

Otoplasty; Comparing Different Surgical Techniques

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ABSTRACT

Hypothesis: No specific surgical otoplasty technique has been considered as the absolute standard in patients with prominent ears.

Methods: A prospective study was conducted within a period of 3 years (2011-2013), 30 patients underwent otoplasty at the Plastic Surgery Department of Kasr El-Ainy Hospital, Cairo University. The patients were divided into 3 groups: Group A: Cartilage sparing in the fashion of posterior suturing (Mustardè) Group B: Posterior Scoring and Suturing. Group C: Posterior suturing refined with anterior scoring.

Results: Between 2011 and 2012, 30 cases of prominent ears was done in Kasr El-Ainy. The average was 14 years. 19 males and 11 females. 3 patients had unilateral prominent ears. All were primary cases. Operated wounds healed in all patients. Early complications: No major complications; erythema was observed in 3 patients (30%) from Group B, and 3 (30%) from Group C, which responded to antibiotics cartilage infection was seen in 1 patient from Group B, and 1 patient from Group C. Skin necrosis was observed in 3 patients 0 from Group A and 2 patients (20%) from Group B and 1 patient (10%) from Group C. Irregularity was observed in the antihelix was observed in 4 patients (40%) (all from group B). 3 patients was over corrected from Group B, and another operation was done. Late complications; patient from group A had recurrence and refused the re-do surgery. Keloids weren't seen in any of our patients. Asymmetry was seen in 2 patients from Group B and 2 patients from Group C. Tingling sensation in the ear was in 2 patients from Group B, and 3 from Group C.

Conclusion: Scoring is advisable to avoid recurrence, yet if posterior scoring is done it needs an experienced hand to avoid antihelix irregularities.

Keywords: *Otoplasty – Prominent ears – Concha – Scapha – Scoring – Mustardè.*

INTRODUCTION

Significant ear deformities are common in today's society and affecting around 5 percent of the population. Although the physiologic effects are negligible, the aesthetic and psychological impact can be profound [1].

The quote "beauty is in the eye of the beholder" is often quoted and still quite relevant. What constitutes a prominent ear? ray elliot stated in his 1990 review article in Clinics of Plastic Surgery, "the esthetic ear protrudes less than 2cm when measured from the surface of the helix to the mastoid scalp at the midpoint of the ear's length". However, once this measurement achieves a distance of less than 1.2cm, the ear has an equally displeasing "pinned back" appearance. The ear protrudes more at the lower pole and less so at the upper pole because of the shape of the skull. The scaphoconchal angle should have a natural soft roll and should not block the view of the helix anywhere along its course when viewed anteriorly [2].

A prominent ear condition can result from underdevelopment of the antihelix, from an enlarged concha bowl, or from a projected lobule. Over the past century, various techniques have been described for the correction of each known deformity. Nowadays, to correct an anti-helical deformity, a cartilage sculpting technique (mainly the Stenstroem technique), a suturing technique (the mustarde technique), or a combination of the two is preferred by many otoplastic surgeons [3].

PATIENTS AND METHODS

A prospective study was conducted within a period of 3 years (2011-2013), 30 patients underwent otoplasty at the Plastic Surgery Department of Kasr El-Ainy Hospital, Cairo university. Approval was received from the ethics committee.

The patients were divided into 3 groups:

Group A: Cartilage sparing in the fashion of posterior suturing (Mustardè).

Group B: Posterior scoring and suturing.

Group C: Posterior suturing refined with anterior scoring.

Concha-Mastoid sutures were done in all cases. Conchal excision and lobuloplasty were done if needed in all groups. The patients were invited to participate in the study. Written informed consent was obtained from each participant after explaining all the possible complications and outcome. The patients had the right to refuse participation in the study or to withdraw at any time without being denied their full regular clinical care. All personal information and medical data were confidential and were not made available to third parties.

Exclusion criteria:

- Primary surgery done elsewhere.
- Associated deformities other than prominent ears.

Primary outcome measures were early and late postoperative complications (6 months), recurrence rates, reoperation rates, patient and doctor satisfaction. Patient photographs were assessed by a blinded lay observer and a blinded physician to evaluate overall appearance and symmetry. All procedures were performed by either a consultant or a specialist.

Operative technique:

The correction for each type of alteration in prominent ears is addressed separately. The steps should be performed according to the type of case. It also must be noted that even the two ears of the same individual may not be perfectly symmetric. Hence, the technique should be individualized for each side.

The parents are requested to wash the patient's hair and auricle with particular care the day before surgery. No antiseptic soap is used.

