Chapter 111 – Congenital and Acquired Atresia of the External Auditory Canal

Elizabeth H. Toh,
Barry E. Hirsch

Atresia of the external auditory canal may be congenital or acquired (Figs. 111-1 and 111-2). Congenital atresia is much more common, with a reported incidence of 1 in 10,000 to 20,000 births, and is often associated with deformities of the auricle and middle ear. Congenital atresia results from developmental abnormalities in the first and second branchial arches during the first trimester of fetal life. Although the vast majority of these defects are sporadic, 10% occur as part of a syndromic abnormality. Acquired atresia of the external auditory canal is unusual and may occur secondary to trauma, chronic inflammation, radiation therapy, or iatrogenic injury after surgery. Other terminology used to describe this acquired condition includes postinflammatory acquired atresia of the external auditory canal, postinflammatory medial canal fibrosis, and chronic stenosing external otitis.[1–3]

Congenital atresia occurs more commonly in males than females and is most often unilateral, with the right ear affected more often than the left. The atresia is more frequently bony than membranous. Associated anomalies of the inner ear occur in less than 20% of patients, so most atresia cases are amenable to surgical correction. The pinna is rarely completely normal or totally absent (anotia). At minimum, there are usually cartilaginous or soft tissue remnants from faulty embryologic development. Mild deformity or microtia is common (Fig. 111-3). In general, the appearance of the external ear correlates well with development of the middle ear.[4]

Because of anomalous development of the first and second branchial arches, anatomic anomalies of the facial nerve are generally present. Middle ear abnormalities such as fixation of the malleus, fusion of the malleus-incus complex, fixation of the stapes footplate, anomalous position of the chorda tympani, and a persistent stapedial artery have also been described. Inner ear dysplasia may involve the cochlea, the vestibule, the semicircular canals, and the internal auditory canal.

Congenital atresia of the external auditory canal has been seen in association with hydrocephalus, posterior cranial hypoplasia, hemifacial microsomia, cleft palate, and genitourinary anomalies. Syndromes in which congenital atresia has been described include Treacher Collins, Goldenhar, trisomy 22, Klippel-Feil, cleidocranial dysplasia, Fanconi, Crouzon's, DiGeorge, and thalidomide toxicity.

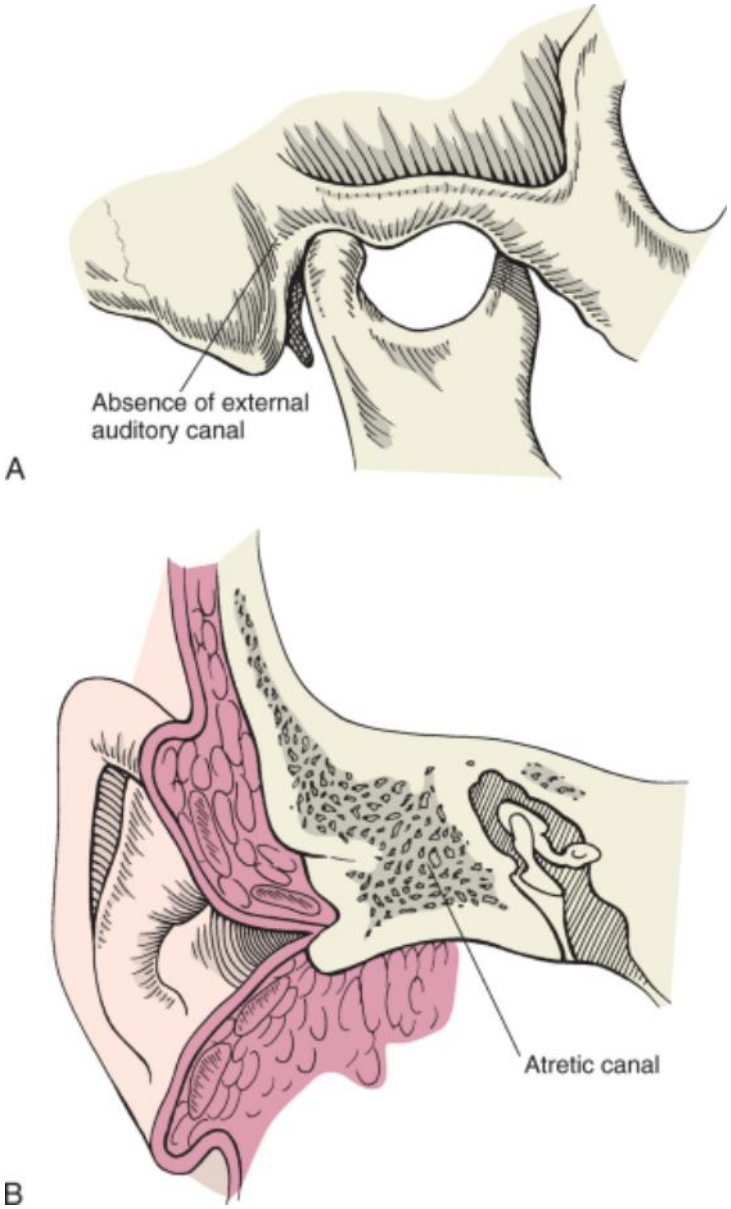

Figure 111-1 Lateral (**A**) and coronal (**B**) views of the temporal bone in a patient with congenital aural atresia.

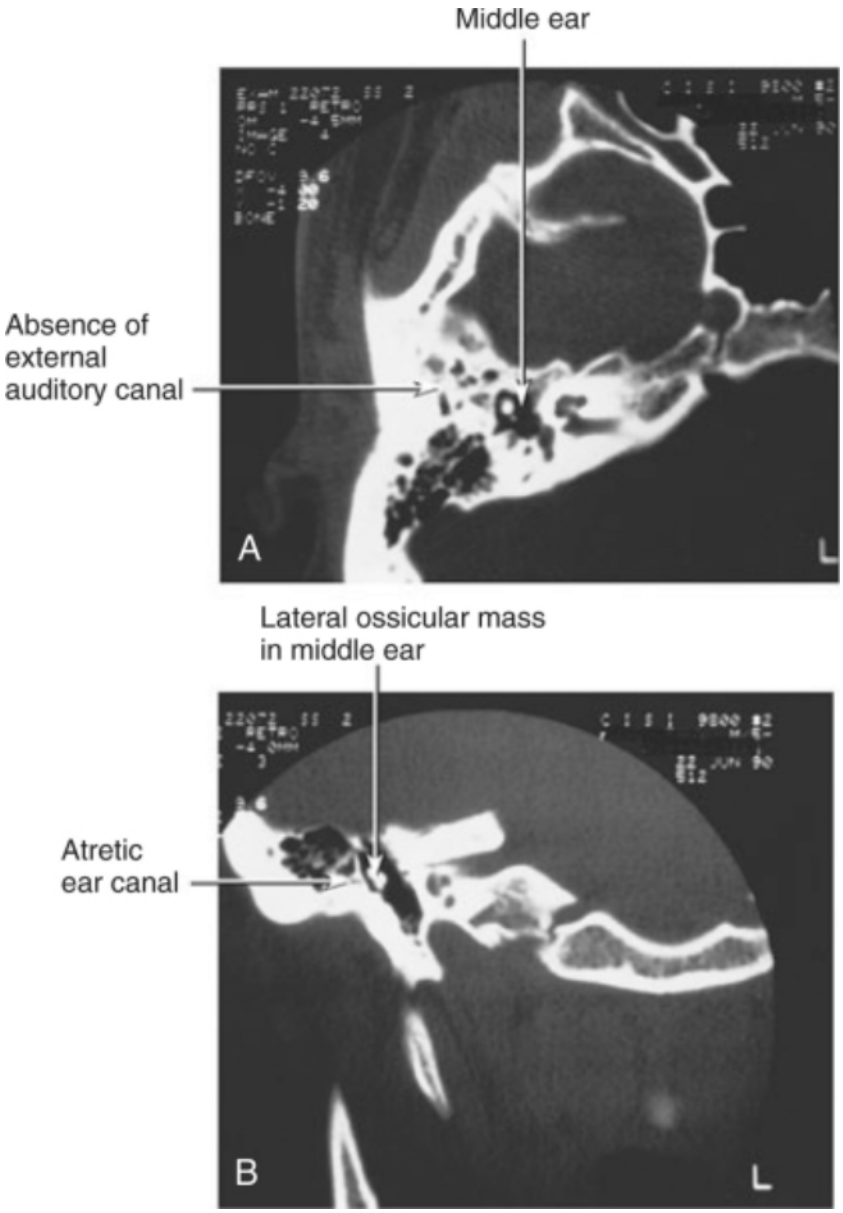

Figure 111-2 Computed tomography scans of aural atresia in the axial (**A**) and coronal (**B**) planes.

