

Conductive Deafness— ITS SURGICAL TREATMENT

by

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When the antibiotics were first discovered, many thought that the end of aural surgery was near. At that time, the bulk of the surgery was done for acute infection, chiefly acute mastoiditis. Chronic disease of the ear, especially chronic suppurative otitis media, with or without mastoiditis, was also common, and mastoidectomies (radical or non-radical) appeared on almost all operating lists. In fact these operations were performed almost as frequently as tonsillectomies.

The antibiotics have reduced the dangers of an acute otitis media to such an extent that a cortical mastoidectomy is rarely necessary. Surgery for chronic disease is still undertaken, but a change in technique has modified present concepts, as we shall discuss later on.

Aural surgery, far from losing its importance, has progressed so much as to produce specialists within the Speciality. Not all otolaryngologists are aural surgeons. The latter require more training and greater surgical skill. In days gone by the surgery was directed against infection, and the patient, although cured, was usually left either totally deaf or with impaired hearing. Little attention was paid to function, while today normal or near-normal hearing is the goal of ear operations. This change was brought about, ironically enough, by the anti-biotics, as well as by better means of sterilization. While previously a labyrinthitis almost invariably meant a fatal meningitis, today surgeons are not afraid to approach the labyrinth, and openings into it are an everyday occurrence.

The operating microscope and better instruments were other factors responsible for the change.

Broadly speaking, aural surgery for deafness tries to repair some defect in the conducting mechanism of the middle ear which is either due to otosclerosis or is the result of infection.

In otosclerosis, new spongy bone develops in the capsule of the labyrinth, replacing the old bone and extending into the footplate of the stapes, thereby interfering with the normal function of the stapedovestibular joint. The disease is progressive and usually bilateral.

During the last century attempts to restore hearing by operation were many but failures were so frequent that leading authorities advised against surgery.

In 1945, Julius Lempert of New York perfected the technique of the fenestration operation. He replaced the oval window, which was blocked by the disease, by a new 'fenestra' in the external semicircular canal. The operation, therefore, short-circuited the ossicular chain and sound waves reached the labyrinth directly through the new opening. The results of the operation were extremely good and for 15 years no other technique was attempted.

The main objections to the fenestration operation were that only a limited number of otosclerotics were suitable, and that a cavity was produced in the mastoid process which required regular attention, and in some patients discharged continuously. Moreover, the operation, however successful, could never produce normal hearing.

The fenestration operation for otosclerosis is now obsolete, but there are thousands of patients all over the world who owe their hearing to Lempert and his successors.

The next operation to be developed was Mobilisation of the stapes. The technique was perfected by Samuel Rosen also of New York. The operation was more logical than fenestration because it aimed at curing the patient by using

is a rare occurrence and is known as Indirect Mobilisation. In the majority of cases, the stapes has to be mobilised directly by exerting pressure on the footplate itself. The operating microscope is of course used for all these stages.

The success of this operation, which is usually done under a local anaesthetic, is very dramatic. Well over 80% of the cases we operated by this technique

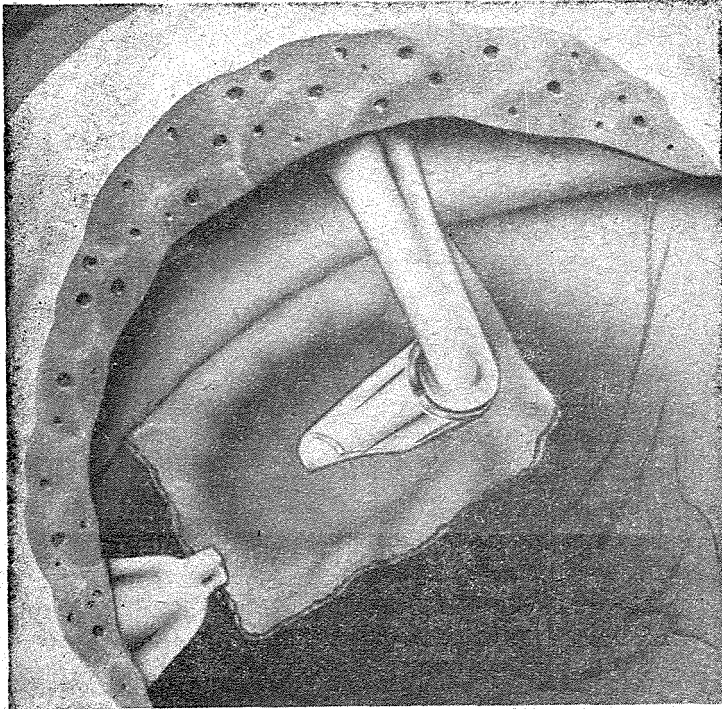


Fig. 1
STAPEDECTOMY. J. Shea's technique using vein graft and polyethelene tube.

the natural means of hearing — the drum and the ossicular chain.

