OTOPLASTY
A Practical Surgical Guide

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With 25 illustrations by
Katja DALKOWSKI, M.D.

This practical guide to otoplastic surgery is based on the personal experience of the authors and on course materials for the surgery courses given yearly at the Department of Anatomy, University of Zurich, Switzerland.

Director: Prof. Oliver ULLRICH, M.D.

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1.0 Introduction

The correction of prominent ears is a continual challenge for the facial plastic surgeon. The selection of an operative technique must be tailored to the individual pathology of the prominent ear (protrusion angle, auricular relief, cartilage texture). A successful operation frees the patient from the stigma of “protruding ears” and is also very gratifying for the surgeon. In this booklet we shall review the basic principles of two proven operative techniques. Aided by these techniques and their modifications, the otosurgeon can successfully correct the majority of auricular deformities with a pleasing aesthetic result.

2.0 Goals of Otoplasty

Otoplasty should achieve the following goals:

I. Aesthetics*
   - Symmetry (< 3 mm difference between the sides).
   - No upper-third protrusion of the auricle.
   - The helix should be lateral to the antihelix when viewed from the front.
   - No significant narrowing of the postauricular sulcus.
   - The corrected auricle should not be too close to the head.

II. Mass*
   - The distance from the anterior helical rim to the posterior mastoid surface should be less than 17–20 mm.

*Modified from McDowell and Weerda.

3.0 Patient Selection

As in any plastic operation, the candidate for otoplasty should be experiencing significant psychosocial distress. The patient’s expectations must be realistic. We perform the operation only in children over 4 years of age. It is not enough for the parents to request the surgery; the child must desire it also. We have found that all aspects of perioperative and postoperative care are far easier to manage, and postoperative pain is reduced, in motivated children.
4.0 The Lucerne Technique
Modified Anterior Scoring Technique

The anterior scoring technique is based on the work of *Sten Stenström* (1963). The perichondrium on the anterior auricular surface is weakened by scoring (Fig. 1) in order to create a convex, tension-free antihelical fold.

![Fig. 1](image)

**Fig. 1**
Histologic section of scored auricular cartilage from the original article by *Stenström* (1963).

### Basic steps in the Lucerne technique:

1. Postauricular skin incision (double ellipse).
2. Anterior scoring to reshape the antihelical cartilage.
3. Contouring of the antihelix postauricular fixation sutures).
4. Correction of auricular position (cavum rotation with or without cartilage excision).
5. Refinements: lobuloplasty, helical spine release, etc.

4.1 Analysis of the Auricle

At the start of the operation, the overall aesthetic impression is assessed and the auricle is analyzed with respect to the cephaloauricular angle, auricular relief (deficient antihelical fold, absent superior crus, depth of the cavum conchae, lobular protrusion), and the cartilage texture (Fig. 2). Preoperative dimensions (distance between the anterior helical rim and mastoid surface) are measured in the upper and middle thirds of the ear and at the lobule. This preliminary analysis is followed by the local infiltration of lidocaine with 1:100,000 epinephrine.

![Fig. 2](image)

**Fig. 2**
Analysis and palpation of the auricle.
4.2 Skin Excision

A double-elliptical skin excision is performed in the postauricular crease (Figs. 3, 4). This should be done sparingly, as any excess skin can still be resected at the end of the operation, although this is seldom necessary. By following the principle of a sparing excision, we have never found significant narrowing of the postauricular sulcus in any of our long-term follow-ups.

After the skin is incised, the subcutaneous tissue is spread open and resected along with the skin ellipse (Fig. 5). The skin is undermined posteriorly to facilitate later suture placement for cavum rotation (Fig. 6).

Fig. 3
The double-elliptical skin excision is marked on the postauricular skin.

Fig. 4
A sparing double-elliptical skin incision is made.
Fig. 5
Resection of skin and subcutaneous tissue.

Fig. 6
The skin is undermined posteriorly.
4.3 Exposure of the Auricular Cartilage and Antitragohelicine Fissure

The skin-subcutaneous flap is dissected from the posterior surface of the auricular cartilage, taking care to preserve the intrinsic auricular muscles and perichondrium. The forceps is kept open and the lower blade merely lifts the tissue to avoid crushing the delicate skin. The dissection is carried far superiorly to aid in the subsequent creation of an absent superior crus (Fig. 7). The antitragohelicine fissure is exposed inferiorly to provide a natural access site to the anterior auricular surface (Figs. 8, 9).

