



耳硬化症及镫骨手术

如何准备及过程

此讲义为您解释耳硬化症，它是一种会引起听力损失的耳朵病症。它也讲述了镫骨手术，其目的是为了改善听力。

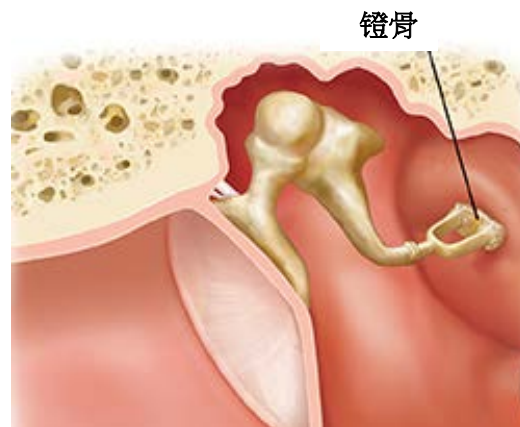
什么是耳硬化症？

耳硬化症 (*Otosclerosis*) (发音：欧投史卡露色史) 是在您中耳的小镫骨（马镫）骨上的异常增长。

这种增长使得镫骨不会对声音响应而振动。

耳硬化症是成人传导性听力损失的最常见原因。传导性听力损失是指声波无法在耳朵中正常移动（参见第 3 页）。

起初，耳硬化症不会导致任何症状。当骨骼生长开始影响镫骨的工能时、听力就开始损失。随着骨骼不断增长，听力损失也就越来越严重。



耳硬化症影响到您中耳内的小镫骨

好消息是仅在 10% 患有耳硬化症的人（即 100 人中有 10 人）有听力损失。深度（严重）的听力损失和耳聋是非常罕见的。

是什么原因导致耳硬化症？

耳硬化症有可能是遗传性的，它可以从父母传给孩子。您家族的某个人可能有这种情况并将其传递给您。如果您患有耳硬化症、您的孩子也有可能继承它。听力损失可能不会发生在家族的每一代。

