



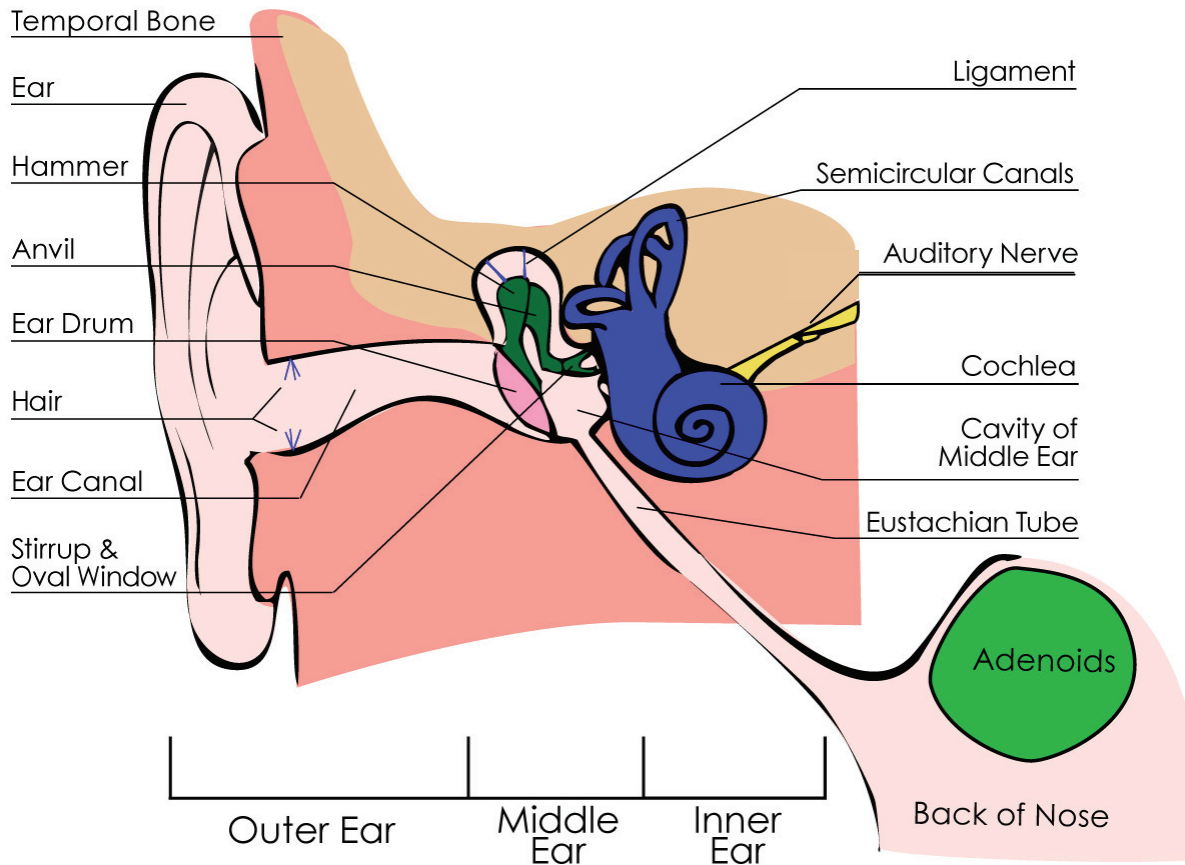
Children's Hospital Boston

Major Ear Surgery for Children and Adolescents

**Department of Otolaryngology & Communication Enhancement
Pre-operative Informational Series**



childrenshospital.org/oto | 617-355-6462



Why major ear surgery?

Ear surgery for children or adolescents is necessary for the treatment of ear problems present at birth or for those developing due to infection and its consequences during childhood. Some children are born with missing, misplaced, poorly functioning, or diseased ear structures. Properly timed surgery can correct these conditions and produce an ear that will hear more effectively and that will not undergo further deterioration with time.

Chronic or recurrent ear infections may occur subsequent to acute ear infections, even if the latter are promptly and properly treated. Such repeated infections of the middle ear and mastoid may lead to the development of undesirable changes in the eardrum, in the tiny bones which normally conduct sound from the eardrum to the inner ear, or in the linings of the middle ear.

Information about the normal middle ear and mastoid

For you to more fully understand and benefit from the discussions about specific ear

operations contained in this booklet, let us first review information about the structure and function of the normal ear. Sound waves are funneled into the ear through the horn-shaped structure called the *auricle* or *pinna*. The sound travels down the external ear canal and strikes the *eardrum* or *tympanic membrane*. The eardrum not only serves as a collector of the sound waves, but it also serves to separate the skin-lined ear canal from the mucous membrane-lined middle ear space called the tympanic cavity. This latter function is vitally important, since any skin tissue in the middle ear space may produce debris leading to infection and pressure upon important structures.

