European Review for Medical and Pharmacological Sciences 2014; 18: 3156-3165

Otoplasty for prominent ears deformity

P. FIORAMONTI, F. SERRATORE, M. TARALLO, M. RUGGIERI, D. RIBUFFO

Unit of Plastic and Reconstructive Surgery, Department of Surgery "P. Valdoni", Sapienza University, Rome, Italy

Abstract. – OBJECTIVE: Prominent ears are a common congenital deformity of the external ear, derived from a combination of defects in the antihelix and concha. The majority of cases are treated surgically, but one of major difficulties associated with otoplasty regards the achievement of lasting aesthetic results. With the present study we propose an effective combination of four surgical techniques of cartilage reshaping with the ultimate goal of creating a new stable antihelical fold.

PATIENTS AND METHODS: Forty-one patients with prominent ears were involved prospectively. The subjects (16 male and 25 female) ranged in age from 6 to 43 years, with a mean age of 12 years. All patients underwent to the same surgical procedure and we performed softening and reshaping of the antihelix adopting the consecutive use of four surgical techniques: hemitransfixing microincisions, scoring, squeezing and posterior mattress suture fixation.

RESULTS: Total number of ears that underwent surgery was 71. The mean postoperative follow-up period was 2 years. The mean postoperative change of protrusion was 7.96 mm referring to the superior cephaloauricular distance, while it was 12.18 mm considering the middle cephaloauricular distance. No patient developed complications or recurrence.

CONCLUSIONS: The proposed surgical procedure for otoplasty resulted in endurance of auricular appearance and symmetry with high success rate and low morbidity.

Key Words:

Auricular cartilage reshaping, Otoplasty, Prominent ear, Protruding ears, Scoring-incision-squeezing techniques.

Introduction

Protruding or prominent ears are a common congenital deformity of the external ear with a prevalence of 5%[1]. Genetic factors, point mutations and environmental influences during pregnancy are the main pathogenetic factors discussed[2,3].

A careful preoperative assessment of the malformation bilaterally, in terms of shape and consistency of the ear cartilage, is essential for selection of surgical technique for each ear[4,5].

Prominent ear derives from a combination of defects in antihelix and concha: underdevelopment/absence of the antihelix, conchal hypertrophy, excessive depth of the concha, increase of conchoscaphal angle (>90°), increase of cephaloauricular distance to the medium upper and/or lower poles[6,7].

These deformities, which often cause low self-esteem and social isolation[8], can be treated non-surgically with molding during first three months of postnatal life[9], but majority of cases are treated surgically during childhood, adolescence or adulthood with various operative techniques.

Several factors affect the appropriate time for surgical correction of prominent ears, such as auricular growth, cartilage consistency, psychological strain, and the patient wishes. By the age of six years the auricular cartilage has completed most of its growth, so an otoplasty at this time does usually not interfere with auricular growth[10].

The correction of prominent ears should meet basic goals of otoplasty as described by McDowell[11]. More than 200 surgical procedures have been described[5,12], but no single technique has been found to be the gold standard for all types of auricular protrusions in different ethnic groups.

Otoplasty techniques are divided in cartilage-sculpting (cutting)[13], cartilage-sparing (suturing)[14,15], and composite techniques (combination of sutures and sculpting)[16,17].

In 1845, Dieffenbach[18] reported the first otoplasty to correct a post-traumatic prominent auricle in a patient using a postauricular skin excision. After several studies[19,20], Gersuny[21] observed that, because of the elastic resetting force of the cartilage and the natural elasticity of the skin, a skin excision alone is not enough to achieve lasting results from otoplasty. Luckett[22] pointed out the important concept of restoration of the antihelical fold with a cartilage-breaking technique. Becker[23] introduced the method in-

Corresponding Author: Francesco Serratore, MD; e-mail: serratorefrancesco@yahoo.it

volving a combination of cartilage incisions and suture techniques to soften the contour of the corrected prominent ear.

Gibson and Davis[24] could finally show that cartilage incised on one side has the ability to warp to the opposite side, and the knowledge of this phenomenon became the starting point for numerous modifications of incision-scoring techniques in the area of antihelix, described by Stenström[13], Converse and Wood-Smith[17], Chongchet[25]. Converse and Wood-Smith[17], Converse et al[26], Crikelair[27] performed incomplete posterior cartilage incisions in combination with fixation sutures. In contrast to the incision-scoring techniques, Mustardé[14,28] described a technique to create a new antihelical fold that was only based on sutures, using a posterior access. However, the use of conchomastoidal suturing was popularized by Furnas[15] and later modified by Spira et al[29].