麻疹病毒可能会影响您是否发生耳硬化，但麻疹本身并不会引起耳硬化。

怎么治疗？

您的医生可能会建议使用助听器、或做镫骨手术来治疗耳硬化症。有时、需要手术和助听器。

耳硬化症很少会引起完全性耳聋。但如发生这种情况、人工耳蜗就是一种选择。请参阅我们“人工耳蜗植入”的讲义以了解更多信息。

正常耳功能

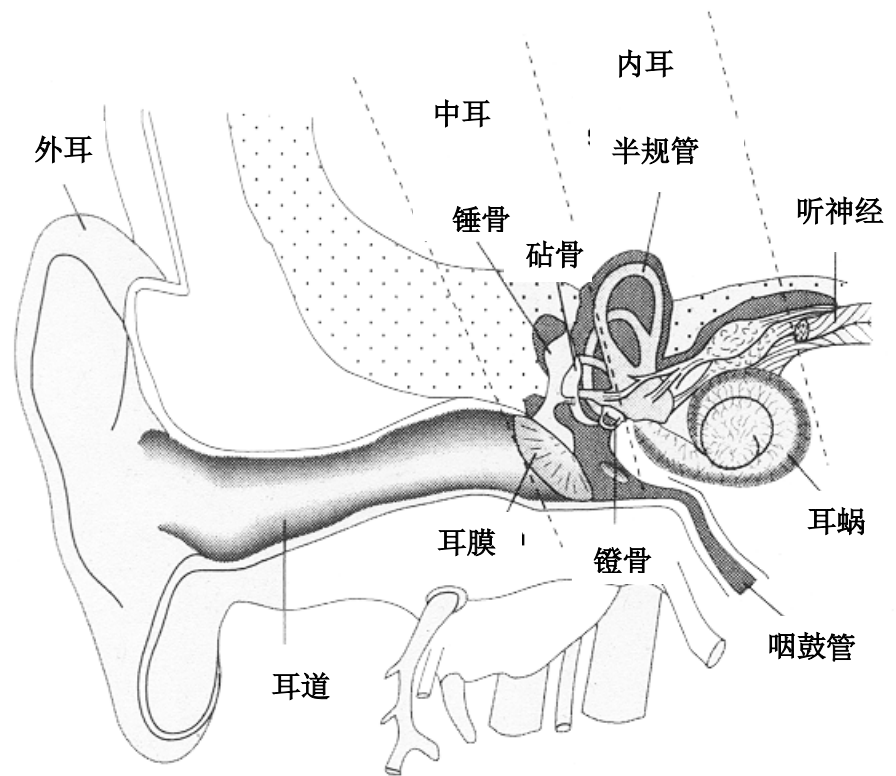
耳朵有 3 个部分：

- 外耳收集声波。
- 中耳增加声强度、并将声音发送到内耳。
- 内耳将声波转变成神经信号再发送到大脑。

当声波穿过耳道时、耳膜会振动。这种振动通过中耳的 3 个小骨：锤骨（锤）、砧骨（铁砧版）和镫骨（马镫）来传递。

镫骨接收到声波时、它会推动一个叫做椭圆形窗口的薄膜。这导致耳蜗中的移动、耳蜗是内耳中的感应器官。

耳蜗内部是微小的毛细胞、可将这些振动转化为电击。听觉神经将这些电击带到大脑。大脑将这些电击解释为声音、这就让您听到了声音。



耳的结构

听力损失的类型

- **传导性听力损失** 当外耳或中耳出现问题时、减少了声音对内耳的振动。换句话说、声音振动不能通过耳朵“传导”。在耳硬化症中、镫骨旁边的新骨骼增长就像水泥一样、影响这些振动通过听骨（小骨）传导的程度。
- **感应性听力损失**是问题出在内耳。

最常导致传导性听力损失是因为耳硬化、有时交杂了两种类型。但很少会涉及听觉神经。

耳硬化症导致的听力损失

镫骨硬化症

大约 **10%** 的人（**100** 个中的 **10** 个）患有耳硬化症的病者、是骨质增生在会影响镫骨和椭圆形窗口。（在早期情况下）膜上镫骨的正常振动受到限制、或（在后期情况下）消失。这称为 *镫骨肌腱硬化*。

耳蜗硬化症

患有耳硬化症的人、大约有 **1%** 到 **2%**（**100** 人中有 **1** 到 **2** 个）是患有耳蜗硬化症。这是骨骼增生扩散到内耳。如果发生这种情况、听力损失是永久性的。

治疗耳硬化症的方法

药物

如您患有耳硬化症、是没有药物或治疗可以直接应用于耳朵来帮助您的听力。一些医生使用 *氟化钠* 试图阻止骨骼增生、但我们不清楚它的效果如何。

帮助您听力减退的两种方法就是使用助听器或做手术、有时两者都需要。在骨骼已经长入内耳并导致完全耳聋的某些情况下、人工耳蜗可能有所帮助。

助听器

助听器可以有效地弥补耳硬化症导致的听力损失。我们可能会建议使用助听器、因为它们安全且运作良好。但大多数健保险计划不涵盖助听器的全部费用。

手术

您的医生可能会与您讨论镫骨手术。有两种类型：**镫骨切除术**（切除整个镫骨）及**镫骨切开术**（仅去除部分镫骨、称为褶皱的部分）。这些类型的手术之间的选择取决于耳硬化的严重程度。

完全切除后、患者的低频听力比部分切除者较好、但高频听力较差。可以用激光或微钻做部分切除术、有助于减轻手术对内耳的影响。

手术可在**局部麻醉**或**全身麻醉**下做。使用局部麻醉时、会给您药物来阻止疼痛、但您还是清醒的。使用全身麻醉、会给您阻止疼痛及让您入睡的药物。

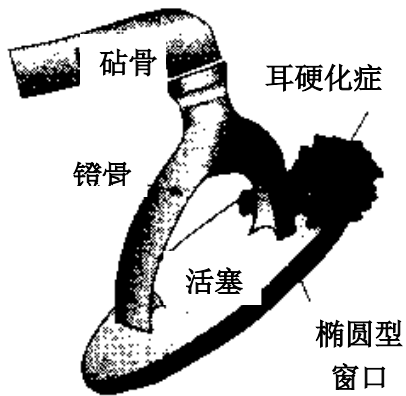
镫骨手术通常是门诊手术。您不必在医院过夜。但是、如您在手术后感到头晕、您可能需要在医院过夜。

一般镫骨手术后恢复很快。超过**90%**的手术（**100**个中有**90**人）改善或完全恢复听力。在**1%至2%**的患者中（**100**人中有**1至2**人）、耳中手术后听力全部损失、并在短期内有严重的头晕。