The surgery is done in day-surgery under local or general anesthesia as requested by the parents and depending on the cooperation of the child. Antibiotics are given routinely. In the operating room, the face, auricular area and scalp are prepared with Betadine, a head drape is placed, leaving both ears and face exposed. We believe it is particularly important not to cover the patient's face when working under local anesthesia to keep in good contact with the patient and to alleviate the anxiety of having the face covered.

The ears are then infiltrated with xylocaine 2% with epinephrine 1:100,000. A total of less than 10cc is used for both ears. The same infiltration is done whether the surgery is being done under local or general anesthesia to facilitate dissection and lessen bleeding. A 30-gauge needle and a very slow infiltration of anesthetic are particularly helpful in children, who often do not feel the needle

prick but rather the tissue distention from the infiltration. The retroauricular skin incision is performed 8-10mm below and parallel to the helical rim. The skin above the cartilage is mobilised caudally up to the mastoid and cranially to the helical rim. In order to prevent postoperative skin distortions, the mobilization should not be extended beyond the helical rim.

Group A: Cartilage sparing in the fashion of posterior suturing (Mustardè).

- The new antihelical fold is punctured with needles from ventrally and is marked using methylene blue solution from retroauricularly, if necessary.
- The 3-5 mattress sutures were taken using non-absorbable sutures prolene (3/0-4/0) and placed at the corresponding markings.
- The knots of the mattress sutures can be everted towards the inside to prevent later extrusion of the sutures.

Group B: Posterior scoring and suturing.

- The cartilage lines are placed parallel to the helical rim and the base of antihelix including the superior crus.
- The cartilage bordered by the needles is scored by partial thickness excision of the cartilage using a scalpel.
- Sutures were taken same as for Group A.

Group C: Posterior suturing refined with anterior scoring.

- Mustardè sutures are done as mentioned.
- A 0.5cm incision is done at the superior pole of the helix anteriorly.
- Adson brown forceps was used to rasp and score the neo-antihelix.

Conchal setback:

Excision of postauricular soft tissue in the sulcus aids in conchal setback. The amount of tissue excised is variable. Care should be taken to avoid dissection closer than 1cm to the external auditory canal to avoid accidental entry or loss of support and collapse of the canal.

The conchal setback is done with concho-mastoid sutures. Usually 3 in number. Placed in cavum concha, cymba concha and fossa triangularis.

Prolene 3/0 was used in all patients. It should involve a good bite of the conchal cartilage and secured to the mastoid periosteum again taking a good bite of tissue. It is important that the vector of pull on the sutures is in a superior-posterior

direction so as to avoid collapse of the ear canal or any downward positioning of the auricle.

Each suture is clamped. And only when all sutures have been placed, they are tightened and tied.

Care should be taken when tightening the middle suture, it might cause over correction which can result in “telephone ear” deformity.

We take the concho-mastoid sutures after the scapho-conchal sutures.

Skin excision:

Done in all cases, either by simple ellipse of hour glass excision in case of prominent lobule, skin is closed by prolene 4/0 in a continuous fashion.

Other refinements:

- *Conchal excision:* It is necessary to correct a very deep concha by excising a small part (full thickness) of the conchal cartilage and re-sutured using prolene 4-0.
- *Correction of prominent lobe:* Corrected by the scapho-conchal sutures, persistent protrusion of the lobe can be corrected by placement of mattress sutures from the cauda helicis to the concha using prolene 4-0. Excision of the cauda is not recommended as this makes suture placement and correction more difficult. Also it can be corrected by the hour-glass skin excision of the posterior auricular skin.
- *Correction of overly prominent superior pole:* Corrected with the placement of a suture from the fossa triangularis to the temporalis fascia. This will medialize the superior pole alone.

Dressing and postoperative care:

- Tie-over using petroleum jelly gauze and sutures to fill in the cavities.
- Soaked saline dressings.
- Elastic bandage is worn for 5th day.
- The dressing is removed on the 2nd day postoperative and replaced with another one, tie-over is removed on the 5th day.
- Head band is encouraged for the first 3 weeks postoperative.

RESULTS

Between 2011 and 2012, 30 cases of prominent ears was done in Kasr El-Ainy. The average was 14 years. 19 males and 11 females. 3 patients had unilateral bat ears. All were primary cases.

Operated wounds healed in all patients. Early complications wasn't major.

Early complications: We didn't have any major complications.

- No hematoma.
- Erythema was observed in 3 patients (30%) from Group B, and 3 (30%) from Group C, which responded to antibiotics.
- Cartilage infection was seen in 1 patient from Group B, and 1 patient from Group C.
- Skin necrosis was observed in 3 patients 0 from Group A and 2 patients (20%) from Group B and treated and 1 patient (10%) from Group C.
- Irregularity was observed in the antihelix was observed in 4 patients (40%) (all from Group B).
- 3 Patients was over corrected from Group B, and another operation was done.

