Otoplasty

56

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56.1 Introduction

Few facial cosmetic surgery procedures are as rewarding as an otoplasty for both the surgeon and the patient. The ability to shape and contour a malpositioned or malformed ear is a relatively quick and efficient procedure that can literally be life-changing.

An otoplasty is the surgical correction of a condition known as prominauris or excessive otic projection. The procedure was first described by Dieffenbach in 1845 based on Ely's work in 1841 [1]. Few cosmetic procedures yield a higher degree of postoperative satisfaction than an otoplasty. This is especially true for children and adolescents who may undergo ridicule and teasing from an early age. Preschool- or kindergarten-age children (5–6 years old) are ideal candidates due to the fact that roughly 85% of ear growth is completed by age 3, and the ear is fully developed by age 7–8. At this age, the cartilage is more pliable and easier to mold and manage than that of an adult. The psychological influence of prominauris is well documented, and studies have demonstrated an improved quality of life, increased self-esteem, and decreased psychosocial anxiety after surgical correction.

Excessive otic projection has two main root causes. Either one can significantly influence the prominence of the ear, but oftentimes they occur in combination. The two anatomic contributing factors are a lack of a well-defined antihelical fold and excessive conchal bowl depth. Each must be evaluated in the preoperative visit and treatment planned for correction accordingly. A frequent mistake by novice surgeons is misidentifying the etiology of prominauris and not treating one defect while overtreating the other. For example, overtreating the lacking antihelical fold while not treating the excessive conchal bowl depth will lead to an unnatural result.

When the patient presents for an otoplasty consultation, it is first imperative to ask his or her chief complaint. Oftentimes, this is easy for the mature patient, but in pediatric patients, this may be more difficult to illicit. As previously mentioned, the ideal candidate is 5–6 years old. The challenge with this age group is that the patient may not be emotionally mature enough to tolerate the postoperative course. Although the parents are the decision-makers, they may or may not be the driving source for the consultation. The surgeon must be sure that this is what the child wants to have done, and not just the will of the parents. Fortunately, at this age, especially if there has been ridicule from peers or siblings, pediatric patients are often eager and willing to undergo the procedure.

During the history and physical exam, the surgeon should specifically assess the patient for symmetry, dystopia of the ears, flexibility and resiliency of the cartilage, signs of skin lesions, or history of otitis media or externa. The patient should be asked if there is any history of hearing loss. The tympanic membrane and external auditory canal should be visualized with an otoscope to access and document infection or perforation of the membrane.

In addition to a thorough history and physical exam, preoperative photos and measurements are imperative. A frontal view, right and left 3/4 view, right and left profile views, a submental vertex, and posterior view are a standard photo set. Often recommended are isolated ear photos with a ruler accessing conchal bowl depth, as well as photos of the superior, middle, and inferior mastoid-to-helix measurement.

During the consultation visit, the surgeon must access the degree of protrusion. This is accomplished by determining the auriculocephalic angle and the scaphoconchal angle. A normal auriculocephalic angle is roughly 25–35°. An abnormal or protrusive angle is generally greater than 45° (Fig. 56.1a). The scaphoconchal angle is normally 75–100°. A lack of an antihelical fold, which causes failure of the ear to fold normally, will typically present with a scaphoconchal angle of >100° (Fig. 56.1b) [2].

