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Remodeling of Antihelix in Combined Approach Otoplasty

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ABSTRACT

Background: Prominent ear deformity represents one of the common congenital anomalies in general population with an incidence of approximately 5%. Surgical correction of prominent ears has passed through many modifications along the years. However, there is still no ideal technique and still there will be an evolution for new techniques and refinements. **Aim:** is to apply a new modification in remodeling of antihelix through cartilage fenestration to overcome the cartilage memory, with usage of distal based post-auricular facial flap in combined approach otoplasty. **Patients and Methods:** This retrospective study was done in Ain Shams University Hospitals during the period from December 2021 to April 2023 on patients with prominent ear. Patients underwent combined approach otoplasty with cartilage fenestration and coverage by distal based post-auricular facial flap. **Results:** Eighteen patients were included in this study, ten females and eight males, no bleeding or hematoma was found in any of the patients in the lateral surface of ear as there was no anterior dissection or anterior cartilage scoring. Patients' satisfaction was assessed by satisfaction score, where twelve patients (66.7%) were very satisfied, and four patients (22.2%) were satisfied, and one patient (0.05%) was neither satisfied or dissatisfied and one patient (0.05%) was dissatisfied. **Conclusion:** remodeling of the antihelix through cartilage fenestration and coverage by distal based post-auricular facial flap represents a reliable method for prominent ear otoplasty with no anterior cartilage dissection, no anterior cartilage scoring, minimal or no complications and high patient's satisfaction outcome.

Keywords: Antihelix, Combined otoplasty, Prominent ear

INTRODUCTION

The ultimate goal for correcting prominent ear deformity is to reach a final natural smooth contour with minimal or no irregularities. This is feasible by having an adequate concho-scaphal angle posteriorly, the ear helix edge must be seen antero-posteriorly and laterally fossa triangularis must be seen with a smooth contour of the ear[(1)]. The ears are located on the visible part of the face, so children with prominent ears are exposed to teasing of their colleagues with resultant psychological problems, mandating early surgical intervention for correction of the deformity. Yet in some cases, due to the fact of the ear covered with hair or relative socio-economic low standards in some communities; the deformity is addressed in older ages[(2)].

At the age of six years, with no gender difference considered, complete transverse growth and conchal depth occurs. However, until the age of 11-12 years; the vertical growth resumes[(3)]. Operations in pediatric age group patients should be performed so as not to alter changes that occur at older ages[4].

Surgical correction of prominent ears has passed through many modifications along the years. However, there is still so far, no ideal or perfect technique and still there will be an evolution for new techniques and refinements[(5)]**.** Otoplasty techniques are broadly classified into cartilage cutting and cartilage sparing[5]. Cartilage cutting techniques are widely criticized and questioned for the morbidity sequalae in the form of hematoma, tissue necrosis and consequently ear deformity. On the other hand, cartilage sparing techniques had a greater acceptance and became more popular. Yet, these techniques still show a recurrence rate owing to the cartilage memory and suture drawbacks like pinpricking, extrusion or fatigue[6]

The aim of the study was to apply a new modification in remodeling of antihelix through cartilage fenestration to overcome the cartilage memory, with usage of distal based post-auricular facial flap in combined approach otoplasty.

PATIENTS AND METHODS

This retrospective study was done in Ain Shams University Hospitals during the period from December 2021 to April 2023 on patients with prominent ear. Preoperative evaluation was done, in the form of medical history, general and local examination, and routine laboratory investigations. All of the patients included in this study were primary cases, and revision surgery cases were excluded.

Standard pre- and postoperative photographs and measurements (SUP: most superior helical point, SCA: superior conchal attachment, ICA: inferior conchal attachment, and lobule points)[7] (Figure1) were documented and statistically analyzed.

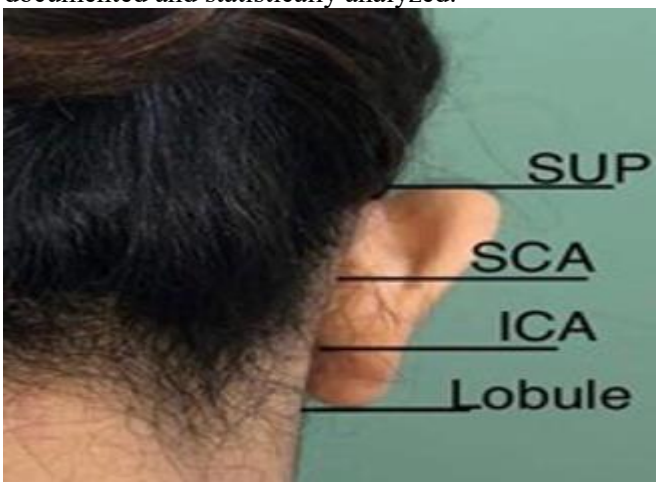

Fig (1): Points of measurement before and after otoplasty; (SUP: most superior helical point, SCA:

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superior conchal attachment, ICA: inferior conchal attachment, and lobule points).

