

CASE REPORT

Otosclerosis and the Role of Second Ear Surgery

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SUMMARY

Hearing loss and tinnitus are the main symptoms of otosclerosis. Little is known about the cause of tinnitus in otosclerosis and the factors influencing the effect of surgery on tinnitus. Though by surgery, we are able to inform patient about probable hearing gain and even benefit concerning bilateral hearing, it is however difficult to predict the course of tinnitus. The principle aim of stapes surgery is to restore hearing but some patients also report reduction in the severity of tinnitus and even complete cessation of it. We describe a case report of a 37 year old male who underwent a second stapes surgery. We wish to illustrate that for our patient, tinnitus represents a major disturbance and the patient is as much concerned with the improvement of hearing as with the improvement of tinnitus.

KEY WORDS:

stapedotomy, second-ear surgery, otosclerosis, tinnitus

INTRODUCTION

Otosclerosis is a disorder of the human temporal bone with a hereditary predisposition that is among the most common causes of acquired hearing loss. The clinical prevalence of otosclerosis is estimated to be twice as common in females as in males. The usual initial manifestation is conductive hearing loss, which is often bilateral in 80% to 90% of patients. Tinnitus is also a common symptom. The sensation is generally one of ringing, hissing or buzzing in one or both ears and it is usually non pulsatile. Its intensity can vary greatly but it is rare for a patient to be severely distressed by it. Treatment for otosclerosis can be either non-surgical such as the use of hearing aid or surgery namely stapedectomy or stapedotomy. The principal aim of stapes surgery is restoration of hearing but some patients also report reduction in the severity of their tinnitus or even complete cessation of it. However, the decision to perform second side or second ear surgery following a successful first stapes surgery is still the subject of controversy.

CASE REPORT

A 37 year old Indian male first presented at the age of 28 with reduced hearing on both ears of insidious onset, progressively worsening and associated with continuous, low pitched tinnitus for one year duration. He had no history of otalgia, persistent otorrhea, head trauma or vertigo. Pure tone audiometry (PTA) showed bilateral conductive hearing loss with an air bone gap of 30 to 50 dB with a Carhart's notch; worse on the right ear. He then underwent a right partial

stapedectomy. Postoperatively, his PTA for the right ear improved to within normal hearing level and he was happy with it (Figure 1). The surgeon at that time had advised him for a second ear surgery after one year. He however was not keen on another surgery and later defaulted his follow up.

He presented again after eight years with complain of progressive worsening of tinnitus with impaired hearing of the left ear. The continuous, low pitched tinnitus had affected his daily activities especially his work and often disturbed his sleep. He was advised for the second stapes surgery and finally agreed.

Otoscopic examination showed a normal left tympanic membrane with a negative Schwartz sign. The right ear was normal. A voice test performed indicated approximately 40 to 60 dB hearing level. A tuning fork test indicated a conductive hearing loss for the left ear. His pure tone audiometry (PTA) showed a left moderate conductive hearing loss with an air bone gap of 40 dB and a Carhart's notch. The right ear had normal hearing level.

He underwent a left stapedotomy. A fixed stapes footplate was identified intraoperatively after which a piston size 0.6mm was inserted. His postoperative period was uneventful and he was discharged well on the next day. He was seen 10 days after the operation and was pleased that the tinnitus had substantially reduced in intensity with noticeable improvement of hearing over the left ear. His PTA showed closure of the air bone gap of the left ear to about 20dB. (Figure 2)

DISCUSSION

Otosclerosis is a localized disorder of bone metabolism of otic capsule endochondral bone that is characterized by disordered resorption and deposition of bone. It is due to fixation of the stapedia footplate along its anterior annulus. This condition presents a characteristic clinical picture of progressive conductive unilateral or bilateral hearing loss. The onset of hearing loss is usually between the third and fifth decade, with a higher prevalence in women.