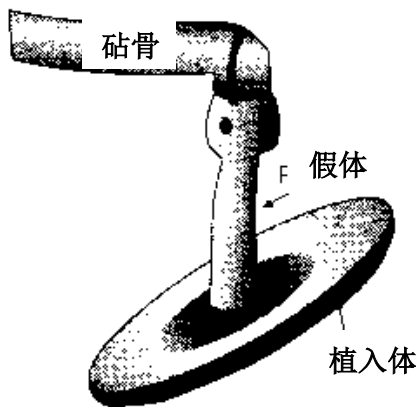
手术的选择

您的医生会考虑您的听力损失的程度及内耳的功能、来建议您做何种手术。如您有：

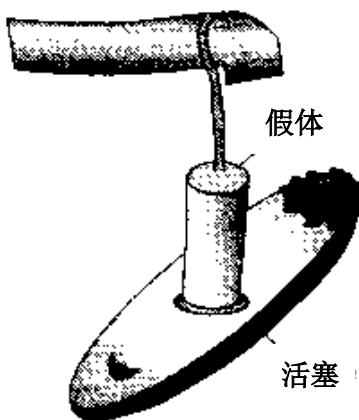
- **少量镫骨硬化症**：在病情恶化之前、我们不建议手术治疗。如您的听力受到影响、使用助听器将有所帮助。
- **单侧（单耳）耳硬化症**：镫骨手术可改善受影响的耳朵的听力、使您更容易知道声音的来源。它还能提高您在嘈杂环境中的听力。
- **良好的内耳功能和双耳听力差**：较差耳朵的镫骨手术有**90%**的几率（**100**个中的**90**个）可导致手术后听力正常、无需助听器。
- **一些内耳损伤**：手术的成功在于听力损失的程度。有时、内耳功能会改进、而不需要助听器。但是、可能需要**轻度增益**的助听器来改善远距离听力。如听力损失严重、可能需要强力的助听器。
- **因耳蜗硬化引起的耳聋**：镫骨手术对此情况是无助的。但是、人工耳蜗植入可能会有帮助、向您的医生咨询更多信息。



正常耳硬化症



全镫骨切除术



植入活塞假体的全镫骨切除术

镫骨手术

镫骨手术是经由耳道做的。可以在耳朵前面做一个小切口、以改善入路和获得少量的组织。该组织将用来密封人造镫骨活塞（假体）的周围。

在手术过程中、外科医生将耳膜向前转、并切除一部分镫骨（镫骨切开术）或全部（镫骨切除术）。这可以用微钻或激光来做。

活塞的导线环（请见左下图）连接在砧骨上、第二个接近镫骨的听骨。然后再将一些组织放置在内耳的开口周围以密封活塞的周围。然后外科医生将鼓膜返回到其正常位置并用软膏或敷料（绷带）填充耳道。

镫骨假体让声波从鼓膜传递到内耳。这让您再次听到声音。手术后恢复的听力通常是永久性的。手术后大约需要 4 到 6 周才能使您的听力得到改善。

手术当天

镫骨手术通常为门诊手术。您在手术的早晨到达医院、您将留在恢复室、直到您我们认为您可以离开。

您不能从医院开车回家、也不能自己乘公共汽车、出租车或其他交通工具。请安排一位家人或朋友开车送您回家。

手术后

旅行

您可以在手术后 48 小时乘飞机旅行。在此之后、最好等 4 到 6 个星期才乘飞机旅行。

活动

- 手术一周后、您应该可以回到办公室工作。如您您的工作需要大量的体力活动、您需要等 4 到 6 个星期后才能恢复到正常的工作水平。
- 避免在有枪声或机器等噪音响亮的环境。这可能会损害您的新听力。
- 我们建议您不要潜水或超过 6 英尺深的水下游泳。压力的变化会损害您的听力。为了保护您的听力、您需要终生遵循这个建议。

手术后听力的改进

手术后您的听力会更差。这是因为在您的耳道里给您的药膏或敷料、及您的耳膜后面所积累的液体。应在术后 3 周左右开始长期改善。大约 4 个月后、您的听力就会达到最佳状态。

听力改善程度在于您耳朵愈合的程度。对于大多数患者来说、耳朵愈合得非常好、并且听力会如他们所希望改进。如您的耳朵没有完全愈合、您的外科医生可能会建议做第二次手术。

如有必要、第二次耳手术可在第一次耳后一年做。

耳鸣

您可能在手术前有耳鸣 (耳鸣)。这种情况经常在从耳朵到大脑的神经冲击不能正常运作的时候发生。

耳鸣的程度并不一定是与听力损失的程度或类型有关。但是、这是听力损失的一个常见结果。当您累了、紧张了、或者在安静的环境中时、情况通常更显严重。当您在做一些需要脑力的事情、如阅读、听音乐或做其他活动时、您可能不会注意到耳鸣。

手术后、您很可能还会有耳鸣。但是、它通常不那么强烈、患者就没有意识到它。

镮骨切除术后的问题

感到头昏

术后几个小时感到头晕是正常的。这种情况会逐渐好转、但也可能在手术后的头几天、您仍然会感到不稳。几个星期内，如您快速地转动您的头，您可能会感到头晕。头晕持续数周以上是罕见的。