One of major difficulties associated with otoplasty techniques regards the achievement of lasting aesthetic results. In fact, shape irregularities and asymmetry secondary to the release of cartilage are frequent. This problem, due to cartilaginous memory, occurs especially in case of cartilage reshaping procedures with incision, scoring, or abrading techniques in absence of sutures.

Unlike most authors, who describe a single surgical technique for auricular cartilage weakening, we propose an effective combination of four techniques of cartilage softening with the ultimate goal of creating a new antihelical fold during otoplasty for prominent ears deformity. Our procedure, which is a combination of sculpting-techniques and suturing-techniques using a posterior approach, is divided into four steps: longitudinal and transverse incisions with a scalpel blade, scoring with needles, squeezing with an Adson-Brown forceps of the antihelix region to create a natural fold of cartilage; and posterior mattress suture fixation to preserve the desired fold. The satisfactory results of our original combined surgical procedure are reported in this article.

Patients and Methods

This prospective study involves 41 patients treated by the principal author from 2001 to December 2012. Patients mean age was 12 years (range: 6-43 years). 16 patients were male and 25 were female. Prospective long term follow up included systematic evaluation of early and late complications (dermatitis, perforation of the skin, hematoma, or infection; and asymmetry, hypertrophic scar and keloid, alteration in sensitivity and growth, or recurrence).

Photographs were taken preoperatively, at 6-weeks postoperatively, and at late follow-up. We recorded early and final outcome assessments, too, including: basic goals of otoplasty[11], patient satisfaction, doctors' satisfaction and measurements of postoperative change of protrusion. Patient satisfaction and doctors' satisfaction (by two blinded physicians) were recorded referring to the overall appearance and symmetry of the ears, using a visual analogue score (0-10) with 0 being the worst possible and 10 being the best aesthetic outcome. According to the marked scores the patients were divided into three groups: high satisfaction (8-10), satisfactory (4-7), and unsatisfactory (<4). Degree of protrusion was assessed pre- and postoperatively by measuring the mastoid to the helical rim distance at the upper border of the helix and at the top of the ear canal; the mean was then calculated. The difference between the pre- and postoperative measurements was calculated as the change of protrusion.

Surgical Technique

The patient was prepared and draped after local anaesthesia. The areas to be corrected are demarcated and include creation of a new anthelical fold, the elliptical retroauricular incision, and in cases of lobule protrusion, the helical tail. Local anaesthetic with adrenaline (lidocaine with 1 in 100,000 adrenaline) was infiltrated along the line of the desired position of the refashioned antihelix between the cartilage and the subcutaneous tissues posteriorly. An elliptical excision of the retroauricular skin was performed: the incision begins at the retroauricular sulcus and should be kept 1 cm away from the helical rim to permit the use of glasses and to retain the natural appearance.

After that, we demarcated the sulcus between helix and antihelix with three-four gauge needles transfixed anteroposterior in the auricular cartilage: these marks serve as guides for full-thickness incision in the posterior face of the cartilage. Joining these points we have access to the anterior face of the cartilage. The skin was undermined from the anterior face of the cartilage to expose the anthelical cartilage. Before proceeding to the modeling of the antihelix, we also performed an elliptical exeresis of the conchal cartilage if the patient had hypertrophy of the concha (Figure 1A).

Softening and reshaping of the antihelix. To create a new antihelix fold we softened the anthelical cartilage adopting the consecutive use of four surgical techniques (see **Video 1**, which shows our surgical procedure for softening and reshaping of the antihelix).

Step 1: The cartilage was shaped with hemitransfixing microincisions in the anterior face to break its "spring" using a no.15 scalpel blade. First we performed a series of parallel incisions, and then we performed a second series of incisions oriented transversely with previous, thus forming a narrow texture. If incised in just one of its faces, the cartilage tends to bend, causing convexity of the incised face and concavity of the opposite face (Figure 1B).

