

Cartilage-Sparing Complete Otoplasty Technique: A 10-Year Experience in 100 Patients

Fernando D. Burstein, MD

Atlanta, Georgia

Otoplasty is one of the most frequently performed esthetic surgical procedures in children and adolescents. Several techniques can give satisfactory results, but few address all the components of the prominent ear deformity. The author reports on the evolution and application of a cartilage-sparing otoplasty technique that addresses all the components of the prominent ear deformity. One hundred patients (200 ears) were treated over a 10-year period. An 8% revision rate and minimal complications were encountered.

Key Words: Ear deformity, ear surgery, otoplasty

Otoplasty is one of the most commonly performed esthetic procedures in children and teenagers. The variety and number of different otoplasty procedures that are available reflect the fact that no single technique has been deemed superior.¹⁻⁵ The generally accepted goals of otoplasty have been well described and include decreasing the prominence and protrusion of the ear, producing an antihelical fold and superior crus if absent or effaced, and making the lobule proportionate to the rest of the ear.⁶ In addition, any surgical technique must "look natural," avoid a pinned ear appearance, and allow for symmetry. Popular techniques include variations on the Stenstrom³ cartilage-scoring technique, the Mustarde² suture technique, and the Furnas⁴ technique. More recently, Bauer et al⁷ have emphasized the concha as the key anatomical feature in correction of the prominent ear.

To avoid an unfavorable result in otoplasty, the

author has endeavored to develop a technique that is not technically demanding and gives easily reproducible and consistent results with minimal complications. It borrows elements from many previous techniques, including those of Stenstrom,³ Mustarde,² Tanzer,⁸ Furnas,⁴ and Bauer et al,⁷ incorporating their principles and technical innovations.^{1,5,8} Initially, a conchal take-out technique was used for 4 years in 30 patients.⁹ Experience with this technique led to several modifications, which are presented here. The current technique was applied to 100 consecutive patients with prominent ears over a 10-year period.

TECHNIQUE

Figures 1 to 5 diagrammatically present the key steps in this technique. The deformity is analyzed before surgery to determine the anatomical elements that are contributing to the abnormal appearance. Particular attention is paid to the conchoscaphal angle, presence or absence of the antihelical fold and superior crus, lobular size and position, asymmetries caused by the size or position of the auricle, and conchal depth. Standardized photographs are obtained.

All patients undergo general anesthesia, and a first-generation cephalosporin is given at the beginning of the case. Methylene blue and a 22-gauge needle are used to mark the proposed antihelical fold, superior crus, and anatomical borders of the concha. The postauricular skin is injected with 0.25% Bupivacaine with 1:400,000 epinephrine, whereas the anterior surface is injected with Bupivacaine alone. An S-shaped incision is carried out from the highest point of the proposed antihelical fold to the lobule. Dissection to the mastoid periosteum and helical rim is carried out using a microcautery needle. The posterior perichondrium is left intact for suture retention. The scapha is then pierced at the level of the proposed superior crus under the helix rim. The anterior skin is undermined with small tenotomy scis-

From The Center for Craniofacial Disorders, Children's Healthcare of Atlanta, and Division of Plastic Surgery, Emory University, Atlanta, Georgia.

Address correspondence to Dr Burstein, Suite 500, 975 Johnson Ferry Road, Atlanta, GA 30342; e-mail: fburstein@aol.com

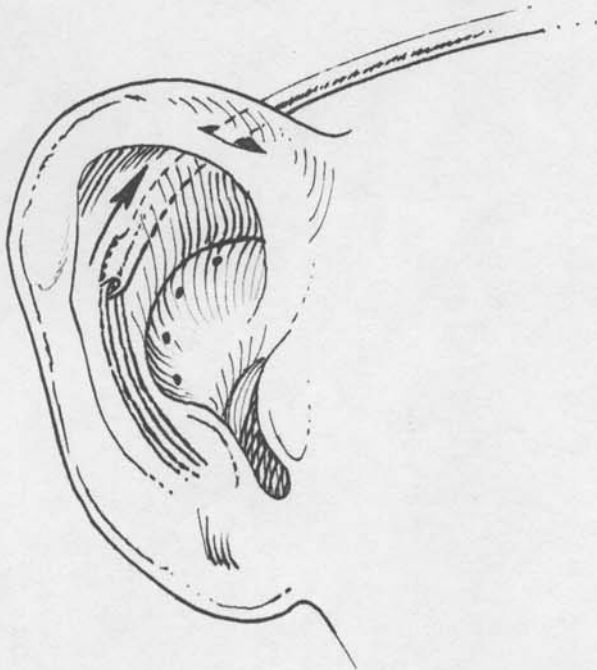


Fig 1 Otoabrader has been inserted through scapha incision. Anterior perichondrium and cartilages are scored along line of proposed antihelical fold.

