

Revision Otoplasty

How to Manage the Disastrous Result

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Objective: To describe how severe ear deformities after otoplasty can be corrected.

Methods: The correction of creases is possible through readaptation of the cartilage edges followed by revision otoplasty using suture techniques in the reconstructed cartilage. In the case of defect formation or extreme thinning of the cartilage, an appealing auricular shape is achieved by the use of porous polyethylene implants.

Results: We have treated 12 severe ear deformities in the past 2 years with the procedures described herein.

In 11 cases, there were no complications, nor was it necessary to make further corrections for cosmetic reasons.

Conclusions: Reconstructing the cartilaginous skeleton and redoing otoplasty is a recommendable procedure with a longer lasting effect than just covering creases with fascia or preserved materials. In the case of a missing ear cartilage skeleton, the use of porous polyethylene implants instead of autogenous cartilage should be considered for reconstruction.

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FOR THE CORRECTION OF prominent ears, widely used methods are the Converse cutting technique,¹ the Stenström scoring technique,² and the pure suture techniques of Mustardé³ or Fritsch.⁴ All cutting or scoring techniques include the risk of formation of undesired edges, defects, or deformities to the ear being operated on.⁵ In extreme cases this can lead to distortions that are often difficult to correct; with cartilage-sparing suture techniques this risk is lower.⁵⁻⁷ In addition, inadequate application of the operation procedure, infections, and intolerance of the suturing materials can also lead to postoperative deformities after otoplasty.⁵ Herein, we describe how severe ear deformities after otoplasty can be corrected.

METHODS

ANALYSIS OF THE FINDINGS

Typical deformities after otoplasty are: asymmetry, overcorrection (**Figure 1B**, **Figure 2B**, and **Figure 3A**), development of a telephone handle deformity (**Figure 4**), and/or development of creases and edges (**Figure 1A** and **C**, **Figure 2A** and **C**, **Figure 3B**, and **Figure 5A**).^{8,9} In particular, if parts of the cartilaginous skeleton are lost, shrinkage of the ear can occur (**Figure 6A**). Rarely, skin defects with related scar develop-

ment can also be seen. Excessive postauricular skin resection leads to the excessive affixation of the ear as well as to effacement of the postauricular fold.⁸ Depending on the degree of asymmetry, formation of creases, presence of cartilaginous, or skin defects, different therapeutic options must be considered.

ASYMMETRY

An asymmetrical outcome with otherwise cosmetically appealingly shaped ears—if a correction is desired at all—requires readjustment of the more prominent side with the usual techniques. Such an asymmetry alone is not considered to be a severe deformity.

CARTILAGINOUS CREASES WITH SKELETON PRESERVED

In the case of complete severance of the cartilage, creases and edges can develop after otoplasty. This happens especially in the antihelical fold but can also occur in the cavum conchae or in the helical rim in connection with atypical incisions and aggressive surgery. We have seen this condition mainly in patients who have undergone surgery using the cutting technique of Converse et al.¹

For the correction of abnormal edges and contours, the usual recommendation is to lift the ventral skin over the defect and cover the crease with temporal fascia or preserved material.⁸ In our experience with such methods, at most a short-term improvement is achieved. Over time, the fascia atrophies, and

