



Split ear helix advancement flap for lesions of the ear involving the helical rim and adjacent skin

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Introduction

Reconstruction of helical rim defects after tumor removal poses a special challenge for the dermatologic surgeon due to the three-dimensional structure of the ear with prominent character and aesthetic implications [1]. Traditionally, tumors affecting the helical rim are removed by a wedge resection. This frequently leads to excisions that extend into the concave concha, affecting architectural integrity and scar contraction. Potential deformities of the wedge closure include webbing, where the elastic memory of cartilage causes it to pull apart, a “butterfly appearance” with pinching of the helix into a bilobed structure, and cupping as the pinna moves anteriorly into a more prominent position than the contralateral ear [2]. Other closure options involve split thickness skin grafting, but this is time consuming and leads to a secondary defect with a longer healing time than the primary site [3]. The classic helical rim advancement flaps overcome these complications and various modifications are described in the literature. However, they are not suitable if the perihelical skin is involved [4–8].

Flap description and case report

Here we propose a modification of the classical helical rim advancement flap [9], allowing the repair of helical rim defects that also involve adjacent skin. The new method takes advantage of the three-dimensional structure of the ear for

defect reconstruction and of the possibility to hide the Burow triangle in the posterior aspect of the lobe, the only anatomically soft and cartilage-free portion of the ear.

An 83-year-old man presented with a slowly growing tumor 12 mm x 8 mm in diameter on his right ear, involving the helical rim and adjacent scaphal skin (Figure 1). Surgical margins were determined with the aid of polarized light



Figure 1 Basal cell carcinoma on the lower third of the right ear, involving helical skin and adjacent scaphal skin. Direct spindle closure would result in distortion of the helical rim and ear deformity.

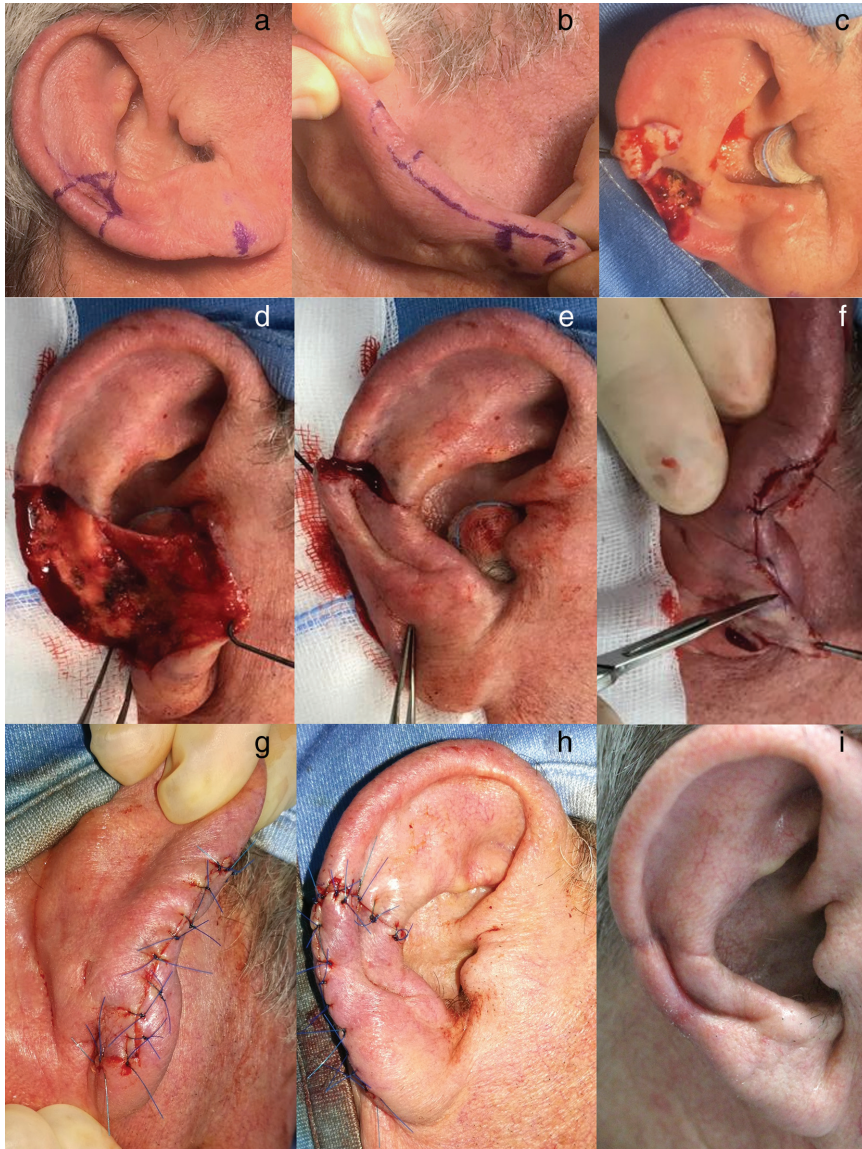


Figure 2 Basal cell carcinoma on the lower third of the right ear involving the helical and adjacent scaphal skin with safety margins, top view (a). Design of the flap, lateral view (b). Defect after removal of the basal cell carcinoma (c). Division of the skin along the helical rim (d). Flap in place (e). Excision of an appropriate Burow triangle on the dorsal aspect of the ear (f). Final flap, lateral view (g). Final flap, top view (h). Result after four weeks (i).