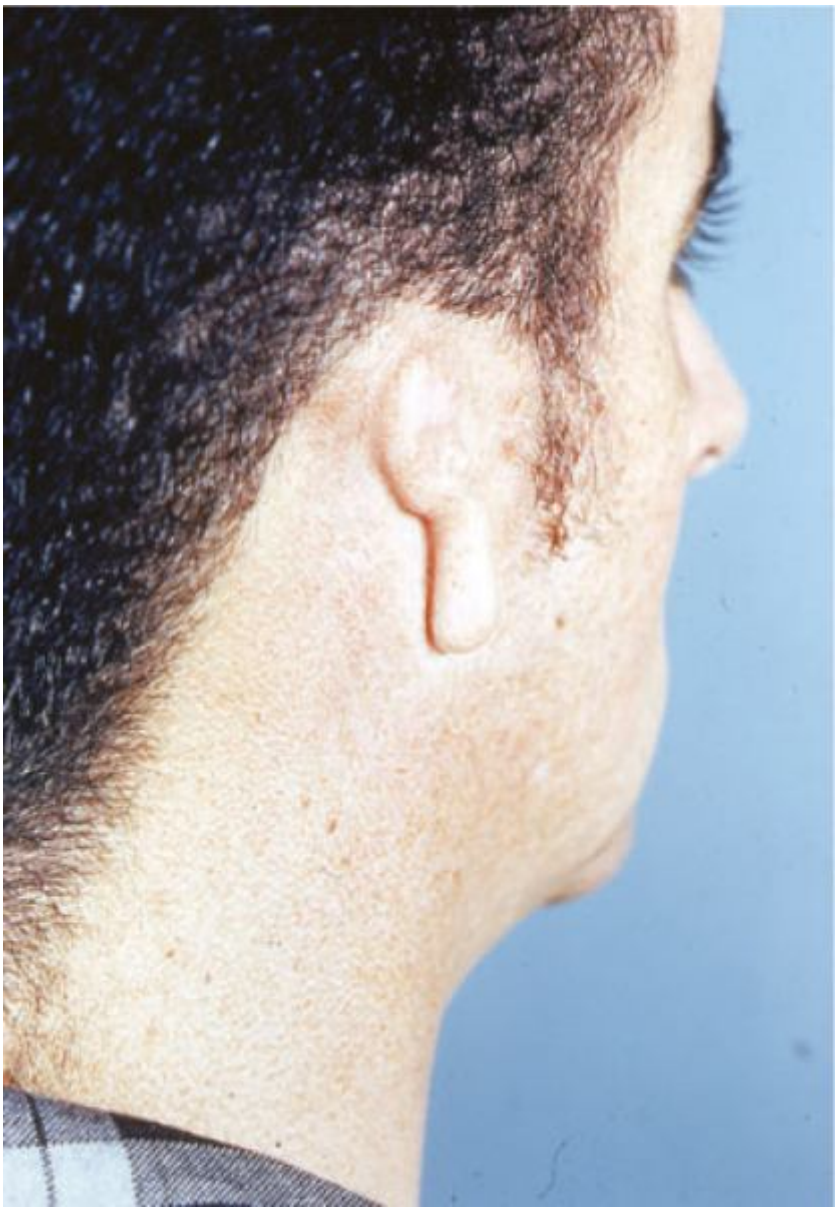

Figure 111-3 Typical appearance of microtia associated with aural atresia.

PATIENT SELECTION

Congenital Atresia

The goals of reconstruction of atresia of the ear include provision of functional hearing and creation of a dry and patent external auditory canal. In 1992, Jahrsdoerfer and associates devised a grading scale using preoperative computed tomography (CT) scans to evaluate a child's candidacy for correction of atresia.[5] These authors assigned one point for each of eight factors detected on CT imaging (Table 111-1), plus two points if the stapes was normal. A perfect score of 10 yields an excellent prognosis for hearing improvement to within a 15 to 20 dB speech reception threshold, and the converse would hold true for a diminishing number of normal structures identified on CT imaging. The prognosis for hearing improvement is expressed as a percentage relative to the assigned CT score. A zero added to each score indicates the percent chance of achieving closure within 15 to 20 dB. Surgery is not usually recommended when the score is 5 or less. When applying the results of this evaluation, surgeons must also consider their own experience, as well as other potential problems with the child's general health and otologic status.

Table 111-1 -- GRADING SYSTEM TO DETERMINE CANDIDACY FOR SURGICAL CORRECTION OF CONGENITAL AURAL ATRESIA

Parameter	Points
Stapes present	2

Parameter	Points
Oval window open	1
Middle ear space	1
Facial nerve	1
Malleus-incus complex	1
Mastoid pneumatized	1
Incus-stapes connection	1
Round window	1
Appearance of the external ear	1
Total available points	10

In the great majority of patients with congenital atresia, reconstruction of the pinna must also be planned and timed appropriately along with the atresia repair. Surgical reconstruction of the pinna should be completed or at least initiated before atresia repair to take advantage of the uncompromised blood supply in the temporal area. Reconstruction of the pinna is a complex and often multistage procedure that may be performed with rib cartilage or synthetic material. The use of rib and rib cartilage for reconstruction of the pinna results in an external ear that is more resistant to trauma, infection, and extrusion. However, synthetic Silastic or porous polyethylene material may result in a cosmetically superior pinna. Regardless of the method of reconstruction, the otologist must ensure that the atresia surgery does not jeopardize the circulation of the auricular reconstruction.

Correction of the atresia at or after the age of 5 years allows optimal development of the mastoid process, adequate time for initiating repair of the microtia, and maturity of the child to participate in postoperative care. When corrective surgery for unilateral atresia is delayed past early childhood, cosmetic correction of the microtia can and should be accomplished in the usual manner. A 4- to 6-month interval between microtia and atresia repair is generally recommended. The presence of cholesteatoma in the atretic canal may be identified by bone erosion on preoperative CT and may dictate the need for earlier surgery.

Acquired Atresia

The most common form of acquired canal atresia involves soft tissue obliteration of the external auditory canal only. The intervening segment between the patent canal laterally and the tympanic membrane usually consists of fibrous tissue. Chronic otitis externa and chronic suppurative otitis media are the most common inciting causes. Acquired atresia may develop after severe trauma to the temporal bone with fracture of the anterior or posterior canal walls. Inflammation, such as severe seborrheic dermatitis and other dermatologic conditions, may result in severe scarring and obliteration of the soft tissues of the external canal over time. Acquired atresia may also occur after burns and may represent the midcanal or medial canal type of fibrosis after tympanomastoid surgery. The final common pathway in the development of an atretic canal is an exuberant fibroproliferative inflammatory response, which typically occurs over the course of years.

In the early inflammatory phase of the disease, conservative medical management with aggressive aural toilet and the application of steroid-containing ototopical antibiotics plays some role in controlling any underlying infection and minimizing the development of granulation tissue. Once mature fibrosis of the canal has developed, the ear is generally dry and hearing loss remains the only functional concern. Because the goal of surgery is hearing improvement when the acquired atresia is unilateral, as is usually the case, the option for amplification should be offered to the patient. Dermatologic disease processes must be made quiescent before surgical repair is attempted. Active seborrheic dermatitis with scaling and exudation does not provide a good environment for surgical repair and reconstruction. When thickened skin obstructs the external meatus and there is no evidence of further active disease after the formation of pachyderma, reconstruction is a plausible approach for hearing improvement. Aural rehabilitation with a bone-anchored hearing aid (BAHA) may be offered to select patients who do not elect to undergo atresia repair and are unable to use a conventional hearing aid in the affected ear because of auditory feedback or fitting problems. Candidates for BAHA use must have an underlying cochlear reserve of at least 40 dB in the better-hearing ear.

PREOPERATIVE EVALUATION

Congenital Atresia

When first evaluating a child with congenital atresia of the external auditory canal, the physician must obtain a comprehensive history and perform a physical examination to determine whether the atresia is an isolated finding or part of a syndromic or hereditary problem. When the latter appears to be the case, genetic counseling may be indicated for future family planning.

The educational needs and philosophy of atresia repair must be considered. Because the great majority of

affected children have unilateral atresia, it must be determined whether hearing is normal in the opposite ear. Sensorineural hearing loss is occasionally identified in the nonatretic ear and must be investigated further. When hearing in the nonatretic ear is normal, the option for conservative management should be weighed against the risks associated with surgery. Speech and language acquisition can be ensured in these children, even if surgery is delayed until they reach their teens or if a decision is made to not proceed with surgery. The presence of atresia at birth will almost certainly ensure that audiometric testing is performed early in childhood. In very young children, auditory brain stem response (ABR) measurements can easily approximate auditory threshold levels. By the age of 4 or 5 years, behavioral audiometric testing can be performed. Reliable responses typically demonstrate maximal conductive hearing loss with normal cochlear reserve. It used to be recommended that surgery for unilateral atresia be postponed until a child had reached the age of self determination. With advances in CT, intraoperative facial nerve monitoring, and greater surgical experience, these guidelines are less rigid. Elective surgery is now performed on unilateral atresia when the parents have been carefully counseled and strongly desire it.

A child with bilateral atresia will undergo the same audiologic evaluation as previously described but requires careful and expert evaluation with bone conduction ABR testing. In these cases, the “near-field” effect of the generator site ensures a larger wave I on the ipsilateral side. Immediate amplification with bone conduction hearing aids is well accepted by small children and will ensure normal speech acquisition and language development until the child is old enough for surgery. It is generally agreed that children with bilateral atresia should undergo surgical repair in one ear by the age of 5 years for the reasons indicated earlier. The higher-graded ear is generally operated on first.

Evaluation of a patient with aural atresia must include high-resolution, thin-cut CT in both the axial and coronal planes. Newer spiral CT machines offer the ability to generate high-quality reconstructed coronal images from the axial sequences obtained, thus reducing the overall dose of radiation delivered. These views permit thorough evaluation of the degree of mastoid and middle ear pneumatization, inner ear morphology, facial nerve anatomy, and ossicular abnormalities. Inner ear dysplasia, such as Mondini's malformation or a large vestibular aqueduct, increases the risk for sensorineural hearing impairment with surgery, which must be discussed with the parents. Review of the CT scans will also inform the surgeon of the presence of canal cholesteatoma, as suggested by an expansile soft tissue density with adjacent bony erosion.

A word is necessary regarding BAHAs in the treatment of congenital atresia. They are not generally advised if repair of microtia is being considered because the surgery necessary for their implantation jeopardizes the blood supply necessary for cosmetic reconstruction of the pinna. In addition, children with favorable results on the CT rating scale have an excellent chance of achieving reasonable hearing. Even when children attain speech reception thresholds that are slightly worse than normal, they will benefit from using in-canal hearing aids once atresia surgery has been performed. BAHAs remain a rehabilitative recommendation for children in whom imaging suggests a poor prognosis for successful hearing improvement and in those who elect to not undergo surgery. The recommended lower age limit for implantation of a BAHA device is currently 5 years.

Acquired Atresia

Because the primary goal of surgery for acquired atresia is improvement in hearing, preoperative audiologic testing will help confirm the nature and extent of loss in the affected ear. The fibrous plug alone will often result in a 25- to 30-dB conductive hearing loss. The patient should be counseled that any additional underlying sensorineural hearing loss would probably necessitate the use of a conventional hearing aid in the operated ear once the ear canal has healed.

Preoperative high-resolution CT imaging of the temporal bone in the axial and coronal planes is helpful in differentiating bony from soft tissue atresia, detecting the presence of underlying cholesteatoma, and assessing the status of the middle ear and ossicular chain.