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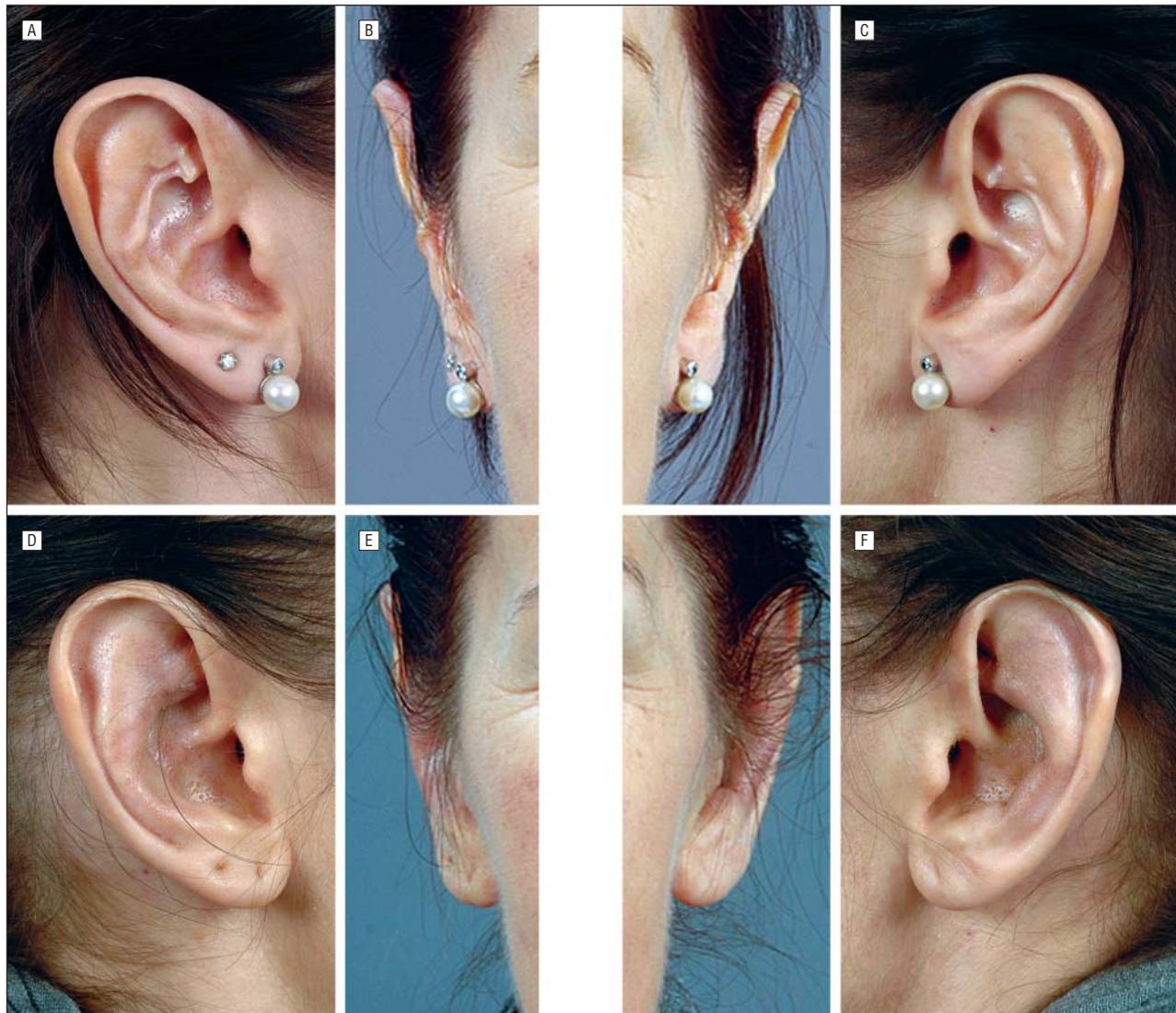


Figure 1. Deformity after otoplasty. A-C, Creases in the antihelix as well as a too-small concha-mastoid angle after overcorrection of protruding ears by applying cartilage incisions. D-F, Result 4 weeks postoperatively after smoothing and readaptation of the cartilage skeleton followed by revision otoplasty using suture techniques.

the crease reappears. A lasting correction of these usually very disfiguring edges is achieved if, through a dorsal incision, the ear cartilage is exposed over the whole affected area and freed from the existing scars. After identifying the incision edges in the cartilage that are causing the visible crease, the incision is reopened, and the ventral skin in the immediate vicinity is detached over a width of about 5 mm, parallel to the cartilage defect. If the cuts in the cartilage are irregular, they are straightened, then readapted in the originally anatomically indicated position, and closed with a long-term, absorbable suture (eg, MAXON, United States Surgical Corp). The configuration of the ear cartilage is thereby restored to its original shape. We have therefore not found it necessary to use conchal cartilage grafts for camouflage.¹⁰ The original restoration of the ear cartilage will, in most cases, cause the auricle to stick out too much, as it did before the first operation. This is determined by intermittent intraoperative measurement of the distance of the helical rim from the skull using Wodak's method.¹¹ If the measurement of distance (by a 1-sided measurement or by comparison with the other side) indicates that correction is needed, a revision otoplasty procedure for folding the auricle is made on the repaired ear during the same