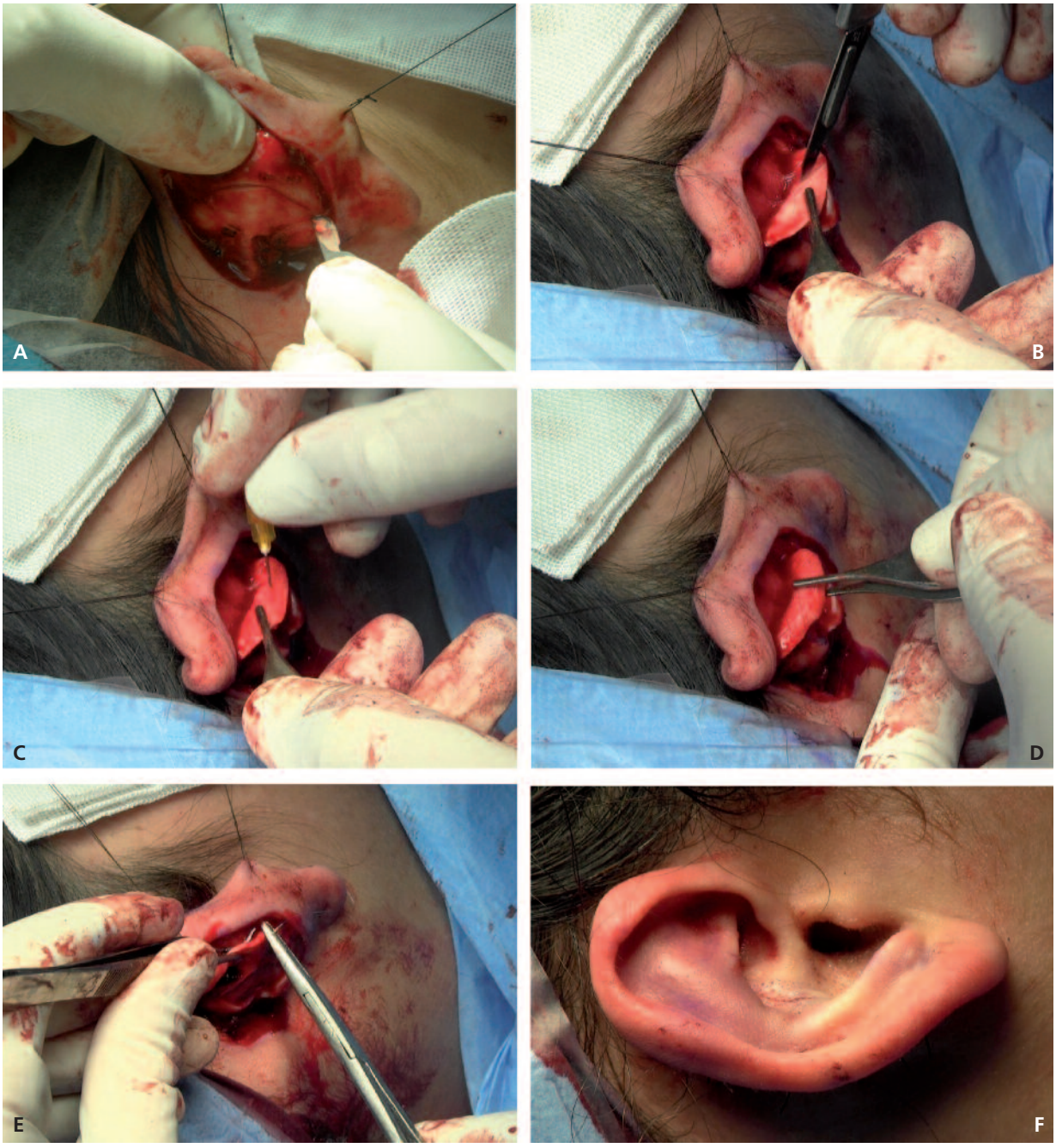

Figure 1. Otoplasty: surgical technique. **A**, Elliptical exeresis of hypertrophic conchal cartilage. **B-E**, Softening and reshaping of the antihelix: *Step 1*, hemitransfixing microincisions in the anterior face of the cartilage with a scalpel blade (**B**); *Step 2*, scoring of the antihelical fold with a needle (**C**); *Step 3*, squeezing of the cartilage with an Adson-Brows forceps (**D**); *Step 4*, posterior mattress suture fixation of the re-created antihelix fold (**E**). **F**, Immediate postoperative photograph of the ear.

