Egypt, J. Plast. Reconstr. Surg., Vol. 30, No. 1, January: 49-56, 2006

Combined Otoplasty for Correction of Protruding Ears; Our Experience with Two Corrective Techniques

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ABSTRACT

Failure of scaphal folding, flat antihelix, deep concha and increased concha scaphal angle create prominence of the ear. Fifty-six prominent ears were corrected in two groups with either combined Mustarde suturing or combined modified Stenstrom otoplasty. The age of the corrected cases ranged from 4 to 43 years. Early postoperatively the corrected mastoid-helix distance in both groups ranged from 15 to 23mm. Among the corrected cases with combined Mustarde otoplasty we recorded bleeding from the wound in 3.57%, wound dehiscence in 3.57% with no hematoma, neither wound infection nor skin necrosis and on follow up we noticed hypertrophic scar in 7.14%, ear asymmetry in 3.57%, suture extrusion in 10.71% with patient unsatisfaction in 7.14% and recurrence of ear deformity in 21.85%. With combined modified Stenstrom otoplasty we detected wound hematoma in 7.14%, wound dehiscence in 3.57% and on follow up we reported ear asymmetry in 10.71%, stitch sinuses in 3.57%, patient unsatisfaction in 10.71% with recurrence rate of 3.57%.

We concluded that, otoplasty to correct protruding ears using either combined Mustarde or combined modified Stenstrom techniques is a relatively easy operation with fewer complications but the recurrence rate is higher without weakening of the scaphal cartilage and the proper early wound dressing lessens the incidence of helical malposition when trans-cartilaginous incision is used.

INTRODUCTION

The human auricles are important paired esthetic units. The incidence of congenital auricular anomalies is unknown, although it varies between racial groups and protruding ears are common in the white population **[1]**. Affected children are often stigmatized by their peers, as the protruding ears may be a source of psychological distress in either sex and at any age. Failure of scaphal folding, underdeveloped or flat antihelix, deep and hypertrophied concha and anterolateral rotation of the concha with increased concha-scaphal angle create prominence of the ear which is usually the result of combined deformities **[2,3]**. For more than a century, many techniques for correction have been proposed which may be categorized as the cartilage incision techniques **[4-10]** versus the sutures placement techniques **[11-15]** and both aim to correct the abnormal shape, namely underdeveloped or flat antihelical fold and concha protrusion or a combination of both these features. All cartilage-tubing techniques depend on scarring to fill the tube and lock the sculpted framework into position **[16,17,18]**. Conchal setback for medialization and correction of auriculo-mastoid space was declared by Furnas who used concha-mastoid permanent sutures **[15]**. Closed anterior scoring of the antihelical fold through a posterior approach had been described by Stenstrom **[7]** and modified by others **[2,8,9,10]** and the experimental works had confirmed the earlier explanation by Stenstrom that the elastin fibers disruption had played a role in changes observed in the antihelical cartilage by scoring **[18,19,20]**.

The aim of the present work is to compare the results of combined Mustarde permanent sutures or combined modified Stenstrom otoplasty as a corrective technique for the prominent ear.

MATERIAL AND METHODS

Fifty-six prominent ears were corrected over

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multiple incisions" in addition to concha to mastoid permanent sutures and excision of a crescentic part of the postauricular skin without suturing of the antihelical cartilage).

In case of bilateral protruding ears, each ear was corrected randomly with one of the studied techniques.

In all deformed ears, we inspected carefully the topographical features of the external ears and the mechanical characteristics of the auricular cartilage were assessed. The ear was manipulated with the fingers to obtain any information (stiff cartilage, floppy cartilage, lobule protrusion, deep or hypertrophied concha) prior to the time of intraoperative judgment. The dimensions and projections of the ears were measured, the asymmetries were observed and the positions of the ears to other facial features were noticed.

Surgical Techniques:

General anesthesia was chosen for all cases. The key markings of the incisions, the folds and suture sites were marked with a colored marker. The operative sites were infiltrated with local lidocaine 1% with 1:100,000 diluted epinephrine.