The eardrum is composed of three layers. The outer layer is thin protective skin, the middle layer is tough fibrous tissue which produces most of the eardrum's strength, and the inner layer is thin protective mucous membrane.

The **eardrum** is connected directly to the first of the three sound-conducting **ossicles** or bones called the **malleus** or hammer. The hammer strikes the second bone, called the **incus** or anvil. The anvil is linked by a very fragile connecting joint to the third of the bones, called the **stapes** or stirrup. The stirrup bone connects directly to the bone encased **cochlea**, the snail-shaped portion

of the inner ear responsible for the production of hearing.

The **inner** ear is filled with fluid set into motion by the sound-induced pulsations of the stirrup bone. The moving inner ear fluids in turn cause motion of the sensitive hair cells. The motion of these cells produces electrical impulses which travel through the nerve of hearing to the brain.

The chain of bones transmits the sound waves across the normally air-filled **middle** ear space. The air enters the ear through the **Eustachian tube**, a mucous membrane-lined tube connecting the middle ear space with the back of the nose. Adjacent to the middle ear space proper are two interconnected spaces. The **epitympanic space**, or the attic, lies above the middle ear space and serves as an air reservoir for both the middle ear and the attic.

Several nerves run through the region of the middle ear, the attic, and the mastoid. The **facial nerve**, which controls all muscle movement on one side of the face, enters the ear from the brain, along with nerves of hearing and balance. It travels through the attic and middle ear, usually encased in a thin bony sheath. The nerve then enters and traverses the mastoid encased in thick bone.

The amount of bone protecting this vital nerve, as well as its exact course, can be variable, and the protective bony sheath can be partially or completely destroyed by infection.

Another important nerve present in the middle ear space is the **chorda tympani nerve**. This nerve supplies the sensation of taste to the front portion of one side of the tongue. In some patients, the nerve is destroyed prior to surgery by a disease process, usually prolonged infection or cholesteatoma.

Adjacent to the mastoid cavity is the portion of the inner ear which participates in the balance system. Sensors inform the brain about changes in the position of the head.

Common types of ear disease requiring surgical treatment

Children may be born with one or more ear

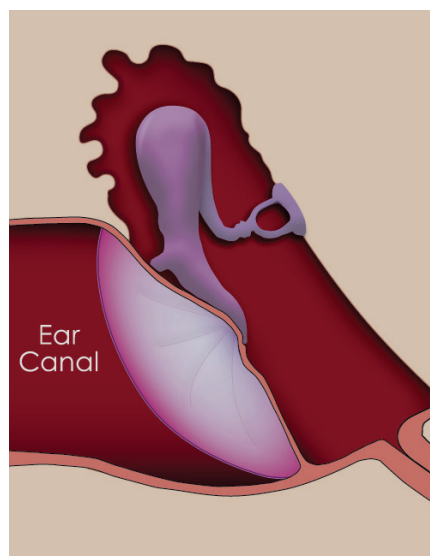
abnormalities including: the maldevelopment or absence of the auricle, ear canal, eardrum, and/or the ossicles; the presence of a skin-lined cyst, called a **cholesteatoma**

behind the eardrum; or the presence of tumor masses in the middle ear. Infants and children may also develop significant ear disease as they grow older, due to injuries, infections, or developmental processes.

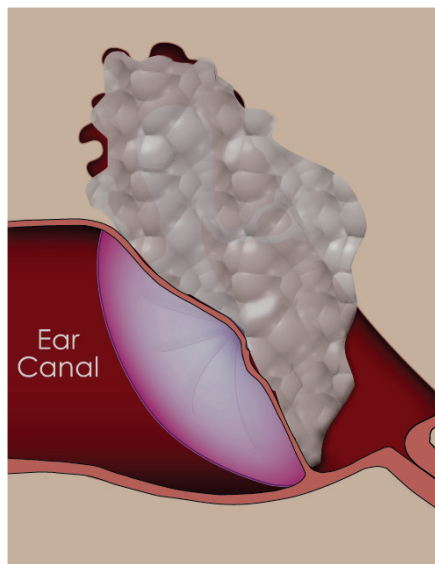
Head injuries or ear infections may produce **eardrum perforations** or holes, which sometimes fail to heal. Recurrent or continuing ear infections may lead to damage of the ossicles, producing a hearing loss of the **conductive type**. This type of hearing loss may often be helped by surgery.

Damage to the inner ear by head injury, by spread of infection from either the middle ear or mastoid, or by exposure to certain strong medications or chemicals may produce a hearing loss

Normal Ear



Cholesteatoma



of the **sensorineural type**. This type of hearing loss cannot usually be helped by surgery. A patient experiencing sensorineural hearing loss, frequently a natural accompaniment of the aging process in adults, will often benefit from wearing a hearing aid. Certain patients not helped by a hearing aid may benefit from the surgical implantation of a processing device called the **cochlear implant**. A cochlear implant electronically converts environmental sounds and particularly speech sounds into electrical impulses which are fed through an implanted electrode directly into the inner ear and nerve of hearing.

