

Otoplasty: An Alternative Approach to Improve Results in Adults

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ABSTRACT

Otoplasty for protruding auricles remains a challenging but rewarding operation for both patients and surgeons. In adults, the cartilage is stiffer with strong memory and elasticity especially in the upper part. To be effective, anterior scoring has to be deep to achieve antihelical folding. This may result in a hinging effect with ridging and irregularities. Also, some of the ears treated with anterior scoring retain some remaining upper third prominence. To avoid these problems, based on observations during septoplasty, we considered superficial cartilage scratching of both surfaces to produce softening and natural folding of the antihelix without provoking irregularities. Thirty two patients underwent otoplasty with the same concept over the last 3 years. The age range was between 24 and 42 years. Through a posterior auricular incision, the anterior perichondrium was elevated along the antihelix including the superior crus and superficial cartilage scratching made with fine toothed forceps. Posterior perichondrial incision and superficial scratching were also made along the antihelix and superior crus. Horizontal scaphoconchal sutures stabilized the smooth antihelical fold. Follow-up revealed satisfactory correction of prominent ears with no residual upper/total ear prominence or recurrence. Three cases had slightly prominent lobules that made no problem to their appearance and two patients developed transient hyperesthesia. A smooth naturally appearing antihelical fold was seen and felt in all patients. Unlike deep scoring of one surface with subsequent ridging, the technique enables creation of a naturally appearing antihelix by combining sutures with conservative anterior and posterior cartilage scratching without provoking irregularities. Extending the process to the superior crus prevents any residual upper ear deformity commonly seen in this age group. The results reported here show that it is a safe procedure in adult ears associated with a high satisfaction rate and a very low complication rate.

INTRODUCTION

When the external ear is overly large or protrudes, it can often have enormous psychological implications. Teasing of the child with prominent ears can be emotionally devastating and correction of the deformity is a common request. Adults often request otoplasty for similar reasons. Typically they have been extremely self-conscious about the prominence of their ears for their entire lives but differed the operation for varied reasons [1]. Nowadays, an increasingly large number of adult patients with stiff cartilage ask for correction of protruding ears.

The relationship between the helix, antihelix and concha determines an ear that is considered prominent. Usually, the antihelical fold, deep concha and prominent lobule are the main areas that require correction. Anatomically the tail of the helix: Shows a ninety-degrees' rotation so that its distal extremity finishes sagittally, setting the lobule location.

Many techniques have been used for correction of prominent ears, indicating that there is no single widely accepted procedure by most surgeons. Treatment of the underdeveloped antihelical fold is divided into two concepts. One is the Mustarde-type approach where the fold is created with permanent sutures. The second relies on incising, abrading or filing the cartilage to alter its shape and thus recreate the fold. Combination of the two techniques is frequently employed to obtain the final smooth, natural result. Full thickness penetration of the cartilage usually results in sharp antihelical fold especially in older patients with stiffer cartilage [2].

Scoring techniques are based on the observation that cartilage tends to bend away from an injured surface [3]. This phenomenon is attributed to release of interlocked stresses by a perichondrial incision [4,5]. The desired amount of cartilage softening and warping can be adjusted by the extent of scratching or scoring.

The same concepts are upheld in adults with some considerations. In adults, the cartilage is stiff and more friable, cartilage elasticity and memory are strong. Moreover, the upper third of the ear easily maintains its original shape because memory and elasticity are stronger than in the middle or lower third [6]. Anterior auricular cartilage scoring is an effective technique for altering these forces and controlling the degree and position of the antihelical fold. For anterior scoring to alter these forces in adult ears, it has to be deep. Deep scoring may produce a hinging effect or break the cartilage and eventually lead to a sharp antihelical fold or irregularities when edema subsides. Also, 8% of

the ears treated with anterior scoring retain some remaining upper ear deformity [6].

In practice, the mere elevation of perichondrium to prepare a tunnel for rasping softens the antihelix. In addition, gentle cartilage scratching reduces the memory further and allows smooth natural folding of an antihelix that retains its integrity. Extending the process to the superior crus prevents residual upper ear deformity. To avoid the problems mentioned, we considered a particular approach to cartilage-sparing otoplasty in adults with gentle cartilage scratching of both surfaces of the antihelix, instead of deep scoring of one surface, to achieve softening and natural folding of the antihelix without provoking ridges or irregularities.

PATIENTS AND METHODS

Thirty two adult patients underwent otoplasty for protruding auricles over the past three years. The patients (22 females and 10 males) ranged in age from 24 to 42 years. All patients underwent a combined approach of superficial anterior and posterior cartilage scratching to achieve softening and natural folding of the planned antihelix. Patients were followed with regard to early and final outcome of satisfactory correction of protruding auricles in absence of cited problems (ridging, irregularities, residual upper ear prominence or recurrence).

