

The Post-Auricular Fascial Flap as a Refinement in Cartilage-Sparing Otoplasty

MAHMOUD F. ELBESTAR, M.D.*; WAEL M.R. SAKR, M.D.** and TAREK KESHK, M.D.***

The Departments of E.N.T., Cairo University* and General Surgery, Bani Suef** & Menoufeya*** Universities.

ABSTRACT

Background.Objective: The objective of this article is to evaluate the role of the post-auricular fascial flap in minimizing the suture complication rate of cartilage-sparing otoplasty techniques.

Material and Methods: Eighteen patients (10 males and 8 females) with prominent ears were included. Fifteen had bilateral while 3 had unilateral prominent ears (total of 33 ears). Age ranged from 5-18 (mean 7.5) years. Patients underwent cartilage-sparing otoplasty with post-auricular fascial flap by the authors at Cairo University Hospitals during the period from January 2005 to December 2007.

Results: The mean follow-up period was 17 months (10-35). The mean preoperative protrusion was 29mm (21-38). The mean postoperative protrusion was 19mm (13-28). Recurrence of the deformity occurred in 2 ears (6.1%). Revision surgery was done in 1 ear (3%). There was no suture erosion, hematoma, skin loss or infection.

Conclusion: The addition of the post-auricular fascial flap helps in minimizing the suture complications of cartilage-sparing otoplasty. It may also help in reducing the recurrence rate of such procedures.

INTRODUCTION

The concept of the initial attempts of correction of prominent ears was based on excision of tissue. This included the post-auricular skin and strips of the conchal cartilage. Lockett introduced the concept of restoration of the antihelical fold. While the concept changed from resection to restoration, it was still achieved by crescentic cartilage excision along the antihelical fold combined with horizontal mattress suture approximation of the cut edges [1]. The concept of restoring the antihelical fold was thus achieved by cartilage-cutting technique.

Cutting the cartilage, however, produced sharp un-natural antihelical fold. As a consequence, efforts were directed to avoid complete cuts in the cartilage. From that point evolved the scoring technique to serve the same concept of antihelical fold creation without having the sharp edges of

the cut cartilage. Scoring techniques were based on the fact that the injured cartilage tends to wrap away from the injured surface [2]. Accordingly, scoring had to be performed at the lateral surface of the cartilage through an anterior approach.

Anterior dissection was found to be associated with fairly high complication rates, mainly in the form of hematoma formation that may lead to skin loss. Chondritis may also follow and end up with an irreparable irregular cartilage [3]. Consequently, there has been a trend away from cartilage-cutting methods with all its variants towards cartilage-sparing techniques. These techniques depend on strong non-absorbable sutures to medialize the auricle [4,5]. Of these sutures, the Mustarde and Furnas types of sutures gained popularity in creation of a smooth antihelical fold and reducing the conchal-mastoid angle respectively [6,7].

Characterized by their lower rate of complications, cartilage-sparing techniques are considered a safe and effective way of correction of prominent ears. However, the use of permanent sutures gave rise to a different type of complication related to their presence. Sutures can erode through the skin and become exposed. Also, they may cause pain secondary to prickling the dermis from beneath [8,9].

In an attempt to bury the post-auricular sutures and minimize their complications, the post-auricular fascial flap was introduced. Few reports in literature reported the use of such a fascial flap [10,11]. Although it seems to be basically a simple refinement, apparently it is not commonly used. This series presents the role of the post-auricular fascial flap as a refinement to the cartilage-sparing techniques in correction of prominent ears with the objective of reducing suture complications. The effect of the flap on recurrence rate is also addressed.

MATERIAL AND METHODS

Eighteen patients with prominent ears underwent cartilage-sparing otoplasty at Cairo University Hospitals by the authors during the period from January 2005 and December 2007. Fifteen patients had bilateral while 3 had unilateral prominent ears with a total of 33 ears. Age ranged from 5 to 18 years with a mean of 7.5 years. Ten patients were males and 8 were females.

Operative procedure:

After induction of general anesthesia, the post-auricular skin was infiltrated with lignocaine 2% and adrenaline 1:200,000. Skin incision was carried in the post-auricular skin through the epidermis and dermis, short of the fascial layer underneath. The skin was elevated off this layer until enough exposure was obtained. The fascial layer was then incised along the helical margin and carefully dissected off the underlying cartilage. Elevation of this layer was continued as far as the mastoid to obtain adequate exposure of the whole of the medial surface of the cartilage as well as the mastoid perisoteum. The extent of the flap was determined by the number of sutures needed to obtain correction in a manner to ensure complete coverage of all sutures.

