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Reconstruction of acquired auricular deformity

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The position of the external ear predisposes it to both traumatic injury and malignancy. The intricate anatomy of the auricle, with its multiple concave and convex surfaces, makes reconstruction challenging. This article explores methods of auricular reconstruction for otohematoma, lacerations, lobule tears, avulsion injuries, and a variety of oncologic defects. Reconstruction techniques focus on restoration of both form and function with an esthetically pleasing result.

Introduction

The function of the auricle is to collect and amplify sound. To perform this function, the auricle is composed of convex and concave surfaces that direct sound toward the external auditory canal (EAC). The protuberant nature of the auricle contributes to function, while simultaneously exposing it to traumatic injury and malignancy. As a result, the facial plastic surgeon encounters an assortment of auricular injuries and defects. This article discusses reconstructive techniques for repair of acquired auricular defects.

Anatomy

The auricle is composed of tightly adherent skin over a cartilaginous framework (Figure 1). Between the skin envelope and underlying cartilage lies a layer of adipose tissue that is present on the posterior surface of the auricle but is lacking on the anterior surface. This subcutaneous adipose layer turns anteroinferiorly with the underlying cartilage to form the helical rim.[1] The lobule lacks underlying cartilage and is made up of thin skin over fibrofatty tissue.

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The auricle has a rich blood supply derived from two branches of the external carotid artery: the superficial temporal artery and the posterior auricular artery. The posterior auricular artery sends perforating branches out to the lateral auricular surface. Venous drainage occurs via the superficial temporal, posterior auricular, and retromandibular veins into both the external and internal jugular veins.[2]

The lateral surface of the auricle is innervated by both cranial nerves and perforating branches of the cervical plexus. The anterosuperior aspect of the lateral auricle is supplied by the auriculotemporal branch of the mandibular division (V3) of the trigeminal nerve. The auricular branch of the vagus nerve (Arnold's nerve) supplies portions of the conchal bowl and EAC. A small branch of the facial nerve also contributes to sensation of the meatus.[3]

The medial surface of the auricle is supplied by cutaneous branches of the cervical plexus. The great auricular nerve (C2, C3) supplies most of the medial surface skin and gives perforating branches to a portion of the lateral surface. The lesser occipital nerve (C2, C3) innervates the auricle's medial surface. The retroauricular scalp skin is innervated by the mastoid branch and the lesser occipital nerve.[3]

Anthropomorphic knowledge of the auricle enables its successful repositioning and reconstruction. The average height of the adult auricle is 6 cm, and the average width is 3-4 cm. In the Frankfort horizontal plane, the root of the adult helix is 6-7 cm posterior to the lateral canthus. The most superior and inferior points of the auricle align with the superior orbital rim and subnasale, respectively. The

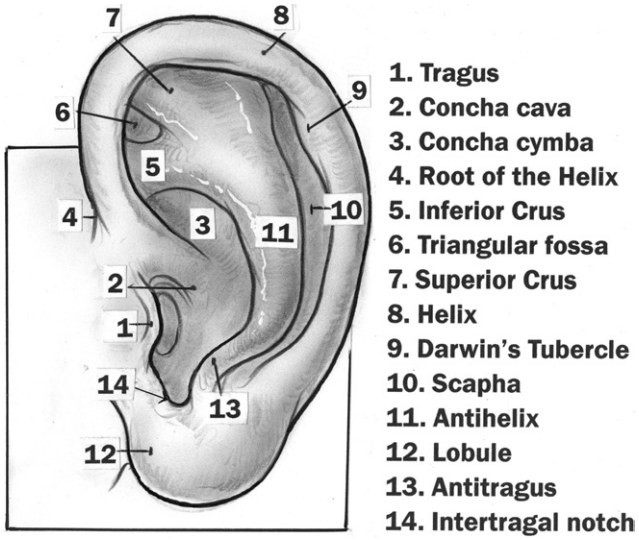

Figure 1 Surface anatomy of the auricle.