An eardrum weakened by infection may develop skin-filled pouches, called **retraction pockets**. If such pockets begin to develop, an accumulation of infected skin debris from the ear canal proper forms what is known as a **cholesteatoma**. Although sometimes described as “ear tumors,” they are not tumors or cancer but rather skin cysts.

Whether formed from the weakened eardrum or occurring at birth, cholesteatomas may grow back into bony compartments within the middle ear, attic, or mastoid cavity, leading to chronic infection. These cysts may continue to expand, producing additional damage to the eardrum, ossicles, and surrounding structures, such as the facial

nerve or the membranes surrounding the brain.

If untreated, continued infections or cholesteatoma expansion may produce: erosion of the ossicles with loss of inner ear function and permanent deafness, infections in the nearby brain tissue, loss of balance function, loss of function of the facial nerve and the muscles it controls, loss of function of the nerve of taste, and spread of infection into large blood vessels adjacent to the ear with subsequent spread of infection to the remainder of the body.

In all cases, ear surgery is necessary to produce a therapeutic effect not achievable by medical therapy or by more limited minor surgical procedures.

Ear surgery is performed through an incision behind the ear or through an incision in the ear canal itself. Operations upon extensively infected or diseased ears or upon ears with exceedingly small ear canals require an incision behind the ear and surgical enlargement of the ear canal. This incision is usually not noticeable after surgery. In order to make the necessary incision, it will be necessary to shave an area of hair around the ear following the natural growth line.

Modern ear surgery is accomplished with the aid of the operating microscope. This tool



magnifies the tiny structures within the ear from six to forty times their normal size. Such magnification makes the operative procedure safer and more effective. Depending upon the extent of disease and the amount of reconstruction work that must be carried out, these delicate operative procedures may require one to six hours or longer to complete. You should be assured that a lengthy operation does not often indicate the development of complications during the procedure. It usually occurs because delicate work is necessary to obtain an optimal result for your child.

The major goal of surgery is to eliminate disease and any unstable situation such as uncontrolled infection, which could cause the general health of the ear to deteriorate. At the same time, it is desirable to stabilize or to improve the hearing in the ear. Sometimes, this latter goal is difficult to achieve because of severe infection. In some cases, manipulation of the ossicles in the presence of infection creates a significant risk to the inner ear. For this reason, it may be necessary to delay a definitive repair of the sound transmission mechanism until a later time when infection is no longer present.

Ear surgery differs from conventional surgery because limited space within the ear canal, the attic, and the mastoid cavity prevents the use of sutures or stitches to maintain the

position of the tiny component parts of the ear. For this reason, it is necessary to use packing to hold tiny tissue and bone grafts in their proper places during the healing process. Consequently, the ear is packed with dissolvable sponges. Resorbable sutures are used to close the skin incision behind the ear. As your child is awakening from anesthesia in the recovery room at the conclusion of the operative procedure we will speak with you to discuss the operative findings and to describe the operative procedure carried out. At that point, we will be able to summarize the prognosis for the post-operative period and whether or not further surgery may be necessary.

General risks and complications

Ear surgery carries with it certain inherent risks and possibilities for complications. These may occur during the operation itself or during the post-operative period. Some complications are more likely to occur than others, depending upon the disease process being treated with an individual operative procedure.

Potential complications directly related to the ear surgery itself include: failure to achieve the desired result, infection, hearing loss and associated noise in the ear, recurrence of

underlying condition, damage to the facial nerve, damage to the chorda nerve of taste, dizziness, bleeding, and narrowing of the ear canal.

The human body, with its unpredictable healing patterns and variable anatomy, may sometimes fail to respond to an operative procedure necessitating further surgery or other therapy.

During the course of the surgery, infection associated with the diseased portion of the ear may spread into surrounding areas. This could produce focal breakdown of the existing or reconstructed eardrum, producing a perforation. Infection could also cause the breakdown of other tissues including skin or tiny bone grafts. To minimize this possibility, your child will be placed on antibiotics at the time of the procedure. These will be continued post-operatively while packing remains in the ear.

It is possible that infection may spread into the inner ear, leading to permanent deterioration of the hearing capacity of that ear. There is also the possibility that infection could spread into the blood vessels within the ear or into the brain, which lies directly adjacent to the ear. The infection could spread throughout the bloodstream to other parts of the body as well. All of these complications are indeed rare.