epiluminescence dermoscopy [10]. A single-stage procedure was used at the patient's request. Abundant local tumescent anesthesia was instilled (15 ml mepivacaine 0.4 %, adrenaline 0.001 %) to enable easier detachment of the (cancerous) skin from the underlying cartilage during the surgical intervention and flap preparation [3, 11]. The lesion was excised, leaving the rim cartilage and posterior skin intact. The ear was then split into two parts along the helical rim (like opening a book), detaching the skin from the cartilage and preparing towards the ear lobe. Once cartilage-free lobal skin was reached, a Burow triangle was removed, including a fatty triangle portion, from the dorsal (and therefore hidden) aspect of the lobe (Figure 2). The primary defect was then closed by suturing the flap into place (see Figure 3 for schematic drawing of the surgical procedure). Histopathology

showed a completely removed ulcerated morpheaform basal cell carcinoma. Healing occurred without complications.

Discussion

The classic variant of the helical rim advancement flap involves a pedicle flap based on the lobule of the ear, leaving an axial blood supply to the flap [12]. The primary helical rim lesion is removed together with the underlying cartilage. The advancement flap is developed with through-and-through incisions (skin-cartilage-skin) beside the helical rim towards the ear lobe; a Burow triangle is usually created there at the medial aspect of the base of the advancement flap in order to maintain the normal position of the lobe [9]. Despite the axial blood supply, some authors have suggested that insufficient

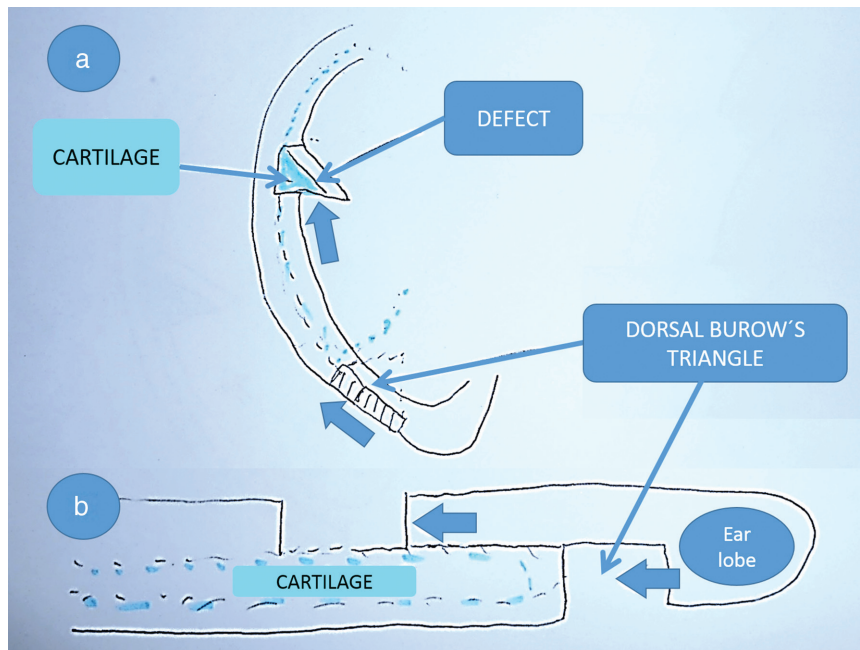


Figure 3 Schematic drawing of the procedure. After tumor removal, the skin of the ear is divided along the helical rim and detached from the helical cartilage on the anterior aspect until cartilage free of lobe skin is reached. An appropriate Burow triangle is then removed on the posterior aspect of the lobe, and the flap is sutured in place. Top view (a). Lateral view. Arrow: skin movement (b).

perfusion of a long pedicle could jeopardize the flap, so other variants base the helical rim on the intact posterior skin without cutting through the entire posterior pedicle, thus providing a larger neurovascular supply [4].

Most defects do not involve the ear cartilage, as the perichondrium provides a certain amount of protection against tumor infiltration into the underlying cartilage [13]. Cartilage-sparing surgery therefore seems to be a feasible option, even for large auricular tumors, if there is no clinical evidence of deep infiltration [3]. Where available, Mohs micrographic surgery should be used to determine free margins before closure [14, 15]. If cartilage-sparing resection is not possible, other reconstruction methods such as composite grafts or local flaps involving standard variants of the helical rim advancement flap are probably the better choice [16–20]. However, closure with full thickness of the skin flap as proposed here also allows partial resection, total resection or curettage of cartilage directly underlying the largest tumor masses, avoiding full wedge resections of the ear and associated complications. The full-thickness skin employed also allows insertion of cartilage grafts into larger defects in order to maintain the contour of the ear by analogy with the procedure described by Hu 2014 [17].

The helical split ear advancement flap proposed here allows a better vascular supply than the classic helical rim advancement flap [21] as explained above, and permits a better aesthetic outcome since the Burow triangle is on the posterior aspect of the ear [22]. The flap is best suited for defects that do not involve the cartilage, although modification of the technique would allow correction for cartilage involvement.

In fact, the most notable feature of this novel flap is the ability to use the unique soft part of the ear to cover the defect of the cartilage portion. This new helical rim advancement flap modification should be useful for defects involving the helical rim and adjacent skin, as well as for lesions that only involve the perihelical skin.

Conflict of interest

None.

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