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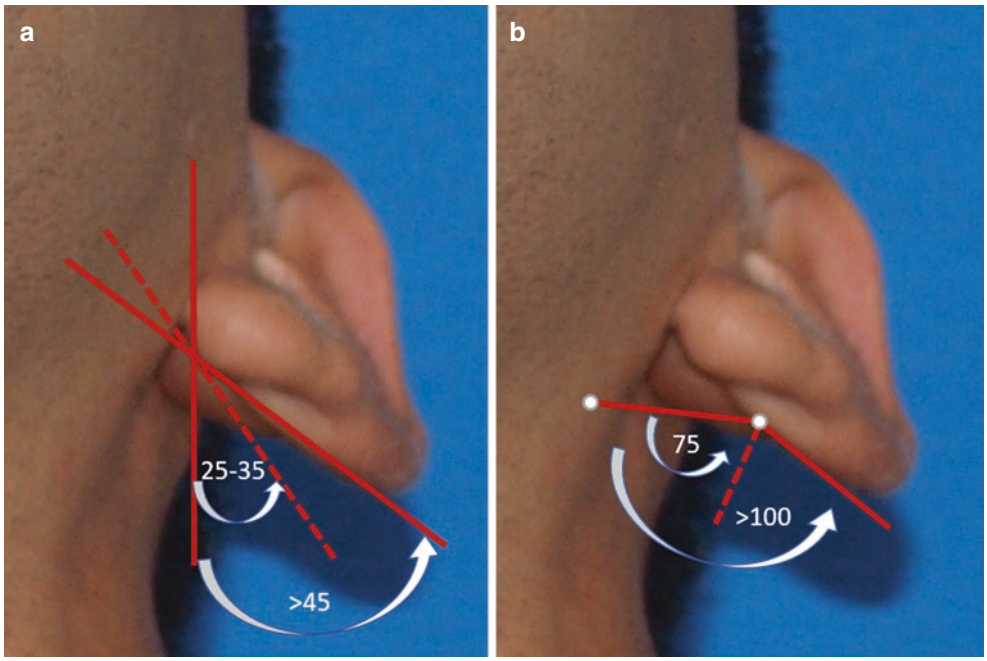


Fig. 56.1 (**a**) Auriculocephalic angle. (**b**) Scaphoconchal angle

Fig. 56.2 Excessive otic projection due to the lack of an antihelical fold

Fig. 56.3 Excessive conchal bowl depth (>8 mm)

As noted prior, a lack of an antihelical fold will cause the ears to protrude (Fig. 56.2). In order to properly correct ear prominence, the antihelical fold must be recreated. The suture technique employed to create the antihelical fold is referred to as the Mustardé technique [3]. The conchal bowl depth is the second significant factor at play. The depth of the conchal bowl measured from the cavum concha to the anterior segment of the antihelix should be roughly 8 mm (Fig. 56.3). A Davis technique is used to resect the base of the conchal bowl. By removing the base and vertical wall, the height of the bowl is reduced, thus reducing prominence.

An assessment and documentation of the degree of prominence should be recorded and photographed to assist in preoperative planning and intraoperative management. The upper 1/3 is measured from the temporal skin to the superior portion of the helix (10–12 mm). The middle 1/3 is from the mastoid skin to the widest portion of the middle helix (16–18 mm), and the lower 1/3 is measured from the mastoid skin to the inferior portion of the helix (20–22 mm) (Fig. 56.4).

More often than not, a combination of the two deformities leads to excessive otic projection and must be treated in conjunction to provide an optimal result.

Fig. 56.4 Measurement of the middle 1/3 of the ear showing excessive distance from the mastoid skin to the middle helix

Additionally, other deformities must be noted, evaluated, and documented. Asymmetries of the right and left ear are very common. These oftentimes can be addressed during the surgery. Treatment of other conditions such as lop ear deformities, otic dystopia, microtia, lobule deformities, prominent Darwinian tubercle(s), lack of a tragus (or antitragus), cup deformities, Stahl's bar, and bat ear deformities are beyond the scope of this chapter.

56.2 Description of the Procedure

Informed consent should include the risks, benefits, indications, contraindications, and alternatives to the treatment. Risks include pain, bleeding, swelling, infection, unaesthetic results, tissue necrosis, stenosis of the external auditory canal, and damage to the canal or even the middle ear.

The goals of an otoplasty should be as follows:

1. Normalization of protrusion.
2. The helix should protrude slightly (2–4 mm) more than the antihelix from the frontal view.
3. Smooth and anatomic contour.
4. Maintenance of postauricular sulcus.
5. Symmetry within 3 mm.
6. Avoiding overcorrection.