SURGICAL APPROACHES

Congenital Atresia

Surgical correction should not be attempted before the pinna has been reconstructed and correctly placed in relation to the anticipated location of the external canal. This can easily be determined by palpating the mastoid tip and temporomandibular joint to ensure that the proposed meatus will be properly located just behind the condyle of the mandible. The preoperative CT scan is reviewed again and particular attention is paid to the intratemporal course of the facial nerve, level of the tegmen, and depth of the middle ear cavity from the surface of the skull. Intraoperative facial nerve monitoring should be performed in all cases.

A standard postauricular C-shaped incision is made after infiltration with a solution of 1% lidocaine with 1:100,000 epinephrine. Every attempt is made to preserve all circulation to the auricle originating from the anterior, inferior, and superior aspects (Fig. 111-4), which may occasionally require placement of the incision further posteriorly than

would ordinarily be done for routine mastoid surgery. The mastoid periosteum is incised and the soft tissue overlying the mastoid is then elevated anteriorly until the glenoid fossa is well identified (Fig. 111-5). A temporalis fascial graft is harvested, thinned, and dried for construction of a new tympanic membrane. The external canal should be created just behind the glenoid fossa and just inferior to the temporal line (Fig. 111-6). The temporal bone sometimes has a small depression or cribriform area that marks the location of the undeveloped external auditory canal. In other cases, a soft tissue plug is present that may be followed directly into the atretic plate or the tympanic membrane. When external canal landmarks are absent, drilling should begin as close to the glenoid fossa and middle fossa dural plate as possible. In doing so, bone must be preserved between the glenoid fossa and what is to become the anterior canal wall. By following the middle fossa dural plate medially, the atretic plate will generally be encountered at a depth of approximately 1.5 cm. Unlike routine mastoid surgery, drilling should be confined to a relatively small circumference to avoid the creation of a mastoid cavity. Mastoid air cells may be encountered, but they should be minimally exposed if the drilling is confined to the location of the atretic canal. The diameter of the external auditory canal that is being created should be only 1.5 times larger than normal (about 1.3 cm in diameter).

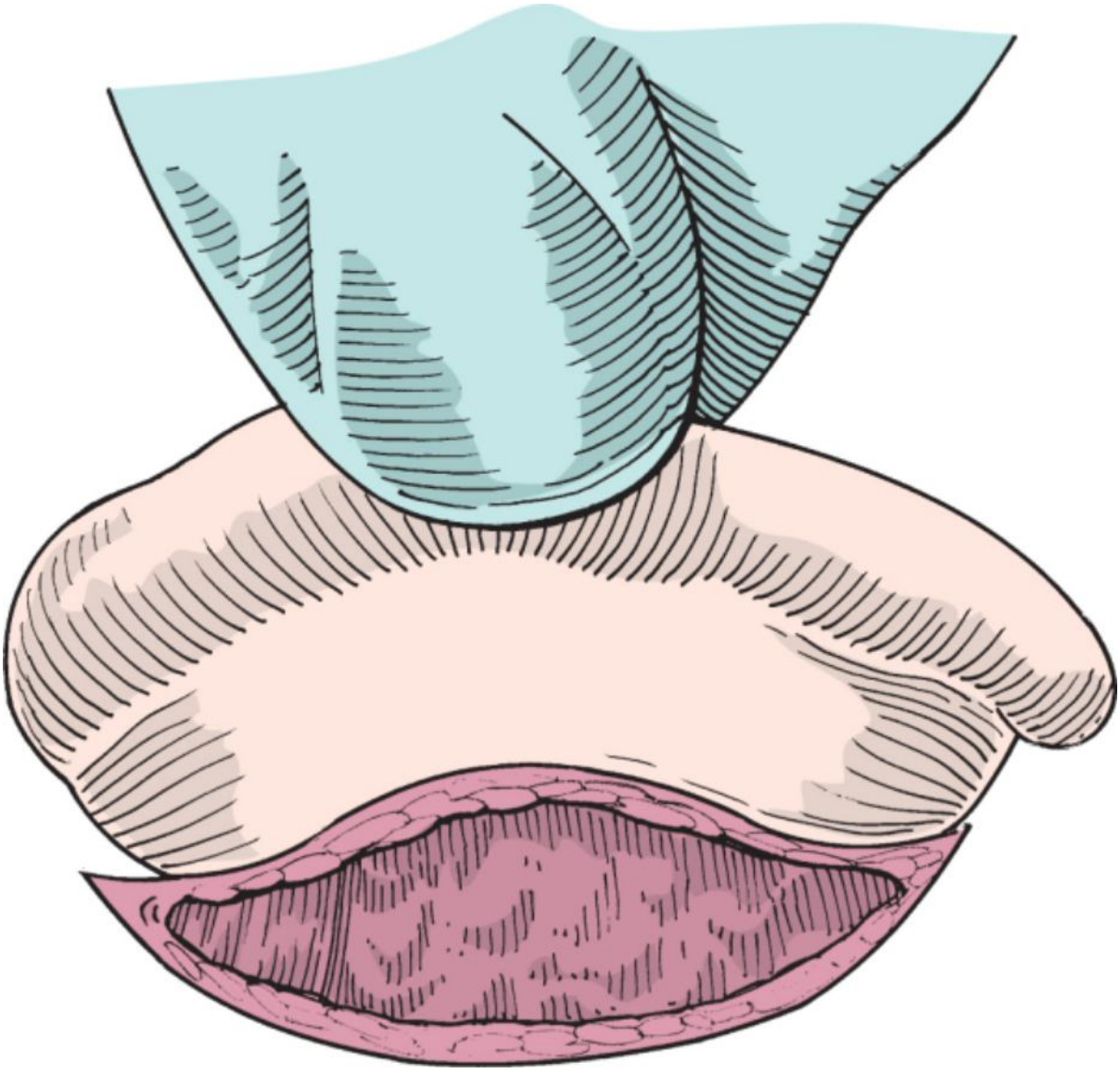

Figure 111-4 Postauricular incision with an attempt to maintain the blood supply to the pinna.

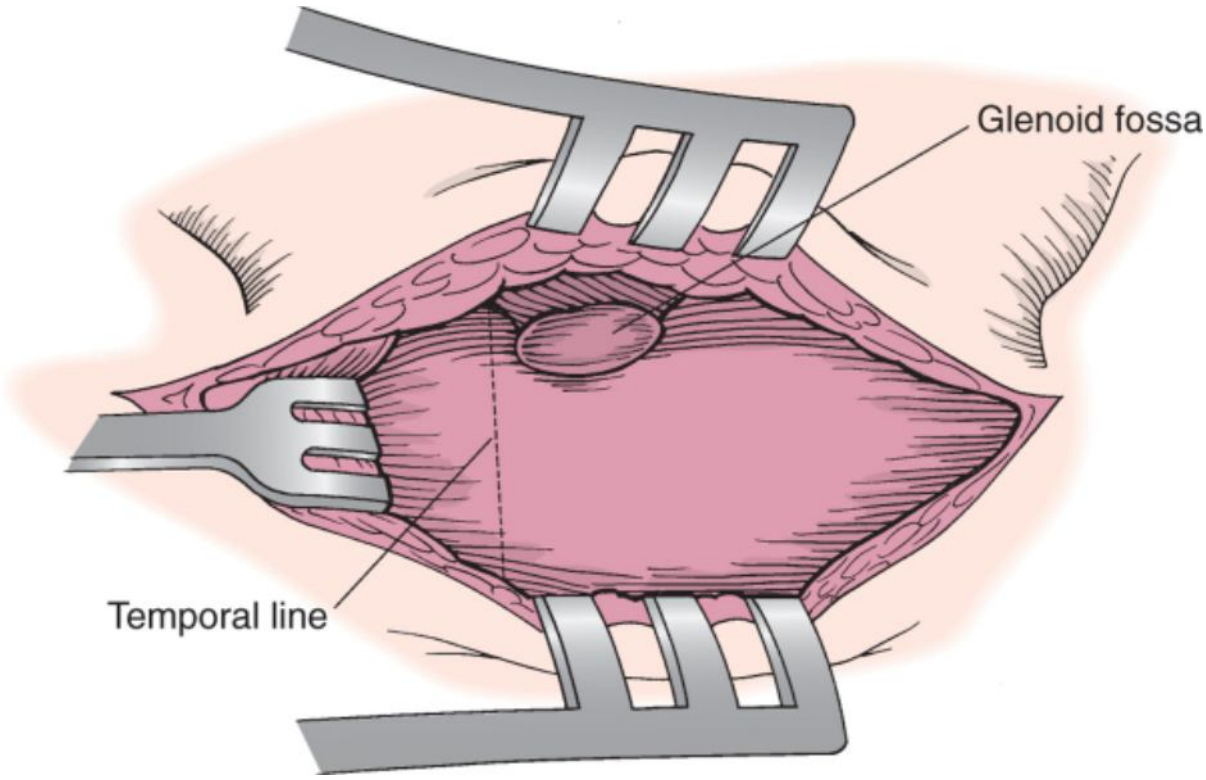

Figure 111-5 Identification of the glenoid fossa (right ear).