We started the correction through a curved postauricular skin incisions of 3-4cm length at least 1cm medial to the helix and about 1cm lateral to the postauricular sulcus with excision of a crescentic part from the postaurical skin (Fig. 1). The flaps of the posterior surface of the ear were elevated to expose the conchal perichondrium and peripherally on the perichondrial surface of the scaphahelix extending almost to the free edge of the helix. To expose the mastoid fascia we transected the auricularis posterior muscle. Hemostasis was secured with the bipolar cautery allover the surgical intervention.

In the first group (combined Mustarde technique) horizontal mattress sutures were centered along the long axis of the root and superior crus of the antihelical cartilage. According to the previously marked antihelix, three sutures of 4/0 polypropylene were used between the cartilage of scapha and that of the concha with the lowermost suture to be placed from cauda helicis to the concha and the uppermost suture to pass from the concha to the triangular fossa. The sutures when pulled tight created the desired antihelix roll with some over correction to allow some postoperative setting (Fig. 2).

In the second group (combined modified Stenstrom otoplasty), through the postauricular incision and after the flaps elevation as in the first group, the cauda helicis was then located and a transcartilaginous incision was done from the cleft between the tail of the helix and the concha, parallel to the border of the helical rim superiorly into the upper third of the auricle maintaining a constant helical width (Fig. 3).

Access to the anterior surface of the concha and antihelix was then provided, and the anterior skin with the perichondrium was elevated with a periosteal elevator. The antihelical cartilage was completely exposed up to its origin and after the section of the origin of the helical cartilage and elevation of the skin and the perichondrium, multiple partial-thickness cartilage incisions were done in a normal appearing "fan shape" antihelix that will curve both superiorly and posteriorly (Fig.4).

The partial-thickness incisions gathered at the middle third of the ear to form the upper portion of the concha. After partial-thickness incisions and proper alignment of the conchal height with the antihelical fold, the cartilage should stay in the desire position without the help of any suture material.

The helical rim and anterior skin flap were then returned to their original position and 5/0 plain catgut suture was used to secure the cauda helicis to the conchal cartilage.

In both groups, the projection of the lobule was examined and its position was controlled by fixing the cartilage of the cauda helicis posteriorly behind the conchal cartilage.

Concha to mastoid 4/0 polypropylene two mattress sutures were placed between the conchal rim and the mastoid plane (passing from the posterior conchal wall to the mastoid periosteum and fascia), which when tightened, the distance between the concha and the mastoid plane was reduced to be in a range of 15-23mm (Fig. 5).

Closure of the skin incision with a running horizontal mattress 4/0 polypropylene suture completed the repair and helped in the correction of the deformed prominent ear. When the auricular cartilage was thick and heavy in both groups, a crescent of the conchal cartilage was removed and the cut edges of the conchal cartilage were approximated with 5/0 polyglactin (vicryl) sutures in addition to the previous steps of surgical intervention.

Postoperative dressing with Vaseline gauze which was molded in the posterior auricular sulcus

and around the auricular contours, the ear was covered with soft gauze pads and a bilateral mastoid-head wrap was placed and reinforced with tape. The dressing was changed in the next day, and was left for 7-10 days unless there was postoperative bleeding.

Postoperatively, the patients were followed up weekly for the first month, then monthly for 6 months and by the end of the first postoperative year.

Fig. (1): Postauricular incision with excision of a skin ellipse.

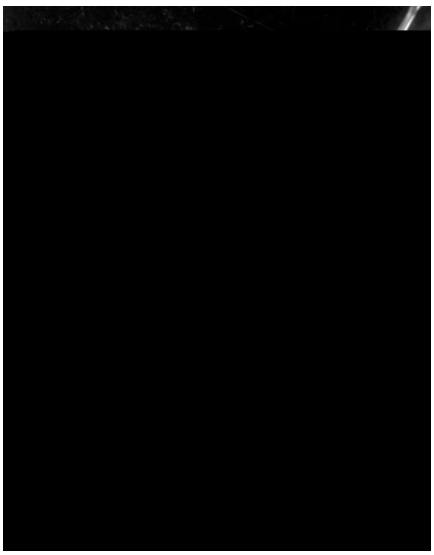


Fig. (2): Transcartilagenous exposure of the anterior surface of the antihelix.

Fig. (3): Anterior multiple partial-thickness incision of the antihelix.

Fig. (4): Conchal-Mastoid suturing.

Fig. (5): Mustarde sutures sitting, Conchal-Mastoid suturing.