The ear is marked in the preoperative holding area. First, the proposed antihelix is drawn. Next, the proposed markings for the placement of the Mustardé sutures are drawn. These are generally trapezoidal in nature with the anterior arm being slightly shorter than the posterior arm. The markings should be placed roughly 7–8 mm on either side of the proposed crest of the newly formed antihelical fold. This is about the distance one will cover with a good bite of a P-3 needle. It is imperative that the proposed markings are placed in a slightly curved fashion to prevent the formation of a non-anatomic straight antihelical fold. Generally, two to three trapezoids are drawn to simulate the number of mattress sutures required to create the fold (Fig. 56.5).

Next, using calipers or a ruler, the conchal bowl is measured to a depth of 8 mm from the transition line of the antihelix. This is to ensure a proper height of residual bowl remains after excision. This is generally in a kidney bean

Fig. 56.5 Newly proposed antihelical fold

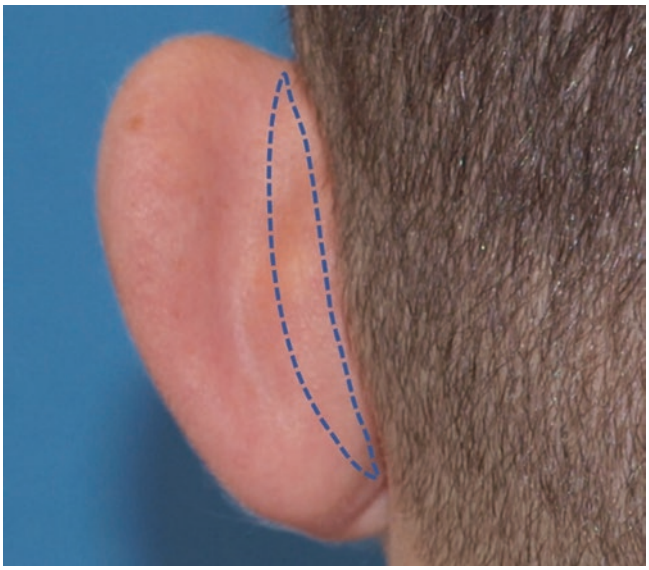


Fig. 56.6 The amount skin to be excised for access does not need to be overzealous. Only 5–10 mm of skin needs be excised or is adequate exposure

fashion. The preoperative markings are crucial because they will be used during the surgery to facilitate tattooing of the cartilage for accurate suture placement and bowl reduction.

The posterior auricular incision is then marked (Fig. 56.6). This is generally fusiform in fashion extending superiorly to inferiorly to gain surgical access to the entire ear. Placing markings 2–3 mm lateral to the sulcus is recommended. This will ease dissection to the helix of the ear as well as promote good tissue approximation during closure. The width of the posterior incision may range from 5 to 10 mm depending on the amount of setback needed. A common misnomer is that one needs to remove a significant amount of skin in order to facilitate setting back the ear. One only needs to extend the incision laterally enough to ensure access to preoperative markings.

After the ear is marked, empiric antibiotics are started prior to skin incision. The majority of cases of otitis externa after otoplasty surgery are the result of bacterial infections due to *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Some surgeons recommend starting the patient on oral ciprofloxacin or levofloxacin (Levaquin) two days prior to surgery and for 5–7 days postoperatively to cover for *Pseudomonas aeruginosa*-related infections. The author has not found that the risks of fluoroquinolones on the pediatric or young adult patients is warranted and chooses to give a parenteral dose of intravenous cefazolin (Ancef) for Staphylococcus aureus coverage 30–60 minutes prior to incision. This is followed by a 5-day course of enteral administration of cefazolin (Keflex). Penicillin-allergic patients are given clindamycin.

Anesthetic options for otoplasties range from local anesthetic to general anesthesia. This decision is multifactorial but mainly depends on the patient's level of anxiety and personal preference. Due to the ability to obtain profound local anesthesia with nerve blocks, most of the author's patients elect for surgery with moderate to deep sedation rather than general anesthesia.