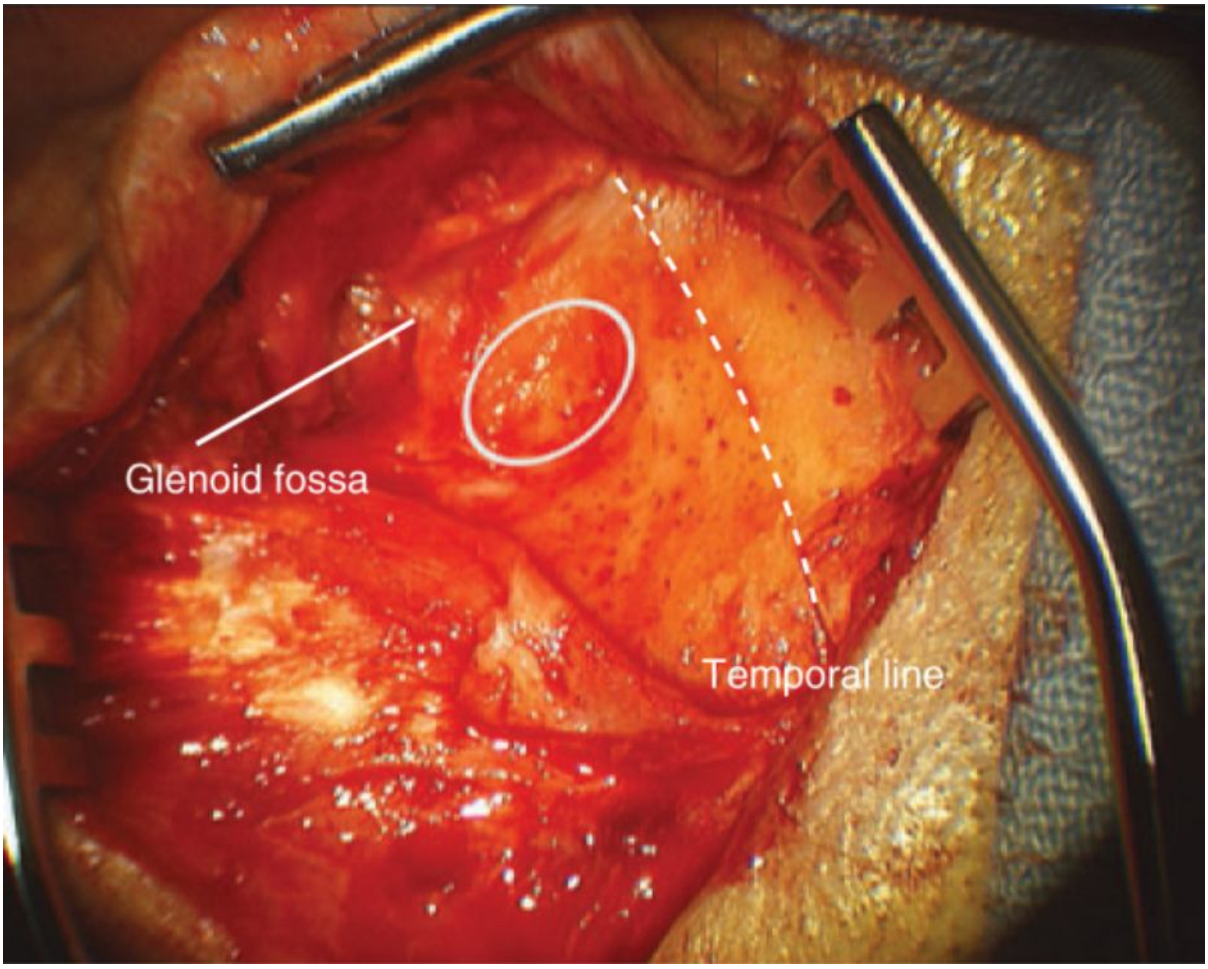

Figure 111-6 Creation of an external meatus just inferior to the tegmen and just posterior to the glenoid fossa (left ear).

Although intraoperative monitoring helps the surgeon minimize trauma to the facial nerve, the general location of this structure should be carefully reviewed on the CT scan preoperatively. In the great majority of cases, the horizontal portion and the second genu of the facial nerve will be in relatively normal positions. The most common anomaly is an anterior and sometimes lateral deviation of the vertical trunk of the facial nerve (Fig. 111-7), which occurs in up to 25% of cases. The nerve may traverse the promontory, round window, or hypotympanum, or it may be inferior to the tympanic annulus, if present. In this situation the surgeon will generally encounter the atretic plate without exposing the nerve, assuming that drilling has been confined to the area described earlier. When soft tissue is initially encountered, drilling should be performed with diamond burrs from that point on. The atretic plate is then thinned until the bone is paper-thin and can be gently lifted away from the fibrous remnants of the tympanic membrane and ossicular chain with angled picks or elevators (Fig. 111-8). Trauma to the ossicular chain must be avoided during drilling to prevent sensorineural hearing loss. The most common ossicular abnormality is a fused malleus-incus complex. Incudostapedial connection by means of a fibrous strand or stapedial arch discontinuity is sometimes found. Footplate fixation occasionally occurs as well. When necessary, ossiculoplasty is performed as it would be during tympanoplasty with bony or cartilaginous autografts or various PORPs (partial ossicular replacement prostheses) and TORPs (total ossicular replacement prostheses). Separation of the incudomalleal complex is generally unnecessary because it is usually mobile. Occasionally, the malleus neck is fixed to the atretic plate by means of a bony spur, in which case it must be separated and mobilized. In rare cases, the ossicular chain may be fixed at more than one location, and complete mobilization of the chain is necessary to ensure optimal postoperative hearing results. The use of an argon laser for lysis of soft tissue adhesions and bony attachments during this portion of the procedure will help minimize the risk of sensorineural hearing loss from excessive manipulation of the ossicular chain.[6]

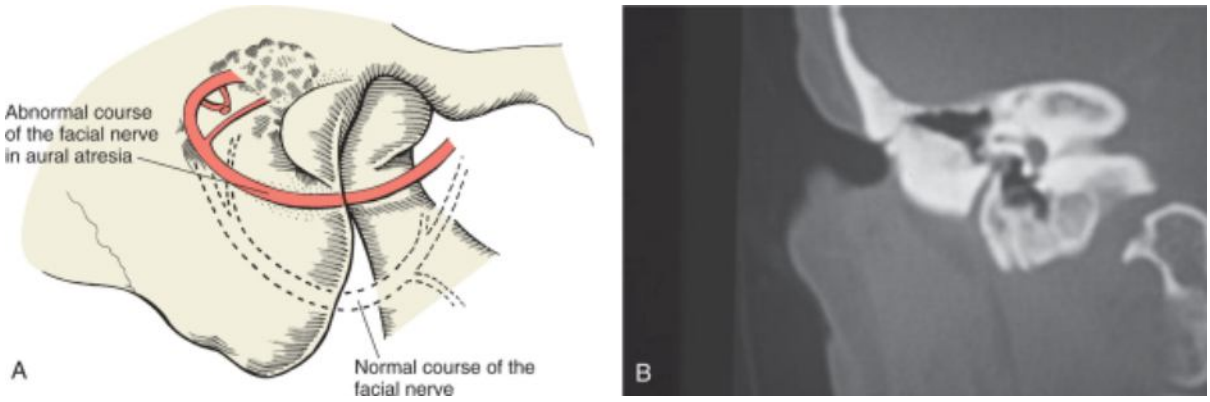

Figure 111-7 **A,** Normal course of the facial nerve and the course usually seen in atresia. **B,** Coronal computed tomography scan showing anterior displacement of the mastoid segment of the facial nerve.

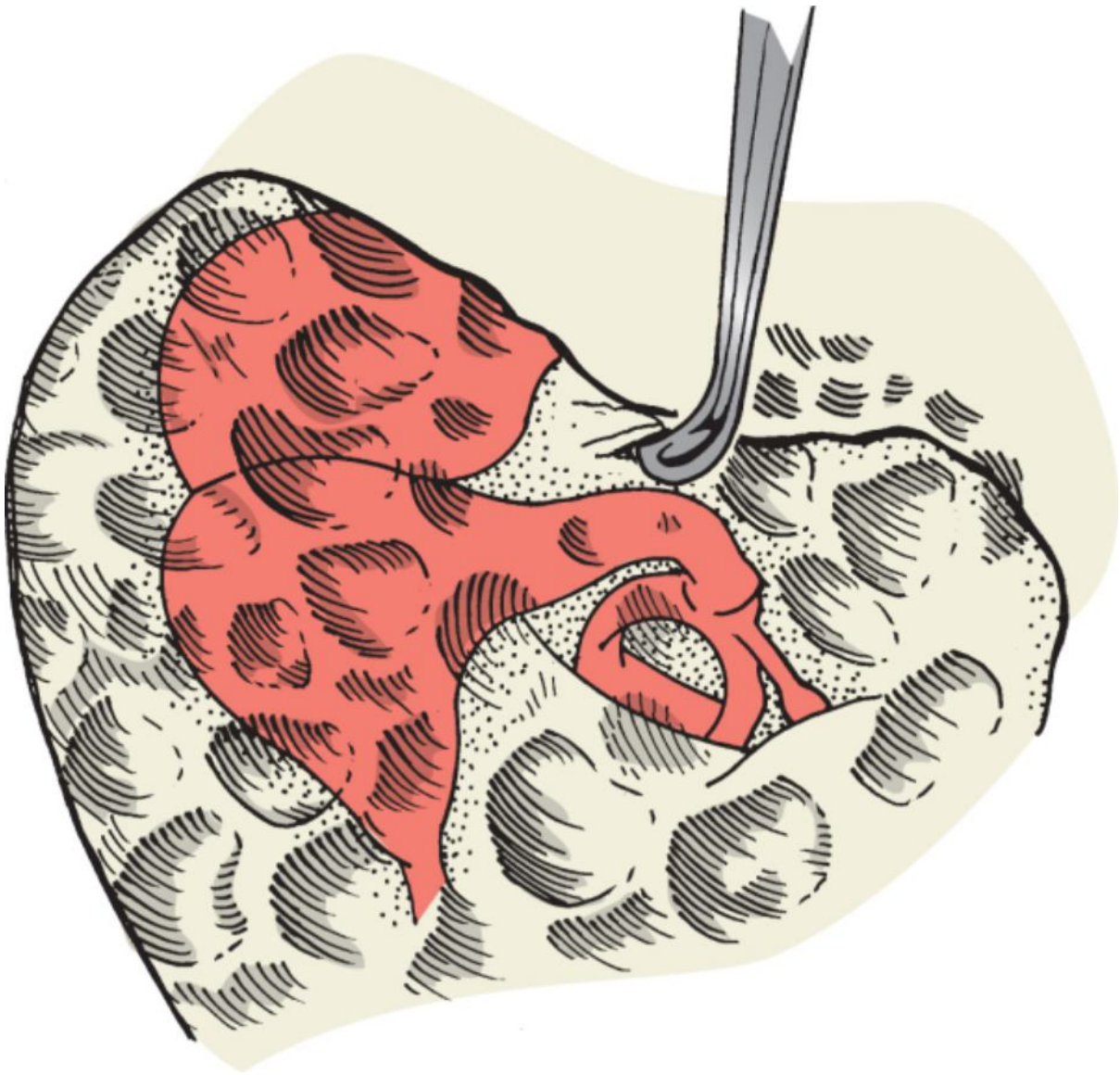

Figure 111-8 Curetting away the remnants of the bony atresia plate overlying the lateral ossicular chain.