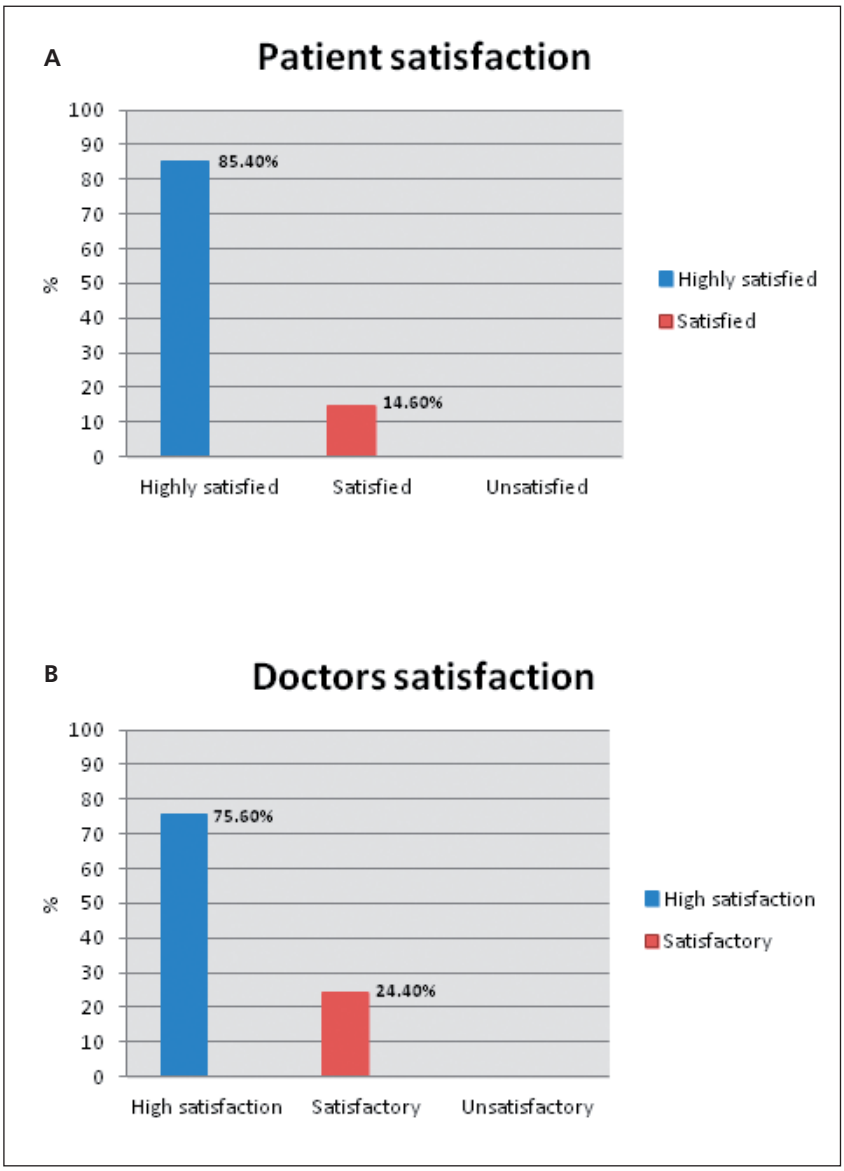

Figure 2. Two clustered column histograms showing percent of patient satisfaction (**A**) and percent of doctors' satisfaction (**B**) in postoperative follow-up.

Step 2: The second step in cartilage weakening consisted in the anterior scoring of the antihelical fold with a 26-gauge needle. Scores were placed on the entire anterior surface of the cartilage making a full-thickness penetration (Figure 1C).

Step 3: We performed squeezing of it with an Adson-Brown forceps. After repeating this step for 6-7 times the cartilage was curved to the desired position (Figure 1D).

Step 4: Maintenance of position of the new antihelical fold was assured by placement of posterior mattress sutures, which acted as an internal mold allowing a smooth tense curve of the antihelix (Figure 1E). We used non-absorbable 6/0 nylon sutures. Bipolar diathermy was utilized to achieve haemostasis. Skin closure was performed with 4/0 nylon sutures. The dressing, which remained in place for 7 days, was packed with greasy gauze pad containing hyaluronic acid sodium salt and fixed by a head bandage.

Results

Total number of ears that underwent surgery was 71. All patients were operated by the same surgeon (the author). The mean postoperative follow-up period was 2 years.

The reported technique allowed for instantaneous reshaping of the cartilage, conferring a natural appearance to the ears and patient satisfaction in all cases (Figure 1F).

Figure 3. Two illustrative cases of bilateral prominent ears before and after otoplasty are shown. A 19-year-old female: preoperative front view (**A**) and front view 12 months postoperatively (**B**). And a 12-year-old boy: preoperative front view (**C**) and one month postoperative front view (**D**).

After early and late follow-up, no complications or sequel (such as hematomas, seroma, cartilage infection, or necrosis) were observed in this series of patients. The postoperative scars were hidden on the posterior surface of the auricle. None of the patients developed keloids.

According to the patient's satisfaction with the results in terms of shape and symmetry, 35 (85.4%) patients were pleased and 6 (14.6%) were satisfied (Figure 2A). Using the doctor's satisfaction outcome 31 (75.6%) patients scored high and 10 (24.4%) patients ranked satisfactory (Figure 2B). No patient developed a recurrence or required a corrective secondary operation. Pre- and postoperative photography of 3 illustrative cases are presented (Figures 3, 4).