operation. In this revision situation, however, a pure suture technique without incision to the cartilage is chosen so as not to cause further weakening of the repaired cartilage. Therefore, the antihelix is folded by sutures according to Mustardé's method.³ The suture material is usually expanded polytetrafluorethylene (GORE-TEX, W. L. Gore & Associates). If necessary, an approximation of the cavum conchae to the skull is performed, as described by Goldstein¹² and Furnas,¹³ and/or correction of the earlobe position is achieved by using a suspension suture following the recommendations of Siegert et al.¹⁴ All of the surgical steps for otoplasty in the repaired ear correspond to the procedure in a primary case. Closure of the wound is performed without any skin resection. Postoperative dressing with ointment and cotton swabs is removed after 2 days (Figure 1 and Figure 5).

DEFORMITY WITH CARTILAGE DEFECT

The situation is more difficult when, as a result of the previous operation, inadequate cartilage incisions are present, but even more so when defects in the auricular framework have

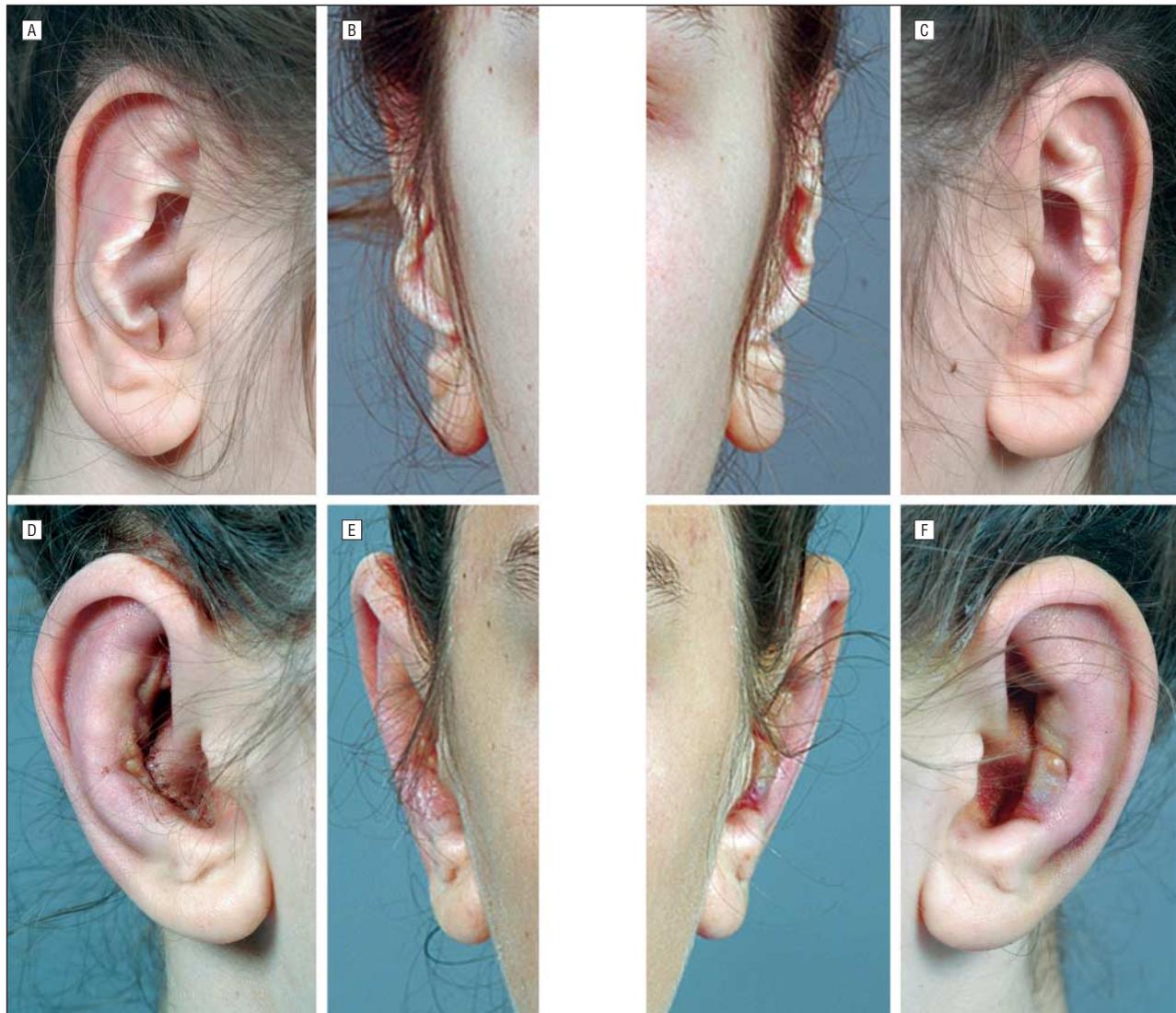


Figure 2. Deformity after otoplasty. A-C, Extreme garland-like edges and creases in the cavum conchae and antihelix as well as a too-small concha-mastoid angle after overcorrection of protruding ears by applying cartilage incisions and sutures. D-F, Result 2 days postoperatively after smoothing and readaptation of the cartilage skeleton followed by revision otoplasty using suture techniques.

occurred because of cartilage resection. In these cases, the deformity is usually considerably more pronounced.

As in the procedure used in patients without cartilage defects, the whole residual cartilaginous skeleton of the ear is exposed through a dorsal incision and freed of scars to make the extent and the localization of the cartilage defect visible. However, simple adaptation of the incision edges of the cartilage through sutures is