Fig. 7
Dissection of the posterior auricular surface.

Fig. 8
Diagram of the auricular cartilage and its landmarks.

Fig. 9
Exposure of the antitragohelicine fissure.
4.4 Anterior Scoring

A small dissecting scissors is passed through the antitragohelicine fissure to the anterior auricular surface, and the skin is undermined along the full length of the anti-helix. The curve of the scissor tips is always directed toward the cartilage to avoid perforating the skin (Fig. 10). When the skin has been sufficiently undermined, a curved Lucerne double-ended rasp is introduced into the tunnel (Fig. 11). The narrow end is used in children, the broad end in adults. The perichondrium and cartilage on the anterior surface are uniformly scored with gentle pressure until an antihelical fold can be created without tension (Fig. 12).
4.5 Contouring and Fixation of the Antihelical Fold

The planned antihelical fold is marked with hypodermic needles (Fig. 13), which are passed to the surgeon on a round sponge (Fig. 14). To prevent injuries, the needles are removed before their position is marked with a bipolar forceps (Fig. 15).

After anterior scoring, the cartilage is malleable and is folded with four Mustarde sutures to create a new antihelix. The Mustarde mattress sutures are placed through the perichondrium 5–6 mm above and below the marked line of the antihelical fold (Fig. 16). They are passed beneath the perichondrium but should not pierce the full cartilage thickness. If necessary, the superior suture can be used to create an absent superior crus (Fig. 17).

The cartilage is slightly indented before the sutures are tied (Fig. 18). After the knot is preplaced, it is held in position with a smooth clamp so that it can be tightened with millimeter precision (Fig. 19).
Fig. 17
Creation of a superior crus.

Fig. 18
The cartilage is indented with the clamp before the sutures are tied.

Fig. 19
The preplaced knot is secured with the clamp.
4.6 Cavum Rotation with or without Cartilage Excision

The position of the auricle is corrected by cavum rotation. In patients with a shallow cavum conchae, this can be accomplished with otopexy sutures and there is no need to perform a cartilage excision (Fig 20).

The position of the otopexy sutures should be shifted slightly posteriorly to prevent narrowing of the meatal opening (Fig. 21).

In patients with a very deep conchal bowl and very thick cartilage, cavum rotation cannot be achieved with otopexy sutures alone, as the tension would be too great. These selected cases require a crescent-shaped cartilage excision from the region of the cavum conchae. Needles can be used to define the depth of the cavum conchae and the necessary extent of the cartilage excision.
4.7 Refinements

Helical Spine, Anterior Auricular Ligament

As Šercer pointed out in 1951, a very tight anterior auricular ligament can create unfavorable tension that requires correction in some patients (Fig. 24).

Fig. 24
The helical spine and anterior auricular ligament.
If this is the case, the helical spine can easily be released from the auricular ligament with a dissecting scissors passed through a postauricular tunnel, aided by digital palpation (Figs. 25a–d).

Figs. 25a–d
Pressure is placed on the auricle to identify the helical spine (a). A tunnel is developed to the helical spine from behind the ear (b, c). Aided by digital palpation, the helical spine is released from the ligament with a small scissors (d).
4.8 Final Checklist

At the end of the operation, the surgeon again checks the ear for important details such as absence of lobular protrusion and a natural superior crus. The final check includes an assessment of overall aesthetic impression and the position of the auricle (Fig. 26).

Fig. 26
Final checklist.

4.9 Postoperative Measurements

Specific postoperative measurements are taken to supplement the overall impression. The distance between the anterior helical rim and mastoid is measured in the upper, middle and lower thirds of the ear (Fig. 27). This makes it easier to achieve a symmetrical result on the opposite side and also provides an objective baseline for long-term follow-up.

Results of pre- and postoperative measurements of the distance between the anterior helical rim and mastoid (cm).

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Fig. 27
Pre- and postoperative measures are determined.
5.0 The Zurich Technique
Creating the Antihelical Fold by Posterior Cartilage Thinning with a Diamond Burr (Posterior Burr Technique)

This is another proven technique for correcting the most common auricular deformities. The main difference from the Lucerne technique described above is that the new antihelical fold is created by thinning the antihelix from the posterior side of the auricle with a diamond burr. The advantage of this modification, first described by Weerda is that it does not require dissection of the anterior auricular surface. Aside from minor technical differences, the main steps in the auricular correction are the same as in the Lucerne technique.