Late complications:

- 1 patient from Group A had recurrence and refused there re-do surgery. Keloids weren't seen in any of our patients.
- Asymmetry was seen in 2 patients from Group B and 2 patients from Group C.
- Tingling sensation in the ear was in 2 patients from Group B, and 3 from Group C.

A patient questionnaire about the result of otoplasty was done as follows:

- 1- Symmetry on both ears.
- 2- Patients satisfaction.

Table (1): Complication rates in our study.

Complications	Group A	Group B	Group C
Asymmetry	0	2	2
Relapse	1	0	0
Irregular antihelix	0	4	0
Need for re-operation	0	3	0
hypertrophic scars	0	0	0
Skin necrosis	0	3	1
Tingling sensation	2	2	2
Skin infection	0	0	0
Suture extrusion	1	0	0
Cartilage infection	0	1	1
Erythema	0	3	3
Total	10	10	10

Table (2): Patient satisfaction.

	Group A	Group B	Group C
Symmetry	10	7	8
Very satisfied	8	6	8
Satisfied	2	1	1
Not satisfied	0	3	1



Fig. (1): Patch of skin necrosis.



Fig. (2): Cartilage infection.



Fig. (3): Irregular antihelix.



Fig. (4): Skin erythema.



Fig. (5-A): Preoperative: Group A.



Fig. (5-B): Postoperative: Group A.



Fig. (6-A): Preoperative: Group B.



Fig. (6-B): Postoperative: Group B.



Fig. (7-A): Preoperative: Group C.



Fig. (7-B): Postoperative: Group C.

DISCUSSION

Each of the three groups of otoplasty techniques has its known predilection for certain complications, these are due to the effects of the procedure on the auricular cartilage. Recurring complications associated with techniques relying on sutures only are suture extrusion and some recurrence of the deformity over time, both of which do not necessarily require revision [4]. However, in a retrospective study comparing a sculpting-only technique [5] to a sutures-only technique [6], Tan did find a significantly higher revision rates when using Mustardè sutures [7]. Loss of correction is attributed to the cutting of the suture material through the cartilage [8], and in thick and strong cartilage the use of sutures alone is often insufficient to control its intrinsic cartilage memory [9]. It has subsequently been suggested that the use of the Mustardè suture technique in isolation should be reserved for patients with thin cartilage [10]. So in our study we didn't apply mustarde technique except in children less than 10 years to avoid this complication, where they always have a thin pliable cartilage.

Suturing techniques are usually preferred because of the precise control they afford the surgeon in comparison to sculpting techniques, without permanently altering cartilage structure, which renders them reversibility [4]. In comparison to the sculpting techniques which permanently alter the the structure of the cartilage and more difficult to control or predict final results. Mainly due to unpredictable contraction forces and cartilage remodeling [11].

In addition, in sculpting techniques there is increased risk of cartilage irregularities, sharp edges and difficulty in revision surgeries due to residual deformities [12].

Finally, different combinations of the mentioned two techniques have been developed to combine the best of both techniques in terms of fewer recurrences and complications.

Complication incidences in literature have been obtained almost similar as in the case of our study.

Overall, the incidence of early complications appears to be quite low, haematomas either did not

occur or were not mentioned in the majority of studies, and when they did occur, rates were no higher than 2.2%. In our study the 3 groups didn't have hematomas as a complication which goes with most of the literature.

Bleeding is not mentioned by most articles, but six articles mentioned rates from 0% to 6.0% [13]. Also bleeding also wasn't a complication in any of the 3 groups.

In the case of infection, only a one study mentioned a rate of 3.5%. Antibiotic prophylaxis was given to prevent the development of infection in few studies all of which had a 0% infection rate [14]. However, other included studies obtained similar results without antibiotics, their prophylactic administration does not appear to have made a significant difference [15]. Wound infection also wasn't a complication in any of the 3 groups in our study however skin erythema was a complication that happened in some of our cases where it responded good to antibiotics.

Skin necrosis is only reported in Colpaert and Missotten's study and in Robiony et al., Nielsen et al., reported a rate of 5.4%. We had 2 patients suffering from skin necrosis patches from Group B (20%) and 1 patient from Group C (10%) where on the contrary to expectations as the dissection is more extensive in the latter yet it remains much higher than that mentioned in literature.

Only in few studies did patients suffer wound dehiscence; of which, in two cases the rates were 0.2% and 0.6% [16]. However we had none in our study.