Under normal circumstances, your child will have a hearing test just before surgery, and a repeat test early in the post-operative period when healing of the ear has stabilized. A **sensorineural** type of hearing loss, better known as **nerve deafness**, sometimes but not always reversible, may occur due to manipulation of the ossicles or due to vibrations conducted into the inner ear. Some ears are more sensitive than others to these types of manipulation. Sensorineural hearing losses, either occurring naturally or resulting from surgery, are often accompanied by noises in the ear called tinnitus. These noises may sound like ringing, whistling, humming, and wind rushing. They may vary in intensity, sometimes disappearing completely. There is no effective medical or surgical treatment for tinnitus.

There is a possibility of damage to the facial nerve. Depending upon the extent of disease within the ear, it is sometimes necessary to uncover this nerve or, at the very least, come quite close to it. During the course of surgery, swelling may occur within the nerve. This situation may create a temporary malfunction of the nerve, and weakness of the muscles on the same side of the face. Usually, such changes are temporary, but in some cases they may become permanent if infection and swelling persist.



If the nerve is sufficiently involved with infected material such that the removal of infection could cause permanent damage, it may be necessary to leave some focal diseased areas behind in the interest of preserving nerve function. This rarely happens, but, again, should be mentioned so that you may be aware of this possibility.

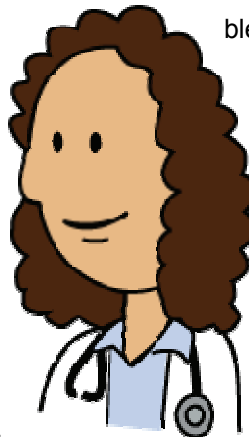
The chorda tympani nerve, which helps to control the sense of taste, may be affected by the operative procedure. The nerve may be involved with disease so that a portion of it must be removed along with the disease.

Occasionally the nerve may be repositioned to gain access to other structures. It is common for the nerve to swell and have a temporary loss of function after such manipulation. Most patients with chorda nerves destroyed by disease are not aware of any loss of taste. Patients whose nerves must be removed or cut at surgery sometimes notice a temporary tingling of the tongue, and occasionally do notice changes in the taste of some foods.

At times, a patient may have prolonged dizziness after an operation. This occurs because the ear's balance sensors, located within the inner ear, may be disturbed by the complexity of the operation. In children this may only be manifest as an upset stomach

or clumsiness. In many cases, patients undergoing ear surgery have some balance instability for several days following the procedure. When this occurs, the central nervous system readjusts itself to changes in signals from the organs of balance and, as stability returns, the dizziness ceases.

As with any surgery, there are small risks of either bleeding from the operative site or of persistent infection. If there is post-operative bleeding, it may be necessary to return your child to the operating room for a re-exploration of the surgical site and drainage of any collections of blood called **hematomas**. To prevent infection, your child will be given an antibiotic.



During the course of surgery, it may be necessary to enlarge the ear canal. Such enlargement usually requires the removal of skin and bone within the ear canal. In many cases, such skin may already be infected and removal will be necessary for that reason as well. If sufficient skin must be removed, resurfacing of the ear canal with new skin will be necessary. The donor skin will be removed from the back of the ear or the inner aspect of the arm at the time of surgery. Occasionally, additional skin must be placed in the ear canal after the healing is partially complete. This will be accomplished at a separate minor operation, carried out

without the necessity of an overnight stay at the hospital. Despite appropriate placement of skin or other precautions, in some cases the ear canal becomes narrowed as healing progresses. If this occurs, a second surgical procedure may be necessary to reopen the ear canal.

Details about specific operations

Tympanoplasty

This type of operation is literally a plastic or reconstructive procedure on the tympanic cavity, or middle ear, including the eardrum. The operation is used to reconstruct a diseased, perforated eardrum and to repair the sound transmission mechanism. The procedure is also used to remove the choleostoma-skin cyst or a tumor from the middle ear.

More extensive tympanoplasty procedures are usually carried out through an incision behind the ear, while repairs limited to closure of small eardrum perforations may be accomplished through the ear canal itself. In either case, the eardrum and its attached skin is turned aside to gain access to the middle ear space. The disease is removed completely.

During the operation, we will assess the integrity of the sound transmission mechanism. Sometimes the chain of bones is intact, but covered with scar tissue or thickened lining tissue. In this case, the bones are cleaned of such tissue, if possible. If the chain of bones is minimally disrupted, a fragment of bones will be fashioned to reconnect them. If the ossicles have been damaged, the chain of bones will be reconstructed by using the bones themselves, repositioned, or by using artificial ossicles constructed of materials tolerated by the body.

The eventual hearing result is most dependent upon the presence of the stirrup bone and the status of its connection with the inner ear. If part or all of this bone is destroyed by disease, it becomes difficult to position a bony or artificial strut to conduct sound vibrations. The position of this strut may be modified during the healing process, during a pressure change in the middle ear, or due to sudden head motion.