impossible in this case because it would lead to renewed and possibly increased auricular deformity. Rather, the missing cartilage material must now be replaced. In principle, this can be done with auricular cartilage from the other ear, but in the case of simultaneous deformity of both ears, this option is not available. However, the removal of rib cartilage for the purpose of reconstruction of the auricular framework seems to be excessive because only a small amount of material is needed. Therefore, in this case we prefer implants made of porous polyethylene, which can be cut precisely to fit the individual purpose.¹⁵ This material is available in different prefabricated parts (Medpor; Stryker Corp), which can be used as replacements for the ear base or for the helical rim for total ear reconstruction.^{16,17} For repair of auricular defects after unsuccessful otoplasty, an implant that exactly fits the defect is pre-

pared from one of these prefabricated implants as needed. Corners and edges are rounded off with a knife. Then the implant can be used to replace missing cartilage or to strengthen cartilage that has been greatly thinned as a result of previous treatment. Thus, the whole antihelix in a previously damaged ear can be reconstructed. In our experience, covering the plastic with fascia or similar material on the anterior skin surface is not necessary. We recommend attaching the introduced implant to the neighboring healthy cartilaginous skeleton with some long-term absorbable sutures to hold it in the desired location (Figure 5).

OVERCORRECTION OF THE AURICULAR POSITION WITH A SMALL CONCHA-MASTOID ANGLE AND “TELEPHONE HANDLE EAR”

A telephone handle ear deformity occurs as a result of overcorrection in the middle third of the ear and development of a too-small concha-mastoid angle.⁸ When viewed from the front, the ear loses its projection, above all in the middle third. This deformity occurs in isolation or in combination with other de-