RESULTS

Fifty-six prominent ears were corrected over the past 4 years. There were 25 patients with bilateral and 6 patients with unilateral prominent ears. Male patients were the majority (87.1%) and the age of the operated patients ranged from 4 to 43 years. The preoperative mastoid-helix distance ranged from 25mm to 35mm, while after correction of the deformity it ranged between 15mm and 23mm.

Early Postoperative Complications: Bleeding in one ear (3.57%) in the first group, while we did not record such complication in the second group. Hematoma was discovered in 2 cases (7.14%) in the second group (Fig. 6), wound dehiscence in 3.57% of the cases in each group while no infection was recorded in both groups.

Late Complications on Follow Up: Hypertrophic scar was detected in 2 cases (7.14%) in the first group and in 3.57% among the second group of patients. Corrected ears asymmetries were seen in 3.57% and 10.71% of the first and second groups respectively. Extrusion of the used buried permanent suture to correct antihelix was detected in 10.71% among the first group while we did not record such complication in the second group and stitch sinus was recorded in 3.57% in the second group which was related to concha-mastoid sutures (Table 1).

Regarding to the Patient's Satisfaction: We recorded that 7.14% of the cases corrected in the first group were unsatisfied with the shape of the corrected antihelix, while 10.71% of the second group were unsatisfied and asked for upper pole correction (Figs. 7-12).

By the end of the first postoperative year, we noticed recurrence of the deformed prominent ear in 21.85% of the cases treated by combined Mustarde technique while the recurrence was detected in only 3.57% among the cases corrected by combined modified Stenstrom otoplasty (Table 2).

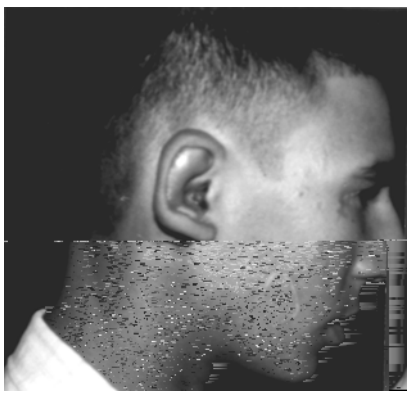


Fig. (6): Postoperative hematoma.

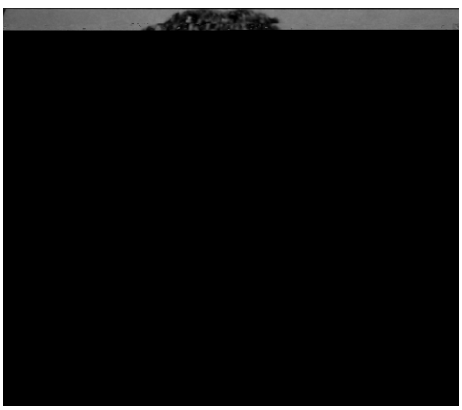


Fig. (7): Preoperative protruding ear.

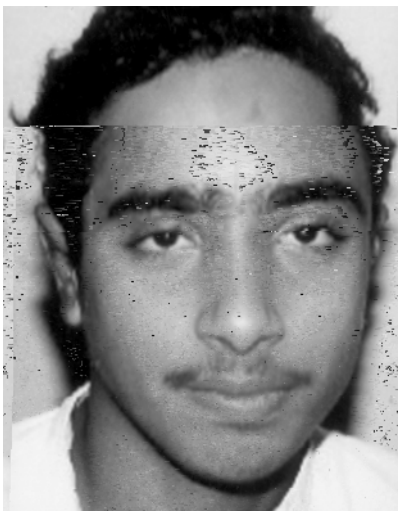
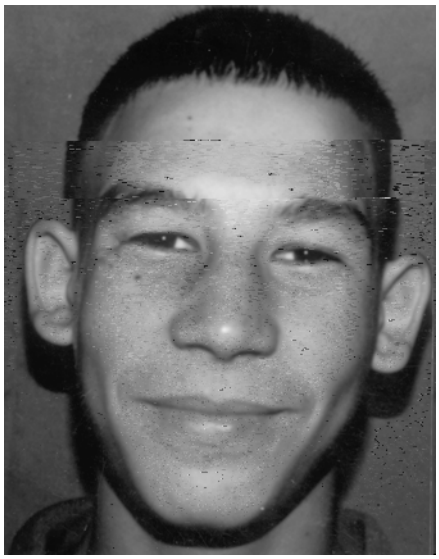
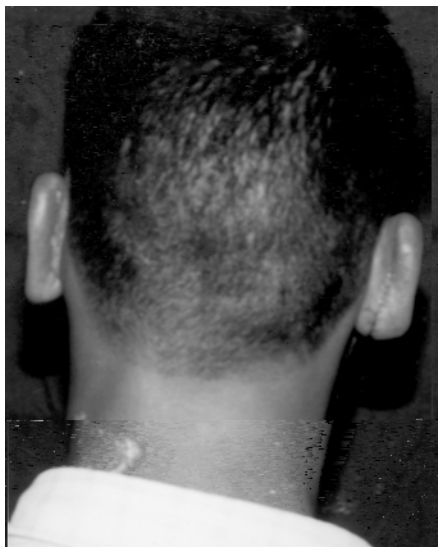


