



SURGICAL MANAGEMENT OF AURICULAR AND PERI-AURICULAR CUTANEOUS MALIGNANCY

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The head and neck region is vulnerable to developing cutaneous malignancy from ultraviolet (UV) light exposure that commonly occurs to this region. Cutaneous malignancies of the auricle and the surrounding region (peri-auricular) can be challenging to treat as these tumours can be aggressive. Examination and management of the often-associated complex anatomy in this area may be difficult for primary care and dermatology providers. As such, these patients are often referred to otolaryngology/head and neck surgery who have the required training and expertise to provide surgical treatment.

Basal cell carcinoma (BCCA) and squamous cell carcinoma (SCCA) are the most common cutaneous malignancies in the auricular and periauricular regions. More aggressive tumours, including melanoma and Merkel cell carcinoma are less common. The most common cutaneous malignancy on UV exposed areas of the auricle and periauricular regions are BCCA, while SCCA is the most common malignancy in the non-UV light exposed EAC. In a review of the senior author's ten-year experience treating 387 patients with periauricular malignancies, 43% were SCCA, 41% were BCCA, 10% were melanoma, and < 1% were Merkel cell carcinoma.

Preoperative evaluation

Preoperative evaluation begins with a thorough history, being certain to assess for risk factors such as significant UV exposure, prior cutaneous malignancy, tobacco use, and use of immunosuppressive medications.

A comprehensive head and neck physical exam must be performed. Examination of the facial nerve is of great importance. The

irregular surfaces, folds, and recesses of the external ear, including the postauricular crease, must be thoroughly inspected. Despite not being typically exposed to UV light, the external auditory canal (EAC) and tympanic membrane must be closely examined with an otoscope, endoscope, or ideally a binocular microscope.

Whenever possible, biopsies done by outside providers should be obtained and reviewed. If any questions about the diagnosis exist, repeat preoperative biopsies should be taken in the clinic at the time of the first clinical encounter.

Computed tomography (CT) imaging for larger and more aggressive cutaneous malignancies of the auricular and peri-auricular locations is recommended when available to assess for extent of disease to associated structures i.e., parotid, mastoid or EAC bone etc. and to detect nodal disease. Depending on the extent and location of the tumour, other imaging may be necessary i.e., chest CT or CXR to evaluate for distant metastasis. If temporal bone involvement is suspected, a dedicated CT is helpful. Magnetic resonance imaging (MRI) may be necessary when there is suspected facial nerve involvement or intracranial extension. Positron emission tomography (PET) can be used to assess for distant metastases.

Auricular and Periauricular Anatomy

Surface anatomy of the auricle (Figure 1)

The auricle primarily serves to capture sound waves and direct them to the tympanic membrane through the EAC. The auricle is primarily composed of elastic cartilage covered by skin (keratinized squamous cell epithelium). Only the lobule is not supported by cartilage and is compos-

ed of areolar connective tissue. The outer, concave curvature of the cartilaginous auricle is known as the helix. The second, convex curvature running in parallel to the helix is known as the antihelix. The tragus is the cartilage prominence anterior to the meatus of the EAC. The hollow portion in the center of the auricle leading to the meatus of the EAC is known as the concha cavum, conchal bowl, or simply concha. The lateral one-third of the EAC is composed of cartilage with overlying skin, and the medial two-thirds are formed by bony EAC of temporal bone also covered with skin. These and other subsites of the auricle are labelled in *Figure 1*.