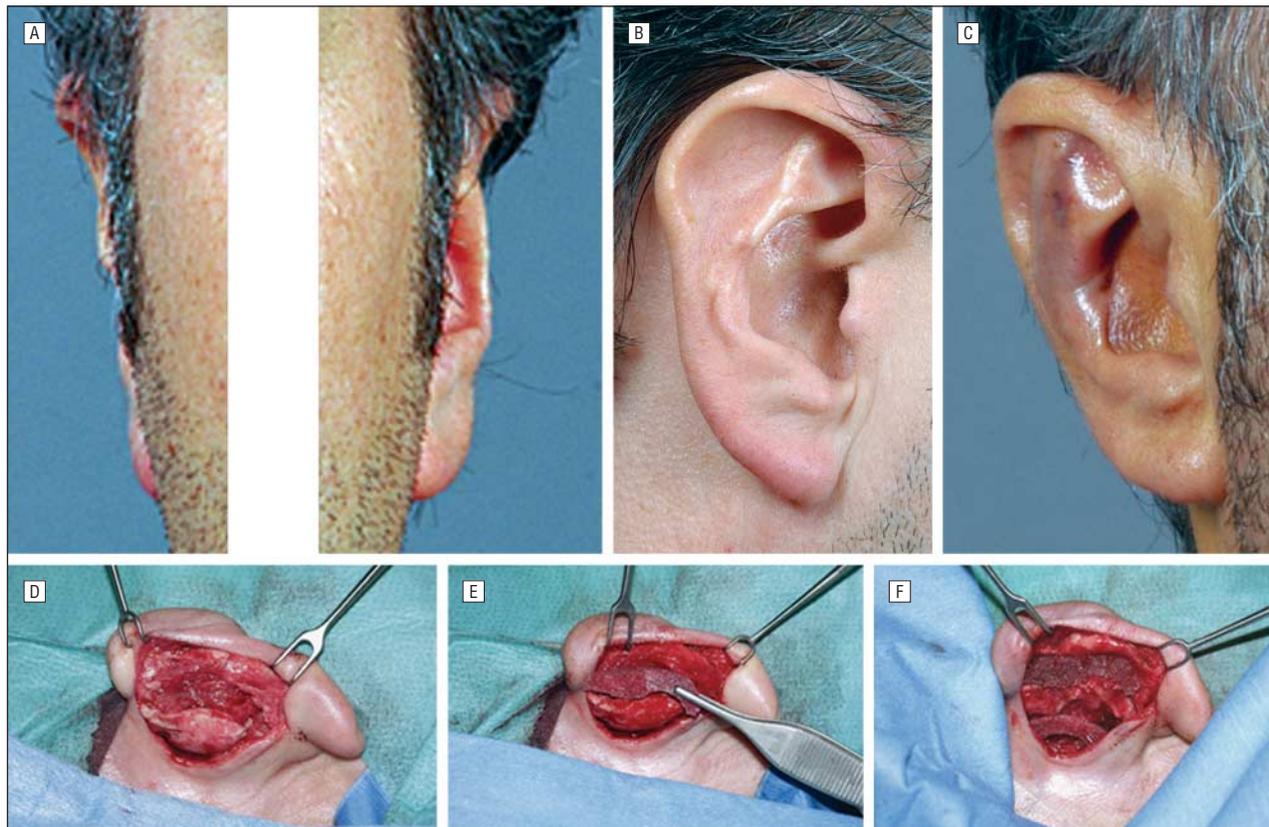


Figure 3. Deformity after otoplasty. A and B, Overcorrection of both ears, with an additional postoperative deformity on the right side. C, Result 5 days postoperatively. D, Intraoperatively, it was revealed that a cartilage bar 1-cm wide was removed in the prior otoplasty, making readaptation of the cartilage skeleton impossible. E, Insertion of the first porous polyethylene for bridging of the skeleton defect. F, Insertion of a second porous polyethylene implant for raising the concha-mastoid angle.



Figure 4. A telephone handle deformity after otoplasty with protruding helix and lobule on both sides. B, Result 6 months postoperatively after dissolving scar tissue and revision otoplasty by suture techniques.

formities. When the distance between the helical edge and skull, according to Wodak's¹¹ method, is measured, distinctly higher values are determined at the top and bottom measuring points than in the middle.

For the correction we use discs or half-moon-shaped implants of porous polyethylene,¹⁵ which are set in between the concha and the mastoid to increase the distance between the ear and the skull again. Through intraoperative measurement

of the helix-mastoid distance, the size of the implant to be chosen can be precisely determined. In our experience, covering such implants (eg, with fascia or periosteum, as opposed to using porous polyethylene implants for total auricular reconstruction) is not urgently necessary in this case. However, if the skin in the operation area is of low quality, or if an additional skin transplant for reconstruction of the postauricular sulcus is necessary, a pedicled flap of fascia or periosteum near the ear can