In some cases, it may be desirable to position an artificial ossicle within the inner ear. Although this type of reconstruction is routine in certain procedures, such as in exploratory tympanotomy and stapedectomy (discussed below) it is usually not carried out in children, who are statistically more likely to develop ear infections. Even in adolescents



and adults, the inner ear should only be opened in the absence of infection and in the presence of an intact eardrum.

At the conclusion of the tympanoplasty operation, the eardrum is then patched using strong yet thin muscle lining tissue called fascia harvested through the incision behind the ear. The middle ear is filled with a naturally resorbable cellulose packing material, and an outer packing is placed. The tissues are sandwiched and held firmly between these packs. The packing material in the middle ear will resorb by itself, a process that may require weeks to months.

Children or adolescents who have had previous ear surgery may have insufficient remaining tissue from which to construct a new eardrum or portions of the ear canal. In such cases, it may be necessary to harvest tissue from behind the opposite ear or from other regions of the body, such as the thigh.

At the conclusion of the operation, the incision behind the ear is closed in two layers using suture materials, which resorb spontaneously and need not be removed.

Mastoidectomy with tympanoplasty

If the disease process involves the attic area, a tympanoplasty may be extended to this

area by removal of the bony wall separating the attic from the ear canal. This type of operation is designated an **atticotomy** and **tympanoplasty**. (The term **–otomy** means opening.) In this case the attic is opened for exploration. If the disease process also involves the main portion of the mastoid cavity, the mastoid must be opened and cleaned surgically. The opening and inspection of the mastoid cavity is called an **antrotomy**, meaning the opening of the **antrum**, the central portion of the mastoid cavity. The total removal of all tissue in the mastoid cavity is called a **mastoidectomy**. The suffix **–ectomy** means removal.

The tympanoplasty procedure detailed above is first carried out. After exposure of the middle ear space and examination of the ossicles, the outer wall of the mastoid cavity is removed to expose its contents. The wall between the mastoid cavity and the middle ear may also be removed if required by the location and type of ear disease.

Mastoid surgery in conjunction with tympanoplasty is often necessary for treatment for more extensive disease or malformations of the ear. For this reason, there is a greater risk of development of any or all of the complications previously discussed.

Children born with bilateral malformed or absent ears undergo a special type of mastoidectomy-tympanoplasty. After creation of a special skin incision, the mastoid is entered and landmarks identified. The ear canal is carefully entered or developed by drilling away bone until the middle ear is reached. A sound conduction mechanism and a new eardrum are constructed. The new ear canal usually includes part or the entire mastoid cavity. Skin grafts must be placed to maintain the newly created ear canal. Narrowing of the new canal is common, and often additional procedures are necessary to create an ear canal of sufficient size.

Exploratory tympanotomy – stapedectomy

This procedure involves the opening of the tympanic cavity by turning aside a normal eardrum. The ossicles are examined and a reconstruction is carried out as described under tympanoplasty. This type of procedure is usually performed for treatment of conductive type hearing losses, often occurring as the result of head trauma, but sometimes present since birth due to malformed or frozen ossicles.

Complications of an exploratory tympanotomy include those previously listed. In addition, some eardrums are quite thin

and fragile. During the process of turning them aside, they may fragment, requiring the placement of a small tissue patch at the close of the operation.

A common cause of a progressive, conductive hearing loss is an inherited disease called **otosclerosis**, or hardening of the stirrup bone and its connection with the inner ear. This process usually occurs from age 20 through 40, more often in women than in men. The hearing loss produced by this process may often be completely reversed by surgery. Because the eardrum and the middle ear linings are not diseased, only the stirrup bone need be replaced to obtain an excellent hearing result.

Otosclerosis may also begin and progress during childhood, but it is usually advisable to delay surgical correction until adolescence or until the cessation of frequent middle ear infections. The procedure called **stapedectomy**, or removal of the stapes bone, may be carried out under heavy sedation or under general anesthesia. It is sometimes desirable to have the patient awake in order to place the prosthesis in a position so as to avoid dizziness.

The top portion of the stapes is removed and a tiny hole through the stapes footplate, a bone separating the middle and inner ear spaces, is created and then enlarged. A



piston prosthesis of appropriate length is attached by its wire to the incus and the piston is allowed to rest in the inner ear. The opening to the inner ear is sealed by tiny pieces of fat, usually harvested from the earlobe. The earlobe incision is closed with resorbable suture material. The eardrum is returned to its normal position and packed in place. If the patient is awake, the hearing is tested informally prior to packing and departure from the operating room.

Because the inner ear is opened, there is a chance, less than one percent, that there will be some deterioration of inner ear function, with or without dizziness or ear noise. The chance of significantly improving hearing is about 85 percent. The improvement may not be permanent, as our experience with stapes prostheses extends only over a 50-year period. There is a possibility of prosthesis failure, either due to a failure of its material or due to a short- or long-term negative effect of the prosthesis on surrounding normal tissues.

