

Modified Chondrocutaneous Helical Rim Advancement Flap: Reconstruction of Marginal Pinna Defects



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Abstract

Due to its unique structure, repair of marginal pinna defects requires special considerations. Various repair techniques have been documented in the literature for decades but many of these techniques result in deformity of the pinna and some can be unnecessarily complicated. Here we report a novel technique for repairing such defects, which is actually a modification of an older method. We have shown that a natural auricle shape is achieved with minimal disruption of the anatomical landmarks.

Introduction

Anatomy and Embryology of Pinna

The Pinna (Latin for feather) is the visible external part of the ear. It is first noticeable around the sixth week of gestation, developing from six rounded protuberances known as the hillocks of Hiss. These develop into the folds of the pinna and

gradually shift upwards and backwards to their final position on the head. The first three hillocks are derived from the 1st branchial arch and form the tragus, crus of the helix, and helix, respectively. The final three hillocks are derived from the 2nd branchial arch and form the antihelix, antitragus, and lobule, respectively (Figure 1).

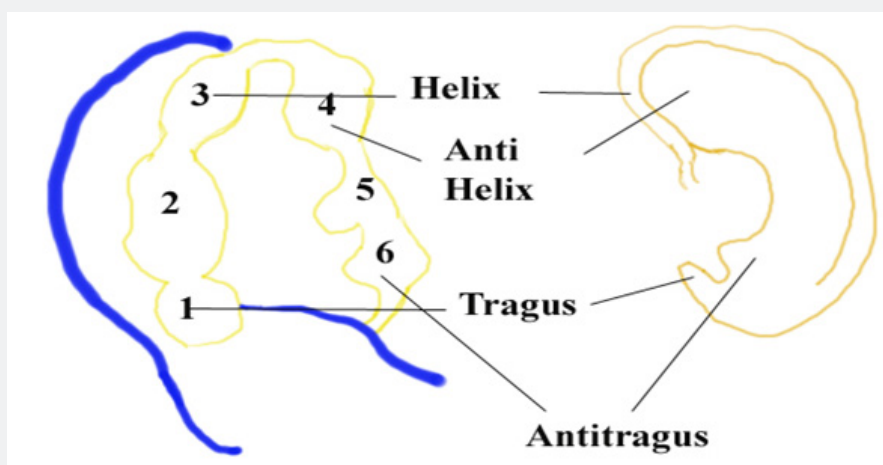


Figure 1: Schematic representation of six Hillocks of Hiss and related structures.

Background & Study

Defects of the helical rim may occur as a result of trauma, burns or cancers. The helical rim of the ear is involved in 45-55% of cancers of the ear [1]. The helical rim is a common site for basal cell and squamous cell carcinoma as this is a sun-exposed area. It is also an area which can be susceptible to trauma resulting in marginal loss. Reconstruction of auricular defects

with 'like for like' (ideally pinna) tissue offers the best aesthetic option. There is, however, a paucity of redundant local ear tissue, owing to well-defined landmarks of the semi rigid cartilage and tight adherence of the overlying skin. A total of one hundred patients underwent repair of a pinna defect between 2004 and 2008 at our institution. The inclusion and exclusion criteria are listed below

- a) Inclusion criteria:
- i. All helical rim procedures undertaken by a single named surgeon.
 - ii. Primary lesions of the helix, antihelix and scapha.
- b) Exclusion criteria:
- i. Post radiotherapy lesions
 - ii. Revision surgery
 - iii. Conchal lesions
 - iv. Patients with concomitant otitis externa

Technique

The surgical technique is described below and also displayed schematically in Figure 2 and using clinical photographs (pictures 1-11) in (Figure 3).