After ossiculoplasty, a 1.5-mm diamond burr is used to create a bony annulus and sulcus on which to place the fascial graft used for creating the new tympanic membrane. Anteriorly, this minimizes blunting of the anterior meatal angle. Thorough irrigation of the newly created ear canal and middle ear space is critical at this point to prevent postoperative bony refixation of the ossicular chain. If a PORP or TORP has been used for ossiculoplasty, irrigation should be performed before placement of the prosthesis. The fascial graft is then centered over the ossicular mass to optimize hearing results (Fig. 111-9). The fascia is extended for 1 to 2 mm onto the newly developed bony annulus, and when possible, a small extension of the fascial graft may be placed into the hypotympanum or protympanum to prevent lateralization of the new tympanic membrane. Any air cells uncovered in the process of drilling the new canalare obliterated with connective tissue plugs to prevent iatrogenic cholesteatoma resulting from ingrowth of skin into the mastoid cavity.

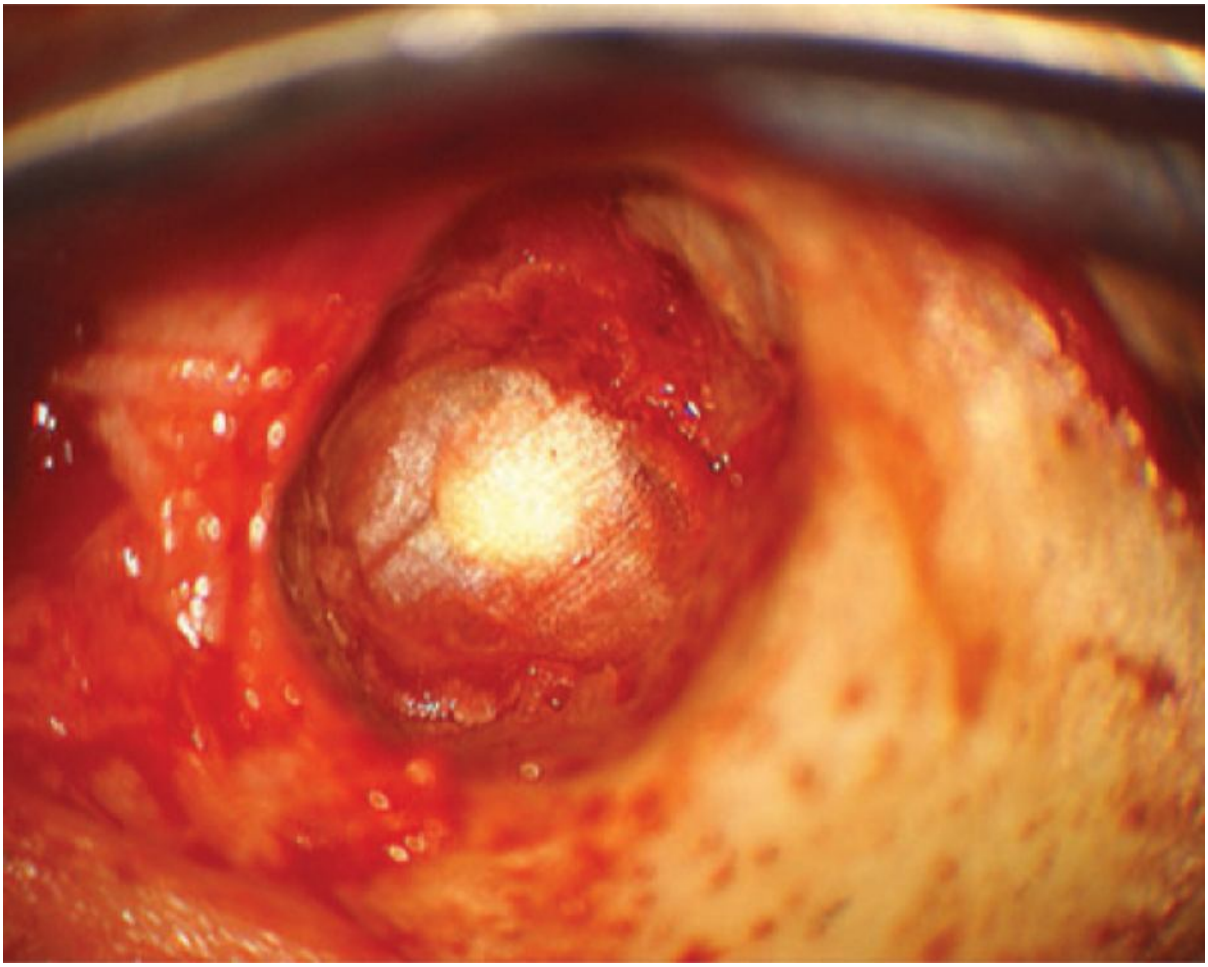

Figure 111-9 The fascial graft is placed over the ossicular mass and placed into the bony annulus and canal.

A split-thickness skin graft 0.008- to 0.010-inch thick and approximately 2 × 3 inches in dimension is harvested from one of several donor sites, including the medial surface of the upper part of the arm, the superior lateral quadrant of the buttocks, or lower part of the abdomen. A thinner graft is less likely to curl at the edges and will reduce the rate of postoperative canal stenosis. The circumference of the tympanic membrane, the length of the canal, and the circumference of the external meatus are measured with a length of suture material. The skin graft is then cut to the appropriate size with these measurements (Fig. 111-10). The external meatus must be created by excising conchal skin and any underlying rib graft or prosthesis when they are present in this area. The meatal opening should overlie the newly created canal and should admit the surgeon's thumb to compensate for postoperative contracture (Fig. 111-11).

Figure 111-10 Split-thickness skin graft trimmed to measured dimensions and contoured along its medial border to allow placement over the fascial graft.

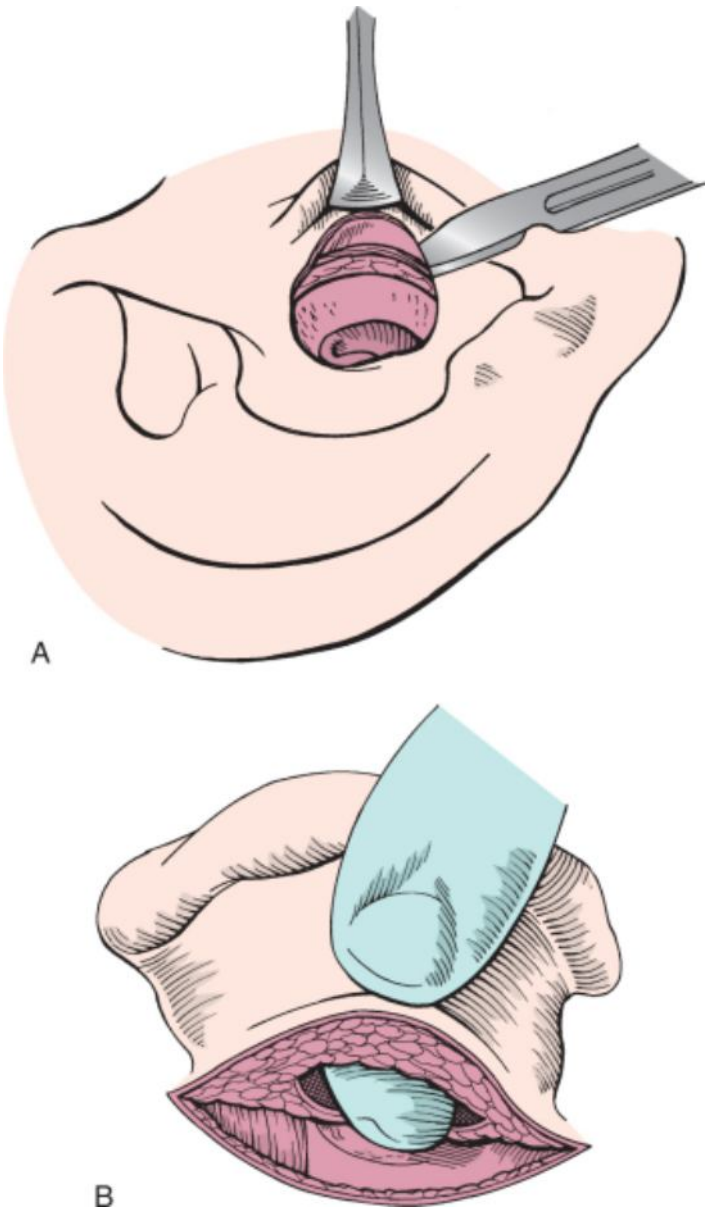

Figure 111-11 **A,** Creation of the meatus in the pinna. **B,** Ensuring adequate diameter of the meatus to make allowance for shrinkage.

The previously measured skin graft is then placed epithelial side down onto a Silastic sheeting template that is 0.04 inch thick. Bacitracin ointment is spread onto the Silastic sheeting to enhance adherence of the skin graft. The Silastic template is cut to the same size as the overlying skin. The Silastic is curled and placed in the canal, where it then unfurls and holds the graft against the canal wall. The medial edges of the skin graft are extended 1 mm over the fascial graft (Fig. 111-12). An additional disc of Silastic marginally smaller than the diameter of the newly created canal may be placed against the tympanic membrane to discourage blunting of the new tympanic membrane (Fig. 111-13). The lateral edges of the skin graft are sutured to the meatus with 4-0 chromic suture (Fig. 111-14). Packing is then placed in the canal and consists of a single large Merocel wick, which once positioned in the newly created canal is hydrated with an ototopical solution to hold the skin graft in place. Alternatively, silk strips may be layered in the canal and the canal packed with Merocel sponges soaked with an ototopical solution (Fig. 111-15). The postauricular incision is then closed in the usual fashion with 4-0 Vicryl or Dexon, and a soft mastoid dressing is applied.

