

Preauricular pits and sinuses are congenital anomalies located in or just in front of the ascending limb of the helix (*Figure 1*).



Figure 1: A typically located preauricular sinus (<http://pinna.hawkelibrary.com/pitsandsinuses>)

They may discharge desquamated keratin debris. Although more common on the right, they may be bilateral. The incidence varies, being as high as 10% in parts of Africa. Preauricular sinuses may be sporadic or inherited (autosomal dominant trait with incomplete penetrance and variable expression) and may be associated with branchio-oto-renal syndrome.

Even though excising a sinus is a relatively minor surgical procedure, recurrence is not uncommon if an adequate resection is not done. Surgery is only indicated when it is complicated by recurrent infection or abscesses (*Figures 2, 3*). An abscess should first be aspirated with a needle and fully treated with antibiotics before surgery is contemplated.

A preauricular cyst should not be confused with a 1st branchial cleft remnant. Misdiagnosing a 1st branchial cleft remnant as a preauricular sinus tract may place the facial

nerve at risk, and incompletely excising a sinus tract. See chapter: [Resecting branchial cysts, fistulae and sinuses](#).



Figure 2: Preauricular sinus abscess. Note puncture wound from needle aspiration



Figure 3: Suppurated lymph node associated with an infected preauricular sinus (<http://pinna.hawkelibrary.com/pitsandsinuses>)

Embryology

The auricle originates from 6 auricular hillocks; numbers 1-3 originate from the 1st branchial arch and 4-6 from the 2nd arch (*Figures 4-6*). The external auditory meatus is derived from the 1st branchial cleft.

The hillocks may not fuse completely and leave sinuses between them, most commonly between the tragus and root of the helix, or between the antihelix and helix. It has also been postulated that infolding of ectoderm during development of the auricle may be the cause.

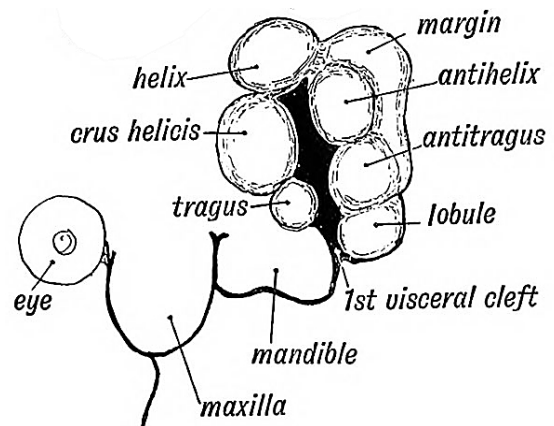
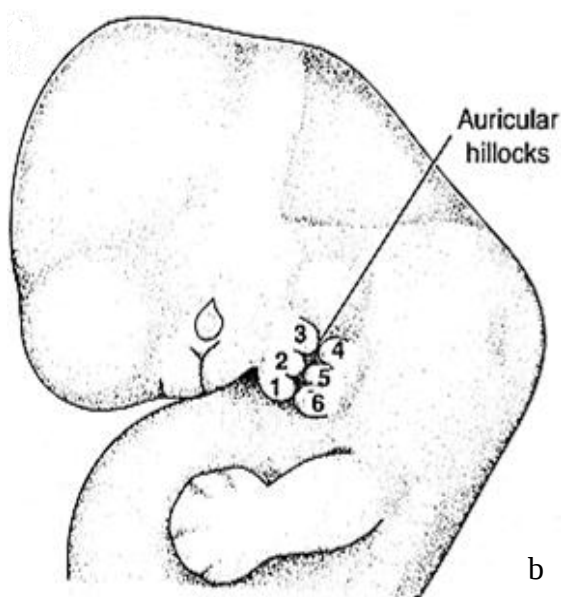