Local anesthetic is key to a successful surgery. Not only does it prevent pain, but it also provides hydrodissection to facilitate access to the cartilage for manipulation and excision. The external ear is innervated by the auriculotemporal nerve (V3), the lesser occipital nerve (C2), and the greater auricular nerve (C2, C3). The conchal bowl is innervated by the auriculotemporal branch of V3 anteriorly and the auricular branch of the vagus nerve (Arnold's nerve) posteriorly (Fig. 56.7). Roughly 8–10 ml of 1% lidocaine with 1:100,000 epinephrine is injected in a field block fashion (Fig. 56.7).

Prior to local anesthetic infiltration and nerve blocks, the surgeon may decide to use methylene blue to tattoo the cartilage. It is recommended to do this prior to admission of local anesthetic because the volume of local anesthetic, especially via local infiltration, will distort the preoperative markings. Obviously, if the patient has chosen local anesthetic only, rather than sedation or general anesthesia, marking with methylene blue prior to anesthetizing the patient is not an option.

A 30-gauge needle (1/2″–3/4″) is passed from the external markings through the skin, cartilage, and posterior body of the ear. At this point, the needle is inserted into the tip of a

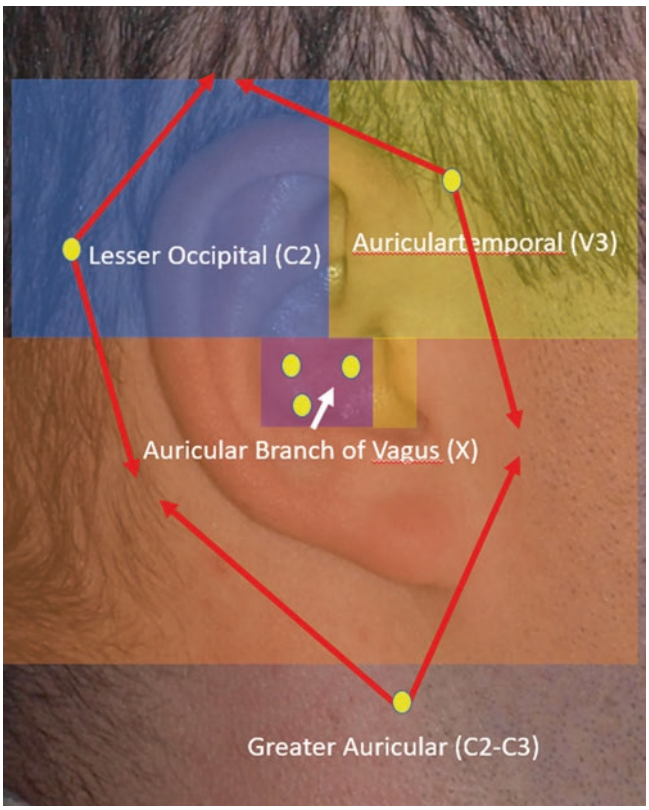


Fig. 56.7 Innervation to the external ear as well as location and direction of injections for otoplasty surgery

Fig. 56.8 Preoperative markings using methylene blue

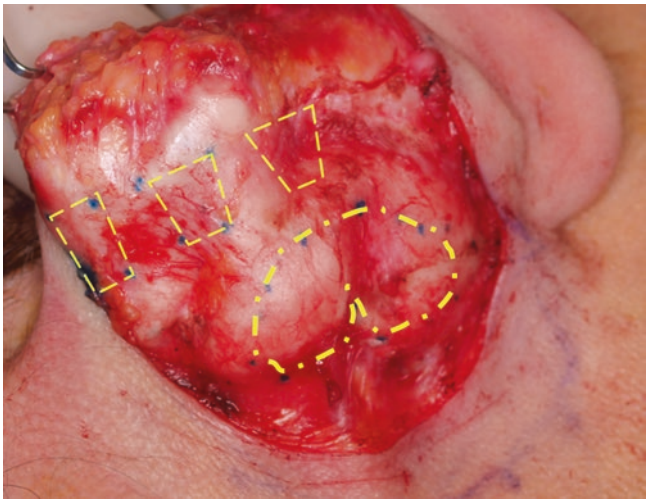


Fig. 56.9 Planned location of cartilage resection (kidney bean) in the conchal bowl and suture placement for antihelical fold creation