In general, there appears that there is a greater variability in late complication incidence. The cumulative percentages vary from 0% to 47.3%, with the highest rate belonging to Colpaert and Missotten. However most falls into both the 'unsatisfactory aesthetic results' as well as the 'asymmetry' category.

Suture extrusion incidence varies from 0% to 3.1%, [14] with the exception of higher incidences for Yugueros and Friedland and Cho and colleagues of 11.9%, 19.0% and 22.2%, respectively [17]. All studies reporting the presence of suture extrusion as a complication employed a type of non-absorbable synthetic sutures with sizes varying from 3/0 to 5/0 strand diameter, such as Goretex, prolene, nylon and polyester fibre. With the exception of Vital and Printza [18]. These sutures were also of the monofilament type, which is known for its tendency to erode through post-auricular skin [19].

Studies without suture complications form a more heterogeneous group of suture types with both absorbable and non-absorbable sutures.

Hypertrophic or keloid scarring rates, if present, ranged from 1.2% to 2.5%. With rates of 6.2% 25 and 2% older studies do not differ significantly [14]. Whether thicker skin and subcutaneous tissue of the posterior surface of the ear has any influence of this result is unclear. It is also not clear if a simple skin incision versus skin excision has any influence on the development of abnormal scar tissue. We had none in our 30 patients which was quite unexpected as the majority of our patient had dark skin.

Asymmetry rates vary from 2.5% to 18.3% [14]. When compared to older literature, Caouette-Laberge has a significantly higher incidence of 18.3%, perhaps overestimated in part because patients with unilateral residual deformity were registered in both the 'abnormal ear shape' as well as 'asymmetry' category.

The incidence of unsatisfactory aesthetic results varies from 0% to 11.1% with significantly higher rates for Nordzell and Sylaidis and Gault. A possible explanation higher rate is residual deformities that were only noticed by the surgeon rather than the patient or parents. Almost 10% in our study. In follow-ups relying solely on chart review or questionnaires, such satisfied patients with a deficit only noticeable to trained eyes would probably not return for a visit. Hence, they often go unnoticed and are therefore excluded from complication incidence rates. Older studies showed much greater variability in unsatisfactory outcome incidence, their rates varied from 5.9% to 16.7% [14]. With a single unusually high rate of 60.9% for Nielsen et al., in the latter case, incidence calculations were based on number of operated ears and had to be converted to number of patients for the sake of comparison, and this nearly doubled the complication percentage. As such, over-estimation is very likely, but unfortunately unavoidable. Recurrence of deformity, partial or complete, varies from 0% to 12.0%, older studies reported a slightly lower incidence: Varying from 1.4% to 5.1%. Which is quite similar to the 3 techniques in our study.

Revision was not required in the case of Peker Lee and Bluestone's [20] combination techniques and unmentioned by Nolst Trenitè [12] and Robiony et al., [21]. The remaining studies showed rates from 1.2% to 12.0%. Interestingly, the studies with the highest cumulative incidence of late complications were not necessarily accompanied by similarly

high revision rates [17]. Thus, it appears that most late complications were not so disabling as to warrant secondary correction. Tan reported a rate of 24.4% for a suture-only technique, which was significantly higher than the 9.9% of the sculpting-only technique it was compared to [7]. We had 1 patient in our study from Group B.

Comparison with literature proved to be very difficult for several reasons, as mentioned previously, there was no uniform method for calculating complications incidence. Most authors chose to express complication rates in terms of the number of affected patients, whereas others were ambiguous in their choice of terms and could be interpreted both ways or they used the number of affected ears. This last method is, of course, more accurate, but recalculating from the number of affected patients to number of ears proved to be impossible due to the fact that most articles did not mention whether or not patients were affected bilaterally or unilaterally. In bilateral cases, the occurrence of complications bilaterally was unlikely. Unfortunately, in doing so, complication rates are most likely somewhat overestimated, because the majority of patients had a bilateral otoplasty.

The variable length of follow-up and different methods of data collection further complicate attempts of comparison. The nature of follow-up procedures, more often than not, is unspecified. Ideally, postoperative assessment would include both objective and subjective methods. However, follow-up is usually deficient with respect to return visits of patients, and questionnaires are often used to compensate. Relying solely on patient questionnaires to assess final outcome is not without its dangers, because patients are usually easily satisfied with prominence reduction alone and cannot match a surgeon's critical eye for the finer aspects of the final outcome. In addition, satisfied patients would probably be less likely to return for follow-up visits [16]. In our study we had few patients returning for follow-up after 6 months.