After surgery, it is normal to have some light-headedness and disequilibrium. Most patients also notice a hollow sound in the operated ear. That sound and the disequilibrium will gradually improve once the inner ear reseals. Rarely, the inner ear fails to seal completely, leading to continued disequilibrium and the possibility of a

delayed permanent hearing loss. The use of earlobe fat as a seal reduces the possibility of this perilymph leakage, but in some cases re-operation may be necessary.

What to do at home in preparation for the hospital visit

We highly recommend that your child attend one of the pre-admission orientation sessions which are held by the hospital. This can be arranged through the hospital admissions office. Such sessions help acquaint you and your child with various areas within the hospital as well as with aspects of hospital procedure. After such orientation, there will be fewer uncomfortable surprises during the hospital stay itself.

You should answer your child's questions about the upcoming hospital stay as honestly as possible. Indicate that certain aspects of the hospital stay will be associated with pain. Everyone knows, especially a young child, that having blood drawn is uncomfortable. Assure your child that the doctors, nurses, lab technicians, and other personnel all work at the hospital because they like children and wish to help them recover from illness.



Your child should not take aspirin or aspirin containing products (Advil, Motrin, Ibuprofen, Bufferin, Alka-Seltzer, etc.) for two weeks prior to entry into the hospital. Alternative or complementary supplements should also be avoided. These medications interfere with platelet function and may cause significant bleeding problems. If the patient requires a medication for pain relief or fever control, aspirin substitutes such as Tylenol (Acetaminophen) may be used.



If your child is receiving any medication for an ear infection or for any other medical problem, he or she should continue to take it, but omit it on the morning of admission unless specific arrangements are made in advance with us or with the anesthesia department. At the time of your child's admission, be certain to notify the doctor completing your child's physical examination about any medications that your child should

continue taking while in the hospital. If the medication has not been ordered, the nurses will notify us so that we may arrange for your child to receive it.

What is a pre-operative evaluation?

You and your child may need to come to the hospital within 30 days prior to surgery for a

pre-operative evaluation. At this time an anesthesiologist will review your child's medical/surgical history as well as explain the risks of anesthesia. A nurse will review what you can expect during the hospitalization. You

may also meet with a representative from the hospital business office regarding your insurance. This pre-operative evaluation takes place in the Admitting Office and may last as long as two hours. In an effort to avoid confusion during this appointment, we ask that only the parent and child who is having surgery come to this visit.

Certain laboratory tests may be performed on the day of this evaluation. These include a red and white blood cell count to determine if your child is anemic or has evidence of a



reaction to infection. Your child may also have a chest x-ray if he or she has a history of disease in the heart or lungs.

We do not routinely determine your child's blood type or prepare blood for transfusion during ear surgery. There is usually a minimal amount of blood lost, and the precaution of having blood in readiness is unnecessary.

If you feel that your child should have additional laboratory tests, or that one of the above-mentioned tests should be omitted, please communicate this to us or to other members of the staff.

What is a parent's role during the hospitalization?

We encourage you to stay with your child as much as possible during the hospitalization. The hospital has facilities available for parents to stay in the hospital as nearby a child's bed as possible.

In the event that you cannot stay overnight at the hospital, it would be advantageous for you to be present during the pre-operative period while your child is adjusting to the hospital environment. As your child will be quite groggy during the first hours immediately following the operation, it will be unnecessary for you to be present at this

time. After that time, your child will be more awake and you will be allowed to stay with him or her.

A parent or interested adult is the best advocate for the child's well-being and care while in the hospital. Such an individual is most familiar with the child's unique personality, general state of health, and particular preferences. For this reason, you will be of immense value in helping the medical staff better care for your child.

We cannot stress too strongly that you are a key member of your child's health care team. Keep your eyes and ears open to all that is going on around you and around your child. The most important purpose of this booklet is to inform you about the general plan of treatment for your child. If you are concerned about the course of your child's treatment and recovery, please do not hesitate to discuss this with the nurses on the hospital floor.

If you do not receive satisfactory answers to your questions or are still concerned, please contact us or one of our associates, day or night. See the note on the last page of this booklet about how to contact us. Good communications between you, your child, the hospital staff and us will be important in obtaining an optimal result during and after your child's hospital stay.

Just before the operation

Children are admitted to the hospital several hours before their scheduled surgery. Be certain that you allow sufficient time for travel, parking, and walking to the admission location. It is absolutely necessary that your child have nothing to eat after midnight prior to the scheduled surgery. Clear liquids (apple juice and water) may be drunk up to two hours before surgery. **Do not** allow your child to have any milk, gum, lollipops or hard candy on the morning of surgery. This is necessary in order that your child's stomach be empty. Sudden nausea and vomiting during the induction of general anesthesia could cause food material in the stomach to enter the windpipe and lungs.