Figure 5: Contributions of hillocks to auricle



Figures 4a, b: Six auricular hillocks at 6 weeks' gestation¹

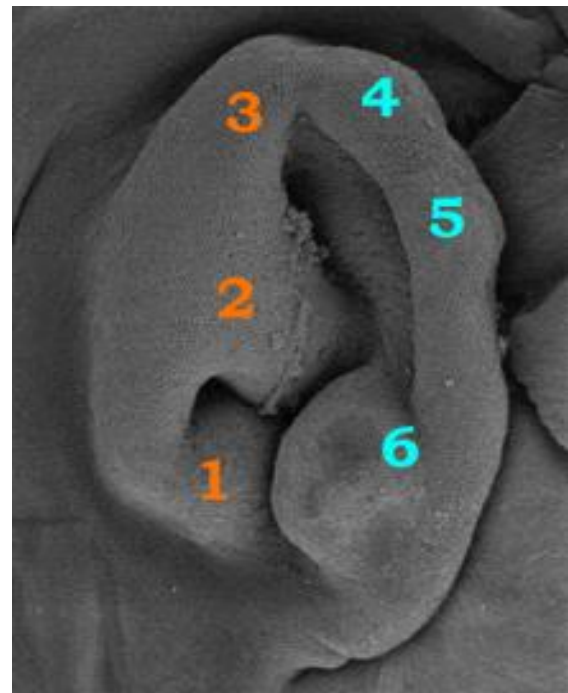


Figure 6: Contributions of hillocks to auricle as seen at 9 weeks' gestation¹

Anomalous development of hillocks 1-3 may also cause supernumerary hillocks and preauricular tags.

Recommended embryology website:
[https://embryology.med.unsw.edu.au/embryology/index.php?title=Hearing - Outer Ear Development](https://embryology.med.unsw.edu.au/embryology/index.php?title=Hearing_-_Outer_Ear_Development)

Histopathology

Excised sinuses are lined by stratified squamous epithelium surrounded by connective tissue with evidence of chronic inflammation. The tract may be of variable length, have a tortuous course, and exhibit extensive branching.

Surgical anatomy

The sinus **remains superficial to temporalis fascia and terminates very close to, or is adherent to, the cartilage of the helix.** The surgeon must be familiar with the following anatomical structures: facial nerve (Figures 7, 8), superficial temporal artery and vein (Figure 8), auricular cartilage (Figure 9) and temporalis fascia (Figure 10).

Facial nerve

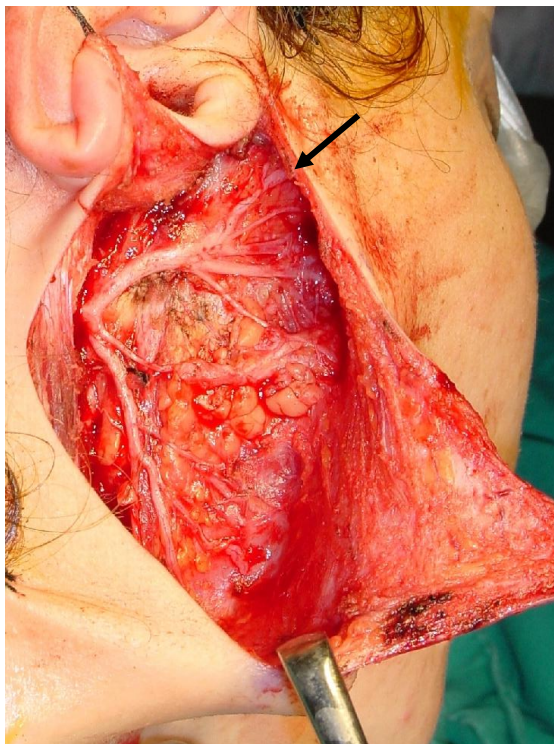


Figure 7: Note the position of the frontal branch of the facial nerve (arrow)

Unlike 1st branchial cleft anomalies, preauricular sinuses/cysts are located superior and lateral to the facial nerve and parotid gland. The trunk of the nerve is located far inferior and deep to the normal surgical field. The frontal branch of the facial nerve crosses superficially over the zygomatic arch and is at risk of injury only if the surgeon strays anteriorly during the resection.