Basic steps in the Zurich technique:

1. Postauricular skin incision (narrow elliptical excision).
2. Correction of auricular position (conchal setback, combined with cartilage excision if necessary).
3. Posterior thinning of the antihelical cartilage with a diamond burr.
4. Contouring of the antihelix (postauricular retention sutures).
5. Refinements: lobuloplasty, helical spine release, etc.

5.1 Postauricular Skin Incision
Narrow Elliptical Skin Excision
The skin on the posterior auricular surface is incised approximately 5–8 mm above the postauricular crease (Fig. 28).

Fig. 28
Skin incision above the postauricular crease.
In patients with severe conchal hyperplasia requiring a cartilage excision for conchal reduction, a small elliptical skin excision is made corresponding to the width of the proposed conchal cartilage excision. The incision is preceded by local infiltration of 1% lidocaine with 1:100,000 epinephrine (Figs. 29–31).

Fig. 29
Infiltration of lidocaine with 1:100,000 epinephrine.

Fig. 30
Elliptical skin excision.

Fig. 31
Dissection of the posterior auricular cartilage and adjacent mastoid surface.
5.2 Correction of Auricular Position

Conchal Setback, Combined with Cartilage Excision if Necessary

Before a new antihelical fold is created, the overall position of the auricle is corrected. This depends basically on the position and shape of the concha. A proven technique is the conchal setback, in which the concha is rotated posteriorly with retention sutures placed in the mastoid periosteum (Webster-Furnas). If significant hyperplasia of the conchal cartilage is present, a preliminary elliptical cartilage excision should be done to reduce the “height” of the concha (Converse). The excision margins are reapproximated with absorbable interrupted sutures (e.g., 4-0 Vicryl).

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Fig. 32
Cartilage excision for reduction of conchal hyperplasia.

Fig. 33
Elliptical excision is made in the vertical portion of the concha.

Fig. 34
The excision margins are reapproximated with sutures.
The retention sutures for the conchal setback consist of nonabsorbable material (e.g., 3-0 Prolene) and are preplaced to avoid interference with the rest of the operation. Prior to skin closure, the retention sutures are tightened and the auricle is fixed in the desired position (Figs. 32–37).
5.3 Posterior Thinning of the Antihelical Cartilage with a Diamond Burr

A major part of most otoplasties is the enhancement or creation of a deficient antihelical fold. After the planned antihelical fold has been marked on the posterior side of the auricular cartilage, the cartilage in that area is carefully thinned with a diamond burr. This significantly reduces the risk of a recurrence by decreasing the elastic recoil of the cartilage (Figs. 38–42).
5.4 Contouring the Antihelix

Postauricular Fixation Sutures
The shape of the newly created antihelical fold is retained with three or four mattress sutures (Mustarde). We prefer to use a fine, nonabsorbable, monofilament suture (5-0 or 6-0), but basically any slowly dissolving material can be used (Figs. 43–46).
5.5 Refinements: Lobuloplasty, Helical Spine Release, etc.

After the position of the auricle has been defined by the preplaced conchal setback sutures and the shape of the antihelix has been defined by the preplaced mattress sutures, any necessary refinements can be carried out. Special care should be taken that the lobule harmonizes with the rest of the corrected auricle. It is often necessary to perform a lobuloplasty at this stage (the various technical options for lobuloplasty are beyond our present scope).

After the refinements have been made, the preplaced mattress sutures for the antihelix and the sutures for the conchal setback are tightened. The shape of the auricle is again assessed, and any necessary corrections are easily carried out at this time. The skin is closed with continuous absorbable or nonabsorbable sutures. A light pressure dressing for hematoma prevention is applied for 24 (to 48) hours (Figs. 47–49).

Fig. 45
Three or four mattress sutures are preplaced so that any necessary refinements can be made in the lobular region.

Fig. 46
The preplaced sutures are tightened, and the definitive shape of the ear is assessed.

Fig. 47
Lobuloplasty by a wedge-shaped soft-tissue resection.
Fig. 48
The skin is closed with continuous sutures.

Fig. 49
The wound is covered with petrolatum gauze, and a light pressure dressing is applied for 24 hours.