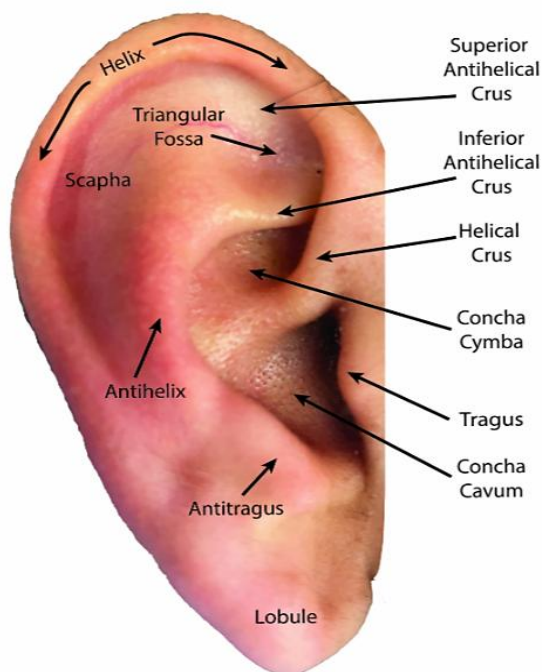


Figure 1: Subsites of the auricle

Lymphatics, vasculature, and innervation

Primary blood supply to the external ear is via branches of the external carotid artery, particularly the posterior auricular, superficial temporal, and occipital arteries. Venous drainage can be variable and typically involves the internal and external jugular systems. The superficial parotid, mastoid, upper deep cervical, and superficial cervical lymph nodes form the lymphatic drainage basin for the external ear. Sensory inner-

vation to the auricle is complex. Branches of the cervical plexus, including the great auricular nerve and lesser auricular nerve innervate the skin of the auricle. The auriculotemporal nerve, a branch of the mandibular nerve (trigeminal nerve; V3), innervates the skin of the auricle and portions of the EAC. Branches of the facial (CN VII) and vagus (CN X) nerves also contribute to innervation of the EAC.

Surgical options for periauricular malignancies

Wide Local Excision (WLE)

Wide local excision is indicated for small, superficial tumours of the auricle or periauricular skin that may involve deeper auricular cartilage (leading to an *en bloc* resection of the skin/lesion and the underlying auricular cartilage to clear the deep margin) but do not involve deeper structures such as the parotid gland. For tumours involving the periauricular skin, a 5mm margin (for BCCA) or 10mm margin (for SCCA, melanoma, Merkel cell) around the gross tumour edge is excised to the subcutaneous layer. For tumours involving the auricle, the same 5-10 mm margin depending on the tumour pathology is excised around the gross tumour along with the underlying cartilage layer *en bloc* as the deep margin. The skin of the auricle on the opposite side of the tumour is left intact when there is grossly no tumour involvement. If available, intraoperative frozen section pathology analysis should be performed on the margins for BCCA and SCCA tumours. For melanoma, permanent margins should be sent in place of frozen sections.

Partial/Subtotal/Total auriculectomy

A partial/subtotal or total auriculectomy is indicated for tumours of the auricular skin involving the cartilage or the entire thickness of the auricle (*Figures 2a-c, 3a,b*).



Figures 2a-c: Images of tumours requiring partial auricectomy. a: SCCA of skin overlying the antihelix; b: BCCA involving helical crus; c: Recurrent SCCA involving remnant concha cyma



Figures 3a,b: Recurrent SCCA requiring partial auricectomy. a: Tumour with 10mm margin marked in remnant concha cyma area; b: Defect following tumour excision. This defect was reconstructed using a split-thickness skin graft

The cartilage as well as the skin on either side of the involved portion of the auricle is excised along with a 5mm (BCCA) or 10mm (SCCA) surgical margin around the gross tumour edge. If available, intraoperative frozen section analysis should be performed on the margins for BCCA and SCCA tumours. A subtotal auricectomy involves excision of multiple auricle subunits, as dictated by tumour involvement. A total auricectomy may be indicated in larger tumours and includes excision of the entire auricle to the bony EAC, up to and including the tragus, the crus or root of the helix and the lobule. When it is safe and feasible, uninvolved auricular subunits should be spared as they may be advanta-

geous for cosmesis, reconstruction, and/or function (i.e., sparing of root of the helix may allow the patient to comfortably continue to wear eyeglasses after surgery).

EAC Sleeve Resection

Sleeve resection, or the removal of ear canal skin typically from both the bony and cartilaginous portions of the EAC, is indicated for less aggressive cutaneous tumours (i.e., BCCA) limited to the skin of the EAC without involvement of the underlying bony canal. Tumours in this area are often difficult to diagnose and may present to the otolaryngologist at an advanced stage.