Concho-mastoid sutures were placed first, followed by the Mustarde sutures creating the antihelical fold. Prolene 4.0 suture material was used in all sutures. After tightening the sutures, the fascial flap was advanced back over the cartilage to cover the sutures and knots. Excess fascial tissue was trimmed then the flap was sutured along the helical

rim using vicryl 5.0 sutures (Figs. 1,2). The skin was then closed and a head bandage was applied for one week. The time consumed in raising the post-auricular fascial flap was documented.

Outcome assessment was performed by measuring the distance between the mastoid skin and the most prominent part of the helix pre and post-operatively.

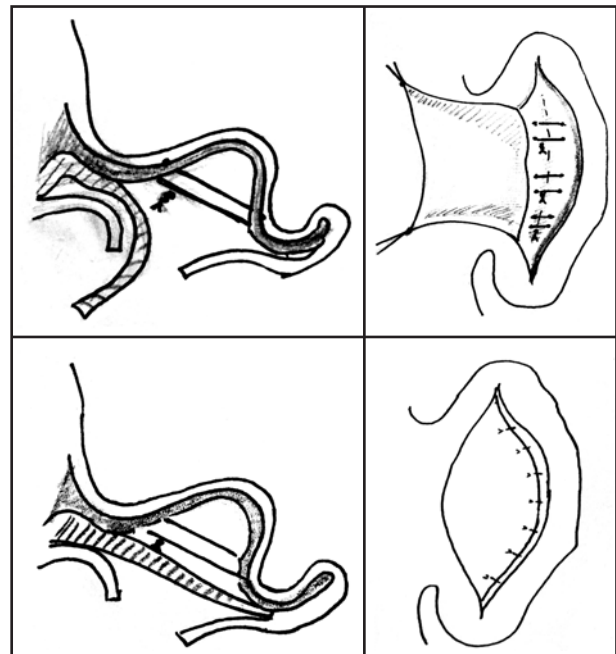
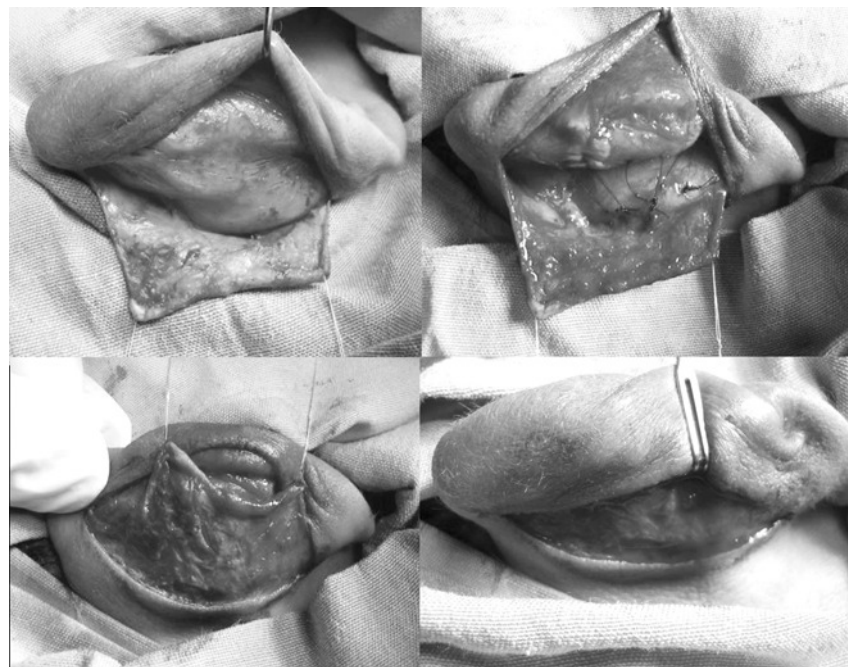


Fig. (1): Diagrammatic illustration of the post auricular fascial flap: Axial cut view (left) and posterior view (right). The skin is dissected in a strict subcutaneous plane. The fascial flap is then dissected off the medial aspect of the cartilage. The suture knots are then covered by the flap before skin closure.