The follow up was done at 2 days, 1 week, 3 months, 6 months and 1 year. Postoperative measurements were taken at 6 month and were statistically analyzed.

Surgical technique:

Under general anesthesia, all patients lied in supine position, sterilization and toweling was done. Tilting the head to one side, then marking of the posterior auricular incision (1-3 cm above the retroauricular fold), then infiltration of hemostatic solution in the form of adrenaline (1/200000), and xylocaine 2%, then waiting for about 10 minutes were done.

Incision of the postauricular skin was done, skin was deepithelialized with a posterior auricular facial flap elevated distally based, and dissected till the helix rim, and then dissection to the mastoid process posteriorly was done (Figure 2).

Fig (2): Posterior auricular incision with elevation of distal based post-auricular facial flap

Marking of antihelix was done using 27-gauge needles being dipped in methylene blue (3 needles). Fenestration of the cartilage was done using 1 mm punch biopsy needle, on the posterior surface, reaching the anterior surface of cartilage without reaching the skin, being supported anteriorly with the other hand, so that fenestration stopped at the level of skin. Number of fenestrations was variable, with more fenestrations at root of helix and less fenestrations at antihelix, it was dependent on size of cartilage per patient and the bending of the cartilage, 3-4 permanent Mustarde suture were applied using proline 4/0 sutures (Figure 3).

Fig (3): Fenestration of cartilage by punch biopsy needle on the posterior surface with applied Mustarde sutures.

Then three conchomastoid (Furnas) sutures were done using proline 4/0 sutures and lastly redraping of the distal based post-auricular facial flap for coverage was done (Figure 4).

Fig (4): Furnas sutures and coverage with the distal based post-auricular facial flap.

Conchal excision was done in cases of conchal hypertrophy. In cases of excess skin, a rim of skin was excised. Finally closure of skin incision was done using proline 5/0 sutures (Figure 5).

Fig (5): Closure of skin with no swelling on anterior surface of ear.

Light dressing and a bandage were applied and all patients were placed on a 5 days postoperative regimen of antibiotic (3rd generation cephalosporins). The sutures were removed on the 10th postoperative day. The patients were recommended to use a headband for postoperative period of at least one month. All complications and complaints were documented.
Patients' satisfaction score was done at 6 months along a Likert scale[8] where 5 represented very satisfied, 4 represented satisfied, 3 represented neither satisfied nor dissatisfied, 2 represented dissatisfied and 1 represented very dissatisfied.

Ethical approval: The procedures in this study were performed in compliance with relevant laws and institutional guidelines in accordance to Helsinki ethical guidelines and have been approved by the Ethical Committee of Faculty of Medicine of Ain Shams University. An informed consent from the parents or guardians of the patients was signed, after full explanation of the surgical procedure and likely comorbidities if any.

Statistical methods

All statistical analyses were performed using IBM SPSS Statistics v26.0 (IBM Corp, Armonk, NY). The values within the group were not regular, so the results were evaluated by Wilcoxon signed ranks test among the non-parametric tests (for paired samples). The preoperative and postoperative SUP, SCA, ICA, Lobule distance values parameters were assessed by non-parametric Wilcoxon test (for paired samples). p values less than 0.05 were considered statistically significant at the 95 % confidence interval.

RESULTS

Eighteen patients were included in this study, with age range (16 -38 years) with an average age 23 years old. Ten females and eight males were the subjects of the study. All patients were discharged one day postoperatively. During the follow up, no bleeding or hematoma was found in any of the eighteen patients in the lateral surface of ear as there was no anterior dissection or anterior cartilage scoring. All cases had Mustarde and Furnas sutures. Whereas conchal hypertrophy excision was done only in two cases. Postoperative photos were taken, and measurements were taken at 6 months and analyzed statistically (Figure 6, 7, 8, 9, 10, 11, 12 and Table 1).

Fig (6): a.18 years old female patient with prominent ear, b. 2 weeks postoperative otoplasty

Fig (7): a. 20 years old female patient with prominent ear, b. 9 months postoperative otoplasty.

Fig (8): a. 30 years old male patient with prominent ear and effacement of antihelix, b. 6 months postoperative otoplasty.

Fig (9): 27 years old male patient with prominent ear and effacement of antihelix antro-lateral view, b. 2 months postoperative otoplasty anteroposterior view, c. lateral view postoperative otoplasty

Fig (10): a. posterior view of a 23 old female patient with prominent ear, b. 2 weeks postoperatively.

Fig (11): a. Preoperative 18 years old female patient with prominent ear A-P view, b. 4-months postoperative A-P view, c. Preoperative posterior view, d. 4-months postoperative posterior view.

Fig (12): Preoperative 33 years old male patient with prominent ear A-P view, b. 6-months postoperative A-P view, c. Preoperative lateral view, d. 6-months postoperative lateral view.