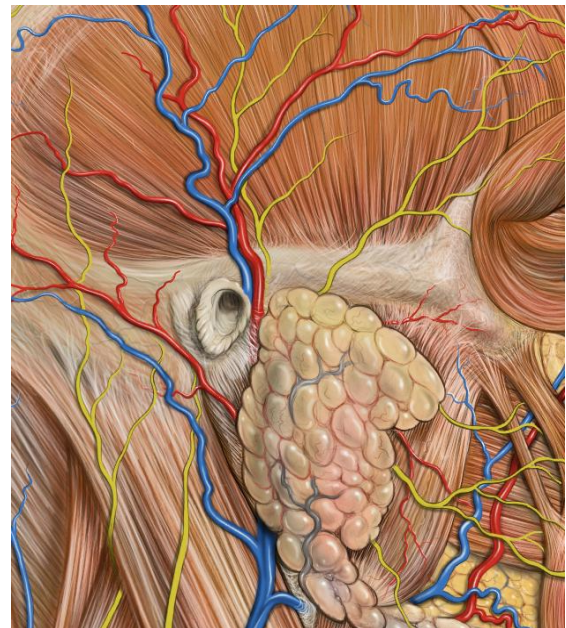


Figure 8: Superficial temporal artery and vein and frontal branch of the facial nerve

Superficial temporal artery and vein

These two vessels are seen in Figure 8. If they are lacerated, bleeding is easily controlled by simply ligating the vessel(s).

Auricular cartilage (Figure 9)

Preauricular sinuses and cysts are closely associated with the auricular perichondrium. *Dunham et al* reported that the histologic distance between excised preauricular epithelial sinus tracts and adjacent auricular cartilage measured <0.5mm in >50% cases, and that the epithelial tract was in continuity with stromal tissue and histologically indistinguishable from perichondrium in nearly all these cases. Hence

some advocate removing a small portion of auricular cartilage adjacent to the sinus tract to ensure a thorough excision and to reduce recurrence rates.



Figure 9: Auricular cartilage superimposed on the ear

Temporalis fascia (Figure 10)

The temporalis fascia forms the deepest plane of the dissection. The frontal branch of the facial nerve traverses the superficial temporal fat pad some distance anteriorly (Figure 10).

Preoperative investigations

CT or MRI imaging is not indicated unless a sinus is atypically located, or a branchial cleft remnant is suspected.

Surgical principles

Recurrence rates following simple sinusectomy (elliptical incision around sinus and

dissection of tract in subcutaneous tissues) of up to 40% have been reported.

Some advocate injecting methylene blue into the cyst or sinus, but the dye often contaminates the surgical field. Others favour probing the tract with a lacrimal probe, although a lacrimal probe may cause a false tract and cannot identify small branches.

The author uses neither technique and does not attempt to identify the actual sinus tract.



Figure 10: The temporalis fascia constitutes the deep dissection plane; note the superficial temporal fat pad anteriorly

Steps taken to reduce recurrence include

- Operate under optimal conditions
 - Wait for infection to settle
 - General anaesthesia without muscle paralysis (to detect stimulation of facial nerve)

- Completely excise the sinus tract with the surrounding tissue
 - Wide exposure: supra-auricular extension of preauricular incision
 - Do not attempt to identify and excise only the sinus tract, but widely resect all the subcutaneous tissue between temporalis fascia and helix
 - Posterior boundary: auricular cartilage
 - Anteromedial boundary: parotid fascia
 - Deep boundary: temporalis fascia
 - Excise neighbouring perichondrium and/or cartilage of the helix