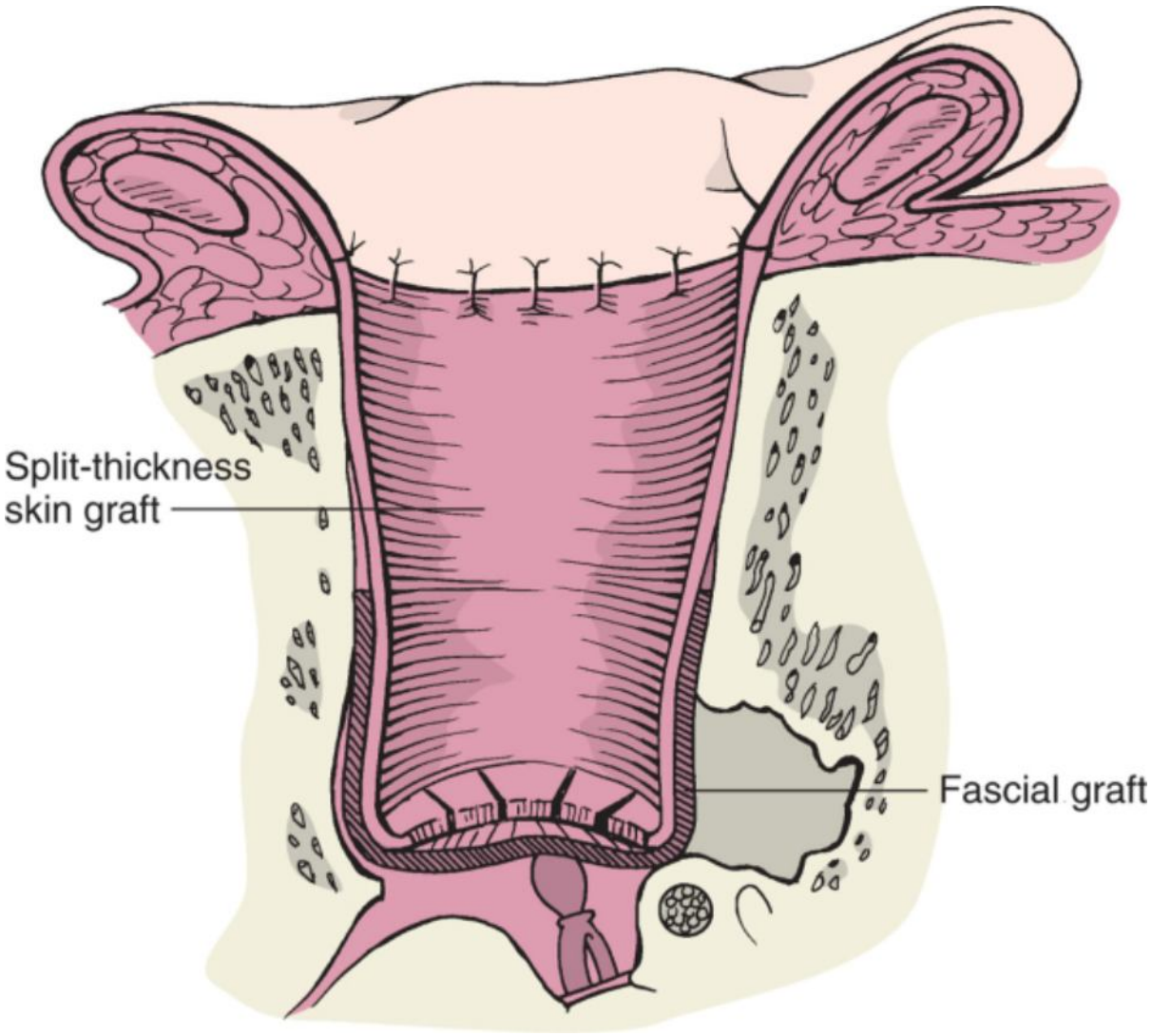

Figure 111-12 The split-thickness skin graft is placed with its medial border overlapping the fascial graft by 1 mm.

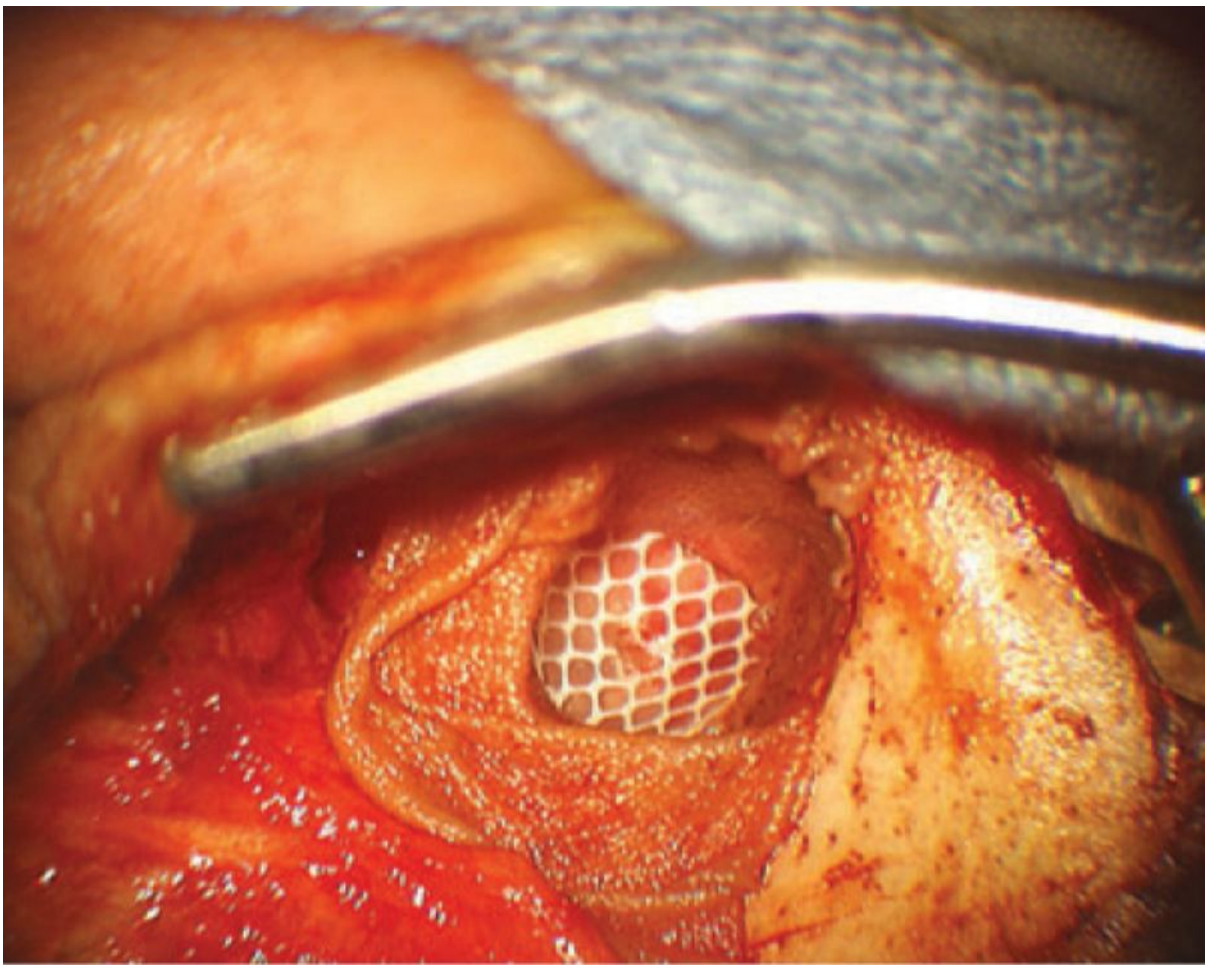

Figure 111-13 A reinforced Silastic disc is placed over the fascial graft after the split-thickness skin graft has been placed.

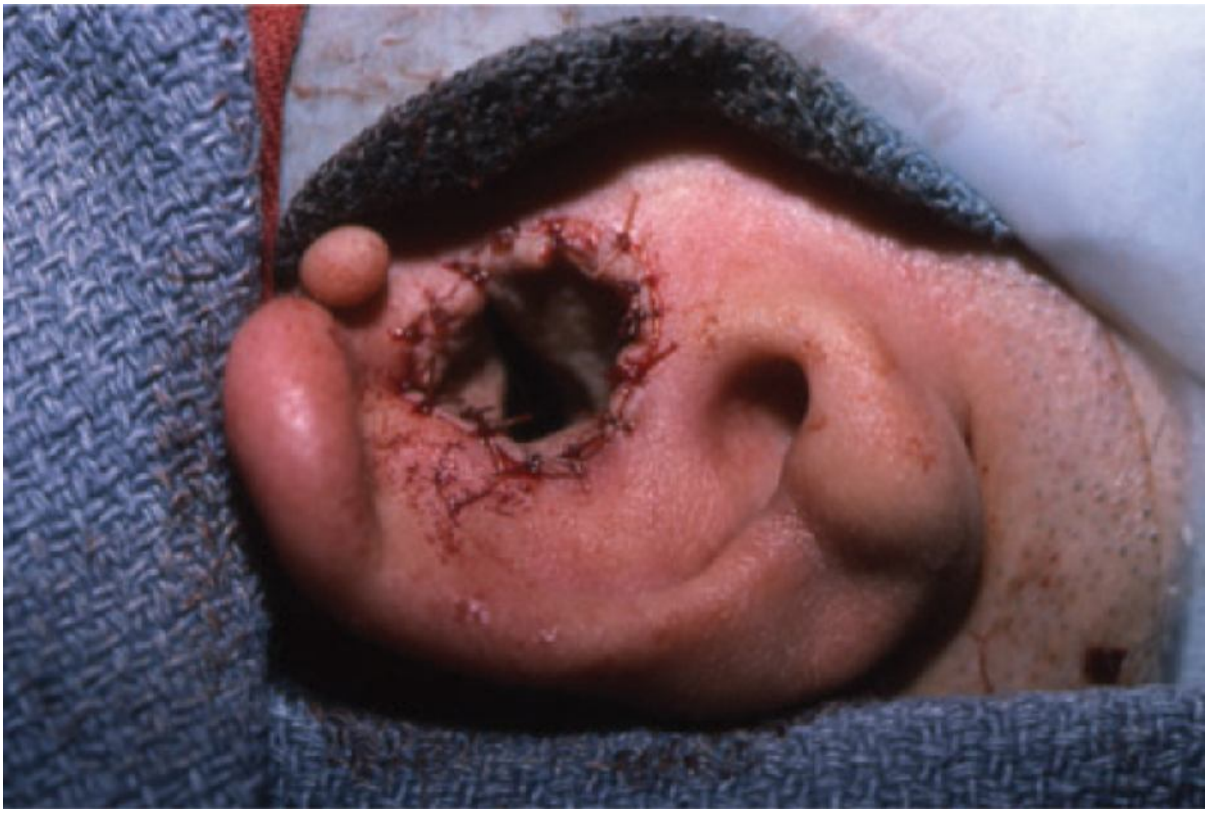

Figure 111-14 The lateral border of the split-thickness skin graft is sutured to the external meatus.