- Sleeve resection may be performed using a microscope or endoscope
- Incise the EAC skin lateral to tumour, leaving a 5-10 mm margin
- Medially, the EAC skin is typically incised at the level of the tympanic annulus
- Additional incisions can be made around the tumour if it does not involve the entire circumference of the EAC
- Elevate the skin off the underlying bone and/or cartilage *en bloc* without disrupting the tumour
- Carefully orientate (medial vs lateral) the specimen for histopathologic margin analysis
- Performed frozen section analysis intra-operatively when possible
- These defects are often reconstructed using a split thickness skin graft (see below)

Lateral temporal bone resection (LTBR)

LTBR is performed for aggressive tumours (SCCA) involving the bony EAC or tympanic membrane surface. Please refer to the chapter titled “[Lateral Temporal Bone Resection Surgical Technique](#)” for more details on this procedure.

Parotidectomy

Tumours involving the auricle and EAC can extend anteriorly into the parotid gland, particularly in patients with a patent foramen of Huschke in the bony EAC or patent Fissures of Santorini in the cartilaginous EAC. Cutaneous tumours of the preauricular or infra-auricular skin can extend into the parotid gland on the deep surface.

Concurrent superficial or total parotidectomy may therefore be required for cutaneous malignancies that involve the parotid gland via direct extension, or when sampling of the parotid lymph nodes is required to achieve locoregional control. Please refer to the chapter titled “[Parotidectomy](#)” for further details.

Surgeons should be aware that tumour infiltration may alter the anatomic landmarks that are often used to identify the main trunk of the facial nerve during parotidectomy. The descending or mastoid segment of the facial nerve can be safely identified by performing a mastoidectomy and traced to the stylomastoid foramen in most of these cases. If the tumour involves the facial nerve, the disease must be cleared from the nerve and confirmed with histopathologic analysis before reconstruction with cable grafting is performed.

Sentinel lymph node biopsy (SLNB)

Sampling of the first echelon lymph nodes by SLNB should be considered in certain auricular and periauricular malignancies treated in settings where nuclear medicine and lymphoscintigraphy are available. SLNB may be offered to patients who have no clinical evidence of nodal metastasis with melanoma that is $> 0.8\text{mm}$ in thickness or melanoma $\leq 0.8\text{mm}$ in thickness with high-risk features such as ulceration, high mitotic rate, young age, or lymphovascular invasion. SLNB can also be considered in patients without clinical or radiographic evidence of nodal metastasis presenting

with SCCA > 2cm in diameter. Please refer to the chapter titled “[Sentinel Lymph Node Biopsy Techniques for Cutaneous & Mucosal Malignancy of the Head & Neck](#)” for further details.

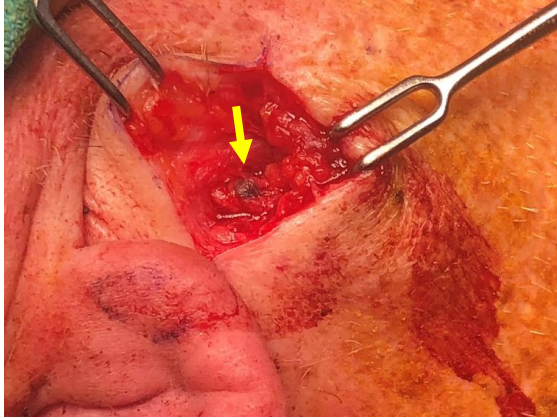


Figure 4: Intraoperative photograph during SLNB. Sentinel node (marked by arrow) visible due to methylene blue dye uptake

Selective neck dissection (SND)

Removal of appropriate lymph nodes with a SND is performed for patients with clinical nodal metastasis, positive SLNB, or advanced SCCA. Typically for aggressive and advanced auricular and periauricular malignancies, SND of levels II-V is performed. Superficial parotidectomy should also be performed in patients receiving SND to sample the parotid lymph nodes. Please refer to the chapter titled “[Selective Neck Dissection](#)” for further details.

Reconstructive options for periauricular malignancies

Primary closure

Small defects of pre-, infra-, or post-auricular skin after WLE may be amenable to primary closure. When possible, surgeons can attempt to place the incision line in a skin crease or parallel to relaxed skin tension lines to optimize cosmesis.

Secondary intention

Small defects in the concave portions of the auricle after WLE may be allowed to heal by secondary intention. Scarring because of healing by secondary intention may alter the shape of the auricle. Healing by secondary intention of the concha near the EAC meatus should be avoided to prevent possible stenosis that then may require a relief of stenosis with a second WLE and skin graft repair. The patient should be capable of performing adequate wound care. The wound should be kept moist with ointment while it heals.