Surgical steps

- Make a vertical elliptical skin incision around the sinus opening (*Figure 11*)
- Extend the incision superiorly into the supra-auricular area (good exposure and hides incision); note the position of the facial nerve (*Figure 11*)
- Dissect (sharp or electrocautery) down to temporalis fascia both anterior and superior to the sinus opening (*Figure 12*)
- Dissect the soft tissues off the temporalis fascia which constitutes the deep dissection plane, in a posteroinferior direction (*Figure 13*)
- Identify the cartilage of the helix (*Figure 13*)
- Dissect along the cartilage, keeping deep to perichondrium (*Figure 14*)
- Excise a slither of cartilage deep to the apex of the preauricular sinus (*Figure 14*)
- Resect the specimen (*Figures 15, 16, 17*)
- Irrigate the wound
- A small drain may be left *in situ*
- Suture the wound in layers

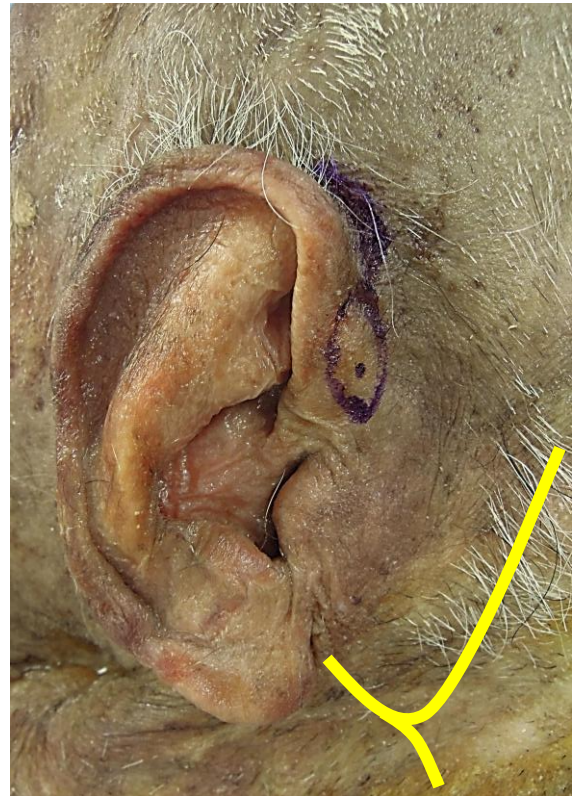


Figure 11: Elliptical incision with supra-auricular extension; approximate position of facial nerve in yellow

