
CASE REPORT

Resolution of Delayed Sudden Sensorineural Hearing Loss After Stapedectomy: A Case Report and Review of the Literature

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Significant sensorineural hearing loss may develop immediately after successful stapedectomy but sometimes occurs months or even years later. The rate of recovery from that disorder has not been determined. Several reports in the 1960s described patients with delayed sensorineural hearing loss, but that entity has not been mentioned in the English-language literature for the last 30 years. We present a review of the literature on this postsurgical auditory complication and describe a patient with delayed poststapedectomy sensorineural hearing loss that developed 15 months after surgery and resolved completely after treatment with an oral steroid.

Sensorineural hearing loss (SNHL), a devastating postsurgical complication of stapedectomy, is often accompanied by vertigo and tinnitus. The reported incidence of SNHL varies between 0.2% and 1% in patients who have undergone primary stapedectomy.¹ In cases of revision stapedectomy, rates of up to 14% have been reported.² SNHL may develop immediately after surgery or days, weeks, months, or years after the procedure.³

SNHL that appears months after stapes surgery is thought to result from intravestibular granuloma, perilymphatic fistula,⁴ or migration of the prosthesis (which can be identified by high-resolution computed tomography [HRCT]).^{5,6} Increased middle-ear pressure was suggested as a cause of immediate poststapedectomy SNHL in a patient who responded well to high-dose steroid treatment.⁷ In the following case report, we describe a patient who experienced this complication and recovered completely after steroid therapy.

CASE REPORT

A 33-year-old woman with a unilateral conductive hearing loss in her right ear underwent right-sided stapedectomy. Before surgery she did not complain of tinnitus, and her family history was negative for SNHL. During surgery, the hole in the footplate was covered by temporalis fascia, and a 4.0-mm Robinson's prosthesis was used. Postoperative hearing results were satisfactory (Figure 1, a and b); the patient's postoperative vertiginous complaints were minimal, and she did not complain of tinnitus. During her follow-up examination at our outpatient clinic, 4 months after the surgery, she complained of mild hyperacusis, which persisted for a few weeks after surgery and resolved spontaneously.

When the patient awakened one morning 15 months after surgery, she noticed diminished hearing and tinnitus in the operated ear. She denied any excessive strain, lifting of weights, head trauma, or upper respiratory tract infection in the period before that event. On examination in our Emergency Department, her otoscopic function and vestibular function were within

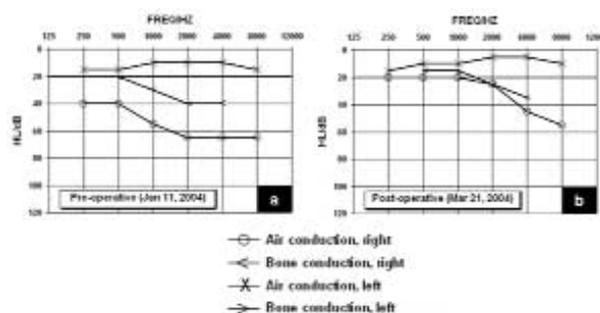


Figure 1, a and b: (a) Preoperative audiogram shows right mixed conductive and sensorineural hearing loss. Word recognition (right) was 92%. (b) Audiogram obtained 2 months after right stapedectomy shows satisfactory closure of the right air-bone gap and some improvement in bone conduction at 1000, 2000, and 4000 Hz. Word recognition (right) was 100%.

normal limits. The results of audiometry revealed a mixed hearing loss in the right ear (Figure 2). HRCT showed a satisfactory position of the prosthesis (Figure 3) and no pathologic conditions of the middle-ear cleft.