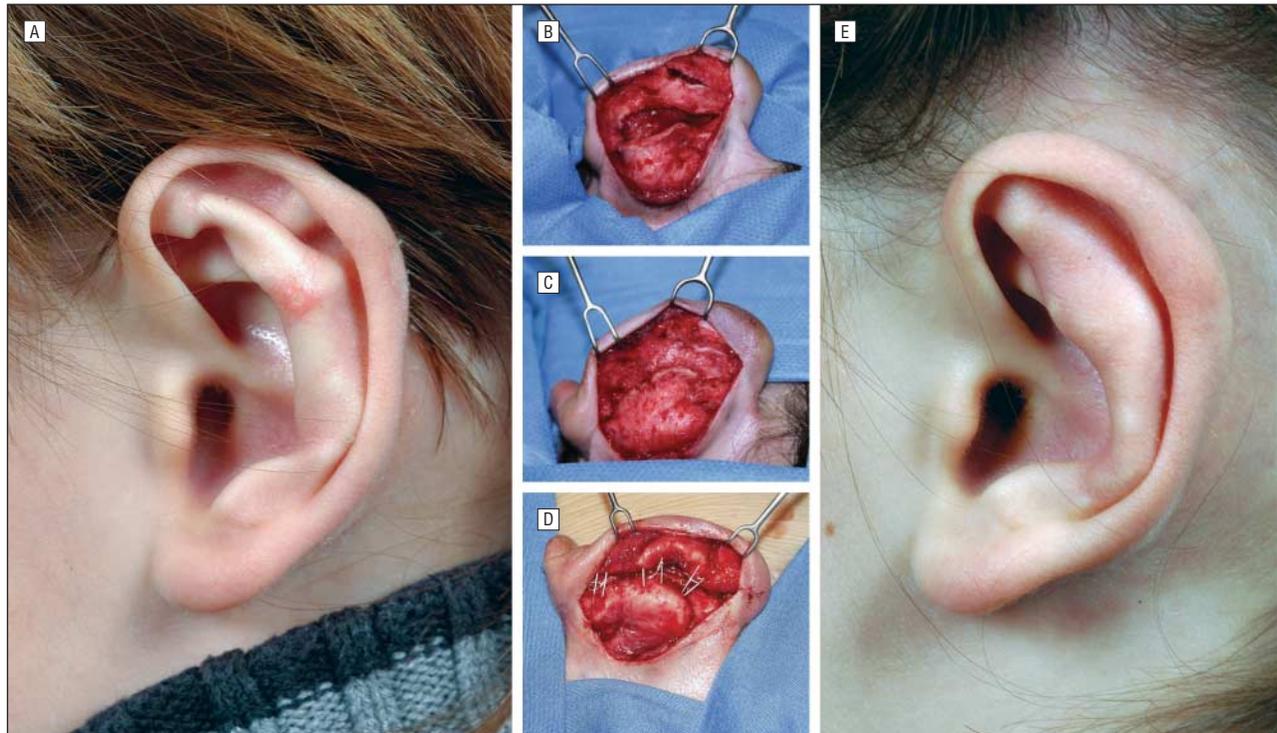


Figure 5. Deformity after otoplasty. A, Creases and extreme antihelical folding after otoplasty. B, Intraoperatively, several radical cartilage incisions and additional use of sutures were found as the cause for the deformity. C and D, Readaptation of the cartilage skeleton freed of scar tissue followed by revision otoplasty using suture techniques. E, Result 2 years postoperatively.

be used for posterior covering of such an implant in the posterior sulcus before it is covered with skin (Figure 1 and Figure 5).

POSTOPERATIVE CONDITIONS WITH CARTILAGE AND SKIN DEFECT

If, as a result of otoplasty or owing to purulent inflammation or other complications, partial or total loss of cartilage and skin occurs, then a partial or total auricular reconstruction is necessary. In this case, we prefer surgical reconstruction with porous polyethylene implants, temporoparietal fascia flaps, regional skin flaps, and free skin transplants, as described in detail elsewhere^{16,17} (Figure 3).

RESULTS

We have treated 12 severe ear deformities in the past 3 years with the procedures described herein. In 11 cases, there were no complications, nor were further corrections for cosmetic reasons necessary within the 3-year follow-up time.

