Stapedectomy Versus Stapedotomy

Horace C.S. Cheng, MD, MASc, Sumit K. Agrawal, MD, FRCSC, Lorne S. Parnes, MD, FRCSC*

KEYWORDS

• Stapes surgery • Stapedectomy • Stapedotomy • Otosclerosis

KEY POINTS

- Stapedectomy and stapedotomy represent the standard surgical procedures to address conductive hearing loss in otosclerosis.
- Stapedotomy provides better high frequency hearing improvement compared with stapedectomy.
- Both stapedectomy and stapedotomy have proven long-term stability in conductive hearing improvements.
- Stapedotomy has lower rates of complication compared with stapedectomy.
- Minimally invasive approaches may represent the next major development in stapes surgery in a selected patient population.

Video content accompanies this article at http://www.oto.theclinics.com.

INTRODUCTION

Some of the most illustrious physicians and otologists from the 18th and 19th centuries, including Valsalva, Toynbee, Troltsch, and Politzer, all played key roles in furthering the understanding of otosclerosis.[1,2] Despite some early promise, the morbidity and even mortality of stapes surgery made it too dangerous, and further attempts were subsequently abandoned. As the understanding of otologic physiology and medical technology improved, attempts to correct the cause of the conductive hearing loss were renewed in the 20th century. These efforts were supported by the introduction of precision surgical tools, better visualization with operating loupes, advances in the field of anesthesia, and the advent of antibiotics.

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Department of Otolaryngology–Head and Neck Surgery, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada
* Corresponding author. London Health Sciences Centre, University Hospital, B1-333, 339 Windermere Road, London, Ontario N6A 5A5, Canada.
E-mail address: parnes@uwo.ca

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The fenestration operation was the operation of choice in the mid 20th century. This procedure restored hearing by creating a new route for acoustic energy to propagate into the inner ear, bypassing the fixed stapes footplate. However, Rosen's discovery of hearing improvement from an accidental mobilization of the stapes in 1952[3] led to renewed interests in the mobilization procedures. Various new techniques and tools were introduced to improve the outcomes. However, they failed to address the recurrent ankylosis of the stapes footplate, the Achilles heel in the mobilization procedure. This factor ultimately led to the deterioration of hearing improvement in a significant proportion of patients.

It was Shea who performed the first stapedectomy in 1956,[4] heralding the modern era of stapes surgery. His first attempts were made with a Teflon replica of the stapes made by Harry Treace. His subsequent vein graft and polyethylene tube prostheses have since been modified with other graft materials and more standardized prefashioned prostheses (**Fig. 1**). Further modifications using micro hand drills, electric micro drills, and various lasers paved the way for the next innovation in stapes surgery whereby small openings just large enough to allow the insertion of piston like prostheses were made in the stapes footplate. Thus stapedotomy, or small fenestra stapedectomy as it was known at the time, was born. Marquet was generally considered to be the pioneer of this technique with his initial attempts in 1963.[5] This technique is illustrated in **Fig. 2**. Subsequent innovations including different prostheses materials and designs have further improved surgical outcomes and reduced complications.

The aim of this article is to provide an informed discussion about the differences between stapedectomy and stapedotomy. Short- and long-term surgical outcomes, and complications are the key areas for review. Furthermore, interesting aspects of stapes surgery such as the size of the prosthesis and the anesthetic choice are also discussed. We provide a brief overview of the modified stapes mobilization procedures and conclude the article with a "How I Do It" description of our own technique accompanied by an edited video of an operation.

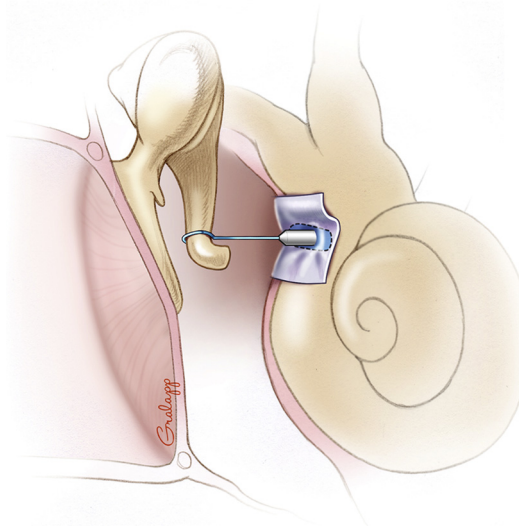

Fig. 1. Schematic diagram of total stapedectomy. Note the prosthesis inserted between the long process of the incus and the tissue graft over the oval window. (©Christine Gralapp.)