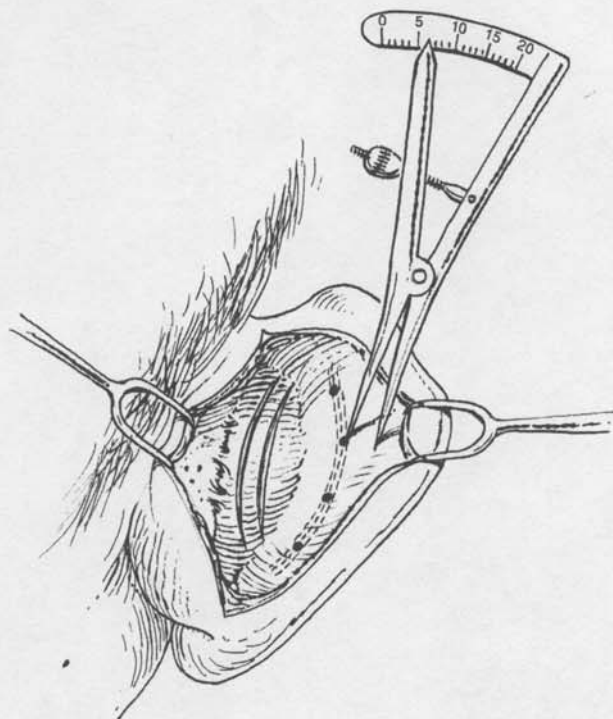


Fig 2 Measurements for placement of antihelix sutures are made with calipers behind area of scapha. Conchal incisions are carried out.

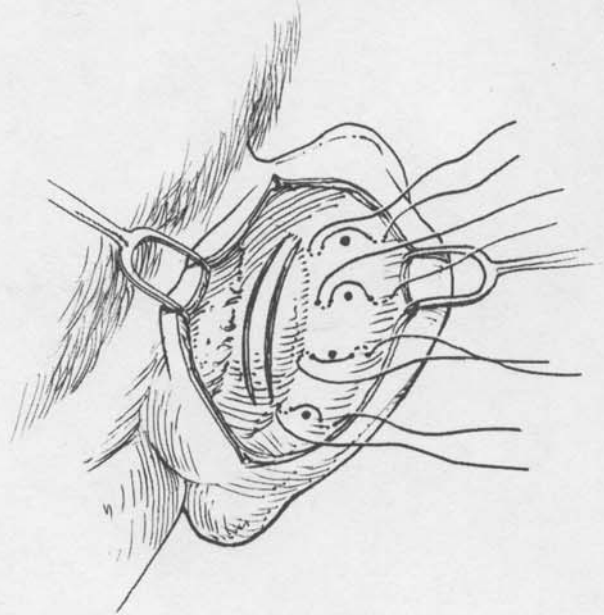


Fig 3 Sutures for creation of antihelical fold are placed and tightened.

sors and then with a small freer elevator. A Dingman otoabrader is used to create multiple microabrasions along the course of the proposed antihelix and superior crus on the anterior scapha surface. Care must be taken only to weaken and not to transect the scapha cartilage. In younger patients or those with thin pliable cartilage, the scissors and elevator dissector may suffice to weaken the cartilage. Next, 4-0 clear nylon mattress sutures are placed along the proposed crus, and the antihelix forms the antihelical fold and superior crus. The placement of the sutures is determined by the markings made with the methylene blue tattoo. A caliper is used to measure 6 mm from the center of the tattoo for placement of each bite of the horizontal mattress suture. Fairly small bites are taken to prevent bunching of the cartilage. This suture determines the height of the antihelical fold, approximately 6 mm above the plane of the scapha. The height of the new antihelical fold is compared with that of the helix and should be slightly lower on frontal view. If the fold is too low, the distance from the central tattoo can be increased, whereas if it is too high, the distance can be decreased before placing an additional three sutures. Next, the conchal hypertrophy component is addressed. The previously marked conchal limits are used to mark proposed conchal scoring incisions, which parallel the long axis of the ear. The first mark is made at the lateral limit of the conchal bowl in the cymba conchae, with the next made approximately 6 mm medially. The perichon-