Conclusion:

Otoplasty has many techniques with relatively good results for both the surgeon and the patients. Articles on otoplasty are shown to be almost similar regarding results and complication in most of the literature. It was difficult to ascribe certain complication rates to any of the three techniques or draw any conclusions regarding efficiency of the different procedures, as they're not equally represented. Our intention was to compare the incidence of complications for the three techniques in our hands would concur with the literature. In our

study results were almost similar to those provided in previous articles, that Group A (Suture only) should have soft cartilage (children) in order to have a relative good results. Complications were relatively higher in Group B (especially the irregularity in the antihelix) than in C yet they remain almost the same as other studies mentioned in the literature of the same procedure. Group B technique just need more experienced hand for the best results.

REFERENCES

- 1- Janz B.A., Cole P., Hollier L.H. Jr. and Stal S.: Treatment of prominent and constricted ear anomalies. *Plast. Reconstr. Surg.*, Jul., 124 (1 Suppl): 27e-37e, 2009.
- 2- Elliott Jr. R.A.: Complications in the treatment of prominent ears. *Clin. Plast. Surg.*, 5: 479e90, 1978.
- 3- Chul Park M.D., Ph.D.* and Tae-Won Jeong, M.D.: Antihelical shaping of prominent ears using conchal cartilage-grafting adhesion) *Laryngoscope*, 122: June 2012.
- 4- Kelley P.E. and Scholes M.A.: Microtia and congenital aural atresia. *Otolaryngol. Clin. North Am.*, 40 (1): 61-80. VI, 2007.
- 5- Stenström S.J.: A "natural" technique for correction of congenitally prominent ears. *Plast. Reconstr. Surg.*, 32: 509, 1963.
- 6- Mustardé J.C.: The correction of prominent ears using simple mattress sutures. *Br. J. Plast. Surg.*, 16: 170, 1963.
- 7- Tan K.H.: Long-term survey of prominent ear surgery: A comparison of two methods. *Br. J. Plast. Surg.*, 39: 270e3, 1986.
- 8- Vuyk H.D.: Cartilage-sparing otoplasty: A review with long-term results. *J. Laryngol. Otol.*, 111: 424e30, 1997.
- 9- Adamson P.A. and Doud Galli S.K.: Otoplasty. In: Cummings C.W, Flint P.W., Harker L.A., Haughey B.H., Richardson M.A., editors. *Cummings Otolaryngology Head & Neck Surgery*. Philadelphia: Mosby Inc; PP.: 853-61, 2004.
- 10- Weerda H. and Siegert R.: Complications in otoplastic surgery and their treatment. *Facial. Plast. Surg.*, 10: 287e97, 1994.
- 11- Nachlas N.E.: Otoplasty. In: Papel ID, editor. *Facial plastic & reconstructive surgery*. 2nd ed. New York, Stuttgart: Thieme, P.: 309e21, 2002.
- 12- Nolst Trenité G.J.: Otoplasty: A modified anterior scoring technique. *Facial. Plast. Surg.*, 20: 277e85, 2004.
- 13- Caouette-Laberge L., Guay N., Bortoluzzi P., et al.: Otoplasty: Anterior scoring technique and results in 500 cases. *Plast. Reconstr. Surg.*, 105: 504e15, 2000.
- 14- Limandjaja C.C. Breugem* and A.B. Mink Van Der Molen M.: Kon Complications of otoplasty: A literature review *Journal of Plastic, Reconstructive & Aesthetic Surgery*, 62: 19e2, 2009.
- 15- Baker D.C. and Converse J.M.: Correction of protruding ears: A 20-year retrospective. *Aesthetic. Plast. Surg.*, 3: 29e39, 1979.

- 16- Colpaert S.D. and Missotten F.E.M.: Otoplasty for prominent ears: Personal technique and review of 150 consecutive cases. *Eur. J. Plast. Surg.*, 28: 179e85, 2005.
- 17- 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: 767e73, 2003.
- 18- Vital V. and Printza A.: Cartilage-sparing otoplasty: Our experience. *J. Laryngol. Otol.*, 116: 682e5, 2002.
- 19- Furnas D.W.: Complications of surgery of the external ear. *Clin. Plast. Surg.*, 17: 305e18, 1990.
- 20- Lee D. and Bluestone C.D.: The Becker technique for otoplasty: Modified and revisited with long-term outcomes. *Laryngoscope*, 110: 949e54, 2000.
- 21- Robiony M., Costa F. and Politi M.: A technique for remodeling the antihelix to correct the prominent ear. *J. Oral. Maxillofac. Surg.*, 59: 9e13, 2001.