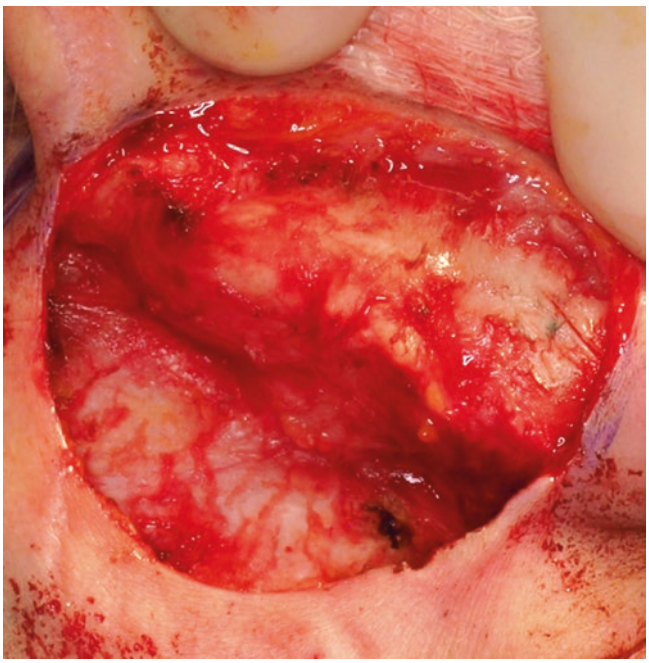


Fig. 56.10 After excision of soft tissue, the smooth and white mastoid fascia is exposed

1 ml syringe filled with methylene blue. The author recommends this technique rather than passing a pre-inked needle from the outer surface because the former is a much cleaner technique with less chance of smearing the markings and creating a messy field. Each of the trapezoidal dots is inked. It is important to pass the needle perpendicular through the skin. Next, the outline of the kidney bean-shaped markings is completed in identical fashion. The final markings should appear as in Fig. 56.8.

Next, using a scalpel blade or Ellman radiofrequency handpiece, the fusiform marking is excised. The incision is through the skin, subcutaneous tissue, and perichondrium. After it is removed, a subperichondrial dissection is completed to expose the tattoos indicating the marking for the Mustardé sutures and conchal bowl excision. Usually, the subperichondrial dissection is carried nearly the full distance to the helical cartilage. When the methylene blue tattoos are visualized, Mustardé sutures commence.

Mustardé sutures are utilized to create a crease in the cartilage in order to form a new antihelical fold. In younger patients where the cartilage is pliable, this is not usually a major challenge. In older patients, the cartilage tends to be firm and brittle. If this is the case, the cartilage may be scored or crushed in order to weaken the cartilage and facilitate sculpting. It is preferable to do the Mustardé sutures prior to excising the bowl because the ear will oftentimes be significantly deprojected after the antihelix is created. It is also often easier to manipulate the cartilage when the bowl is still attached.

Using 4-O Mersilene sutures, the needle is passed from posterior to anterior through the cartilage, being cognizant not to button hole the skin. The posterior markings are used first and then the needle is redirected through the anterior markings ensuring no subcutaneous tissue is tethered. The knot is tied in a vertical vector to promote the curvature along the long axis of the newly formed antihelical fold. Usually, two to three mattress sutures are placed (Fig. 56.9).

Once the antihelical fold is created, attention is turned to reducing the conchal bowl. The soft tissue posterior to the bowl must be excised to create what will essentially become the new floor of the conchal bowl. The tissue posterior to the bowl is removed down to the mastoid fascia. This will include the subcutaneous tissue, fat, and a portion of the posterior auricular muscle. The mastoid fascia must be thoroughly exposed and free from remnants of the superficial tissue (Fig. 56.10).