味觉改变

手术后的几个星期内、大多数患者的舌头和手术耳一侧会失去味觉。这是因为手术会影响 *鼓索神经*，它从口腔传到大脑时会通过中耳。

这种味觉的损失通常不会持久。当这种神经再次开始起作用时、大多数人的味觉都会恢复。

失去听力

手术后约 1% 至 2% 的患者（100 人中有 1 至 2 位）听力损失更多。这是因为：

- 结的疤痕
- 感染
- 血管痉挛
- 内耳受刺激
- 内耳积液渗漏

在 1% 至 2% 的患者（100 位中有 1 至 2 位）、在愈合期间可能出现严重的听力损失问题。在这些情况下、手术的耳朵助听器在也不能起作用。这也就是手术前选择听力最差的耳朵来做手术的原因。如出现问题、您的医生望另一只耳朵来保持较好的听力。

耳膜受损

在不到 1% 的患者（100 人中不到 1 位）、发生耳膜穿孔（穿孔）、通常是由于感染。感染清除后、膜可以自行愈合。如它不能愈合、可能需要做一种叫鼓膜成形术的手术来修复耳膜。

面瘫

镫骨手术后非常罕见的一个问题是面部无力。这可能是由于椭圆形窗口旁边的面神经肿胀、或者是由于某些其他异常。

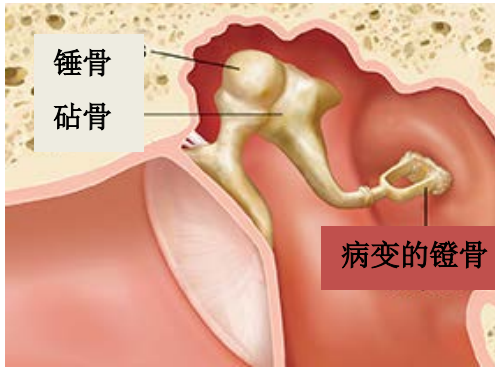
助听器

患有耳硬化症的人很少失去所有的听力。他们经常受益于助听器或助听器和手术。您年龄越大、手术后听力持续损失的可能性就越小。无论您是否接受手术、您都可能会发现适合的助听器是很有帮助的。

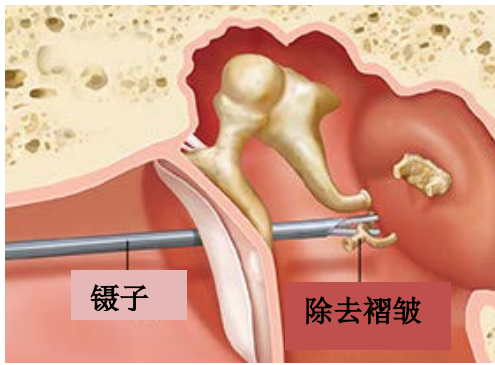
我们关心您的听力

如您的医生建议做镫骨手术、但您尚未做手术。我们建议您每年做一次听力测试。您可以选择任何时间做手术都会有良好的效果。如有任何问题、请致电或写信给我们。

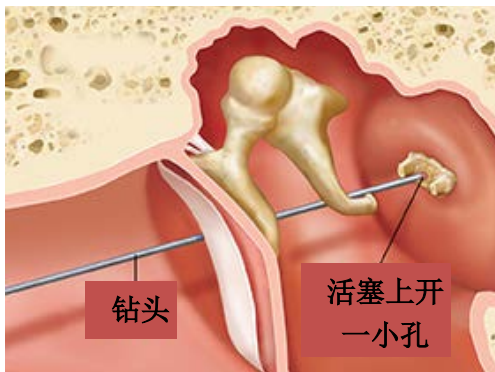
镫骨手术



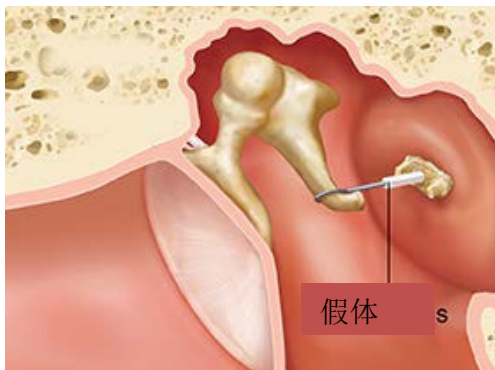
中耳有3个骨头：锤骨，砧骨和镫骨。



您的外科医生使用镊子除去褶皱，镫骨的受损部分。



您的外科医生将使用钻头在假肢镫骨的足板上开一个小孔。



当假体安置好，您的耳朵就开始愈合。

您有疑问吗？

我们很重视您的提问。您有疑问或顾虑时、请致电您的医生或医护人员

安排门诊预约，致电耳鼻喉科 - 头颈外科中心

206.598.4022、当您听到录音时、再按8与前台服务人员联系

如您已经是病人但对您的治疗计划有疑问：

- 工作日上午8点至下午5点、请致电喉科的语音信箱 206.598.4437
- 下班以后及周末假期、请致电 206.598.4022 当您听到录音时、再按5。就会将您转到社区护理专线的护士。