Recommended Literature


Instrument Set for Otoplasty – according to the „Lucerne“ Technique
Instrument Set for Otoplasty – according to the „Lucerne“ Technique

1. 208000 Surgical Handle, Fig. 3, length 12.5 cm, for Blades 208010 – 19, 208210 – 19
2. 208013 Blade, Fig. 13, non-sterile, package of 100
3. 208010 Blade, Fig. 10, non-sterile, package of 100
4. 512511 Scissors, with tungsten carbide inserts, blunt/blunt, curved, length 11 cm
5. 791813 REYNOLDS Dissecting Scissors, curved, delicate tips, length 13 cm
6. 511210 Scissors, curved, extra delicate, length 10 cm
7. 791202 Scissors, curved, sharp/blunt, length 14.5 cm
8. 533112 ADSON Tissue Forceps, 1x 2 teeth, length 12 cm
9. 533212 ADSON-BROWN Tissue Forceps, atraumatic, fine side grasping teeth, length 12 cm
10. 474200 FREER-JOSEPH Elevator, double-ended, slender, semisharp and sharp, length 20 cm
11. 169800 LUZERN Cartilage Rasp, double-ended, width 3 mm and 5 mm, 15° upturned, length 20 cm
12. 800204 Retractor, very delicate, sharp, 4 prongs, length 13 cm
13. 204810 FERGUSON Suction Tube, with cut-off hole and stylet, LUER, 10 Fr., working length 11 cm
14. 535212 HALSTEAD “Mosquito” Artery Forceps, curved, length 12.5 cm
15. 516013 Needle Holder, tungsten carbide inserts, length 13 cm
16. 841046 Bipolar Coagulating Forceps, insulated, tips curved, blunt, very delicate, tips 1 mm, length 10.5 cm, for use with Bipolar High Frequency Cords 847000 or 847000 A/E/M/V
17. 847000 E Bipolar High Frequency Cord, to KARL STORZ Coagulator 26021 B/C/D, 860021 B/C/D, 27810 B/C/D, 28810 B/C/D, AUTOCON® system (50, 200, 350), AUTOCON® II 400 system SCB (111, 113, 115) and Erbe-Coagulator, T- and ICC-row, length 300 cm
Instrument Set for Otoplasty – according to the „Lucerne“ Technique

- **Surgical Handle**, Fig. 3, length 12.5 cm, for Blades 208010 – 19, 208210 – 19
- **Blade**, Fig. 10, non-sterile, package of 100
- **Same**, Fig. 13
- **Scissors**, with tungsten carbide inserts, blunt/blunt, curved, length 11 cm
- **REYNOLDS Dissecting Scissors**, curved, delicate tips, length 13 cm
- **Scissors**, curved, extra delicate, length 10 cm
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UNIDRIVE® S III ENT

40 7016 01-1  UNIDRIVE® S III ENT
including:
UNIDRIVE® S III ENT with KARL STORZ-SCB®,
power supply 100 – 240 VAC, 50/60 Hz
Mains Cord
Two-Pedal Footswitch, two stage,
with proportional function
* Silicone Tubing Set, for irrigation, sterilizable
Clip Set, for use with Tubing Set 20 7116 40
SCB Connecting Cable, length 100 cm
** Single Use Tubing Set, sterile, package of 3

UNIDRIVE® S III ECO

40 7014 01  UNIDRIVE® S III ECO
including:
UNIDRIVE® S III ECO,
power supply 100 – 240 VAC, 50/60 Hz
Mains Cord
Two-Pedal Footswitch, two stage,
with proportional function
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Clip Set, for use with Tubing Set 20 7116 40
** Single Use Tubing Set, sterile, package of 3

280052 B  Universal Spray, 500 ml bottle, for use with spray diffuser 280052 C
– Hazardous Goods – UN 1950
280052 C  Spray Diffuser, for use with Universal Spray 280052 B
031131-10** Tubing Set, for irrigation, for single use, sterile, package of 10

*not available in the USA

** mtp medical technical promotion gmbh, Take-Off GewerbePark 46, D-78579 Neuhausen ob Eck, Germany
Drill handpieces and EC micromotor

252479 **INTRA Drill Handpiece**, angled, extra long, length 18 cm, for use with 12.5 cm long straight shaft burrs, transmission 1:1 (40,000 rpm)

252477 **INTRA Drill Handpiece**, angled, length 15 cm, for use with straight shaft burrs, length 9.5 cm, transmission 1:1 (40,000 rpm)

252475 **INTRA Drill Handpiece**, angled, length 12.5 cm, for use with straight shaft burrs, transmission 1:1 (40,000 rpm)