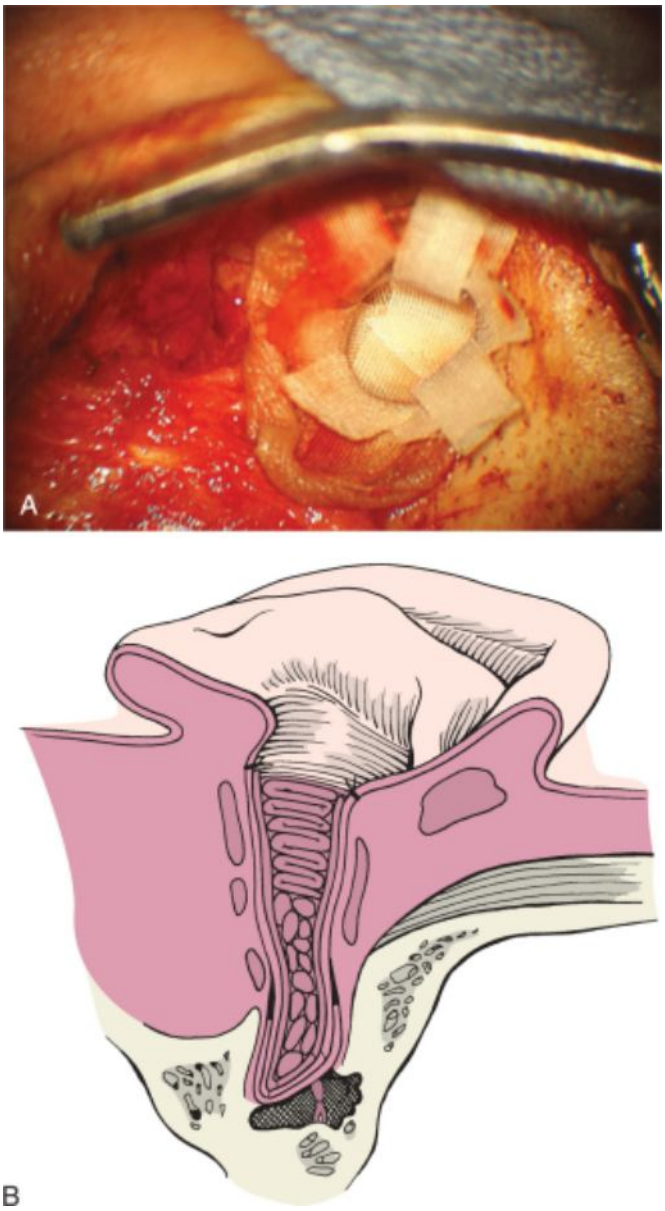

Figure 111-15 **A,** Silk strips are layered in the ear canal. **B,** Packing is placed within the silk lining to maintain the skin graft in place.

Some surgeons used to prefer a mastoidectomy technique wherein a “canal wall–down” type of cavity is created to correct congenital atresia. Although this technique may be successful in restoring hearing, it introduces the added problem of a mastoid cavity. We do not advocate this technique.

Acquired Atresia

Most of these patients will have soft tissue atresia as a result of previous surgery or a chronic inflammatory process. The goals of surgery are to remove the fibrous plug, expose the tympanic membrane, and re-epithelialize the ear canal with normal healthy skin. Preoperative CT scanning will confirm the presence of any bony atresia. If drilling will be necessary for bony atresia, intraoperative facial nerve monitoring should be performed. A postauricular approach is generally recommended for wide surgical access. Repair via endaural approaches has been uniformly unsuccessful.[7]

After infiltrating the postauricular region and ear canal with a solution of 1% lidocaine with 1:100,000 epinephrine, a circumferential canal incision is initially made at the junction of the normal medial conchal skin margin and the lateral aspect of the canal stenosis/atresia. A standard postauricular incision is then made down to the level of the temporalis fascia superiorly and the mastoid periosteum inferiorly. The mastoid periosteum is incised in along the linea temporalis and then down to the mastoid tip. Surgical dissection is continued under the periosteum anteriorly to the level of the cartilaginous ear canal. Ear canal skin and soft tissue are then gently elevated off the bony external auditory canal (Fig. 111-16). This dissection proceeds medially until the tympanic membrane is identified

(Fig. 111-17). There is usually an identifiable plane between the fibrous external canal plug and the fibrous layer of the tympanic membrane. In cases of bony atresia, a combination of small cutting and diamond drill burrs is used to carefully enlarge the bony canal. Care should be exercised to not expose mastoid air cells posteriorly when doing so. The goal of canalplasty should be to provide a direct unobstructed view of the entire tympanic membrane through the external auditory meatus. Once this has been completed satisfactorily, the ear is thoroughly irrigated to remove all bone dust. Middle ear exploration is advised if preoperative audiometric testing indicates a conductive hearing loss greater than the 20 to 30 dB expected for canal atresia alone.

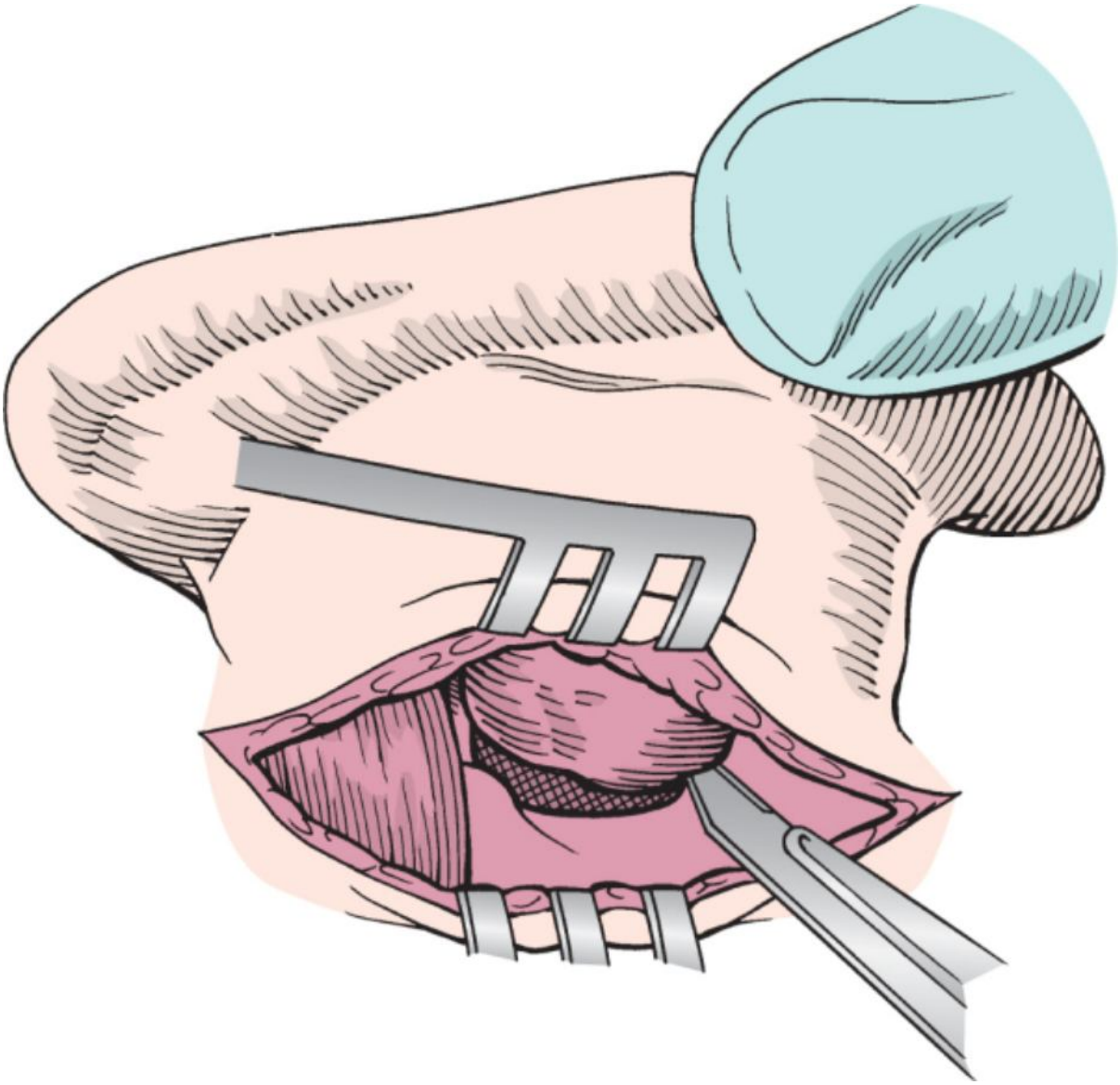

Figure 111-16 Postauricular approach for acquired atresia.