At this point, the floor of the conchal bowl is removed. Using the methylene blue marks, a full-thickness incision

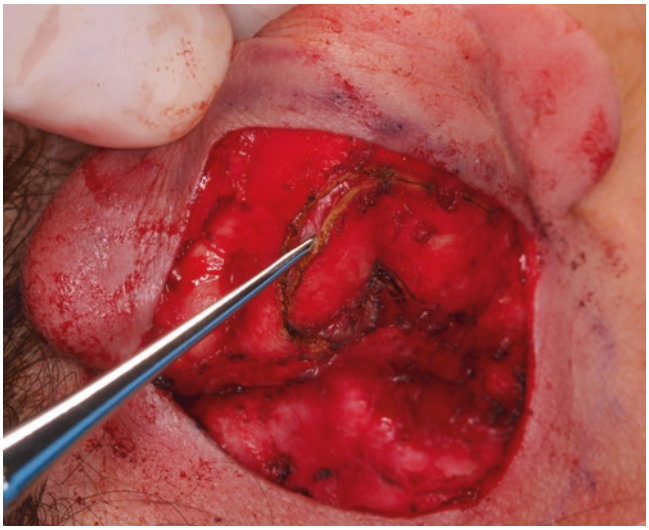


Fig. 56.11 Excision of the kidney shaped cartilage of the conchal bowl

is made through the cartilage, being mindful not to cut the overlying skin, with either a scalpel blade or an Ellman. The cartilage is then dissected from the overlying perichondrium and removed (Fig. 56.11). Hemostasis is obtained, and the ear is set in its final position. At this point, measurements are taken and compared to their preoperative counterparts. Occasionally, a small amount of residual cartilage from the deep portion of the crus of the helix may need to be removed.

After verification of final measurements, mattress sutures are placed with 4-O Mersilene at the superior, middle, and inferior aspects. The sutures are placed through the remaining cartilage and secured to the mastoid fascia. The author prefers to place at least three sutures. These are left untied until all are placed and individually tied under appropriate tension using a ruler or caliper to verify final position of the ear.

The incision is then closed with a running 5-O fast gut suture. Bolsters may be placed using dental cotton rolls or resorbable sutures through the bowl to the fascia to close dead space. The author rarely places bolster dressings. Xeroform gauze is paced in the newly formed bowl as well as in the sulcus. A dressing consisting of fluffs, Curlex, and Coban is then applied.

56.3 Postoperative Course

The patient is discharged with a 5–7-day course of antibiotics, a nonsteroidal anti-inflammatory medication, a small dose of narcotic analgesics, 3 days of postoperative steroids, and bacitracin ointment. The patient is seen the next day for follow-up. He or she is instructed to bring an athletic headband to the follow-up appointment. At the follow-up, the headwrap is removed and the surgical sites are inspected for hematomas and tissue integrity.

Patients are instructed to wear the athletic headband for 24 hours per day for the first two weeks. At that point, they are to wear the headband in the evening and while sleeping for an additional two weeks.

56.4 Postoperative Complications

Although uncommon with proper surgical technique, complications may ultimately arise. The surgeon should be adept at management and treatment.

Complication	Prevention	Treatment
Infection	Peri- and postoperative antibiotics	Incision and drainage, cultures, and sensitivities
Hematoma	Bolster dressing, Xeroform gauze, headwrap	Evacuation and hemostasis
Perichondritis/ perichondral hematoma	Hemostasis and pressure dressing	Evacuation, antibiotics
Wound dehiscence	Careful dissection, adequate approximation	Wound care, reapproximation (seldom required)
Tissue sloughing or necrosis	Judicious use of electrocautery	Topical vasodilators, hyperbaric oxygen, medicinal leeches, wound care
External auditory canal perforation	Careful dissection	Primary closure with gut suture
External auditory canal stenosis	Passive seating of ear prior to closure	Return to OR for revision

Additional complications may arise in terms of cosmetic deformities. An over-operated or poor surgical tech-