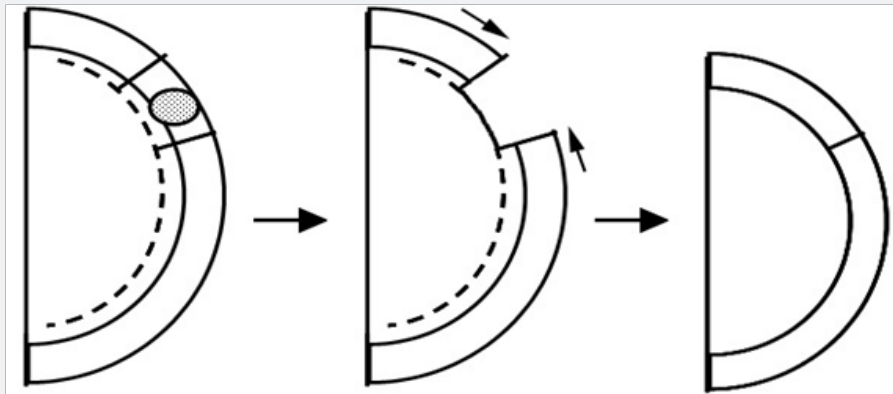
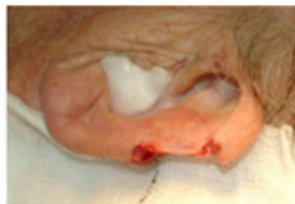


Figure 2: Schematic description of surgical technique.



Pic 1: helical defect following excision of the tumour



Pic 2: Incisions are made along the helical rim superiorly and inferiorly



Pic 3: auricular skin and cartilage are incised to create flaps



Pic 4: Subperichondrial flaps are raised superiorly and inferiorly



Pic 5: Cartilage exposed posteriorly



Pic 6: Portion of the helical rim and excess skin excised inferiorly



Pic 7: Helical rim cartilage with excess skin excised superiorly



Pic 8: Wound closed without tension



Pic 9: Stitched pinna



Pic 10: Repaired pinna with portion of the ear excised



Pic 11: Healed pinna

Figure 3: Description of the surgical technique using clinical photographs.

- a) The skin lesion is marked and the excision margin measured and delineated.
- b) The lesion is then excised as rectangular section of helical rim (Picture 1).
- c) The skin and cartilage are incised along the lateral surface of the ear superiorly towards the scaphoid fossa and inferiorly to the lobule (Picture 3).
- d) The post-auricular skin is elevated off the conchal cartilage both above and below the excised lesion and the skin raised off the anterior aspect of the cartilage for 2-3mm (Picture 4-5).
- e) The cartilage rim is then trimmed so that the skin edges can meet without undue tension and accurate apposition of skin and cartilage (Picture 6-8).
- f) Stitched pinna with tissue excised to include lesion and additional tissue excised to attain closure of the defect (Picture 9 & 10).
- g) Well healed pinna at 3 months (Picture 11).

Discussion

The original technique described by Antia and Buch in 1967 used chondrocutaneous advancement flaps with wide posteromedial auricular skin pedicle and V-Y helical root advancement [2]. The senior author in the current study has modified this technique by using residual auricle tissue to repair the helical rim defect. The edges are brought together by reduction of the size of the scapha and part of the conchal cartilage, which mobilises the superior and inferior helical flaps to achieve good apposition. This allows repair of defects arising after the excision of lesions extending to the antihelix and scapha. This creates a normal looking ear, though smaller from superior to inferior. Other surgical techniques include the frequently described wedge excision [3], which allows single stage repair of defects. However this results in a pointed auricular shape and protrusion of the upper pole. Wedge resection with approximation of the

edges by removing two burrows triangle over the concha has also been described in the past [4]. Additionally, composite auricular grafts [5], post auricular flaps [6] and tissue expanders with cartilage grafts [7] have been discussed in the literature. Many of these techniques are complicated procedures and may require general anaesthesia. Reduction of the opposite ear has also been documented to correct the asymmetrical size of the ears [8].

Conclusion

We achieved a natural auricle shape with minimal disruption of the anatomical landmarks. No mobilisation of the helical root as described by the original authors [2] was performed which improved the cosmetic results. Thus a major limitation of the original technique, in that it was best for repairing only peripheral helical defects, has been improved by our technique. Furthermore, our modified technique avoided unnecessary dissection on the post auricular area to create a wide based post auricular advancement flap as described by the original authors.

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