Otosclerosis and Stapes Surgery

How to prepare and what to expect

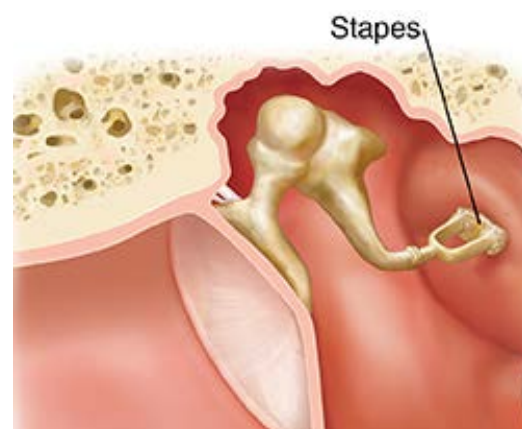
This handout explains otosclerosis, an ear problem that causes hearing loss. It also describes stapes surgery, which is done to improve hearing.

What is otosclerosis?

Otosclerosis (oh-toh-skleh-ROH-sis) is abnormal growth on the tiny *stapes* (stirrup) bone in your middle ear. This growth keeps the stapes from vibrating in response to sound.

Otosclerosis is the most common cause of *conductive* hearing loss in adults. Conductive hearing loss is when sound waves cannot move normally in the ear (see page 3).

At first, otosclerosis does not cause any symptoms. Hearing loss begins when the bone growth starts to affect how the stapes works. As the bone keeps growing, the hearing loss gets worse.



Otosclerosis affects the stapes, a tiny bone in your middle ear.

The good news is that hearing loss occurs in only 10% of people (10 out of 100) who have otosclerosis. Profound (severe) hearing loss and deafness are very rare.

What causes otosclerosis?

Otosclerosis can be *hereditary*, which means it may be passed from parents to their children. Someone in your family may have had the condition and passed it down to you. If you have otosclerosis, your children may inherit it. Hearing loss may not occur in all generations.

The measles virus may affect whether or not you develop otosclerosis, but measles alone do not cause it.

How is it treated?

Your doctor may advise hearing aids or that you have stapes surgery to treat otosclerosis. Sometimes, both surgery and a hearing aid are needed.

It is very rare for otosclerosis to cause total deafness. But if this happens, a *cochlear implant* is an option. Please see our handout “Cochlear Implant” to learn more.

Normal Ear Function

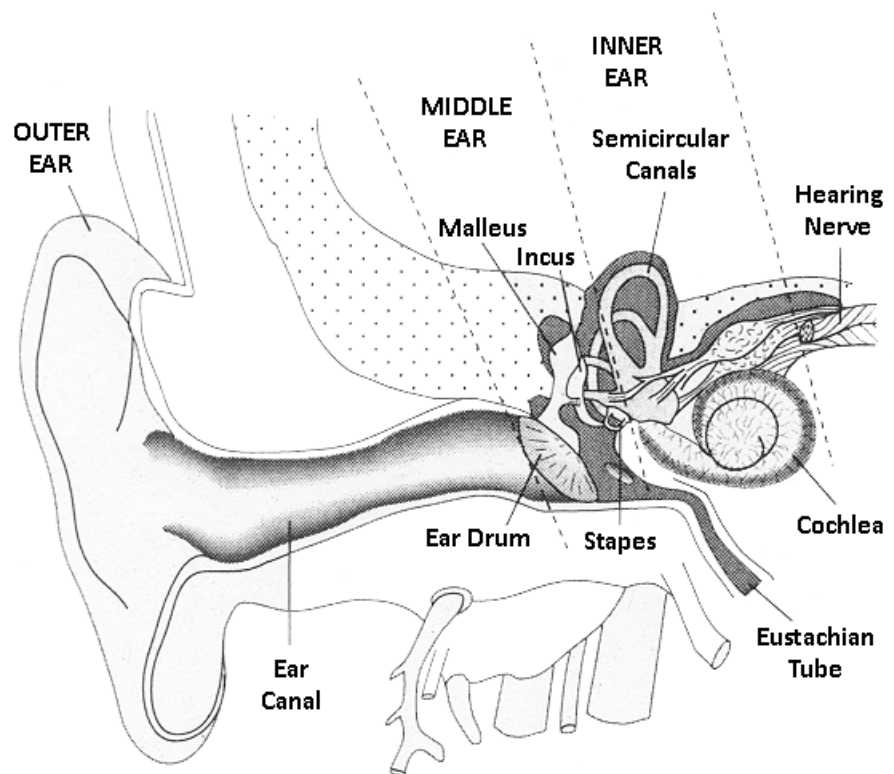
The ear has 3 parts:

- The **outer ear** collects sound waves.
- The **middle ear** increases the sound energy and sends the sound to the inner ear.
- The **inner ear** changes the sound waves into nerve impulses that are sent to the brain.