Fig. (2): The post auricular fascial flap. The flap is dissected (above left). Sutures placed to create the antihelical fold (above right). The flap is reflected to cover the sutures (below left). Note the excess tissue in the flap that can be trimmed. The flap is secured in place with complete coverage of the sutures (below right).



RESULTS

Follow-up ranged from 10-35 months with a mean of 17 months. The fascial flap was successfully raised in all cases. In two cases, button-holing of the flap occurred during elevation. This incident was noted to happen at the upper part of the flap where the fascial layer is thin. Flap button-holing did not interfere with the function of the flap to cover the suture knots, which were posteriorly located under cover of the thicker part of the flap. The operative time consumed in flap elevation ranged from 8-23 minutes with a mean of 14 minutes.

Preoperative protrusion ranged from 21-38mm with a mean of 29mm. Postoperative protrusion ranged from 13-28mm with a mean of 19mm.

Recurrence of the deformity occurred in 2 ears (6.1%). Only one case underwent revision surgery (3%). No suture erosion, hematoma, skin loss or infection were encountered.

DISCUSSION

Cartilage-sparing otoplasty is an effective and safe procedure. The cartilage is folded by the forces of the placed sutures without interruption of its integrity. This produces a smooth antihelix with no sharp edges. Furthermore, anterior dissection, with the risk of hematoma formation, is not required [11].

However, recurrence rates tend to be higher than those of cartilage-cutting techniques. Reviewing the literature, the recurrence rate after scoring cartilage-cutting technique was found to range from 4.4 to 12.7% with a median of 9.9% [3,4,9,12,13]. It was noted that the lower recurrence rates in this range belonged to the large case series (above 500 cases) (Table 1). Regarding recurrence of deformity after cartilage-sparing techniques, rates ranged from 6.6 to 24.4% with a median of 12.3% [5,9,14] (Table 2).

Table (1): Recurrence rate after scoring otoplasty.

Author	Year	Number	Recurrence (%)
Jeffery [3]	1999	118	12.7
Caouette Laberge [4]	2000	500	4.4
Tan [9]	1986	101	9.9
Calder [12]	1994	562	8
Chongchet [13]	1962	21	10

Table (2): Recurrence rates after suture cartilage-sparing otoplasty.

Author(s)	Year	Number	Recurrence (%)
Adamson [5]	1991	55	6.6
Tan [9]	1986	45	24.4
Minderjahn [14]	1980	135	12.3

With the increasing use of permanent sutures in cartilage-sparing otoplasty, a new set of complications started to appear. This includes suture erosion, sinus formation, bow-stringing and pain. The range of suture complications in cartilage-sparing otoplasty ranged from 0% to 15.4% with a median of 9.7% [5,8,9,14,15,16] (Table 3). Although rare, suture complications can be annoying to the patient and hence needed introduction of minor technical refinements to overcome this problem.

Table (3): Suture complications after cartilage-sparing otoplasty.

Author(s)	Year	Number	Recurrence (%)
Adamson [5]	1991	55	8.4
Attwood [8]	1985	52	4.6
Tan [9]	1986	45	15
Minderjahn [14]	1980	135	0
Cho [15]	2003	13	15.4
Rigg [16]	1979	101	11

The post-auricular fascial flap is a simple adjunct to the suture cartilage-sparing otoplasty technique. Few reports in literature mentioned the use of such a flap and its effect in otoplasty. Horlock et al., used flap coverage in 96 ears and had no suture complications [10]. Mandal et al., compared between two groups of patients with and without the use of the fascial flap [11]. They reported lower rate of complications with fascial flap (1.2%) as compared to cartilage sparing techniques without flap coverage (7.9%). Therefore, the rate of suture complications with the use of the fascial flap was 0-1.2% with series of nearly 100 procedures. In this series, we had no suture complications with flap usage in 33 procedures.

In the aforementioned reports of the use of the fascial flap in otoplasty [10,11], there was no mention of any technical problems encountered in flap elevation, or of the operative time consumed in

performing this additional step. In this series, we report the incident of "button-holing" of the flap during dissection in two cases. It was noticed that the flap's thickness increased gradually from the helical rim towards the mastoid. This can explain the vulnerability of the flap at its upper edge. Care has to be taken to keep on the surface of the cartilage to ensure adequate thickness of the flap in its upper part. It has to be noted that the thicker posterior part of the flap is the part responsible of covering the suture knots. The average operative time consumed in raising a fascial flap per ear in this series was 14 minutes. Therefore, in bilateral cases, the operative time can be expanded by an extra half an hour.