Denis *et al*¹ reported that stapes surgery was valuable in the improvement of severe and disturbing tinnitus, as seen this case report. Szymanski *et al*² concluded that tinnitus improvement after surgery is not related to the quality of the hearing result and that the outcome of stapedotomy in relation to tinnitus improvement cannot be predicted pre-operatively. However, a significant proportion of patients

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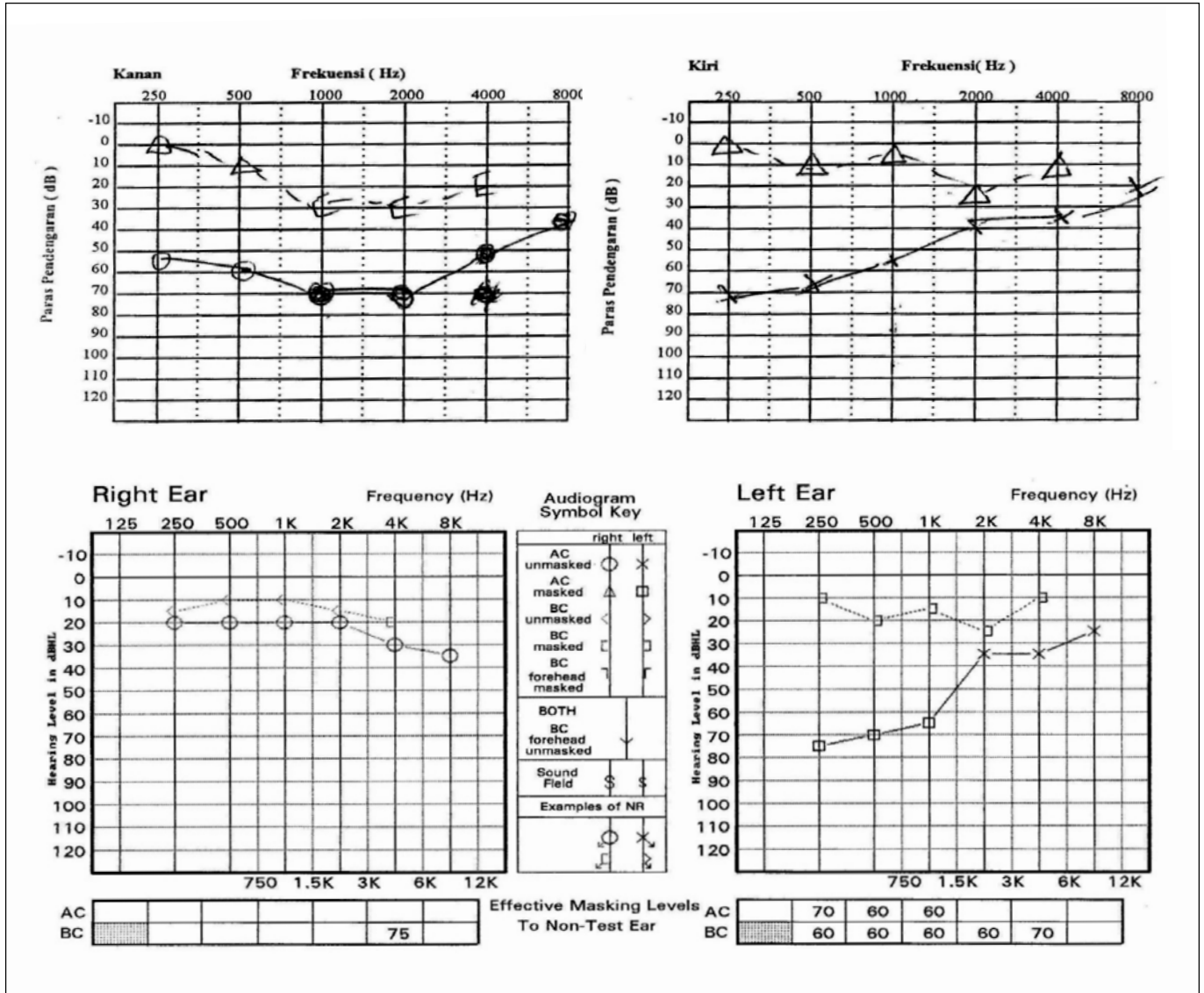