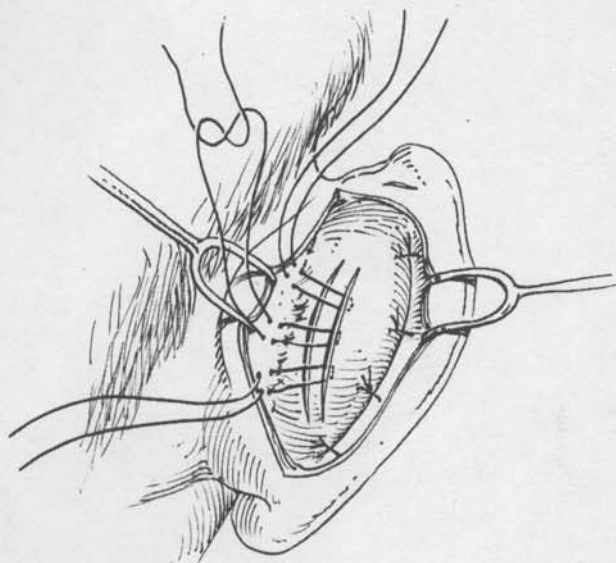


Fig 4 After the antihelix is created, sutures are placed from lateral conchal incision to mastoid periosteum.

drium is cut with the microcautery needle, and the cartilage is cut with a scalpel, taking care to preserve the anterior skin. This maneuver breaks the spring of the conchal bowl. Three to four 4-0 clear nylon mattress sutures are then placed 6 mm apart between the distal edge of the most lateral conchal scoring incision and the mastoid periosteum. This brings the scapha posterior against conchae and closer to the mastoid, correcting the central ear prominence. The wounds are irrigated, all bleeding points are coagulated, and symmetry is confirmed. The most lateral point of the helix should be no closer than 18 mm from the mastoid to prevent a pinned-back appearance. Redundant skin is trimmed in an hourglass pattern, avoiding tension. Care must be taken to avoid overresection of skin in the central part of the wound to prevent a telephone ear deformity. If the lobule is excessive, a wedge of soft tissue is removed perpendicular to the long axis of the incision. The wounds are closed with a running 4-0 chromic gut suture and coated with antibiotic ointment. Oral acetaminophen with codeine is given along with an oral cephalosporin for 4 days. A pressure dressing consisting of Dacron fluffs and gauze is applied for 36 hours only. Patients are asked to sleep with a headband for 4 weeks.

RESULTS

A total of 100 patients (200 ears) underwent otoplasty surgery over a 10-year period.⁶ There were no major complications. There were no infec-

tions, and one postauricular hematoma was evacuated in the office. Eight patients required unilateral revision otoplasty. Four ears had slight recurrence of the superior pole prominence, which was corrected