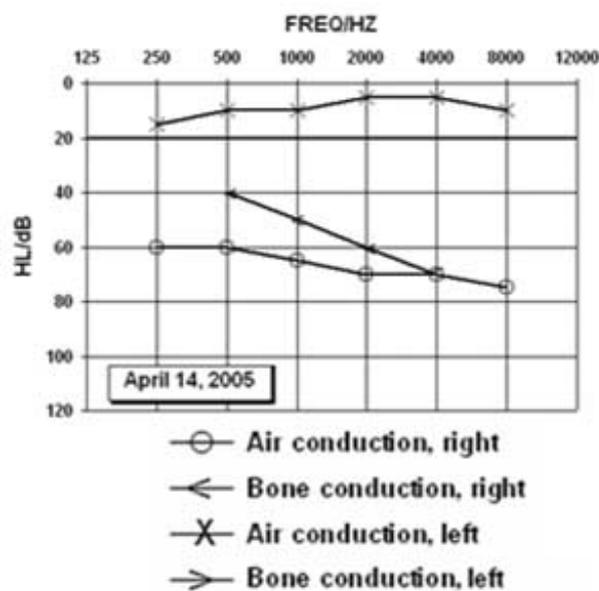


Figure 2: Audiogram showing delayed onset of sudden sensorineural hearing loss that occurred 15 months after successful stapedectomy. Word recognition (right) was 100%.

The patient was hospitalized on complete bed rest and was treated with oral prednisone 1 mg/kg/d, which was equivalent to an overall dose of 60 mg/d. Five days



Figure 3, a and b: High-resolution computed tomographic image (axial view) obtained on admission to the hospital for the treatment of sudden sensorineural hearing loss. In images a and b, the prosthesis is in place (white arrow), and the vestibule is shown (thick black arrow). The thin black arrow (image a) points to the thickened footplate.

after steroid treatment was initiated, she reported an improvement in hearing and cessation of the tinnitus on the affected side, and a marked improvement was revealed on audiometric testing (Figure 4a). The dosage of oral prednisolone was reduced to 40 mg/d for 5 more days and was further reduced over the following 10 days. During her follow-up examination at the

outpatient clinic (5 months after the development of SNHL), the patient reported complete resolution of her complaints. Her subjective report was confirmed by the results of audiometry (Figure 4b).

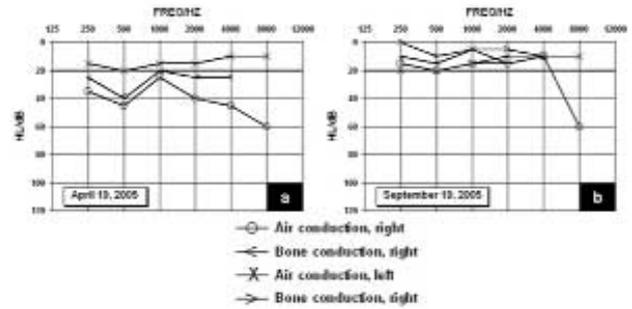


Figure 4, a and b: (a) Audiogram obtained 5 days after the initiation of steroid treatment shows improvement in bone conduction at 500, 1000, 2000, and 4000 Hz. Word recognition (right) was 100%. (b) The last follow-up audiogram (5 months after sudden sensorineural hearing loss) shows further improvement in bone conduction. Word recognition (right) was 96%.

DISCUSSION

The development of delayed SNHL after successful stapedectomy is a known and severe complication of that surgical procedure. Only a few reports of this entity have been published, and the information they offer is limited (Table). Schuknecht⁸ reported that delayed SNHL developed 6 months after surgery in 2 patients in

Table. Results of delayed post-stapedectomy sensorineural hearing loss, 1960-2005

Duration of follow-up after SNHL (mo)	Interval between treatment and hearing	Treatment	Medical event before SNHL symptoms	Accompanying g symptoms	Characteristics of SNHL	Onset of SNHL after stapedectomy (mo)	Previous ipsilateral stapes procedure (date)	Date of Surgery	Patient age (y) and sex	No. of Cases	Author
NA	No improvement	NA	NA	NA	NA	6	NA	NA	NA	2	Schuknecht ⁸
NA	NA	NA	NA	Tinnitus, fullness	Preceded by a period of hearing fluctuation	NA	NA	NA	NA	2	Shea Jr ⁷
35	1	Hydrocortisone, procaine hydrochloride	URTI	Tinnitus	Sudden onset	8	Stapes mobilization (1958)	Feb 1960	38; Male		
6	1	Hydrocortisone, histamine-sulfate, diphenhydramine, vitamin C, meprobamate, nicotinic acid	URTI	Tinnitus	Sudden onset	9	None	May 1962	50; Female	2	Hora ¹⁰
5	5	Prednisone	None	Tinnitus	Sudden onset	13	None	Jan 2004	33; Female	1	Our patient