Cephaloauricular Measures and Statistical Analysis

Mean pre-operative superior and middle cephaloauricular distances were, respectively, 20.45 ± 3.32 mm (range 14-26 mm, $p < 0.001$) and 24.81 ± 2.03 mm (range 21-28 mm, $p < 0.001$). At the 24 months follow-up mark, the measurements were, respectively, 12.49 ± 2.92 mm (range 9-18 mm, $p < 0.001$) and 12.63 ± 1.15 mm (range 11–15 mm, $p < 0.001$; see Table I).

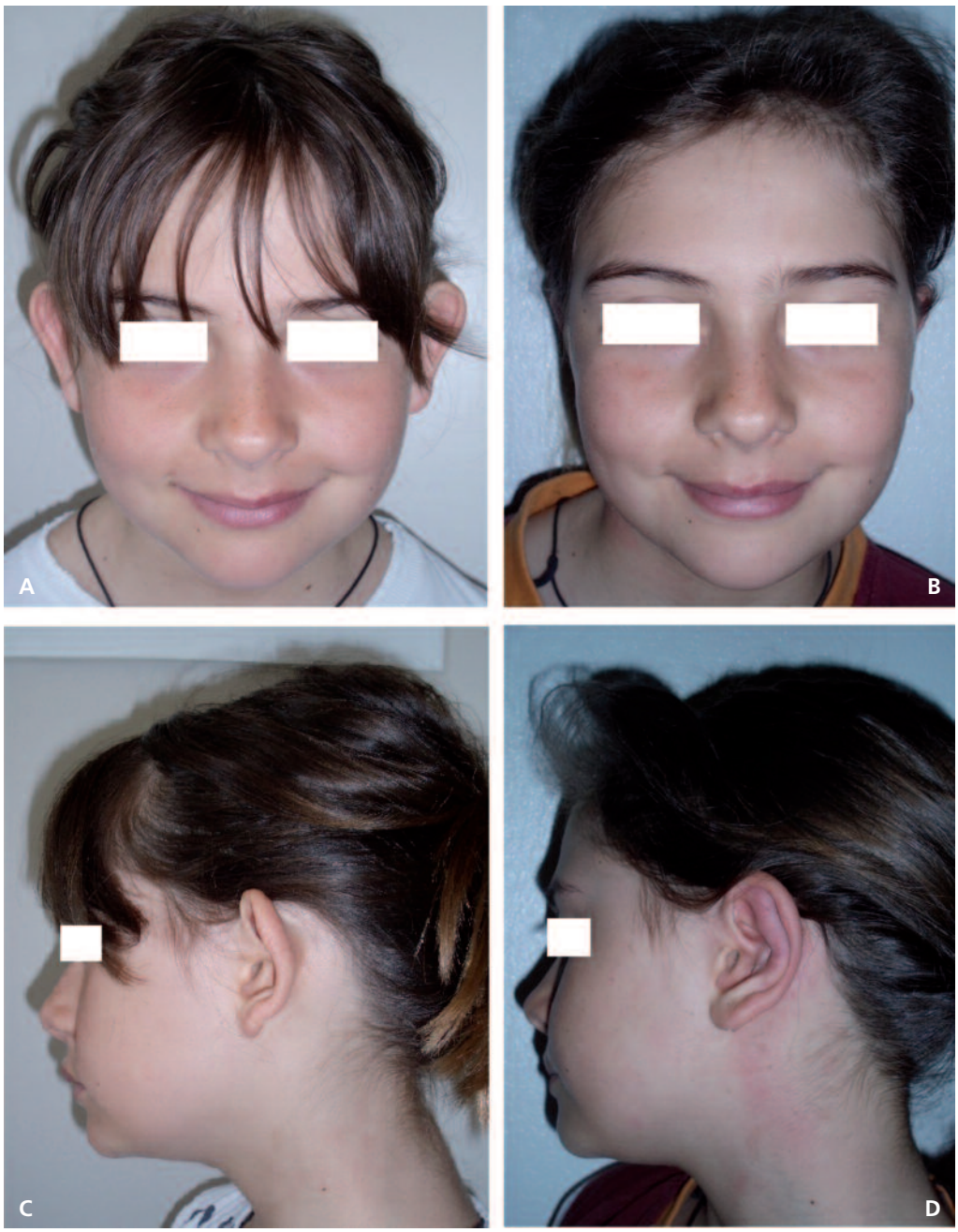

Figure 4. A 9-year-old girl with bilateral prominent ears. **A**, Preoperative front view. **B**, Postoperative front view after 4 months. **C**, Preoperative left lateral view. **D**, Four months postoperative left lateral view.