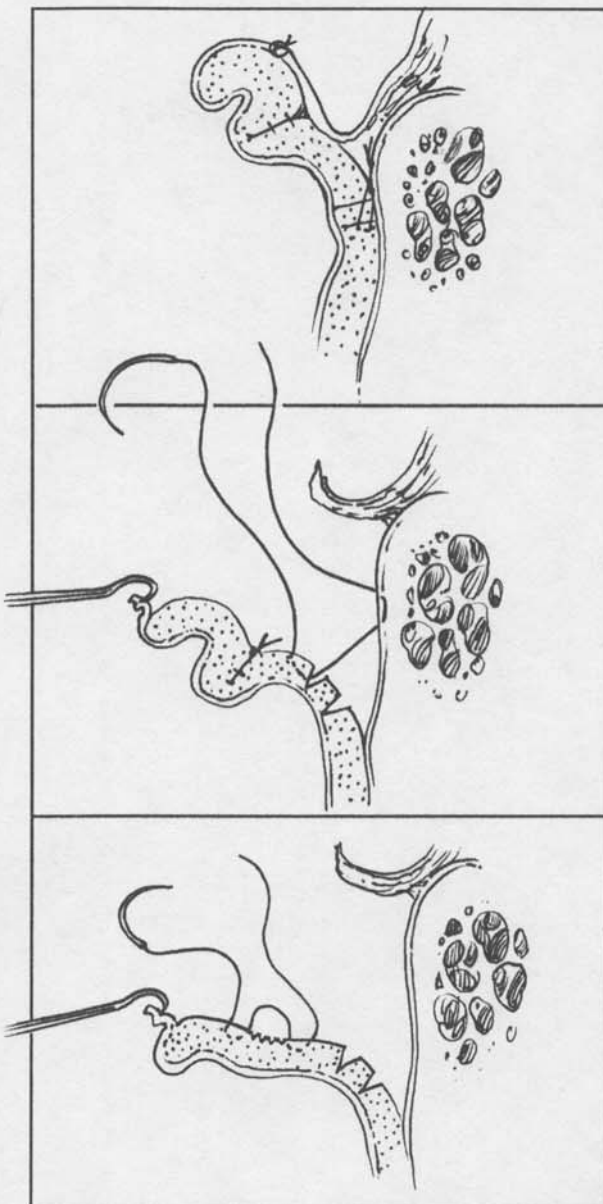


Fig 5 Axial views demonstrating the sequential effects of surgical maneuvers on ear protrusion. (Top) Partial-thickness scoring of scapha with suture placement to create antihelical fold. Full-thickness incisions in concha to break the spring of the cartilage. (Middle) Sutures placed from lateral conchal cut to mastoid periosteum. (Bottom) Final scapha position after creation of antihelical fold and correction of conchal hypertrophy. The most lateral point of the helix should be 1.8 to 2.0 cm from the mastoid.



Fig 6 (A) Preoperative view of patient with protrusive ear. Note lack of antihelical fold and conchal hypertrophy. (B) Postoperative view of same patient 6 months after otoplasty with creation of antihelical fold and reduction of conchal hypertrophy.

by simple postauricular skin excision under local anesthesia. Four ears required replacement of one or more sutures under general anesthesia at the superior third of the antihelical fold for recurrent deformities. Two patients developed hypertrophic postauricular scars, both of which responded to a combination of topical and injected steroids. One patient developed a small hypertrophic scar along the inferior aspect of the newly created antihelical fold, which responded to topical steroids.

DISCUSSION

Technical pitfalls in otoplasty have been well documented.¹⁰⁻¹² Iatrogenic problems include telephone ear deformity, which is caused by overly enthusiastic central conchal or skin resection. Scoring the cartilage too deeply or completely cutting it, thereby creating an edge effect, causes the sharp antihelix. The pinned ear can be caused by overly tight suturing of the concha to the mastoid or by overresection of postauricular skin. The conchal skin folding deformity is caused by aggressive conchal resection with insufficient skin undermining. Other less common problems include gross asymmetry of an antihelical fold that is far higher than the helical rim, damage to the anterior auricular skin, and hypertrophy or keloid formation in postauricular scars.

Any surgical technique must be judged by its simplicity, reproducibility, and safety. The technique described in this report has been applied to 100 consecutive patients over a 10-year period. The results have been consistently good, with a minimum of