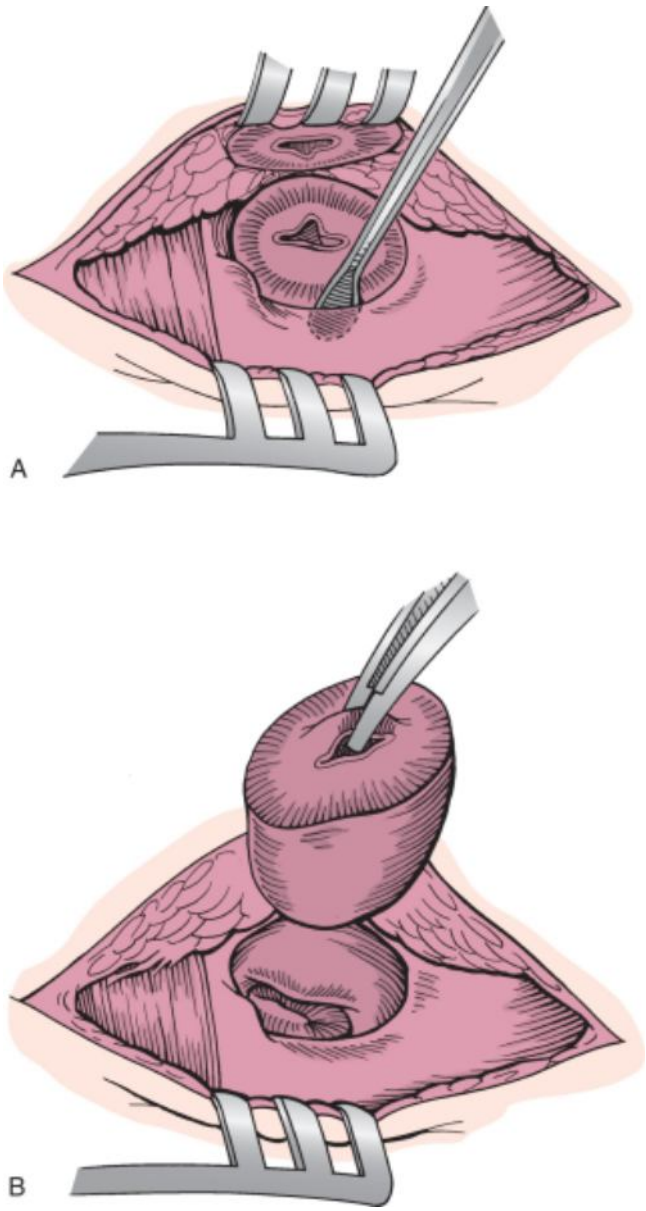

Figure 111-17 **A** and **B,** Elevation and elimination of the canal stenosis.

Generally, little skin can be salvaged from the canal in such cases because the soft tissue is composed almost entirely of scar tissue. For this reason, a skin graft is used in the manner previously described for reconstructing a congenital atretic canal. Once again, it is not prudent to remove and replace skin from the external auditory canal that is actively inflamed, such as in chronic external otitis, because the same problem will usually recur. Resolution of acute and chronic inflammation should be ensured before proceeding in this manner.

POSTOPERATIVE MANAGEMENT

Self-absorbing suture material is used for both the skin graft and the postauricular incision. The mastoid dressing is removed 24 hours after surgery and the ear is kept dry. The canal wick is continually hydrated with antibiotic eardrops. Patients are seen 7 days postoperatively to remove Steri-Strips from the postauricular incision and inspect the canal wick. After removal of the canal wick at day 10 to 14, the patient is seen every 2 weeks until the skin graft is completely healed. Desquamation during this period is common, and frequent cleaning of the ear canal may be necessary. Small layers of granulation tissue may also develop in the seams between the edges of the skin graft, but frequent examination allows débridement and cauterization of this tissue before it becomes bothersome or obstructive. The use of steroid-containing ototopicals may be of benefit in this situation. The initial postoperative audiogram is obtained 6 to 8 weeks after surgery, when healing is mostly complete. Thereafter, the patient is seen at 6- to 12-month intervals for routine cleaning of the ear.

Hearing is generally improved immediately postoperatively but may deteriorate over time. The best hearing results have been reported by Jahrsdoerfer and coworkers, with 67% of patients attaining speech reception thresholds of

30 dB or better.[5] These results are similar to those achieved by Tuefert and De La Cruz,[6] although the number of patients who maintained an air-bone gap of 30 dB or less fell from 63.1% to 50% over time. Our experience supports the fact that roughly two thirds of patients achieve these thresholds. The risk for severe sensorineural hearing loss related to atresia surgery is 2% to 7.5%.[5,6]

When hearing improvement does not exceed a 30-dB speech reception threshold, some patients may wish to use an in-canal type of hearing aid once healing within the canal is complete. Typically, only a small amount of amplification is necessary to restore hearing to acceptable levels, which is why the creation of a canal alone has sometimes been helpful.

COMPLICATIONS

Canal restenosis and lateralization of the tympanic membrane are by far the most common complications after atresia surgery. Other complications include blunting of the tympanic membrane, sensorineural hearing loss, and facial nerve injury. For an inexperienced surgeon, the facial nerve is at its greatest risk in the inferoposterior portion of atretic bone just lateral to the middle ear.[8] Facial nerve problems occur much less frequently because intraoperative facial nerve monitoring is now routine.

Stenosis in the midcanal area seems to take place only in unepithelialized areas in which bare bone persists. If early signs of canal stenosis are evident on postoperative follow-up, gentle stenting and dilatation of the canal will usually limit the extent of stenosis. Any areas of granulation within the canal should be aggressively cauterized with silver nitrate and treated with steroid-containing ototopicals.

In the case of midcanal or medial canal stenosis after a previous attempt at tympanoplasty or mastoidectomy, special precautions may be taken to prevent recurrence. A steroid solution may be placed in the packing at the time of surgery and a short course of oral steroids given in the immediate postoperative period. If despite these measures medial fibrosis begins again in the postoperative period, triamcinolone acetonide (Kenalog), 10 mg/mL, is injected with a 27-gauge needle into the medial canal stenotic area. This will usually prevent restenosis.

PEARLS

- In the absence of any identifiable ear canal in an atretic ear, drilling should always begin at the level of the linea temporalis, just posterior to the glenoid fossa.
- Lateralization of the tympanic membrane graft in atresia surgery is best prevented by tucking a small flap of fascia anteromedial to the bony annulus or under the malleus handle.
- Blunting in the anterior sulcus is minimized by creating a good bony annulus to seat the fascial graft, minimizing the amount of skin-fascia overlap medially, and tightly packing the anterior sulcus with a Silastic disc over the tympanic membrane.
- Meatal stenosis is prevented by creating a large meatus 1.5 times the normal size and careful suturing of the lateral margins of the skin graft to the newly created meatus to facilitate early healing in this area.
- Patients who are poor surgical candidates for atresia repair may be rehabilitated with a BAHA, provided that their underlying cochlear reserve is 40 dB or less in the better-hearing ear, and microtia repair is not planned in the future.

PITFALLS

- An aberrant facial nerve that crosses the oval window will increase the risk of trauma to the nerve at the time of ossiculoplasty (Fig. 111-18).
- Failure to mobilize the entire ossicular chain before tympanic membrane grafting will result in residual postoperative conductive hearing loss.
- The most common causes of sensorineural hearing loss after atresia are drilling on the ossicular chain and overzealous manipulation of the ossicular chain.
- The presence of any active dermatologic condition involving the meatus and canal at the time of atresia repair will compromise healing and result in restenosis of the canal.
- Soft tissue stenosis of the ear canal often results from nonepithelialized bone within the ear canal.

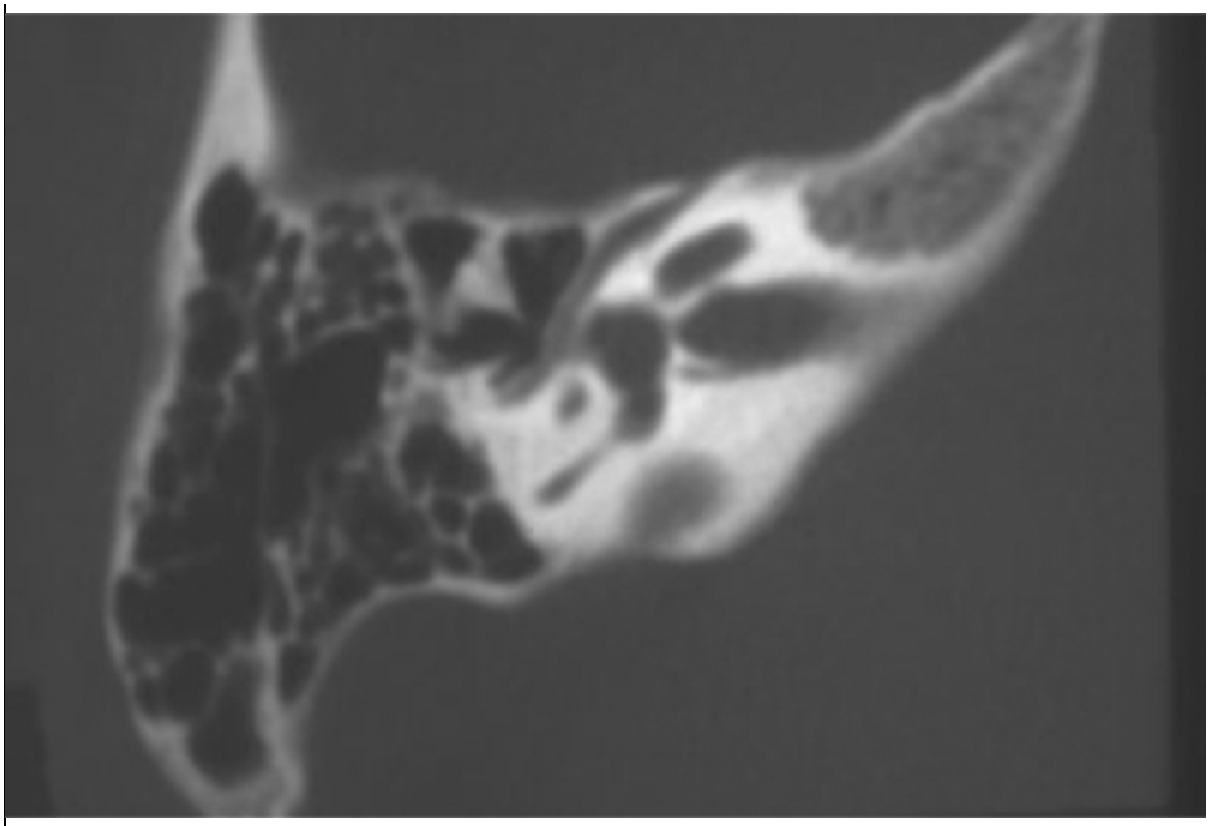

Figure 111-18 Axial computed tomography scan showing the facial nerve coursing over the oval window.