Fig. (8): Postoperative combined sternstrom otoplasty.



Figs. (9): Preoperative bilateral protruding ears.

Figs. (10): Preoperative bilateral protruding ears.

Figs. (11,12): Postoperative combined sternstrom otoplasty (Lt) Mustarde (Rt).

Table (1): Postoperative complications.

	GI		GII	
	No.	%	No.	%
Early complications:				
Bleeding from the wound	1	3.57	0	0.00
Hematoma	0	0.00	2	7.14
Wound dehiscence	1	3.57	1	3.57
Late complications:				
Hypertrophic scar	2	7.14	1	3.57
Corrected ear asymmetries	1	3.57	3	10.71
Extrusion of the buried stitches	3	10.71	0	0.00
Stitch sinus related to concho-mastoid sutures	0	0.00	1	3.57

Table (2): Follow up outcome.

	GI		GII	
	No.	%	No.	%
Patient's satisfaction:				
Patients satisfied by cosmetic results	26	92.86	25	89.29
Patients unsatisfied by cosmetic results	2	7.14	3	10.71
Recurrence of the deformity	6	21.85	1	3.57

DISCUSSION

Normally the angle between the axis of the ear and the coronal plane is about 20 degrees and for both sexes, the ear normally protrudes by 17-21mm from the mastoid skin with a concha-scaphal angle of 90 degrees **[2,3,4]**. Failure of scaphal folding, flat antihelix, deep concha and increased concha scaphal angle create prominence of the ear. The protruding ears may be a source of psychological distress in either sex and at any age. Prominent ear like other deformational auricular anomalies are best treated nonsurgically by molding within the first 3 months of life, as the cartilage is malleable during this early period because of the influence of maternal estrogens **[21-24]**. An accurate diagnosis of each contributing factor in the prominent ear deformity is an essential goal. The goals of otoplasty and shortcoming different surgical techniques have been documented by Mc Dowell **[25]** and others **[12,13]**. Recently, more attention has been focused on "suture techniques" to correct the abnormal cartilage shape **[15,16,17]**, often in combination with cartilage weakening procedures on the posterior surface of the cartilage **[15,26]** or on its anterior surface but generally without wide exposing the anterior surface of the auricular cartilage **[27-30]**. Although the cartilage cutting techniques **[4-6,10]** are often regarded as one group of operations, there are actually many different techniques that use a trans-cartilaginous incision **[31,32,33]**. The original publication of Lukett **[5]** introduced an incision in the auricular cartilage at the location of the proposed antihelical fold and many authors have followed his teaching **[10,12,34]**. Recent experimental works **[18,19,35]** confirmed the early work of Gibson and Davis **[6]**, which studied the natural tendency of the cartilage to curl in a direction opposite to the side weakened. Others used cartilage incision between the helix and the antihelix to gain access to the anterior surface of the auricular cartilage **[31,33,36]**. Stenstrom and Heftner **[37]** published a technique in which the anterior surface of the ear is widely exposed for direct scoring and weakening to create a natural antihelical fold but without a cartilage incision,

while others combined a technique of permanent sutures for the antihelical fold with a cartilage incision and resection in the concha without cartilage scoring **[12,16,29,38]**.

