

# Ear Defects

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## KEYWORDS

- Ear • Reconstruction • Defect • Auricle • Mohs
- Wedge • Helical

The external ear is particularly susceptible to actinic damage because of its projection and exposure. Approximately 5% to 8% of all skin cancers are located on the external ear.<sup>1,2</sup> In general, basal cell carcinoma accounts for 75% of all skin cancers, and squamous cell carcinoma accounts for 20% of skin cancers.<sup>3</sup> In contrast, many report that in the ear squamous cell carcinoma is more common than basal cell carcinoma.<sup>1,2,4</sup> Because of local spread and regional metastasis, auricular carcinomas can be difficult to treat, and complex reconstructions can both mask early recurrence and alter the lymphatic drainage patterns.<sup>5</sup> When reconstructing auricular defects, these oncologic considerations must take precedence.

Auricular defects resulting from excision of cutaneous malignancies are challenging to reconstruct because of the complex anatomy of the ear. The complexity of the anatomy arises from the convexities, concavities, and subtle curves of the thin and pliable cartilage and the tight adherence of the overlying skin.<sup>6</sup> The surgeon faces the challenge of recreating the complex cartilaginous–skin interface, which reveals the normal auricular shape. Fortunately, the ear itself does not define facial beauty, and expectations should be tempered accordingly. Ideally, the ear blends in with the face and remains inconspicuous while other features enhance facial aesthetics.<sup>7</sup> To reconstruct defects of the ear successfully, the surgeon must have a comprehensive understanding of the anatomy of the ear and must be familiar with a variety of reconstructive options.

## ANATOMY OF THE EXTERNAL EAR

The first and second branchial arches form the external ear, which begins its development as six

buds of mesenchyme termed “hillocks.” These hillocks are each responsible for a portion of the auricle. The hillocks fuse by the twelfth week of gestation, and the auricle is completely formed by the twentieth week. The auricle reaches 85% of adult size by age 6 years. Important surface landmarks include the helix, antihelix, crura of the antihelix, tragus, antitragus, intertragal notch, scaphoid fossa, triangular fossa, concha cymba, concha cavum, and lobule (**Fig. 1**).

The ear is composed of a single piece of thin, pliable, elastic cartilage enveloped in cutaneous tissue. Cartilage is present in only the upper two thirds of the ear (**Fig. 2**). The lobule is composed of skin and fibrofatty tissue. The anterior or lateral skin envelope is tightly adherent to the underlying perichondrium; there is no subcutaneous adipose tissue between the skin and cartilage. Conversely, there is a thick layer of adipose tissue between the skin and the perichondrium on the posterior or medial aspect of the auricle. The size and shape of the helical rim is derived from a thin curl in the underlying cartilage and from a relatively thick layer of subcutaneous adipose tissue (**Fig. 3**).

## Anthropometry

The proper positioning and orientation of the ear are critical for successful auricular reconstruction (**Fig. 4**). The anthropometry of the ear is not intuitive, and an improperly positioned or oriented ear may be more noticeable than an ear with an abnormal shape.<sup>6</sup> Important measurements for the proper position of the auricle include inclination, level, position, and protrusion.<sup>8</sup>

The inclination of the ear is measured by determining the angle between the longitudinal axis of the ear and true vertical. The longitudinal axis of the ear is a line drawn connecting the most inferior

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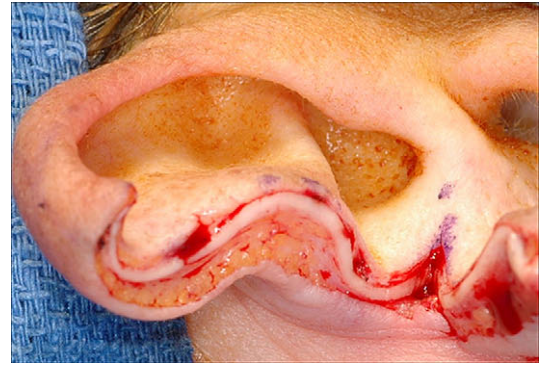


**Fig. 1.** Anatomic landmarks of the auricle.

and most superior points of the ear with the head in the Frankfort horizontal position. In this position, the longitudinal axis of the normal ear tilts posteriorly at  $15^\circ$  to  $20^\circ$  from true vertical (a line drawn perpendicular to the Frankfort horizontal line).<sup>9</sup> The level of the ear is determined by comparing the position of the most superior and inferior points on the ear with the superior orbital rim and subnasale, respectively. Again, with the head in the

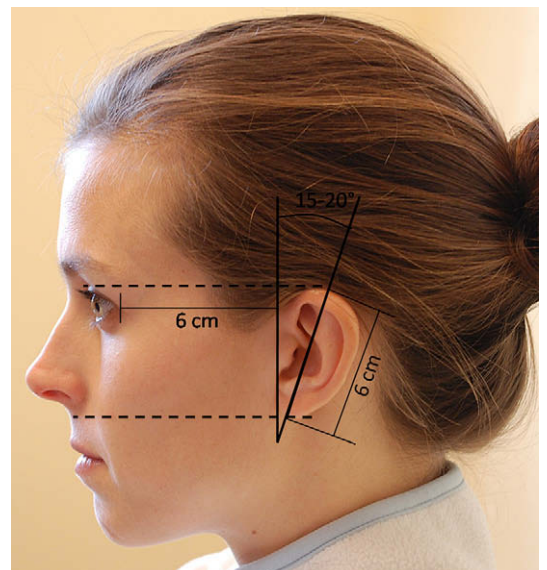


**Fig. 2.** Cadaveric dissection demonstrating anterior skin reflected off underlying cartilage. Note the absence of cartilage in the inferior one third of the ear.



**Fig. 3.** Wedge excision of the helical rim. The helical rim is formed by a thin curl of cartilage and a relatively thick layer of subcutaneous fat.

Frankfort horizontal position, the most superior point of the ear should align with the superior tarsal crease, and the most inferior point of the lobule should align with the subnasale.<sup>8</sup> One study demonstrated that approximately 10% of individuals have slight asymmetry in the level of the ear that is too subtle to detect visually.<sup>10</sup> The position of the ear can be determined by measuring the distance between the root of the helix and the lateral canthus. This distance should be 6 to 7 cm in adults.<sup>11</sup> The protrusion of the ear is measured between the skin of the mastoid and the posterior skin of the auricle. This distance should be 15 to 20 mm in adults. The horizontal width of the normal adult ear is 3 to 4 cm, and the vertical height is roughly 6 cm. The inferior



**Fig. 4.** Inclination, level, and position of the normal auricle.

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