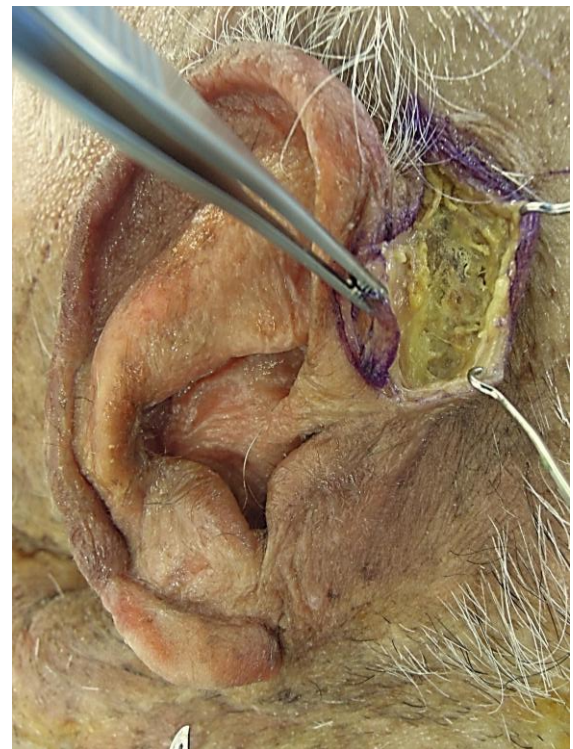


Figure 12: Dissecting down to temporalis fascia

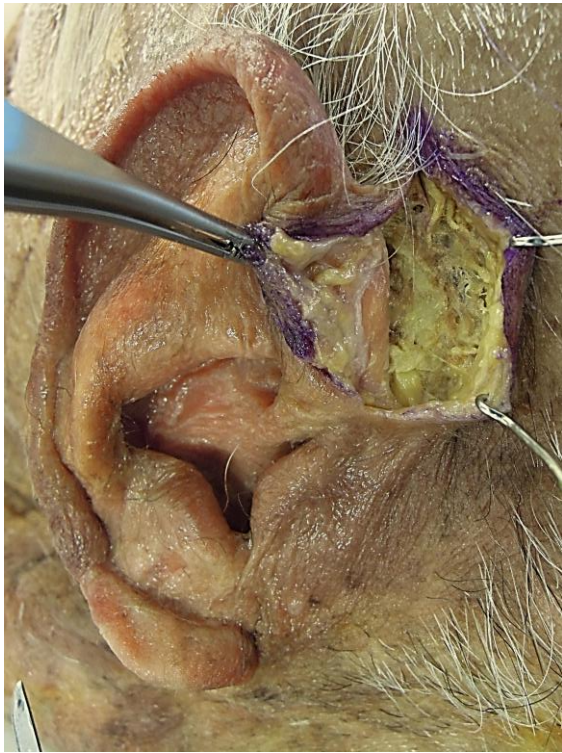


Figure 13: Dissecting along temporalis fascia up to cartilage of helix



Figure 15: Final part of dissection including an island of helical cartilage

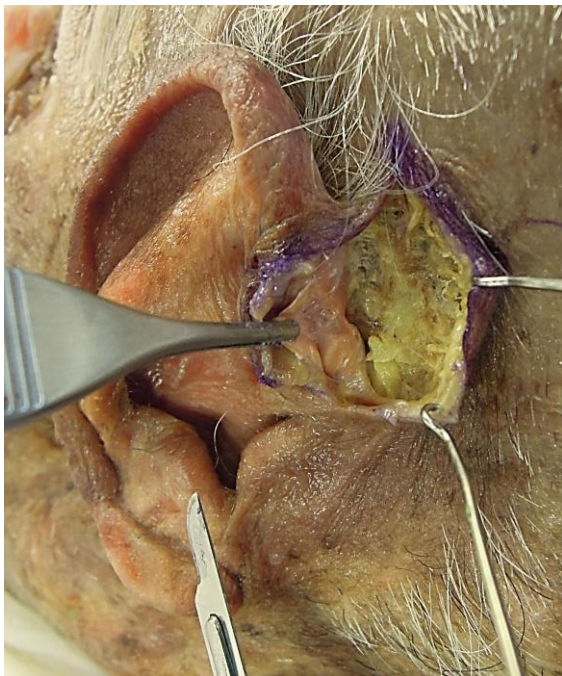


Figure 14: Slither of helical cartilage excised at apex of sinus tract



Figure 16: Surgical defect following excision of slither of cartilage at the apex of preauricular sinus

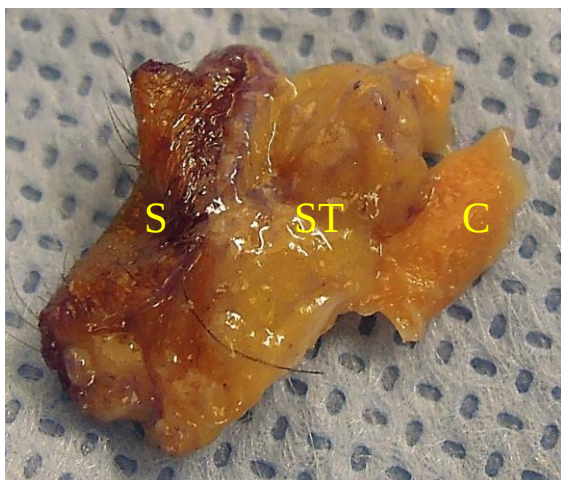


Figure 17: Specimen: skin (S), soft tissue containing preauricular sinus (ST) and cartilage (C)

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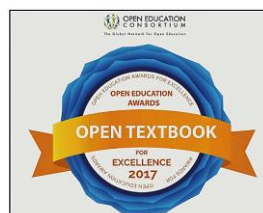
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