252495 **INTRA Drill Handpiece**, straight, long shape, length 10.4 cm, for use with straight shaft burrs, transmission 1:1 (40,000 rpm)

252490 **INTRA Drill Handpiece**, straight, length 8.7 cm, for use with straight shaft burrs, transmission 1:1 (40,000 rpm)

To operate the drill handpieces, an EC micromotor 20 7110 32 and the connection cable 20 7111 72 are required.
Burr

Straight shaft burrs with a length of 12.5 cm for Handpiece 252479

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649600 L  **Standard Straight Shaft Burr**, stainless, size 014 – 070, length 12.5 cm, set of 11

649700 L  **Diamond Straight Shaft Burr**, stainless, size 014 – 070, length 12.5 cm, set of 11

649700 GL **Rapid Diamond Straight Shaft Burr**, stainless, with coarse diamond coating for precise drilling and abrasion by light hand pressure and generating minimal heat, sizes 023 – 070, length 12.5 cm, set of 9, color code: gold

280034  **Rack**, for 36 straight shaft burrs with a length of 12.5 cm, can be folded out, sterilizable, size 22 x 17 x 2 cm
Burrs

Straight shaft burrs with a length of 9.5 cm for Handpiece 252477

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649700  **Diamond Straight Shaft Burr**, stainless, size 014 – 070, length 9.5 cm, set of 11

649700 G **Rapid Diamond Straight Shaft Burr**, stainless, with coarse grit diamond coating for precise drilling and abrasion without light hand pressure and generating minimal heat, size 023 – 070, length 9.5 cm, set of 9

280033  **Rack**, for 36 straight shaft burrs with a length of 9.5 cm, can be folded out, sterilizable, size 22 x 14 x 2 cm
## Burrs

**Burrs with a length of 7 cm for Handpieces 252475, 252490 and 252495**

<table>
<thead>
<tr>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard sterilizable</th>
<th>Tungsten Carbide</th>
<th>Transverse Tung. Carb.</th>
<th>Diamond sterilizable</th>
<th>Diamond, coarse</th>
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<td>261008</td>
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<td>262008</td>
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<td>261010</td>
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<tr>
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260000  **Standard Straight Shaft Burr**, stainless, sizes 006 – 070, length 7 cm, set of 15

261000  **Tungsten Carbide Straight Shaft Burr**, stainless, sizes 006 – 070, length 7 cm, set of 15

262000  **Diamond Straight Shaft Burr**, stainless, sizes 006 – 070, length 7 cm, set of 15

262200  **Rapid Diamond Straight Shaft Burr**, stainless, with coarse diamond coating for precise drilling and abrasion by light hand pressure and generating minimal heat, sizes 023 – 070, length 7 cm, set of 9 color code: gold
Burrs

Straight shaft burrs with a length of 5.7 cm, for use with Handpieces 252475, 252490, 252495

<table>
<thead>
<tr>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard</th>
<th>Tungsten Carbide</th>
<th>Diamond</th>
<th>Diamond, coarse</th>
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</table>

649600 K  **Standard Straight Shaft Burr**, stainless, sizes 014 – 070, length 5.7 cm, set of 11

649700 K  **Diamond Straight Shaft Burr**, stainless, sizes 014 – 070, length 5.7 cm, set of 11

649700 GK **Rapid Diamond Straight Shaft Burr**, stainless, with coarse grit diamond coating for precise drilling and abrasion without light hand pressure and generating minimal heat, sizes 023 – 070, length 5.7 cm, set of 9
Accessories for the drill

280030  **Rack**, for 36 straight shaft burrs with a length of 7 cm, can be folded out, sterilizable, size 22 x 11.5 x 2 cm

280030 K  **Metal Bar**, for fixation at Rack 280030, to hold 18 burrs with a length of 7 cm and 16 burrs with a length of 5.7 cm, 16 x 2.5 x 1 cm

280032  **Rack**, for 36 straight shaft burrs with a length of 9.5–12.5 cm, can be folded out, sterilizable, size 22 x 17 x 2 cm

280033  **Rack**, for 36 straight shaft burrs with a length of 9.5 cm, can be folded out, sterilizable, size 22 x 14 x 2 cm

280034  **Rack**, for 36 straight shaft burrs with a length of 12.5 cm, can be folded out, sterilizable, size 22 x 17 x 2 cm
Notes:
Notes:
WITH COMPLIMENTS OF
KARL STORZ—ENDOSKOPE