The present work included 56 prominent ears, which were corrected over the last 4 years. There were 25 patients with bilateral and the other 6 cases had unilateral prominent ears. The age of the operated cases range from 4 to 43 years. Early postoperatively we recorded bleeding from the wound in 3.57% of the patients corrected by combined Mustarde technique. We detected wound hematoma in 7.14% among cases managed by combined modified Stenstrom otoplasty. Wound dehiscence was noticed in 3.57% of the patients corrected in each group, while we did not detect wound infection in any corrected ear. By the end of the first 6 months follow up, we recorded hypertrophic scar in 7.14% of the cases treated by combined Mustarde technique while we noticed such complication in 3.57% of the ears corrected by combined modified Stenstrom otoplasty. We noticed asymmetry between both ears in 3.57% of cases treated by combined Mustarde technique, while we recorded such complication in 10.71% of the cases corrected by combined modified Stenstrom otoplasty and this higher percentage of asymmetry could be explained by higher risk of malposition of the helix when the skin was redraped after finishing the scoring of the scapha as there was a complete disjunction between the helix and the antihelix by the anterior scoring technique. Extrusion of the used buried sutures was detected in 10.71% when we used permanent sutures technique of Mustarde while the patients were complaining of stitch sinuses related to concha-mastoid stitches in 3.57% among the other corrected group. To prevent suture extrusion and reduce the pain from nonabsorpable sutures prickling the dermis from beneath, Horlock and others **[39]** had combined the postauricular fascial flap with the Mustarde and Furnas concha-mastoid sutures. As regard to the patient's satisfaction with the results of the corrective procedure we recorded that 7.14% of the cases treated by combined Mustarde otoplasty were unsatisfied with the result because of the sharp angulation of the corrected antihelix and the used permanent suture extrusion, while 10.71% of the cases treated by combined modified Stenstrom otoplasty were unsatisfied with the net result of the correction because of either malposition or an anterior location of the helix particularly in the upper third causing prominent upper third which were noted among the corrected cases early in our study. Elliott **[9]** and Erol **[31]** used the anterior approach for otoplasty and found that the healing was uneventful and postoperative edema was less with good unimpaired vascularity and innervation with no postoperative malposition of the pinna. To overcome the recurrence of the deformity due to the capability of the cartilage to retain its ability to curl again without prior weakening it as in Mustarde technique, several authors had described posterior weakening of the cartilage by using parallel curvilinear incisions along the antihelix groove posteriorly **[28,40]** or by using derma-brasion **[41,42,43]** or by the aid of endoscopic techniques **[20,44]**. Heftner **[27]** with Stenstrom otoplasty had found that 89% of his patients were satisfied with operative results while Baker and Converse **[26]** by using Mustarde technique had noted hematoma in 0.8%, hypertrophic scar in 0.7% and recurrence of the deformity in 4.3%.

By the end of the first postoperative year, the prominent ear deformity recurred in 21.85% of the cases managed by combined Mustarde otoplasty, while the recurrence was recorded in 3.57% among the cases corrected by modified Stenstrom technique. These results are comparable with the results of Tan **[24]** who compared the Mustarde with Stenstrom otoplasty and had found that 24% of patients treated by Mustarde technique had required re-do, whereas 10% of cases corrected by Stenstrom otoplasty had required reoperation. By otoplasty with anterior partial-thickness multiple incisions of the antihelical cartilage without permanent suturing or postauricular skin excision, Caouette-Laberge and others **[33]** reported wound dehiscence in 0.2%, residual deformity in 4.4% and asymmetry in 5.6% without any risk of chronic suture sinuses or loss of correction. In a series of 41 prominent ears, Shehab El-Din **[30]** noted that with combined anterior scoring and permanent suture technique, there was suture extrusion in 8.7%, upper pole recurrence in 8.7%, and he did not report wound hematoma, infection hypertrophic scarring or skin necrosis.

Conclusion:

Combined otoplasty using Mustarde or modified Stenstrom technique in correction of the prominent ear deformity is technically easy and safe procedure with less time consuming. Combined modified Stenstrom otoplasty resulted in a better esthetic results with less recurrence rate and either early or late complications and there is no need for over correction because there is less relapse as may happen after Mustarde sutures without cartilage weakening. The combined modified Stenstrom otoplasty has the advantage of giving access to all areas of the ear and can be used for many different forms of prominent ears, but because there is

complete disjunction between the helix and the antihelix, there is a risk of malposition of the helix when the skin is redraped.

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