longitudinal axis of the auricle is inclined 15-20 degrees off the true vertical axis. The ear protrudes from the postauricular skin approximately 1.5-2.0 cm.[4]

Philosophy and principles of auricular reconstruction

The primary goal of auricular reconstruction is to preserve function and maintain the anterior and lateral profiles.[5] Because the auricles are situated laterally, their complex surfaces are seldom held in comparison; therefore, the lateral view of the auricle permits subtle differences in height, width, and surface anatomy during reconstruction. On the contrary, the frontal view allows for direct comparison of position, protrusion, and height. An inconspicuous result therefore relies on symmetry in the frontal view and maintenance of surface contour and axis in the lateral view. The complex surface anatomy of the auricle makes reconstruction challenging but facilitates scar camouflage.

Reconstruction proceeds in a layered fashion. A cartilage framework is reestablished by either primary repair or use of cartilage grafts. Common donor sites for cartilage include the conchal bowl, nasal septum, and rib. Exposed or grafted cartilage must be covered with vascularized tissue. A layered closure is then performed with existing skin or with the addition of a skin graft. Bolsters are used to prevent hematoma and the subsequent associated auricular deformities.

The use of perioperative antibiotics serves to decrease infection. Topical antibiotics are applied to all lacerations and sometimes are all that is required for simple repairs of the skin. Skin lacerations with an intact perichondrium can also be covered with a first-generation cephalosporin. For injuries with exposed cartilage in adults, oral fluoroquinolones are recommended. Patients with human or animal bite injuries are administered amoxicillin/clavulanate to cover oral flora. All traumatic injuries in the acute setting should be copiously irrigated and debrided of foreign bodies. Tetanus and rabies vaccines should be administered if appropriate.

Traumatic defects of the auricle

To perform its function, the auricle holds a protuberant and exposed position, making it susceptible to traumatic injuries, such as hematomas, lacerations, lobule tears, and avulsion injuries. Traumatic injuries of the ear should be evaluated within the context of a complete head and neck trauma examination. Special consideration is given to examination of the tympanic membrane, presence of CSF otorrhea, associated temporal bone fractures, facial nerve function, and lacerations extending into the EAC. Circumferential lacerations of the EAC can result in canal stenosis that limits function. For lacerations that extend into the EAC, an Ambrus (Medtronic, Mystic, CT) external auditory meatus pack is placed as a stent and otic drops are used.

A regional block of the auricle will facilitate its repair by limiting the anatomical distortion associated with direct infiltration. Local anesthetic is first infiltrated just inferior to the lobule to block the great auricular nerve. The block should be continued superiorly within the auriculocephalic sulcus. The auriculotemporal branch can be accessed from the anesthetized posterior side.[6]

Auricular hematoma

Auricular hematomas result from collections of blood in the subperichondrial plane that eventually form a fibrotic clot. If left untreated, an unsightly cauliflower ear deformity develops. This is often found in wrestlers and pugilists, who experience repeated blunt trauma to the auricle.

In the acute setting, auricular hematomas (Figure 2) are drained with small, dependent based incisions hidden in the concave surfaces of the lateral auricle. An incision down to cartilage permits aggressive drainage of the clot and is usually preferable to needle aspiration. Dental roll bolsters are contoured to the concave surfaces of the lateral auricle and secured through and through with a large, nonabsorbable monofilament suture to obliterate the potential space and prevent reaccumulation of blood or serum. Furthermore, a 4-0 chromic on a straight Keith needle can be used as a quilting suture to accentuate sulci, particularly the depression of the scaphoid fossa.

Lacerations

Lacerations of the ear are copiously irrigated and debrided of nonviable tissue. A layered closure is recommended using a 4-0 or 5-0 long-lasting absorbable monofilament suture to approximate a disrupted cartilaginous framework. Particularly close attention should be paid to the helical rim, where small differences in approximation can result in soft tissue step off deformities. Skin is approximated by fast-absorbing plain gut or nylon sutures. A bol-