The mean postoperative change of protrusion was 7.96 mm referring to the superior cephaloauricular distance, while it was 12.18 mm considering the middle cephaloauricular distance.

Data are presented as mean. Student's *t* test (two samples) is used to calculate the *p*-values and $p < 0.05$ is considered to be statistically significant.

Discussion

Ears prominence should always be viewed in the context of the individual facial structure, so the choice of surgical technique should be adapted to every single patient with the aim of creating well-shaped, symmetric and natural-appearing ears, without evidence of manipulation[1,30].

Table I. Our series of 71 reshaped protruding ears on 41 patients: mean pre-operative superior and middle cephaloauricular distances were, respectively, 20.45 ± 3.32 mm (range 14-26 mm, $p < 0.001$) and 24.81 ± 2.03 mm (range 21-28 mm, $p < 0.001$); the post-operative measurements were, respectively, 12.49 ± 2.92 mm (range 9-18 mm, $p < 0.001$) and 12.63 ± 1.15 mm (range 11–15 mm, $p < 0.001$). Data are presented as mean. Student's *t* test is used to calculate the *p*-values and $p < 0.05$ is considered to be statistically significant.

Patient ears	Age	Distance from the ear to the head at the superior helix (mm)		Distance from the ear to the head at the top of the ear canal (mm) the head at the top of the ear canal (mm)	
		Before surgery	After surgery*	Before surgery	After surgery*
1R	19	25	17	27	12
1L		26	18	28	13
2R	9	24	16	26	15
2L		25	16	27	15
3R	10	24	16	27	14
3L		25	17	27	13
4R	17	20	10	23	13
4L		20	11	22	12
5R	11	14	10	22	11
5L		14	10	25	11
6R	10	16	11	22	12
6L		18	11	23	12
7R	7	19	9	26	15
7L		19	9	28	14
8R	13	25	17	28	13
8L		25	17	25	12
9R	8	21	10	22	11
9L		23	11	24	12
10R	15	23	15	27	12
10L		22	15	25	12
11R	28	18	9	24	12
11L		20	10	26	12
12R	7	18	11	24	11
12L		19	10	24	12
13R	43	15	10	23	13
13L		17	10	24	13
14R	11	23	17	26	12
14L		24	17	28	12
15R	10	25	16	27	12
15L		26	17	28	13
16R	6	17	10	22	11
16L		18	10	23	11
17R	7	17	9	23	12
17L		18	9	23	11
18R	13	19	12	25	14
18L		21	13	27	15
19R	8	19	10	22	13
19L		18	10	23	12
20R	11	24	16	27	14
20L		24	15	28	13
21R	9	13	10	24	15
21L		15	11	24	14
22R	7	18	9	23	13
22L		17	9	22	12
23R	11	18	10	25	14
23L		18	10	23	13
24R	15	23	11	25	12
24L		22	11	25	13
25R	10	24	14	26	13

Table continued

Table I *Continued*. Our series of 71 reshaped protruding ears on 41 patients: mean pre-operative superior and middle cephaloauricular distances were, respectively, 20.45 ± 3.32 mm (range 14-26 mm, $p < 0.001$) and 24.81 ± 2.03 mm (range 21-28 mm, $p < 0.001$); the post-operative measurements were, respectively, 12.49 ± 2.92 mm (range 9-18 mm, $p < 0.001$) and 12.63 ± 1.15 mm (range 11–15 mm, $p < 0.001$). Data are presented as mean. Student's *t* test is used to calculate the *p*-values and $p < 0.05$ is considered to be statistically significant.

Patient ears	Age	Distance from the ear to the head at the superior helix (mm)		Distance from the ear to the head at the top of the ear canal (mm) the head at the top of the ear canal (mm)	
		Before surgery	After surgery*	Before surgery	After surgery*
25L		20	13	26	12
26R	8	17	10	22	11
26L		17	10	24	12
27R	13	21	13	24	14
27L		20	13	26	15
28R	15	19	12	23	12
28L		20	12	23	12
29R	9	24	15	27	13
29L		22	17	25	13
30R	9	23	15	26	13
30L		24	15	27	12
31L	14	24	16	27	14
32L	10	25	17	28	13
33R	11	23	16	26	11
34L	12	18	10	23	14
35R	8	23	15	27	12
36R	14	19	11	23	13
37L	9	24	15	27	13
38L	18	18	10	22	13
39R	12	20	10	25	11
40L	8	17	11	22	12
41R	7	18	9	21	11

R, right; L, left.
* The reported post-operative superior and middle cephaloauricular distances were measured at 24 months of follow-up.