Briefly the technique is as follows: An incision is made in the external auditory meatus and the soft tissues are elevated together with the drum. They are displaced forwards and the contents of the middle ear examined. When the otosclerotic focus is small, pressure on the neck of the stapes may break the focus and mobilisation is complete. This

regained their hearing on the operating table. Little trauma is done and the patient remains in hospital for only 24 hours. No prophylactic antibiotics are given and complications are rare.

The objection to mobilisation of the stapes is that the improvement in hearing is often temporary. Only 20% of the successful cases keep their gain after 18 months.

The general opinion today is that if

the gain in hearing is to be permanent, the stapes must be taken away — Stapedectomy. Naturally, this will disrupt the ossicular chain and, therefore, a link from the incus to the vestibular opening has to be made. At present there are 3 ways of effecting this:

1. Shea's method: The vestibular opening is covered by a vein graft and a polyethelene tube bridges the gap between the graft and the incus.

ed between the articular surfaces of the stapedovestibular joint. This principle is often used in orthopaedic surgery.

Opinion is divided as to which of these techniques is the best. They all give excellent and spectacular results and are suitable for all patients with otosclerosis, however deaf. We have tried all three methods and find the Schuknecht technique preferable. Interposition is the most difficult.

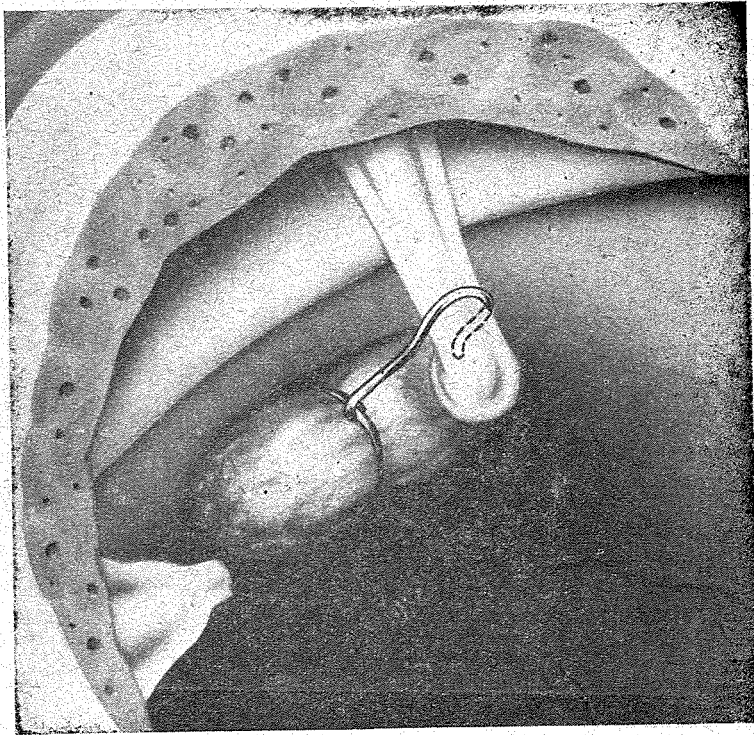


Fig. 2.
STAPEDECTOMY. The Schuknecht operation with fat plug and stainless steel wire.

2. Schuknecht's technique: The vestibular opening is closed by a plug of fat around which stainless steel wire has been tied; the end of the wire is anchored to the incus.

3. Portmann's Interposition: The vestibular opening is closed by a vein graft and the original stapes is replaced upon it. In other words, the graft is interpos-

Like other operations on the internal ear, total deafness may result, but this is a rare occurrence. We have only had one case in the past 7 years, and the deafness came on about 3 weeks after operation following an attack on influenza.