In 1 case involving reconstruction of the antihelical fold by the use of a porous polyethylene implant, the patient showed up a year later with a double skin defect of 2 and 3 mm over the reconstructed antihelix. This was caused by laser treatment of skin irregularities in this area by a medical practitioner, leading to skin loss and exposure of the implant. The treatment in this case was repair of the damaged anterior skin using an island flap from the posterior sulcus with a broad subcutaneous pedicle. At the same time, the implant was removed and replaced by a smaller one. Since that revision there have

been no further complications in this patient, who was very satisfied with the results.

COMMENT

In our experience, covering unsightly creases of the auricle after otoplasty exclusively with free fascia transplants under the ventral skin has not proved to be of value. The fascia becomes atrophied and thin over the course of time, so that the original creases reappear. The procedure described herein—of reconstructing the cartilaginous skeleton and redoing the otoplasty—although more extensive, has a lasting effect.

The use of autogenous cartilage material instead of a porous polyethylene implant for the reconstruction of a missing ear cartilage skeleton has many disadvantages. A new operation field must be opened, with all the risks this entails.¹⁸ If both ears are affected by 1 auricular deformity, the respective opposing ear is, as a rule, not available for removal of cartilage transplantation material because of previous surgery. However, harvesting a rib cartilage transplant represents an unnecessary procedure, with a substantial risk of complications despite the small volume of material that is needed. Furthermore, it represents a cosmetic detriment that must be weighed against the cosmetic improvement in another area. Porous polyethylene, in contrast, has been proven effective for years and can be used without an additional burden to the patient.¹⁹ The fundamental suitability of this material has been confirmed in reconstructive facial surgery: porous polyethylene has been used in ear reconstruction by

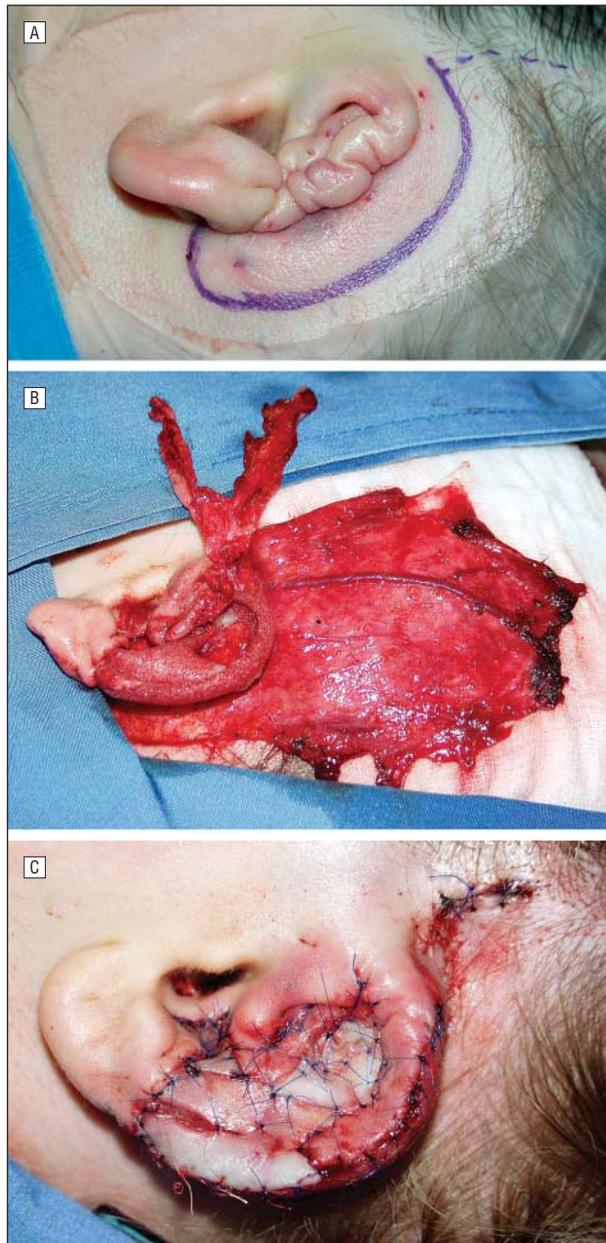


Figure 6. Deformity after otoplasty. A, Deformity of the upper two-thirds of the left ear after otoplasty, probably due to a postoperative infection with foreign body reaction to suture material. B and C, Reconstruction with a porous polyethylene framework, a temporoparietal fascia flap, and pedicled local as well as full-thickness skin grafts.