An aspect with significant impact on procedure planning is the analysis of the cartilage consistency[4]. The elastic properties of auricular cartilage are age dependent. If the cartilage is very thin and soft (as it is before the age of 6 years), the gentle suture technique described by Mustardé[28] with the use of non-absorbable suture material is promising regarding the shaping of a new antihelix, with a low recurrence rate. In contrast, the use of softening-sculpting techniques or sculpting-suture techniques is generally required in cases of thick or stiff auricular cartilage or for revision procedures to achieve sufficient weakening of the cartilage and shaping of the antihelix[5].

In fact, sculpting techniques permanently alter the structure of the auricular cartilage[1,30]: cartilage tends to warp away from an injured surface[24], because of the so called "internal self-locked stress system". These interlocked stresses exist in intact cartilage as a result of its growth pattern and there are released by a perichondrial incision (break of cartilage spring)[24,31]. Based on the studies by Gibson and Davis[24], as well as those by Stenström[13] and Chongchet[25], numerous methods and their modifications have been presented over the last years which achieve the desired shape of the cartilage with scoring, incisions, grinding down with diamond drills, rasps, needles, or Adson-Brown forceps[13,17,24,32-38]. These procedures are frequently performed in combination with mattress sutures of absorbable or non-absorbable suture material to keep the weakened cartilage in the desired position[36-38].

The purpose of all these techniques consists of recreating of the antihelical fold, reducing the concha and reducing the scaphomastoid angle. Unfortunately, despite the multitude of surgical techniques described, the ideal procedure is yet to be found.

A frequent unsatisfactory long-term outcome of otoplasty is residual deformity and loss of correction with the rate of this complication increasing with time postoperatively[39,40]. In fact, even if the surgical technique is correctly performed, a recurrence with renew protrusion of the ears may occur.

We tried to avoid this problem by adopting the use of more than one technique for weakening of the auricular cartilage making it more malleable and get a stable and lasting modification of its imprinting, in accordance with the "theory of the cartilage behavior" proposed by Gibson and Davis[24].

Our surgical procedure for cartilage weakening consists of four consecutive steps: longitudinal and transverse incisions with a scalpel blade (step 1), scoring with a needle (step 2), squeezing with an Adson-Brown forceps (step 3) and posterior mattress suture fixation (step 4) of the re-created anti-helix fold. This way we achieved a greater degree of softening of the cartilage than the one obtainable by using a single technique as reported in the literature by most authors.

Furthermore, our weakening procedure was also effective in decreasing the natural tendency of the cartilage to return to its original position due to the "process memory"[31]. In fact, we stably modified the imprinting the cartilage, thanks to the combination of the described above techniques.

The long-term outcome in our series has been fully satisfactory: natural appearance, tactile sensation, and malleability of the ear are similar to those of ears that had no surgery.

Conclusions

The proposed surgical procedure for otoplasty results in a high success rate with low morbidity. It is a safe, simple, reliable, reproducible and versatile method. Thus, we propose this combined technique as an alternative approach to managing the antihelix-scalpha-helix complex during correction of prominent ears deformity.

Conflict of interest

The Authors declare that they have no conflict of interests.