Infection is another complication which should, however, respond to anti-

biotics. Nowadays we prefer to use these drugs prophylactically and to continue them for one week after operation.

The other operations on the ear are intended to combat a chronic infection and at the same time repair the damage that has resulted from it. These are the **TYMPANOPLASTIES**, and, in the main, owe their evolution to the German School of otologists. The names of Zöll-

When the infection is quiescent and the contents of the middle ear are whole but are not functioning properly due to a perforation in the drum, a type I tympanoplasty can be done. The procedure is also known as Myringoplasty, and consists in the closure of the perforation by a graft. The material used for the graft varies with individual surgeons. We have used whole-thickness

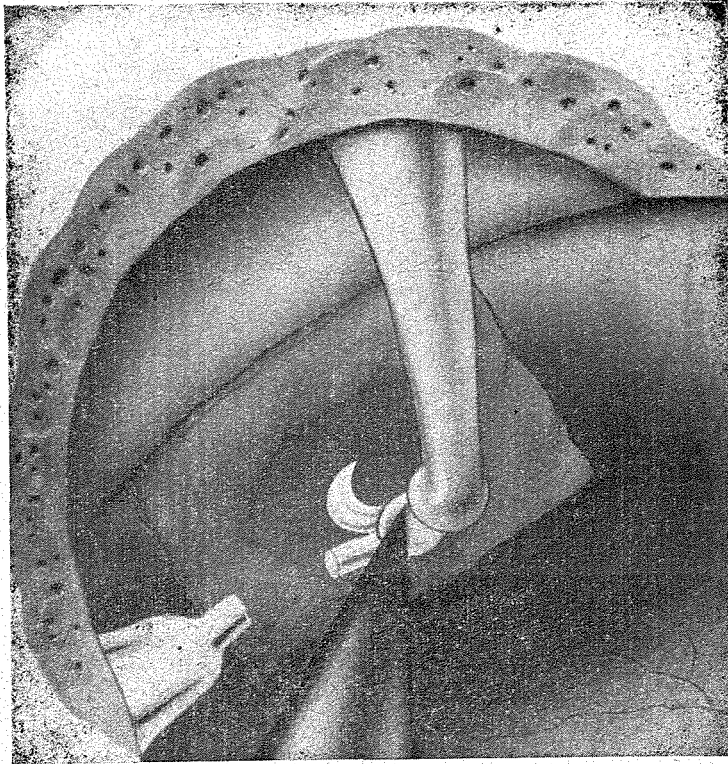


Fig. 3.
INTERPOSITION. The appearance of the middle ear at the end of the operation. A vein graft has been interposed between the remains of the stapes and the vestibular opening.

ner and Wullstein stand out amongst these. They applied well known physiological principles to surgery, and the results of these operations, when successful, are of benefit to the patient and gratifying to the surgeon.

There are 5 types of tympanoplasty according to the extent of disease and the damage that it has produced.

and split-skin grafts, vein and connective tissue, and find that the best is fascial graft taken from the temporal muscle. This almost invariably 'takes', and for the past 6 months we have not had one failure.

When a small cholesteatoma has eroded bone and disrupted the ossicular chain, a type II tympanoplasty has to

be done. Sound waves reaching the drum are transmitted to the internal ear via the malleus, incus and stapes, and when one or a part of these ossicles is eroded by disease, the so-called columella effect is lost. The chain must therefore be repaired. This is effected either by ossicular transposition or by bridging the gap in the chain by bone grafts or by artificial prosthesis. Results in this type are also good.

If after removal of diseased bone, and possibly also of a large cholesteatoma, one finds the middle ear contents to be almost entirely missing, a type III, type IV or type V tympanoplasty has to be done. Results in these types are not so good with regard to hearing. The technique is difficult and type V entails also a fenestration of the lateral semicircular canal, because the stapes is absent

and the footplate ankylosed in the oval window niche. In fact, if the post-operative hearing level remains the same as it was pre-operatively, the result is considered good.

SUMMARY

A brief description of the surgery of deafness has been given. Most of the operations are specialised and demand careful preparation before they are undertaken. Medical treatment should be tried in all cases before surgery is considered. The results of these operations are good, but there will clearly be improvements in the future. Although the advance in the last 10 to 15 years has been great, one cannot see that this will continue to be so unless more knowledge is gained about the character of the disease; this is especially true of otosclerosis.