complications and an 8% revision rate. All the recurrent deformities occurred in the superior part of the antihelical fold and were easily corrected. All were the result of suture failure or sutures pulling through the cartilage. These problems occurred early in the series and were attributed to insufficient cartilage scoring and to superficial placement of the antihelical sutures. All the recognized components of the prominent ear deformity, including the lack of an antihelical fold and superior crus, conchal hypertrophy, and a prominent lobule, are addressed (Fig 6). A combination of mattress sutures as described by Mustarde² and cartilage scoring similar to that described by Stenstrom³ are used to form the antihelical fold as well as the superior crus. Unlike the Mustarde technique, the mattress sutures are completely tightened down rather than adjusted individually, which can be difficult to reproduce from side to side. Measuring the proposed peak of the antihelical fold has been helpful in achieving symmetrical results as well as in avoiding the hidden helix.¹⁻⁵ To avoid sharp ridges along the antihelix, gentle partial-thickness abrasion of the anterior surface of the scapha is used to weaken the cartilage. Unlike the Stenstrom technique in which the entire scapha is exposed, limited skin undermining of the anterior scapha is advocated to avoid potential subcutaneous hematoma and resulting secondary deformity.^{3,10} Bauer et al⁷ recently re-emphasized the role of conchal hypertrophy as a component of the prominent ear deformity, which must be addressed to prevent undesirable results.⁷ They perform an anterior chondrocutaneous dissection, with a postauricular approach used to create the antihelical fold. Other au-

thors have also advocated addressing the concha through excision either from the anterior or posterior approach.^{7,8,13} Bauer et al⁷ point out that failure to resect the skin with the conchal cartilage can result in visible skin wrinkling. I prefer to approach both the scapha and the concha through a postauricular incision because of the possibility of hypertrophic scar being visible from the anterior approach.¹⁰ Rather than resect the concha, I prefer to weaken its spring by making parallel incisions through the postauricular perichondrium and full thickness of the conchal cartilage, leaving the anterior perichondrium intact. This is similar to the scapha incisions described by Tanzer⁸ for creation of the antihelical fold. Most commonly, two incisions are used, starting at the juncture of the concha and scapha, with the second parallel incision placed approximately 6 mm medially. In mild cases, only one incision is necessary. If less conchal recession is desired, the sutures can be placed more medially along the concha, which has the effect of allowing a greater scaphoconchal angle. This method is a powerful tool for the complete correction of the conchal hypertrophy component of the deformity and avoids potentially visible anterior scar as well as conchal skin deformities. The final skin and lobule tapering have been well described by others.^{3,7} The surgeon must not rely on the final skin excision to correct any significant residual cartilage deformities, because elastic forces will eventually result in recurrence. The simplified postoperative care suggested has resulted in good patient and parental acceptance.

This technique combines the cartilage-sparing

and scoring techniques of Stenstrom³ and portions of the Mustarde² and Furnas⁴ suture techniques, also addressing the conchal hypertrophy as advocated by Bauer et al.⁷ Guidelines for the height of the antihelical fold, conchal setback, and scaphoconchal distance help to ensure a reproducible result.

REFERENCES

1. Luckett WH. A new operation for prominent ears based on the anatomical deformity. *Surg Gynecol Obstet* 1910;10:635
2. Mustarde JC. The correction of prominent ears using simple mattress sutures. *Br J Plast Surg* 1963;16:170
3. Stenstrom SJ. A "natural" technique for correction of congenitally prominent ears. *Plast Reconstr Surg* 1963;33:509
4. Furnas DW. Correction of prominent ears by concha-mastoid sutures. *Plast Reconstr Surg* 1968;42:149
5. Kaye BL. A simplified method for correcting the prominent ear. *Plast Reconstr Surg* 1967;40:44
6. McDovell AJ. Goals in otoplasty for protruding ears. *Plast Reconstr Surg* 1968;41
7. Bauer BS, Song DH, Aitken ME. Combined otoplasty technique: chondrocutaneous resection as the cornerstone to correction of the prominent ear. *Plast Reconstr Surg* 2002;110:1033-1040
8. Tanzer RC. The correction of prominent ears. *Plast Reconstr Surg* 1962;23:1
9. Cohen SR, Burstein FD. Protruding ear. In: Spitz L, Coran AG (eds). *Rob and Smith's Operative Surgery*. London: Chapman and Hall Medical, 1995:76-85
10. Elliott RA Jr. Complications in the treatment of prominent ears. *Clin Plast Surg* 1978;5:479-490
11. Spira M. Otoplasty: what I do now: a 10 year perspective. *Plast Reconstr Surg* 1999;104:834
12. Spira M. Reduction otoplasty. *Goldwyn Red. The Unfavorable Result in Plastic Surgery*. Boston: Little, Brown and Company, 1972:168-169
13. Spira M, Stal S. The conchal flap: an adjunct in otoplasty. *Ann Plast Surg* 1983;11:291