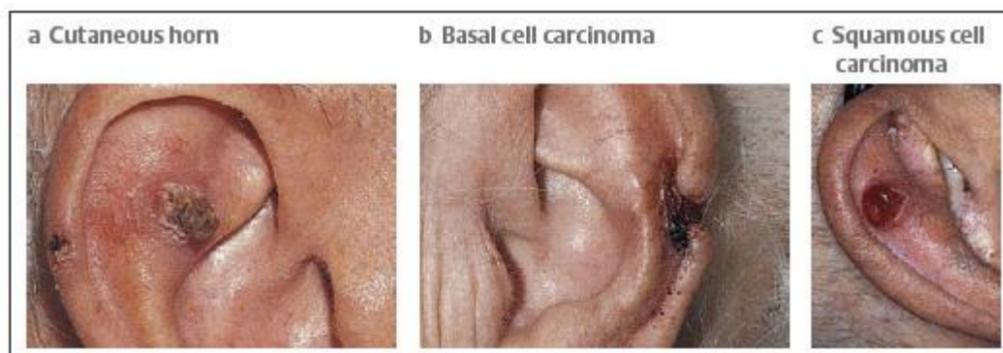
Source of picture: Rudolf Probst, Gerhard Grevers, Heinrich Iro "Basic Otorhinolaryngology" (2006); Georg Thieme Verlag; ISBN-13: 978-1588903372 >>

Ceruminomas arise in outer third of ear canal.

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

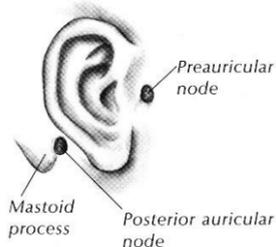
Basal cell, squamous cell carcinomas on *pinna* after regular sun / radiation exposure; in *ear canal* after persistent inflammation in chronic otitis media.

- 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.



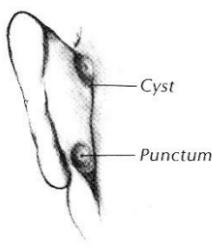
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LYMPH NODES



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", 3rd ed. (1983); J.B. Lippincott Company; ISBN-13: 978-0397543991 >>

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