Prior to or shortly after admission to the hospital, you will be asked to sign an informed consent operative permit, indicating that you are familiar with the proposed operative procedure, its potential benefits, its risks and its complications.

Prior to arrival in the operating area, your child may receive medications as ordered by the anesthesiologist. These medications are often administered as injections, but can sometimes be given orally.

If you have any questions regarding the procedure itself, its benefits, risks, or complications, which have not been previously answered by either reading this booklet or by our prior discussions, please

be certain to contact us so that we may discuss your concerns in detail.

In the operating room

Upon arriving in the operating room area, you and your child will wait in a pre-operative area. For older children, an intravenous needle may be placed in the hand or arm during this time. Particularly anxious younger children may receive a sedative in the

holding area, and they will fall asleep prior to entering the operating room. Most younger children will have anesthesia induced in the operating room by breathing laughing gas through a mask. Once your child is asleep, inhalation anesthetic agents are administered to maintain a deep level of general anesthesia.

After your child is asleep, a breathing tube, or *endotracheal tube*, will be carefully placed by the anesthesiologist through the vocal cords and into the windpipe. This tube permits us to protect the airway and maintain adequate breathing during the operation. Your child will be closely monitored during surgery.



The post-operative period

After the operative procedure your child will remain in the recovery room for observation. This phase usually requires several hours and continues until your child's breathing pattern is regular enough to permit his or her safe return to a regular hospital room. In some cases, a child's return to the hospital room may be delayed because of slow recovery from anesthesia.

During recovery, it may be necessary to restrain your child's hands to prevent picking at the dressing. This is not unusual but is done only if necessary. Your child will have an intravenous in place in the recovery room and during the early phases of recovery in the hospital room. This permits administration of antibiotics and fluids until oral intake resumes.

Fortunately, the recovery from ear surgery is usually rapid. During the early phase of recovery, your child's stomach may be upset from the anesthetic medications administered, and there may be some drowsiness as the effects of such medications wane. Oral intake will resume rapidly and your child will soon feel like moving about.



There is usually very little pain in the post-operative ear. Your child may notice occasional sharp pains in the ear. This is expected, and will decrease in frequency and severity as healing progresses.

Some children note discomfort from wearing the dressing. It is usual to experience some discomfort. If your child complains of severe discomfort, please notify the nursing staff so that they may examine the dressing. If such discomfort continues, please notify us or our associates so that we may make appropriate adjustments in the dressing.

In general, most children will go home the same day or the day after surgery. If there are any post-operative concerns, your child may need to stay in the hospital longer for observation. On the morning after surgery, the dressing is removed. You will notice some packing within your child's ear canal. The ear may be swollen and protrude out from the side of this head. This is temporary and lasts for a few weeks before going away.

For patients undergoing less extensive procedures, the dressing may be removed on the first day following the operation and reapplication may not be necessary. In these patients, it is unnecessary to place a drain.

General post-operative instructions

The following precautions should be observed following ear surgery:

No water should be permitted in the operated ear. Water precautions must be maintained until the ear canal and the eardrum are completely healed. Therefore, a cotton ball with Vaseline must be placed into the ear canal to prevent water entry when bathing.

Avoid nose blowing or sneezing. If your child develops the urge to sneeze, have them expel the air through the mouth. This will permit excess air pressure to escape rather than possibly being forced up through the Eustachian tube, where it could cause displacement of the grafts within the middle ear.

Activities should be restricted. During the two weeks while packing remains in the ear canal, we recommend that your child pursue quiet play at home and avoid rough play outside. Generally, your child will remain home from school during the first post-operative week, though return to school may resume sooner if your child is feeling well. We **prohibit** lifting of heaving objects, excessive bending, or air travel for six weeks after surgery.



Medications

Upon discharge from the hospital, you may receive a prescription for an antibiotic. This medication should be taken by your child as directed during the period while the packing is in place. This prevents overgrowth of bacteria and minimizes the risk of post-operative infection.

After hospital discharge, Tylenol or another suitable aspirin **substitute** may be given to relieve any slight discomfort which may occur. Please avoid administering aspirin or aspirin-containing products, as this could cause bleeding problems when the packing is removed. In general,

as noted above, there is little pain associated with ear surgery.

Post-operative visits

Your child will be asked to make a number of post-operative visits to us for evaluation of the operated ear. All of the healing takes place after discharge from the hospital and even after the packing has been removed. For this reason it is important for us to observe your child's ear carefully during this phase.



The first post-operative visit

This will occur approximately two to four weeks after surgery. At this visit, any large dressings will be removed. The incision behind the ear will be cleaned and assessed. You will be given a prescription for antibiotic eardrops and instructions on how to administer them. These drops will assist in dissolving the packing. If you have any questions on how to use these drops, do not hesitate to ask. This step is a very important part of the healing process.