Regarding the impact of the fascial flap on recurrence rates, it is difficult to attribute the reduction in rates only to the flap. Horlock et al., reported recurrence rate of 8% with flap usage [10]. Mandal et al., reported reduction in recurrence rates from 8% to 4.8% in the group in which the post-auricular flap was used [11]. In this series, the recurrence rate was 6.1% and 3% revision rate.

Trimming the excess fascial tissues after placement of the sutures may help in maintaining the new position of the auricle. It shares with elliptical skin excision, the concept of resection that was initially used in the first attempts of otoplasty. Also, fixation of the edge of the flap to the helical margin may offer an extra support to the auricle in its new position. Thus, trimming of excess tissue and offering an additional supportive layer may have an impact on reducing recurrence rates of cartilage-sparing otoplasty. However, it is difficult to attribute the reduced recurrence rate solely to the addition of the fascial flap.

In conclusion, the post-auricular fascial flap appears to be a vascular layer that can combat the suture complications in otoplasty. Its addition represents a considerable refinement to the cartilage-sparing otoplasty techniques that fairly reduces suture erosion rates and may be of value in minimizing recurrence rates.

REFERENCES

- 1- Janis J., Rohrich R. and Gutowski K.: Otoplasty. *Plast. Reconstr. Surg.*, 115 (4): 60e-72e, 2005.
- 2- Gibson T. and Davis W.: The distortion of autogenous cartilage grafts: Its cause and prevention. *Br. J. Plast. Surg.*, 10: 257, 1958.
- 3- Jeffery S.: Complications following correction of prominent ears: An audit review of 122 cases. *Pr. J. Plast. Surg.*, 52: 588, 1999.
- 4- Caouette Laberge L., Buay N., Bortoluzzi P., et al.: Otoplasty: Anterior scoring technique and results in 500 cases. *Plast. Reconstr. Surg.*, 105: 504, 2000.
- 5- Adamson P.A., McGraw B.L. and Tropper G.J.: Otoplasty: Critical review of clinical results. *Laryngoscope*, 101: 883, 1991.
- 6- Mustarde J.: Correction of prominent ears using buried mattress sutures. *Clin. Plast. Surg.*, 5: 459, 1978.
- 7- Furnas D.: Correction of prominent ears with multiple sutures. *Clin. Plast. Surg.*, 5: 491, 1978.
- 8- Attwood A. and Evans D.: Correction of prominent ears using Mustarde's suture technique: An out-patient procedure under local anesthetic in children and adults. *Br. J. Plast. Surg.*, 38: 252, 1985.
- 9- Tan K.: Long-term survey of prominent ear surgery: A comparison of two methods. *Br. J. Plast. Surg.*, 39: 270, 1986.
- 10- Horlock N., Misra A. and Gault D.: The post-auricular fascial flap as an adjunct to Mustarde and Furnas suture type otoplasty. *Plast. Reconstr. Surg.*, 108 (6): 1487-90, 2001.
- 11- Mandal A., Bahia H., Ahmad T., et al.: Comparison of cartilage scoring and cartilage sparing otoplasty. A study of 203 cases. *J. Plast. Reconstr. Aesthet. Surg.*, 59 (11): 1170-6, 2006.
- 12- Calder J.C. and Nassan A.: Morbidity of otoplasty: A review of 562 consecutive cases. *Br. J. Plast. Surg.*, 47: 170, 1994.
- 13- Chongchet V.: A method of antehelix reconstruction. *Br. J. Plast. Surg.*, 16: 268, 1963.
- 14- Minderjahn A., Huttel W. and Hildmann H.: Mustarde's otoplasty: Evaluation of correlation between clinical and statistical findings. *J. Maxillofac. Surg.*, 8: 241, 1980.
- 15- Cho B.C., Chung H.Y. and Park J.W.: Surgical correction of prominent ear using modified tube technique and posterior approach. *J. Craniofac. Surg.*, 14 (5): 767-73, 2003.
- 16- Rigg B.: Suture materials in Otoplasty. *Plast. Reconstr. Surg.*, 63: 409, 1979.