Operative technique:

Minimal infiltration of the skin of the posterior surface of the auricle is carried out to prevent distortion. The skin on the anterior surface of the auricle where horizontal mattress sutures will pass subcutaneously is also infiltrated to avoid inclusion of the skin in the sutures. The antihelix and horizontal mattress suture points are marked with methylene blue by the insertion of straight needle. Making after infiltration prevents hematoma and preserves the marked points.

Folding the auricle back to the proposed correction plane shows the amount of skin to be removed: In most cases, no skin is removed. A 3.5-Cm posterior auricular incision is made 1Cm from the helical rim so that it lies in the concavity created by the antihelical fold. Dissection is continued in the supraperichondrial plane to reveal the markings of the mattress sutures. A small incision is made in the lower part of the antihelix through the cartilage, without cutting anterior perichondrium, to gain access to the anterior surface of the antihelix. Using a small septal elevator, the perichondrium on the anterior surface of the antihelix is gently elevated along its whole length including the superior crus. A single blade of fine Adson forceps

or a needle is introduced in the tunnel and cautious superficial scratching of the cartilage is performed. The posterior perichondrium is incised and elevated along the antihelix including the superior crus and superficial scratching of the posterior surface of the cartilage is similarly performed (Fig. 1,B). Cartilage scratching is extended along the superior crus to enable softening of the cartilage in the upper part and complete prominent ear correction. With this maneuver, softening of the cartilage along the whole neo-antihelical axis is achieved, natural shaping of the antihelix evolves and its tendency for recoil decreases.

One or two conchomastoid sutures are placed to correct anterolateral rotation of the concha if needed. In few cases, cartilage is resected to improve conchal hypertrophy. A thin wedge excision of the hypertrophic part of the helix tail is performed to bring back the prominent lobule if present. A single 4-0 non absorbable sutures is placed to fix the helix tail in a good position to the posterior wall of the concha. This should correct the lobule protrusion and also nicely initiate the antihelical fold. Horizontal mattress sutures (inferior, middle and superior) are placed using 4-0 clear polypropylene sutures. Each suture is tested for effectiveness as it is placed. Sutures are then tied consecutively from inferior to superior using decreased tension to provide a graduated contour. The helix should have a smooth and regular line throughout and be seen beyond the antihelix from the front view.

The wound is closed with rapidly absorbed polyglactin suture. Cotton rolls covered with ointment are placed over Vaseline gauze in the folds and postauricular sulcus. A cotton ball is placed in the concha. Fluffy gauze is added and bilateral light mastoid dressing applied. The patient is instructed to protect the ears from pressure during sleep. The dressing is removed after 3-5 days and the patient wears a headband over the ears while sleeping for 1-2 weeks.

RESULTS

Follow-up ranged from 6-36 months. All the procedures were bilateral. In 6 patients, the protrusion was more on one side than the other. A short smooth recovery period was observed. We did not observe any complications such as hematoma, infection, skin necrosis or suture extrusion through the posterior skin in the early follow-up period. No sutures were palpable or seen through the anterior skin. Three cases had slightly prominent lobules that made no problem to their appearance. Two patients developed transient hyperesthesia which resolved gradually over 2-3 weeks. The remaining patients were satisfied with their cos-

metic improvement of ear projection and slope with no recurrence (Figs. 1-3). In particular, there were no ridging or cartilage irregularities, residual upper part/total ear prominence or appreciable

asymmetries. A smooth natural antihelical fold was seen and felt in all patients. None of the patients required secondary revisions due to residual deformity, recurrence or other causes.



Fig. (1-A): Preoperative front view of a 29 year-old female with a lack of antihelical fold definition and prominent lobule. The surface of the auricle is seen in front view.



Fig. (1-B): Perichondrial incision and superficial cartilage scratching of the posterior surface of the antihelix (and superior crus) up to the helical rim.



Fig. (1-C): Postoperative front view at 9 months after superficial scratching of both antihelical surfaces with complete correction of protrusion.



Fig. (1-D): Preoperative back view.



Fig. (1-E): Postoperative back view with smooth regular helix-lobule outline and absence of residual upper third prominence.

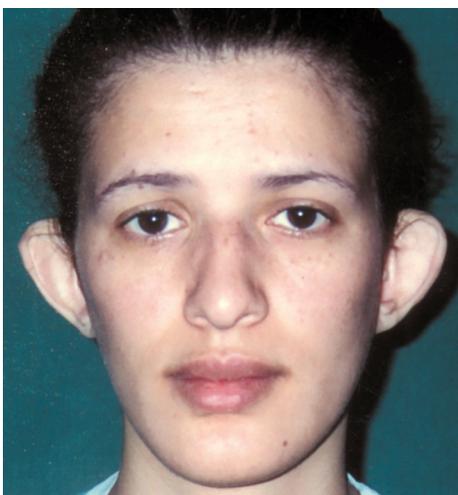


Fig. (2-A): Preoperative front view of a 32 year-old female with bilateral protruding auricles; more in the upper part. The surface of the auricle is seen in front view.

