



# Otosclerosis and the Stapes Surgery

**Drs. Howard P. House and Antonio De la Cruz Discuss the Evolution and Benefits of This Procedure**



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*Stapes surgery has been known by different names over the years as the techniques, materials and instruments have evolved. In our previous issue of House Calls Magazine we ran a human-interest story about a patient whose hearing had been restored after stapes surgeries for both ears. We referred to this patient's treatment as a "stapedectomy," as it is still widely called. In this Question and Answer, we asked ear specialists from the renowned House Ear Clinic to answer questions about the procedure currently known as a "stapedotomy."*

**Q: The stapes procedure is most commonly used for which type of hearing impairment?**

A: Otosclerosis, a common cause of conductive hearing impairment, which affects the smallest bone in the body known as the stapes. Otosclerosis is a hereditary disease that occurs when an abnormal growth of spongy bone surrounds the stapes making it fixed, or "locked," so that it cannot transmit sound effectively to the inner ear. Normally the stapes acts as a piston, which transmits the vibrations of sound to the fluids of the inner ear. When the stapes is fixed, this transmission does not occur effectively and the patient develops a conductive hearing loss.

**Q: How do stapes surgeries help patients with hearing loss?**

A: Stapes surgery has evolved over the years to treat otosclerosis. During stapes surgery, all or part of the stapes footplate is removed and a prosthesis is used to bypass the fixed stapes bone allowing transmission of sound from the middle ear to the inner ear fluids.

**Q: Can you describe, briefly, an early example of a surgical treatment for hearing loss due to otosclerosis?**

A: In the late 1800's the fenestration operation was developed to bypass the fixed stapes. An opening in the bone covering the inner ear was created allowing

**Q: What are the current surgical procedures used to treat hearing loss from otosclerosis?**

A: The laser or microdrill stapedotomy is the current procedure for replacing the stapes. For this surgery, different materials and techniques are used worldwide with similar results.

**Q: What are the surgical techniques and prosthetics that you use in this surgery?**

A: The stapedotomy procedure involves making a 0.7 mm round opening in the fixed footplate of the stapes with a laser and a diamond burr in order to insert the prosthesis, a miniature (4 mm – 5 mm) Teflon/platinum or steel piston.

**Q: How are current techniques and materials an improvement over the earlier treatments for otosclerosis?**

A: With the laser or microdrill stapedotomy, there is minimal mechanical manipulation of the footplate, reducing complications. The piston prosthesis greatly reduces the risk of hearing loss in patients and has had worldwide success. The stapedotomy is our first choice over its predecessor, the stapedectomy and we now rarely see post-operative dizziness. For this reason most patients are able to leave the hospital the same day. However, the stapedectomy is still performed in places around the world with good results.

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sound to bypass the stapes. It was first performed without antibiotics or microscopes and resulted in numerous complications including meningitis and death. At the turn of the century, the American Medical Association's International Congress of Otolaryngology suspended all surgeries for hearing restoration until complications for the patient could be significantly reduced.

**Q: What was the next step in the evolution of the stapes treatment?**

A: In 1922, Dr. Gunner Holmgren of Stockholm, Sweden, successfully re-introduced the fenestration procedure. He was the first to use a microscope to perform this surgery. Dr. Julius Lempert of New York further improved the surgical technique. In 1956, Dr. John Shea removed the fixed stapes from the oval window and inserted a prosthesis connecting the second ear bone, the incus, to the middle ear. This became known as the stapedectomy and the operation of choice throughout the world.

**Q: At what point in this history did you become involved in performing stapes treatments for your patients at the House Ear Clinic in Los Angeles?**

A: After I finished my residency at USC, I traveled for one year in this country and abroad learning from the giants in the field. In 1943, I took a course from Dr. Lempert and returned to Los Angeles in 1944 to start my practice in otology and began performing fenestration surgeries.

**Q: How many of these surgeries did you perform over the course of your medical practice?**

A: There was a time when I was performing 14 fenestration surgeries a week, including Saturdays. I performed a total of 3,000 fenestrations between 1943 and 1956. The families of two of my earliest fenestration patients, the Eccles and Witter families, were so pleased with the benefits gained from the procedure that they contributed funds to help establish the House Ear Institute as a non-profit research and education organization. ❖

**Q: How long does a stapedotomy typically take?**

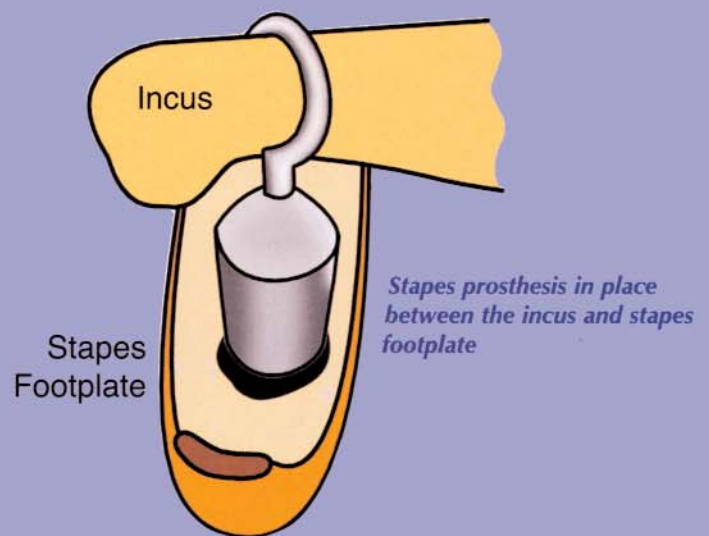
A: A stapedotomy is an outpatient procedure performed under local anesthesia. The entire surgery usually takes less than one hour.

**Q: What are the expected hearing results after stapes surgery?**

A: Over 90% of patients who undergo stapes surgery have their hearing restored. The majority of patients experience an improvement in hearing within 3 weeks following the surgery with maximum hearing improvement obtained in approximately 4 months. The degree of hearing improvement depends on how an individual's ear heals. For a small number of patients, hearing improvement may be only partial or temporary and one to two percent can lose some degree of hearing.

**Q: As Director of Education at HEI, do you teach this procedure to other physicians?**

A: Yes, as part of our education program, we train Ear, Nose and Throat specialists, hearing health professionals and scholars from all over the world. Instruction includes the stapedotomy procedure at HEI's renowned, state-of-the-art education facilities. HEI has trained more than 25,000 doctors and scholars in middle and inner ear procedures. ❖



Dr. De la Cruz's book, *Essentials in Otology and Neurotology*, which includes information about stapes surgeries from Howard P. House, M.D., is slated for publication in early 2003.