References

1) Kelley P, Hollier L, Stal S. Otoplasty: evaluation, technique, and review. J Craniofac Surg 2003; 14: 643-653.
2) Takemori S, Tanaka Y, Suzuki JI. Thalidomide anomalies of the ear. Arch Otolaryngol 1976; 102: 425-427.
3) Porter CJW, Tan ST. Congenital auricular anomalies: Topographic anatomy, embryology, classification and treatment strategies. Plast Reconstr Surg 2005; 115: 1701-1712.
4) Salgarello M, Gasperoni C, Montagnese A, Farallo E. Otoplasty for prominent ears: a versatile combined technique to master the shape of the ear. Otolaryngol Head Neck Surg 2007; 137: 224-227.
5) Naumann A. Otoplasty--Techniques, characteristics and risks. GMS Curr Top Otorhinolaryngol Head Neck Surg 2007; 6: Doc04.
6) Janis JE, Rohrich RJ, Gutowski KA. Otoplasty. Plast Reconstr Surg 2005; 225: 60-67.
7) Ribeiro JA, da Silva GS. Finesse in otoplasty in four steps. Aesthetic Plast Surg 2012; 36: 846-852.
8) Schwentner I, Schmutzhardj, Deibl M, Sprinzl GM. Health-related quality of life outcome of adult patients after otoplasty. J Craniofac Surg 2006; 17: 629-635.
9) Tan ST, Shibu M, Gault DT. A split for correction of congenital ear deformities. Br J Plast Surg 1994; 47: 575-578.
10) Gosain AK, Recinos RF. Otoplasty in children less than four years of age: Surgical technique. J Craniofac Surg 2002; 13: 505-509.
11) McDowell AJ. Goals in otoplasty for protruding ears. Plast Reconstr Surg 1968; 41: 17-27.
12) Limandjaja GC, Breugem CC, Mink van der Molen AB, Kon M. Complications of otoplasty: A literature review. J Plast Reconstr Aesthet Surg 2009; 62: 19-27.
13) Stenstrom SJ. A "natural" technique for correction of congenitally prominent ears. Plast Reconstr Surg 1963; 32: 509-518.
14) Mustardé JC. The treatment of prominent ears by buried mattress sutures: A ten-year survey. Plast Reconstr Surg 1967; 39: 382-386.
15) Furnas DW. Correction of prominent ears by conchamastoid sutures. Plast Reconstr Surg 1968; 42: 189-193.
16) Walter C. Plastic surgery of protruding ears. HNO 1998; 46: 193-194.
17) Converse JM, Wood-Smith D. Technical details in the surgical correction of the lop ear deformity. Plast Reconstr Surg 1963; 31: 118-128.
18) Dieffenbach JE. Die operative Chirurgie F. A. Brockhause, Leipzig, 1845.
19) Ely ET. An operation for prominence of the auricles. Arch Otolaryngol 1881; 10: 97.
20) Monks GH. Operation for correcting the deformity due to prominent ears. Boston Med Surg J 1891; 124: 84.
21) Gersuny R. Über einige kosmetische Operationen. Wien Med Wochenschr 1903; 53: 2253.
22) Luckett WH. A new operation for prominent ears based on the anatomy of the deformity. Surg Gynecol Obstet 1910; 10: 635-637.
23) Becker OJ. Correction of protruding deformed ear. Br J Plast Surg 1952; 5: 187-196.

24) Gibson T, Davis W. The distortion of autogenous cartilage grafts: its cause and prevention. Br J Plast Surg 1958; 10: 257.

25) Chongchet V. A method of antihelix reconstruction. Br J Plast Surg 1963; 16: 268-262.

26) Converse JM, Nigro A, Wilson FA, Johnson N. A technique for surgical correction of lop ears. Plast Reconstr Surg 1955; 15: 411-418.

27) Crikelair GF. Another solution for the problem of the prominent ear. Ann Surg 1964; 160: 314-324.

28) Mustardé JC. The correction of prominent ears using simple mattress sutures. Br J Plast Surg 1963; 16: 170-178.

29) Spira M, McCrea R, Gerow FJ, Hardy SB. Correction of the principal deformities causing protruding ears. Plast Reconstr Surg 1969; 44: 150-154.

30) Vuyk HD. Cartilage-sparing otoplasty: a review with longterm results. J Laringol Otol 1997; 3: 424-430.

31) Fry HJ. Interlocked stresses in human nasal septal cartilage. Br J Plast Surg 1966; 19: 276-278.

32) Yugueros P, Friedland JA. Otoplasty. The experience of 100 consecutive patients. Plast Reconstr Surg 2001; 108: 1045-1053.

33) Bulstrode NW, Huang S, Martin DL. Otoplasty by percutaneous anterior scoring. Another twist to the story: a long-term study of 114 patients. Br J Plast Surg 2003; 56: 145-149.

34) Peker F, Celikoz B. Otoplasty: anterior scoring and posterior rolling technique in adults. Aesthetic Plast Surg 2002; 26: 267-273.

35) Keramidas EG. The use of Adson-Brown forceps to score the cartilage in otoplasty. Plast Reconstr Surg 2006; 118: 263.

36) Scuderi N, Tenna S, Bitonti A, Vonella M. Repositioning of posterior auricular muscle combined with conventional otoplasty: a personal technique. J Plast Reconstr Aesthet Surg 2007; 60: 201-204.

37) Erol OO. New modification in otoplasty: Anterior approach. Plast Reconstr Surg 2001; 107: 193-205.

38) Hassanpour SE, Moosavizadeh SM. Posterior scoring of the scapha as a refinement in aesthetic otoplasty. J Plast Reconstr Aesthet Surg 2010; 63: 78-86.

39) Nielson F, Kristensen F, Crawford C. Prominent ears: a follow-up study. J Laryngol Otol 1985; 99: 221-224.

40) Adamson PA, McGraw PL, Tropper GJ. Otoplasty: critical review of clinical results. Larygoscope 1991; 108: 883-888.