As sound waves pass through the ear canal, the eardrum vibrates. This vibrating motion is sent through 3 small *ossicle* bones in the middle ear: the *malleus* (hammer), *incus* (anvil), and *stapes* (stirrup).

When the stapes bone receives sound waves, it pushes on a thin membrane called the *oval window*. This causes movement in the *cochlea*, a sense organ in the inner ear.

Inside the cochlea are tiny hair cells that convert these vibrations to electrical impulses. A hearing nerve carries these impulses to the brain. The brain interprets these impulses as sound. This allows you to hear.



Parts of the ear

Types of Hearing Loss

- **Conductive hearing loss** occurs when there is a problem in the outer or middle ear that lessens the flow of sound vibration to the inner ear. In other words, sound vibrations are not “conducted” well through the ear. In otosclerosis, the new bone growth next to the stapes acts like cement and affects how well these vibrations are conducted through the hearing bones (ossicles).
- **Sensory hearing loss** occurs if the problem is in the inner ear.

Otosclerosis most often causes conductive hearing loss, but sometimes there is a mix of both types. It is very rare for the hearing nerve to be involved.

Hearing Loss from Otosclerosis

Stapedial Otosclerosis

In about 10% of people (10 out of 100) who have otosclerosis, the new bone growth affects the stapes and the oval window. The usual vibration of the stapes on the membrane is restricted (in early cases) or gone (in late cases). This is called *stapedial otosclerosis*.

Cochlear Otosclerosis

About 1% to 2% of people (1 to 2 out of 100) who have otosclerosis develop *cochlear otosclerosis*. This is when the bone growth spreads to the inner ear. If this occurs, the hearing loss is permanent.

Treatment for Otosclerosis

Medical

There is no medicine or treatment that can be applied directly to the ear that will help your hearing if you have otosclerosis. Some doctors have used *sodium fluoride* to try to stop the bone growth, but we are unclear how effective it is.

The 2 ways to help your hearing loss are by using a hearing aid or doing surgery, and sometimes both. In some cases where bone has grown into the inner ear and caused total deafness, a *cochlear implant* may help.

Hearing Aids

A hearing aid works well to make up for the hearing loss from otosclerosis. We may advise using a hearing aid, since they are safe and work well. Most health insurance plans do not cover the full cost of hearing aids.

Surgery

Your doctor may talk with you about stapes surgery. There are 2 types: *stapedectomy* (removing the entire stapes) and *stapedotomy* (removing only part of the stapes, called the *crura*). The choice between these types of surgery depends on how severe the otosclerosis is.

After total removal, the patient has better low-frequency hearing but poorer high-frequency hearing than with a partial removal. A partial removal may be done with a laser or a microdrill to help lessen the effects of the surgery on the inner ear.

The operation may be done under *local anesthetic* or *general anesthesia*. In local anesthesia, you will receive medicine to block pain, but you will stay awake. With general anesthesia, you will receive medicine that will both block pain and make you sleep.

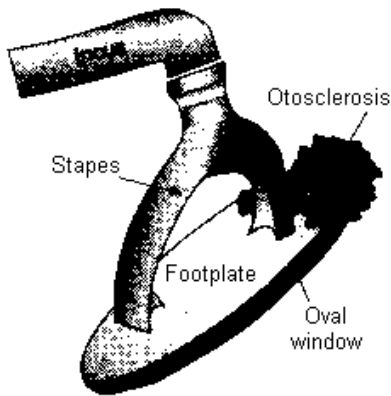
Stapes surgery can usually be done as an *outpatient* procedure. This means you do not have to stay overnight in the hospital. But, if you feel dizzy after the operation, you may need to stay overnight.

Recovery after stapes surgery usually goes quickly. Over 90% of these surgeries (90 out of 100) improve or fully restore hearing. In 1% to 2% of patients (1 to 2 out of 100), there is total hearing loss in the operated ear and short-term severe dizziness.

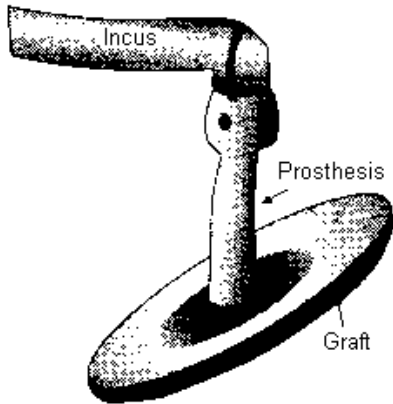
Surgery Options

Your doctor will consider the level of hearing loss in both of your ears and the level of inner ear function when advising you on what kind of surgery to have. If you have:

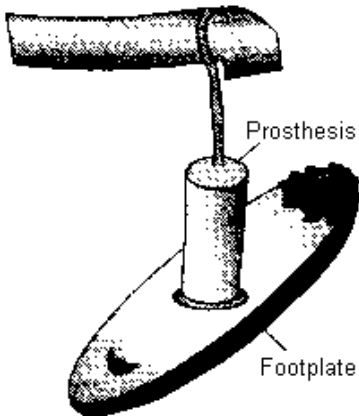
- **A small amount of stapedial otosclerosis:** We do not advise surgery until the condition gets worse. A hearing aid will help if your hearing is affected.
- **Unilateral (one-ear) otosclerosis:** Stapes surgery will improve hearing in the affected ear, make it easier for you to know where sound is coming from. It should also improve your ability to hear in a noisy setting.
- **Good inner ear function and poor hearing in both ears:** Stapes surgery in the poorer ear has a 90% chance (90 out of 100) of resulting in normal hearing after surgery, without the need for hearing aids.
- **Some inner ear damage:** The success of surgery depends on how much hearing loss there is. Sometimes, the inner ear works better so that a hearing aid is not needed. But, a *mild-gain* hearing aid may be needed for distance hearing. A powerful hearing aid may be needed if loss is severe.



Normal stapes with otosclerosis



Total stapedectomy



Stapedotomy with piston prosthesis

- **Total deafness due to cochlear otosclerosis:** Stapes surgery will not help. But, a cochlear implant may be helpful. Ask your doctor for more information.

Stapes Surgery

Stapes surgery is done through the ear canal. A small incision may be made in front of the ear to improve access and to get a small amount of tissue. This tissue will be used as a seal around the man-made stapes piston (*prosthesis*).

During surgery, the surgeon turns the eardrum forward and removes part (stapedotomy) or all (stapedectomy) of the stapes bone. This may be done with either a microdrill or a laser.

The wire loop of the piston (see drawing at bottom left) is attached to the *incus*, the second hearing bone next to the stapes. Then some tissue is placed around the opening to the inner ear to seal around the piston. The surgeon then returns the eardrum to its normal position and fills the ear canal with ointment or a dressing (bandage).

The stapes prosthesis lets sound waves pass from the eardrum to the inner ear. This lets you hear again. The hearing regained after surgery is usually permanent. It may take about 4 to 6 weeks after surgery for your hearing to improve.

Day of Surgery

Stapes surgery is usually done as outpatient surgery. You will arrive at the hospital the morning of the surgery, and you will stay in the recovery room until you are well enough to leave.

You may **not** drive yourself home from the hospital, or take a bus, taxi, or other transportation by yourself. Bring a family member or friend to drive you home.

After Surgery

Travel

You may travel by air up to 48 hours after surgery. After this, it is best to wait 4 to 6 weeks to travel by air.

Activities

- You should be able to return to a desk job about 1 week after surgery. If you must do heavy physical activity for your job, you will need to wait 4 to 6 weeks to return to your normal level of work.
- Avoid being around loud noises such as gunfire or machinery. These may damage your new hearing.

- We advise you **not** to dive or swim more than 6 feet under water. The pressure changes could damage your hearing. To protect your hearing, you will need to follow this advice **for the rest of your life**.

Hearing Improvement After Surgery

Your hearing will be worse right after surgery. This is from the ointment or dressing in your ear canal and the fluid that builds up behind your eardrum. Long-term improvements should begin about 3 weeks after surgery. In about 4 months, your hearing should be at its best.

The level of hearing improvement depends on how well your ear heals. For most patients, the ear heals very well and hearing improves as they had hoped. If your ear does not heal all the way, your surgeon may advise a 2nd surgery.

If needed, surgery on the 2nd ear may be done 1 year after the first ear.

Tinnitus

You may have some *tinnitus* (ringing in your ears) before your surgery. This often occurs when the nerve impulses from the ear to the brain are not working well.

The level of tinnitus is not always related to the extent or type of hearing loss. But, it is a common result of hearing loss. It is usually worse when you are tired, nervous, or in a quiet setting. When you are doing something that occupies your mind such as reading, listening to music, or doing other activities, you may not notice the ringing.

After stapes surgery, you will most likely still have tinnitus. But, it is usually less intense and patients are not as aware of it.

Problems After Stapedectomy

Feeling Dizzy

It is normal to feel dizzy for a few hours after a stapedectomy. This will slowly get better, but you may still feel unsteady for the first few days after surgery. For several weeks, you may feel dizzy if you move your head quickly. It is rare for dizziness to last longer than several weeks.

Taste Changes

For a few weeks after surgery, most patients lose their ability to taste on the side of their tongue, on the side of the operated ear. This occurs because the surgery affects the *chorda tympani* nerve, which passes through the middle ear as it goes from the mouth to the brain.