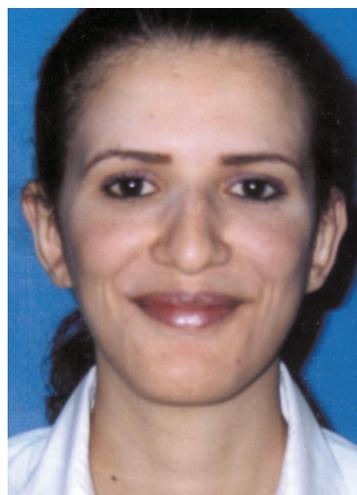


Fig. (2-B): Postoperative front view at 2 years with satisfactory, stable correction of upper third/total ear prominence.



Fig. (2-C): Preoperative lateral view with underdeveloped antihelical fold.



Fig. (2-D): Postoperative lateral view with well defined natural antihelical fold.



Fig. (2-E): Preoperative back view.

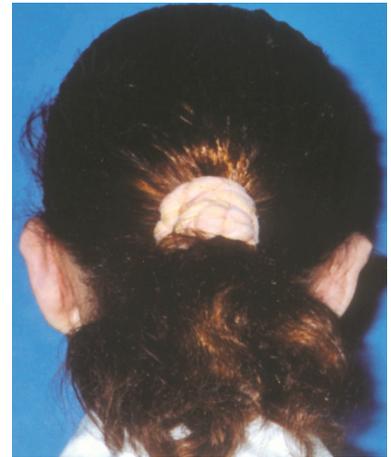


Fig. (2-F): Postoperative back view with absence of residual upper third prominence and smooth regular outline throughout the helix and lobule.



Fig. (3-A): Preoperative front view of a 37 year-old man with protruding auricles, more on the right side.

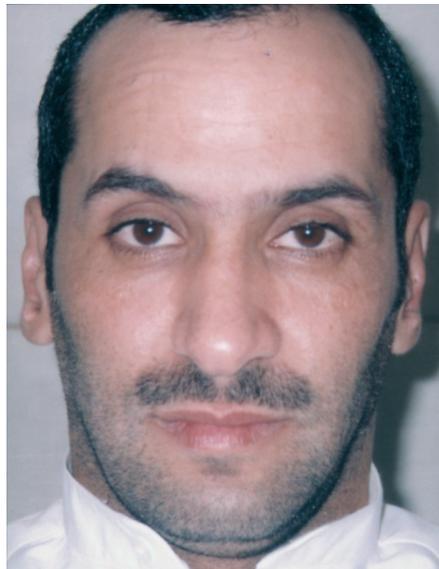


Fig. (3-B): Postoperative front view at 36-month follow-up with symmetrical correction of protruding auricles and absence of recurrence.



Fig. (3-C): Preoperative lateral view with underdeveloped antihelical fold.



Fig. (3-D): Postoperative lateral view with well defined smooth, natural antihelical fold.



Fig. (3-E): Preoperative back view with protruding auricles, more on the right side.



Fig. (3-F): Postoperative back view with smooth regular outline throughout the helix and lobule.

DISCUSSION

Otoplasty for the correction of protruding auricles remains a highly debated topic. The greatest area of focus is on the finer nuances between cartilage-sparing and cartilage-incising techniques [7]. There is no single technique that can re-create the complex three dimensional form of the otherwise normal human ear. So, the simplest technique that can obtain the maximum effect should be employed [1].

Scoring techniques can be subdivided further into those that only superficially score the cartilage and those that score deeply enough to cut through the newly created antihelix. Furthermore, the scoring can be accomplished on either the anterior or posterior surface of the cartilage. In general, full thickness penetration of the cartilage usually results in sharp antihelical fold which is undesirable and unnatural [2].

Simple digital pressure reveals a well defined antihelix imprinted in the auricular cartilage framework. Thus, we are enhancing an existing incomplete antihelical fold, rather than, creating new one from a scratch. Also, the cartilage of the unfolded antihelix is the same thickness as normal antihelix and the overlying skin is particularly thin. Too much thinning of the antihelix will affect its topography on the skin surface and irregularities may be noticeable. In addition, cartilage elasticity and memory are notably strong in adults. Anterior cartilage scoring is an effective technique for altering these forces and controlling the degree and position of the antihelical fold. Scoring the posterior surface to a very thin cartilage can also achieve an adequate antihelical fold [8]. Scoring of one surface, however, needs to be aggressive to produce the desired antihelical folding. Aggressive scoring of a normal thickness antihelix can cause unattractive and painful ridging in older patients with stiffer cartilage.