Fig. 1: First stapes surgery on right ear: Pure tone audiogram pre (above) and post op (below) showing closure of air bone gap.

can be expected to report improvement after surgery. As highlighted in this case report, the patient had disturbing tinnitus that interferes with his daily activities. Though he reported significant improvement in his hearing status, the tinnitus finally became a major disturbance prompting him to agree for surgery. The findings of Szymanski study support the theory that tinnitus in otosclerosis is due to impairment of the fluid mechanics of the cochlea.

Nowadays, stapes surgery has established its position as the primary treatment of conductive hearing losses in otosclerosis. A current trend has been the movement from total or partial stapedectomy to small fenestra stapedotomy as described in this case report. This trend reflects the thought that the limited opening of the vestibule in small fenestra techniques carries a reduced risk of damage to the inner ear. Surgical intervention on the better hearing ear or only hearing ear is a relative contraindication. The worse hearing ear should be approached first as what was illustrated in this case report. In those patients with unilateral mixed hearing loss, it is important to consider the outcome of obtaining a serviceable hearing. Improved communication in such a patient may not be achieved after elimination of

the conductive component due to the continued sensorineural hearing loss (SNHL). However, more important than innovations in techniques or technology, the experience of the surgeon may be the most important determinant of successful stapes surgery.

In patients with bilateral otosclerosis, the decision to perform second-ear stapes surgery is still controversial. There is a risk of immediate or delayed sensorineural hearing loss, and the patients operated on both sides are exposed to the risk twice. Vestibular damage can also occur with permanent loss of balance. Typically, the second ear surgery would be considered at least a year after the first successful stapes surgery. The low risk of delayed sensorineural hearing loss after stapedotomy appears to support the policy of performing a second ear operation for optimum auditory rehabilitation³. Conventionally, the results of stapes surgery are reported in terms of improvement in air conduction threshold and postoperative closure of the air-bone gap. These methods are appropriate for the purpose of assessing the surgical success⁴. It is, however, also important to be aware of the benefit a patient will obtain after stapes surgery, especially when considering second-ear surgery. de Bruijn *et al*⁵, concluded