Table (1): The comparison of the changes in terms of preoperative and postoperative measurement values

	Preoperative right Median (IQR)	Postoperative right Median (IQR)	P-value	Preoperative left Median (IQR)	Postoperative left Median (IQR)	P-value
SUP	25 (24 – 25)	14 (13 – 14)	<0.001	25 (24 – 25)	13 (13 – 14)	<0.001
SCA	27 (26 – 28)	16 (15 – 16)	<0.001	27 (26 – 27)	16 (15 – 16)	<0.001
ICA	26 (25 – 26)	16 (15 – 16)	<0.001	26 (25 – 26)	16 (15 – 16)	<0.001
Lobule	22 (20 – 23)	19 (18 – 19)	<0.001	21 (20 – 23)	19 (18 – 19)	0.001

IQR: interquartile range (25-75%), SUP: most superior helical point, SCA: superior conchal attachment, ICA: inferior conchal attachment.

‡: Wilcoxon Rank test

Patients' satisfaction was assessed by satisfaction score, where 66.7% were very satisfied, 22.2% were satisfied, 5.6% was neither satisfied or dissatisfied and 5.6% was dissatisfied (Table 2)

Table (2): Likert Satisfaction score of the patients in the study

Satisfaction score	Number of patients	Percentage/%
Very satisfied	12	66.7
Satisfied	4	22.2
Neither satisfied nor dissatisfied	1	5.6
Dissatisfied	1	5.6
Very dissatisfied	0	0

However minor complications occurred as disrupted sutures (two cases) and were managed conservatively with topical antibiotic ointment and skin soothing creams and pain from buried suture occurred in two cases; managed by analgesics for about 2 weeks (Table 3).

Table (3) Early and late complications of the 18 cases

Complications	Number of patients
Cartilage/skin necrosis (early)	0
Hematoma and bleeding (early)	0
Wound disruption (late)	2
Recurrence (late)	0
Auricular deformities (late)	0
Pain	2

DISCUSSION

Prominent ear deformity represents one of the common congenital anomalies in general population with an incidence of approximately 5%. By anthropometric studies, it is described as having concho-scaphal angle of more than 90°, concho-mastoid angle of more than 30°, and also an increase of distances between helical rim and scalp, which is normally 1-1.2 cm at the upper part, 1.6-1.8 cm at the middle part, and 2-2.2 cm at the lower part[9].

In this study pre- and postoperative measurements of the helical scalp distances added an objective measurement for the final outcome as postoperative distances, where the results of the study are comparable with the range of the ideal measurements.

Otoplasty for prominent ear deformity is basically divided into two major techniques; cartilage cutting and cartilage sparing. Both techniques have their drawbacks[10]. All of these controversies high spot the need to develop cartilage protection techniques.

The cartilage memory, represents the main concern in different studies and how recurrence of the deformity occurs, still endures the main drawback especially in thick auricular cartilage patients. Moreover, the cutting techniques and cartilage excision or scoring techniques, still leaves sharp edges or demarked lines during the creation of the antihelical fold[11].

Hereby comes in this study, enduring the full advantages of the cutting technique by fenestrations of the full thickness of the cartilage anteriorly and posteriorly and thus delineating the memory of the cartilage, but still without leaving sharp edges to be felt or seen.

In studies utilizing anterior scoring in their technique, **Caouette-Laberge** *et al*[12], **Salgarello** *et al*[13] and **Bhatti and Donovan**[14], bleeding occurred as a major complication in their studies with incidence of 2.6%, 3% and 2.9% respectively. Whereas in this study there was 0% incidence of hematoma owing to not doing anterior dissection or scoring in this technique.

In this study the results were very similar to other studies utilizing the posterior scoring in combined otoplasty technique[15] (concerning the aspects of no major complications especially bleeding or cartilage infection or skin necrosis). Moreover, utilizing this technique minimizes the incidence of suture extrusion owing to the usage of the distal based post-auricular facial flap.

A distally based post auricular fascial flap was used by many authors (**Horlock** *et al*[10], **Shokrollahi** *et al*[16], and **Irkoren** *et al*[17] in combined otoplasty with the aim of covering the Mustarde suture and reaching to cover the conchomastoid sutures, this flap helped to reduce the incidence of suture extrusion as tension is distributed over a larger wider area. Furthermore, the post-auricular facial flap was viewed as a means of support to minimize the incidence of recurrence.

In this study, the use of post auricular facial flap was utilized as a further measure to minimalize the incidence of complications; namely suture extrusion and to further add to lessening the incidence of recurrence. Thus, optimizing the technique utilized in the study and its surgical outcomes with minimal complications was often reported by different studies[10, 16, 17].

Regarding patient satisfaction in this study; more than were 88% very satisfied or satisfied; adds to the subjective reliability of the technique with minimal complications and satisfactory outcome, relieving the patients and optimizing social confrontation for these patients.

CONCLUSION

Remodeling of the antihelix through cartilage fenestration and coverage by distal based post-auricular facial flap represents a reliable method for prominent ear otoplasty with no anterior cartilage dissection, no anterior cartilage scoring, minimal or no complications and high patient's satisfaction outcome.

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