The second post-operative visit

This will occur at approximately two months following surgery. During this visit, any residual packing in the ear canal may be removed. This is usually not painful but occasionally is accompanied by a slight amount of blood oozing from the unhealed surfaces of the ear canal. Younger children will require a brief general anesthetic for packing removal. After the packing is removed, we will have an opportunity to examine the eardrum and the canal walls. The survival of the grafts may be assessed and further plans made.



You should never attempt to remove the packing or use cotton swabs to clean the ear.

Generally, it is necessary to keep water out of the operated ear until all surfaces have healed completely. This may require from

two to eight weeks to achieve. Protect the ear from water by the use of cotton, which is coated with Vaseline or a non-prescription antibiotic ointment such as Bacitracin to make it watertight. The cotton is placed in the auricle nearby the opening to the external ear canal. The cotton should not be pushed into the ear canal proper, as it

may impede healing within the canal.

Additional minor operative procedures

After the packing has been removed, your child may be asked to return every two to four weeks. During the course of these follow-up sessions, conditions may indicate that an additional minor operative procedure is necessary. This procedure may be required for several reasons: to provide additional skin to cover the ear canal; to provide ventilation of the middle ear space

by placement of a tympanostomy tube through the eardrum or graft tissue; or to remove packing in a young child who is exceptionally anxious and uncooperative.

As previously described, certain operative procedures are accompanied by widening of the ear canal. For this reason, there may be insufficient skin to completely cover the canal at the conclusion of the procedure. Usually, skin will grow onto the uncovered surfaces from other portions of the ear canal. If complete resurfacing of the ear canal does not occur, it becomes necessary to place thin fragments of skin in the ear canal to complete the healing process. This will be done as a separate surgical procedure.

A dressing will be placed on the skin-donor site, a scrape-like wound, which is usually uncomfortable while healing. Care must be taken to keep this site dry during its healing process. An antibiotic will be given by mouth during the period of skin graft and donor site healing.

If your child's eardrum, original or reconstructed, appears retracted and if there is an absence of air within the middle ear space, it is sometimes advisable to place a tympanostomy tube in the eardrum in order that air may enter the middle ear space and the vacuum be relieved. This procedure is carried out under the general anesthesia. Your child will come to the hospital in the morning without breakfast and have general anesthesia induced. In some cases, both skin grafting and tube insertion may be necessary. These procedures will be carried out during the same general anesthetic.

The hearing result

After healing has progressed satisfactorily, a hearing test will be obtained. In the interval between the operation and this test, hearing in the operated ear will be estimated using tuning forks and other methods. There is no reason to test the hearing until at least the surface of the eardrum and the ear canal have healed.

It should be noted that healing will continue within the middle ear space over many months, and that an initial hearing result may change, becoming either better or worse while healing commences within the middle ear. If a tympanostomy tube is in place, it is desirable to minimize the chances of a middle ear infection by observing water precautions. In this way, a good hearing result may be maintained.

Danger signs

You should consult with us immediately if any of the following problems develop:

Prolonged dizziness

A minimal amount of dizziness or loss of balance function is normal over the first several days following surgery. In some cases, this may be prolonged. It is, however, unusual for dizziness to recur once it has stopped. If this occurs, we should be notified immediately. Often it is difficult in children to determine whether they are feeling dizzy. They will sometimes report an upset stomach as the only sign of loss of inner ear balance function. You may note some increase in clumsiness or an abnormal walk.



Ear pain or drainage following packing removal

It is not unusual for there to be mild pain and occasional shooting pains after ear surgery. However, your child should not have severe pain in the ear, either while the packing is in place or after its removal. There will be occasional drainage during and after the packing has been removed. A profuse amount of drainage, bloody or otherwise, is unusual and should be reported.

Loud noises in the ear

It is normal for your child to notice some noises or echoes in the ear. Many children report crackling noises due to the cellulose packing in the middle ear space. Excessively loud noises, particularly loud ringing or whistling, may indicate a difficulty with the inner ear.

A successful result after ear surgery

This will only be obtained with your help. If you have questions about any topic discussed in this booklet, please ask us about it. If you feel that your child's post-surgical course is worrisome, please contact us as soon as possible.

How to reach us

During the day

- Call the ORL Nursing line: 617-355-7147.
- If your issue is not urgent, and you reach voicemail, leave a message and we will usually be able to return your call in 1-2 hours.
- If your issue is urgent, and you reach voicemail, listen to the end of the message and you will hear instructions as to how to page the nurse on call for immediate attention.

Nights, weekends & holidays

- Call the Children's Hospital Boston paging operator at 617-355-6369. Ask for the ORL doctor on-call and give the operator your name and phone number.
- Set your phone to received blocked caller IDs. Most of our physicians have blocked caller IDs and will not be able to reach you if your phone blocks these calls.
- To schedule an appointment at any of our locations, please call 617-355-6462 from 8:30 a.m. to 5:00 p.m. Monday through Friday.