From our experience in septoplasty, perichondrial incision and superficial scratching on both sides produce cartilage softening. Thus, instead of deep scoring of one surface only, we managed to produce folding of the antihelix through perichondrial separation and superficial cartilage scratching of both surfaces. Perichondrial separation (elevation on the anterior surface and incision on the posterior surface) helps release interlocked stresses [4], soften the cartilage and allow it to fold easily under elevated anterior perichondrium. These maneuvers overcome natural elasticity and intrinsic memory

of the cartilage and prevent its tendency to spring back and cause recurrence.

Scoring the cartilage deeply on the anterior surface may lead to linear weakness and hinging effect with subsequent ridging or irregularities. Superficial scratching of both surfaces produces a gentle bend as it maintains substance of the antihelix and ensures a smooth natural antihelical contour. In adults, we prefer not to thin the cartilage too much because, in time, irregularities may show. Moreover, too much thinning is not needed to achieve folding of the antihelix. Release of perichondrium and gentle scratching of the cartilage on both sides produce the desired softening without breaking the cartilage or affecting its integrity. Preserving perichondrium anteriorly contributes to the smooth natural contour. Incision of posterior perichondrium, in this series, remains hidden in antihelix concavity and enables better release of interlocked stresses and softening of the cartilage. It is also simple as we already have a posterior approach.

The aim is to soften the cartilage not to direct folding, by overly done anterior scoring, at the expense of integrity. Some reports thinned the cartilage posteriorly to effect antihelical folding. In one study, a diamond burr drill was used to thin the cartilage posteriorly with good aesthetic results [9]. Pilz et al. [10] combined controlled dermabrasion of the posterior cartilage surface with scaphomastoid sutures to produce antihelical folding. Scoring combined with reverse-side bipolar diathermy was highly synergistic and produced more robust warping than scoring alone in an *ex vivo* pig ear model [11]. Cartilage-sparing otoplasty refined with the post-auricular fascial flap achieved significantly reduced complication rate and improved aesthetic outcome than anterior cartilage scoring [12]. Most of these studies relied on significant thinning of the cartilage to effect antihelical folding. Sevin [8] even thinned the posterior surface of the cartilage to about 25% of its thickness to achieve an adequate antihelical fold. In our patients, superficial scratching of both surfaces helped minimize injury to the cartilage and produced softening necessary for smooth, natural antihelical folding.

Sutures work well with conservative scratching to produce smooth natural antihelical fold. Release of interlocked stresses, with superficial scratching on both surfaces, softens the cartilage to assist suture placement in reforming the antihelix. Corchado expressed that anterior scoring was insufficient for a durable result in thick cartilages and

had to be supported with non-absorbable sutures [13]. Also, Spira proposed Stenstrom's closed anterior scoring technique because he found that cartilage suturing alone was insufficient in adults [14]. We, as Peker and Bahatten [15], think that sutures decrease the recurrence rate observed in procedures that do not use sutures. In addition, with sutures, overly done cartilage rasping is not needed to stabilize the antihelix in its new shape.

Extending superficial scratching of both surfaces along the superior crus of the antihelix enables softening of the cartilage in the upper ear to achieve maximum antihelix convexity and complete prominent ear correction with a long-lasting result.

The tail of the helix shows a ninety-degrees' rotation so that its distal extremity finishes sagittally, setting the lobule location. Resecting the hypertrophic part of the helix tail allows its retroposition on the concha [16]. In cases with lobule protrusion, we removed a small, 2 to 3mm, closing wedge of the cauda helix and secured the helix tail, in a good position, with a single suture to the posterior conchal wall to aid in medialization of the lobule. This was sufficient to improve rotation of the helix tail on the concha and reduce lobule protrusion in most of our patients; only 3 patients had residual lobule protrusion. We, like many [17], prefer not to excise skin to avoid scarring of the lobule.

Deep scoring results in linear weakness with a hinging effect which may lead to ridging, sharp antihelical folds or irregularities. Superficial scratching of both surfaces achieves a smooth natural folding of antihelix without injury to the stiff cartilage of the adult ear. A smooth naturally appearing antihelical fold can be seen and felt in most patients. The technique allows a more anatomical correction of both ear's projection and slope improving symmetry. By extension of superficial cartilage scratching to the upper ear (superior crus), the cartilage memory is reduced along the whole neo-antihelical axis, residual upper ear prominence decreases and the aesthetic result becomes more permanent. The technique is simple, and provides for precision, quality of results and brevity of recovery time. It can be considered a very good option for otoplasty in adults with consistently good long-term results.

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