Full-thickness skin graft (FTSG)

To repair surgical defects not immediately adjacent to the meatus of the EAC, a FTSG may be useful. FTSG is especially useful for reconstruction of defects near the root of the helix, where the auricle skin is thicker. FTSG can be harvested from the supraclavicular fossa as this area is typically within the surgical field and presents very limited donor site morbidity. An appropriately sized skin graft is harvested to the level of the subcutaneous layer. The donor site is then closed primarily. The undersurface of the skin graft is thinned to the dermis layer using scissors. The graft is secured to the donor site using absorbable suture, if available, and a gauze bolster dressing is placed to apply pressure to the graft for 1-2 weeks as it heals.

Split-thickness skin graft (STSG)

Reconstruction of defects of the anterior surface of the auricle, external auditory meatus, and EAC (after sleeve resection) can be accomplished with a STSG.

- Measure the size of the defect
- Harvest the graft e.g. from the post-auricular skin or upper thigh
- The graft can be harvested manually to the level of the dermis using a #10 scalpel blade or an air or electric powered

dermatome set to harvest a graft of approximately 0.2-0.4mm thickness

- Carefully identify the dermal surface of the graft to ensure it is properly oriented when placed in the defect
- For auricle defects, suture the graft into place with absorbable suture and apply a bolster dressing to the surface for 1-2 weeks as it heals (*Figures 5a, b*)
- Place a foam wick in the EAC if the defect involves the concha to prevent meatal stenosis
- For defects in the EAC, carefully lay the graft against the canal wall
- For larger defects in the EAC, multiple strips of the graft may be used to obtain coverage in a piecemeal fashion
- Ensure that the grafts are flat and do not overlap to avoid possible delayed development of an EAC cholesteatoma
- Secure the grafts with a foam wick (Ambrus pack) treated with antibiotic and steroid ear drops in the EAC



Figures 5ab: Patient with SCCA of auricle requiring subtotal auricectomy: a: Pre-operative image of tumour; b: Postoperative

ve image following subtotal auricectomy and split-thickness skin graft.

Cervicofacial advancement flaps (CFAF)

A CFAF is an excellent reconstructive option for medium-to-large tumours that result in significant facial defects, particularly in the preauricular bed. It is especially useful for tumours in which parotidectomy and/or SND are required as raising the CFAF in a subplatysmal plane provides the necessary exposure for these operations. Incisions must be carefully planned so that a broadly based flap that provides adequate coverage can be raised. Please refer to the chapter titled "[Cervicofacial Flaps in Head and Neck Reconstruction](#)" for further details.

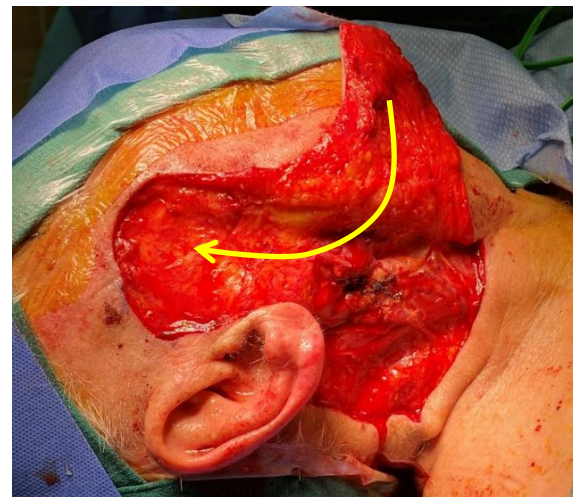
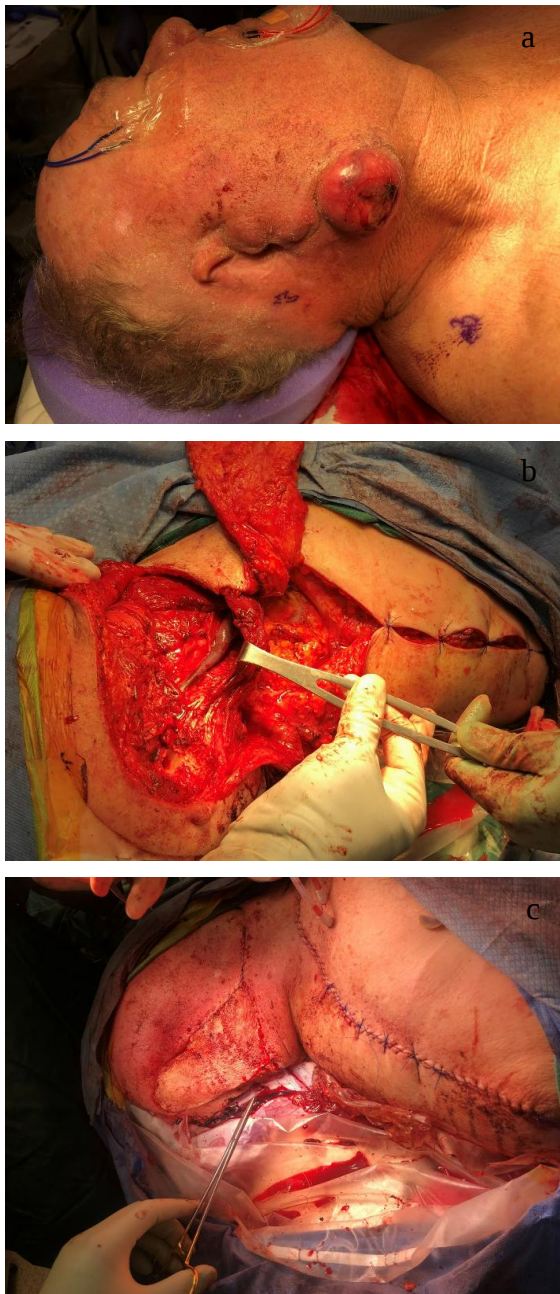