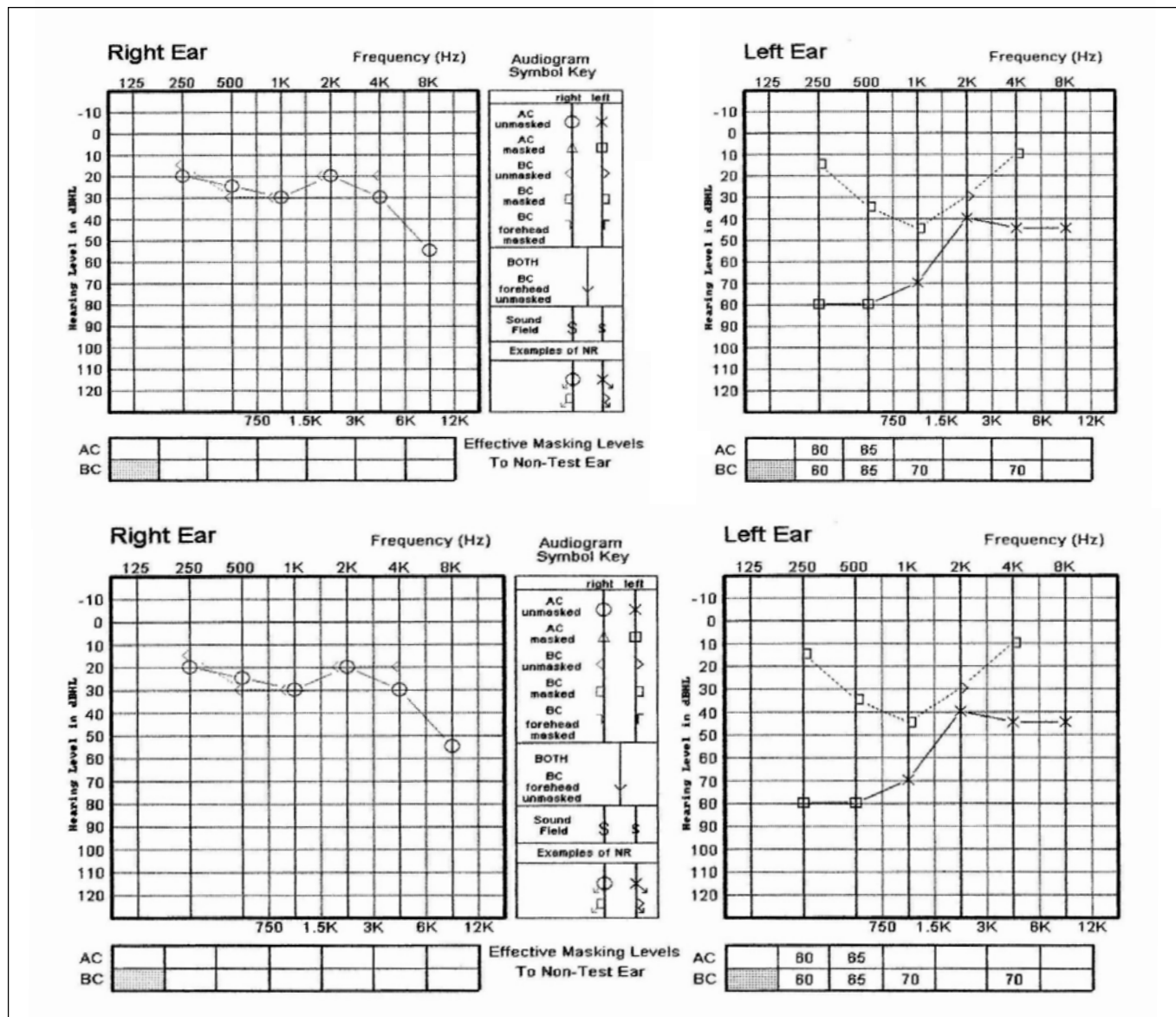


Fig. 2: Second stapes surgery on left ear, eight years after the first surgery on the right: Pure tone audiogram pre (above) and post op (below) showing closure of air bone gap.

that a second-ear stapedotomy improves the chance of achieving 'normal and symmetrical hearing'. Those patients who had good result from the first-ear operation may expect a good result from their second-ear operation. By using the Glasgow Benefit Plot, they were able to evaluate the hearing results of each individual ear after stapes surgery in a more functional way rather than from a technical standpoint and identify the patients who will have less benefit of stapes surgery and particularly of second-ear stapes surgery.

Although surgical treatment, in the hands of experienced surgeon provides a good outcome for the condition, the usage of hearing aid also has a role. Hearing aids are usually very effective early in the course of the disease. Air conduction hearing aid can be commenced when the hearing loss is moderate. Bone conduction hearing aid or bone anchored hearing aid (BAHA) offers a third treatment option for otosclerosis in patients who refuse or experience difficulty with conventional hearing aids. Although hearing aid is a useful non surgical treatment options, eventually a stapes surgery may be required for definitive treatment.

In conclusion, second ear surgery clearly has a role in otosclerosis. The advantages if it is successful are the improvement of binaural hearing and consequently the ability to localize the direction from which the sound is coming. We believe and would like to support that performing second surgery in otosclerosis is beneficial in terms of improvement in hearing as well as improvement in tinnitus.

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