one of us (A.B.) for 30 years¹⁵ with excellent long-term results in biocompatibility and stability.¹⁹

To avoid severe ear deformities after otoplasty that are difficult to repair, we recommend the use of less aggressive suture techniques instead of cartilage incisions, scoring, or resection. Recent literature shows that excellent long-term stability is achieved with suturing techniques with no statistically significant change in head-to-auricle distances over time as long as nonabsorbable suture material is used.²⁰ Also, postauricular skin resection should be avoided; we have not performed this procedure in primary otoplasties for the past 15 years, with no loss of quality in the results.²⁰

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REFERENCES

1. Converse JM, Nigro A, Wilson FA, Johnson N. A technique for surgical correction of lop ears. *Plast Reconstr Surg* (1946). 1955;15(5):411-418.
2. Stenström SJ. A "natural" technique for correction of congenitally prominent ears. *Plast Reconstr Surg*. 1963;32:509-518.
3. Mustarde JC. The correction of prominent ears using simple mattress sutures. *Br J Plast Surg*. 1963;16:170-178.
4. Fritsch MH. Incisionless otoplasty. *Laryngoscope*. 1995;105(5, pt 3)(suppl 70):1-11.
5. Adamson PA, McGraw BL, Tropper GJ. Otoplasty: critical review of clinical results. *Laryngoscope*. 1991;101(8):883-888.
6. Mandal A, Bahia H, Ahmad T, Stewart KJ. Comparison of cartilage scoring and cartilage sparing otoplasty: a study of 203 cases. *J Plast Reconstr Aesthet Surg*. 2006;59(11):1170-1176.
7. Kelley P, Hollier L, Stal S. Otoplasty: evaluation, technique, and review. *J Craniofac Surg*. 2003;14(5):643-653.
8. Weerda H. *Surgery of the Auricle*. 2nd ed. Stuttgart, Germany/New York, NY: Thieme; 2007.
9. Limandjaja GC, Breugem CC, Mink van der Molen AB, Kon M. Complications of otoplasty: a literature review. *J Plast Reconstr Aesthet Surg*. 2009;62(1):19-27.
10. Lentz AK, Plikaitis CM, Bauer BS. Understanding the unfavorable result after otoplasty: an integrated approach to correction. *Plast Reconstr Surg*. 2011;128(2):536-544.
11. Wodak E. On the position and shape of the human auricle. *Arch Klin Exp Ohren Nasen Kehlkopfheilkd*. 1967;188(2):331-335.
12. Goldstein MA. The cosmetic and plastic surgery of the ear. *Laryngoscope*. 1908;18(10):826-851.
13. Furnas DW. Correction of prominent ears by conchamastoid sutures. *Plast Reconstr Surg*. 1968;42(3):189-193.
14. Siegert R. Correction of the lobule. *Facial Plast Surg*. 2004;20:293-298.
15. Berghaus A. Porous polyethylene in reconstructive head and neck surgery. *Arch Otolaryngol*. 1985;111(3):154-160.
16. Berghaus A. Porecon implant and fan flap: a concept for reconstruction of the auricle. *Facial Plast Surg*. 1988;5(5):451-457.
17. Reinisch JF, Lewin S. Ear reconstruction using a porous polyethylene framework and temporoparietal fascia flap. *Facial Plast Surg*. 2009;25(3):181-189.
18. Kawanabe Y, Nagata S. A new method of costal cartilage harvest for total auricular reconstruction: part I: avoidance and prevention of intraoperative and postoperative complications and problems. *Plast Reconstr Surg*. 2006;117(6):2011-2018.
19. Braun T, Gratz S, Becker S, et al. Auricular reconstruction with porous polyethylene frameworks: outcome and patient benefit in 65 children and adults. *Plast Reconstr Surg*. 2010;126(4):1201-1212.
20. Braun T, Hainzinger T, Stelter K, Krause E, Berghaus A, Hempel JM. Health-related quality of life, patient benefit, and clinical outcome after otoplasty using suture techniques in 62 children and adults. *Plast Reconstr Surg*. 2010;126(6):2115-2124.