This loss of taste usually does not last. As this nerve starts to work again, the sense of taste returns in most people.

Hearing Loss

About 1% to 2% of patients (1 to 2 out of 100) have more hearing loss after the surgery. This is due to:

- Scar tissue
- Infection
- Blood vessel spasm
- Irritation of the inner ear
- Leaking of inner ear fluid

In 1% to 2% of patients (1 to 2 out of 100), there may be major problems during healing that cause severe hearing loss. In these cases, hearing aids will not work in the operated ear. This is why the ear with the poorest hearing before surgery is chosen for surgery. Your doctor wants to preserve your better hearing in the other ear in case problems occur.

Ear Drum Damage

In less than 1% of patients (fewer than 1 out of 100), a hole in the eardrum (*perforation*) occurs, usually due to an infection. The membrane may heal itself after the infection is cleared. If it does not heal, a surgery called *myringoplasty* may be needed to repair the eardrum.

Face Weakness

A very rare problem of stapes surgery is weakness in the face. This may happen because of swelling of the facial nerve next to the oval window, or due to some other abnormality.

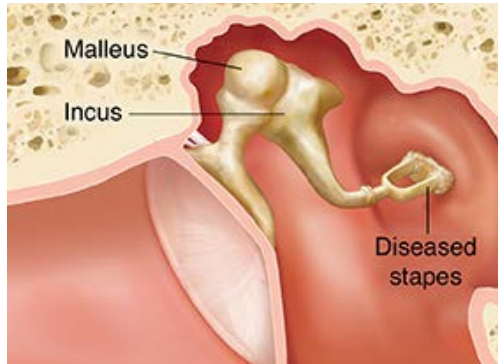
Hearing Aids

People with otosclerosis rarely lose all of their hearing. They often benefit from either a hearing aid alone or a hearing aid and surgery. The older you are, the less likely you are to have more hearing loss after surgery. You may find that good hearing aids that fit well are helpful, whether or not you have surgery.

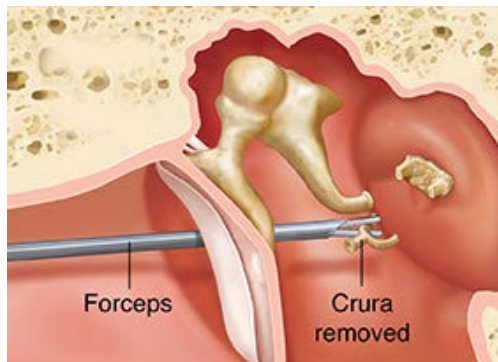
We Care About Your Hearing

If your doctor has advised stapes surgery but you have not yet had your operation, we advise you to have hearing tests every year. You may choose to have the surgery at any time with good results. Please call or write us with any questions you have.

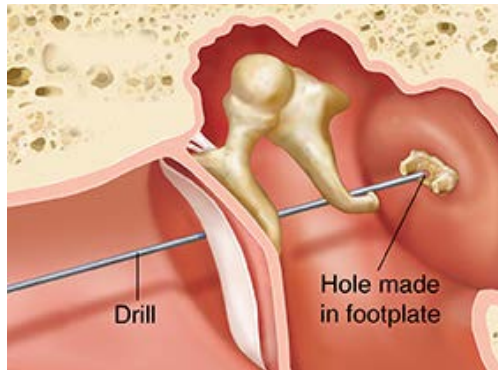
Stapes Surgery



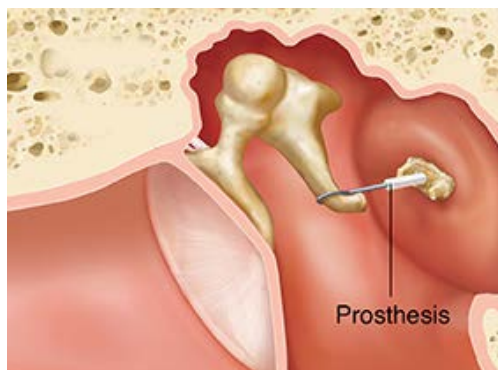
There are 3 bones in the middle ear: the malleus, incus, and stapes.



Your surgeon will use forceps to remove the crura, the damaged part of the stapes.



Your surgeon will use a drill to create a hole in the footplate of the stapes for the prosthesis.



Once the prosthesis is in place, your ear can begin to heal.

Questions?

Your questions are important. Call your doctor or health care provider if you have questions or concerns.

For appointments: Call Otolaryngology – Head and Neck Surgery Center at 206.598.4022.

If you are already a patient and have questions about your treatment plan:

- Weekdays from 8 a.m. to 5 p.m., call the Otology Voice Mail Line at 206.598.7519.
- After hours and on weekends and holidays, call 206.598.4022 and press 5 when you hear the recording. You will talk with a Community Care Line nurse.