Figure 6: CFAF elevated following WLE of preauricular SCCA and parotidectomy. The flap was rotated into the preauricular defect as indicated by the yellow arrow

Supraclavicular artery island flap

The SCAIF may be used for large auricular and peri-auricular defects. The SCAIF is relatively thin and pliable. The pedicle length and composite flap (fat and skin) makes it well-suited for total auricectomy and LTBR defects extending to the temporal scalp. The flap is pedicled on the supraclavicular artery, which is a branch of the transverse cervical artery, stemming

from the subclavian circulation. Dissection of the pedicle is typically not required, making the procedure simpler and safer. There is an extended donor site incision which has rare potential for morbidity (i.e., hematoma, dehiscence). Please refer to the chapter titled “[Supraclavicular Flap for Head & Neck Reconstruction](#)” for further details.



Figures 7a-c: Reconstruction with SCAIF.
a: Preoperative image showing large recurrent periauricular SCCA; b: Defect following WLE, completion auriculectomy, parotidectomy, SND, and elevation of

SCAIF. The sternocleidomastoid muscle is being retracted to expose the carotid sheath contents; c: Following inset of SCAIF into defect and closure of donor site.

Free tissue transfer

Free tissue transfer or free flap reconstruction is an excellent option for large defects, especially when there is a significant soft tissue deficit. The anterolateral thigh free flap is often used for reconstruction of defects after a total or radical parotidectomy, LTBR, and total auriculectomy as this flap provides considerable soft tissue bulk. It can be harvested with variable amounts of muscle and skin, depending on the reconstructive requirement. Please refer to the chapter titled “[Anterolateral Thigh \(ALT\) Free Flap for Head and Neck Reconstruction](#)” for further details on this technique. Free tissue transfer from other donor sites may also provide excellent results. Unfortunately, free flap reconstruction requires specialized personnel and equipment which may not be readily available in many settings.

Postoperative follow-up protocol

Follow-up protocols for patients with auricular and peri-auricular malignancies are variable and depend on several factors including pathology, staging, and extent of surgical resection. In the senior author’s practice, patients are followed every 2-6 weeks for the first three months to ensure proper wound healing, to discuss surgical pathology results, and to help coordinate adjuvant treatment, as necessary. Once the wounds have stabilized, frequency of followup examination is decreased to once every 3-12 months. Patients are recommended to follow-up in clinic at least annually for at least for five years after surgery to monitor for recurrence.

Multidisciplinary surveillance for cutaneous malignancies including primary care providers, dermatology, and/or medical on-

cology is strongly advised when available. Establishment of a multidisciplinary team prior to treatment (head and neck tumour board) helps facilitate a smooth transition to post-treatment surveillance.

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