Fig. 56.12 Patient treated with bilateral otoplasties via Furnas sutures. Although the patient had a good cosmetic result initially, the ears relapsed 1 year postoperatively

nique can lead to an unnatural look. As mentioned earlier, a Mustardé suture technique is described as the placement of multiple horizontal mattress sutures in order to create a new (or defined) antihelical fold. A Davis technique is implemented to remove an excessively deep conchal bowl in order to decrease bowl height [4]. Furnas suturing technique is seldom utilized in practice as a sole modality. In this technique, the soft tissue of the conchal/mastoid region is excised down to the mastoid fascia. Furnas sutures (conchal-mastoid sutures) are placed to set back the bowl. Oftentimes, the bowl is not excised as with a Davis technique. Frequently, an unexcised conchal bowl is secured to the mastoid fascia under significant tension. It is highly unstable and often results in relapse (Fig. 56.12).

Other potential (and avoidable) complications include what is known as a telephone ear deformity. This is characterized by an overaggressive setback of the middle portion of the ear. In a telephone ear deformity, the superior portion of the helix and the lobule are significantly more lateral than the middle 1/3. In a reverse telephone ear deformity, the middle 1/3 of the ear projects more laterally than superior and inferior thirds. Overaggressive Mustardé sutures will result in the antihelix positioned more lateral than the antihelix from the frontal view. Ideally, the helix should project 2–3 mm more lateral than the antihelix in the frontal view.

56.5 Case Presentation

A healthy, 24-year-old male presents with a chief complaint: "My ears stick out too far." His preoperative exam is unremarkable for hearing loss, tinnitus, tympanic membrane perforation, and canal stenosis. His preoperative measurements and exam are as follows:

- External ear-specific exam.

Right superior: 15 mm	Left superior: 20 mm
Right middle: 25 mm	Left middle: 30 mm
Right inferior: 22 mm	Left inferior: 27 mm
Right Conchal bowl depth: 12 mm	Left Conchal bowl depth: 18 mm

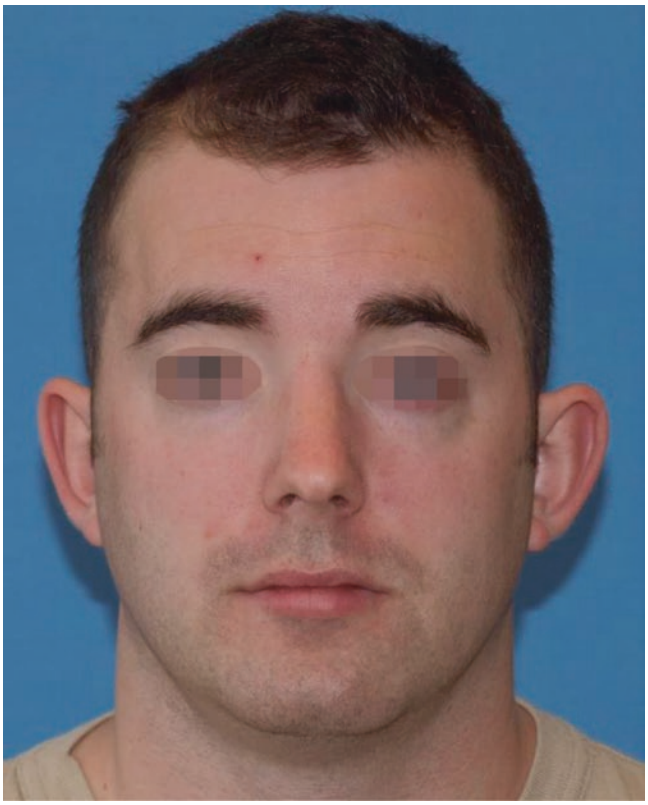
- Lack of antihelical fold definition bilaterally with the left less defined than the right.

Diagnosis: bilateral excessive otic projection secondary to excessive conchal bowl depth and lack of antihelical folds.

Procedure: Bilateral otoplasties with Mustardé sutures to reconstruct antihelical folds, Davis technique for conchal bowl reduction bilaterally.

Pre-op photos showing bilateral excessive otic projection secondary to excessive conchal bowl depth and lack of antihelical folds.

Postoperative photos



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