SNHL, Sensorineural hearing loss; URTI, upper respiratory tract infection; NA, non available

his series of 750 primary stapedectomy cases. The results of long-term follow-up and the final outcome of treatment in those patients were not described. Shea Jr⁹ described 2 patients in whom delayed SNHL developed suddenly several months after primary stapedectomy. Before the development of hearing loss, both of those patients had complained of fluctuations in their hearing, which might have been a sign of serous labyrinthitis. Those patients also experienced a worsening of pre-existing tinnitus after the hearing loss developed. Hora¹⁰ described 2 patients with delayed hearing loss after stapedectomy. The first was a 38-year-old man in whom SNHL developed 8 months after successful revision stapedectomy. Treatment with intravenous hydrocortisone, which was initiated at a dosage of 100 mg and was tapered by 10 mg each day for 7 days, resulted in a substantial improvement in his hearing. The second patient was a 50-year-old woman in whom SNHL developed 9 months after primary stapedectomy. She was treated with a similar course of hydrocortisone therapy, but for only 4 days. Her hearing function fluctuated for a year until the hearing loss had completely resolved.

With continuing improvement in surgical techniques and patient care, it seems that one of the remaining goals in stapes surgery is to further reduce the rates of partial or total poststapedectomy SNHL. HRCT and ultra-HRCT enable the accurate assessment of the position of the prosthesis (especially the position of the tip in the vestibule) (Figure 3). Postoperative middle-ear granuloma and the presence of middle-ear fluid caused by either perilymphatic fistula or otitis media with effusion also can be identified by HRCT. Although it is recommended for patients with immediate poststapedectomy SNHL, middle-ear exploration yields poor results, which also might be expected in patients with a delayed poststapedectomy event.^{11, 12}

The case described in this report suggests that delayed poststapedectomy SNHL, which is an extremely troublesome complication, might nevertheless have a favorable outcome. The patient described did seem to fulfill the criteria for this diagnosis, but the cause of her condition remains

unconfirmed, as it does in most such patients. Perhaps she experienced the effect of sudden idiopathic SNHL, but her hearing loss may have been a complication of stapedectomy. It is hard to determine whether steroid treatment was responsible for the restoration of sensorineural hearing in our patient and in the 2 patients described by Hora.¹⁰ According to currently acceptable treatment protocols for fluctuating or sudden idiopathic SNHL,¹³⁻²⁰ the use of steroids in similar cases appears mandatory, as does initiating steroid treatment as early as possible.

REFERENCES

1. Mann WJ, Amedee RG, Fuerst G, Tabb HG. Hearing loss as a complication of stapes surgery. *Otolaryngol Head Neck Surg* 1996;115:324-8.
2. Lesinski SG, Stein JA. Stapedectomy revision with the CO2 laser. *Laryngoscope* 1989;99:13-9.
3. Wiet RJ, Harvey SA, Bauer GP. Complications in stapes surgery. Options for prevention and management. *Otolaryngol Clin North Am* 1993;26:471-90.
4. Causse JB, Causse JR, Wiet RJ, Yoo TJ. Complications of stapedectomies. *Am J Otol* 1983;4:275-80.
5. House HP. Early and late complications of stapes surgery. *Arch Otolaryngol* 1963;78:606-13.
6. Rangheard AS, Marsot-Dupuch K, Mark AS, Meyer B, Tubiana JM. Postoperative complications in otospongiosis: usefulness of MR imaging. *AJNR Am J Neuroradiol* 2001;22:1171-8.
7. Causse JB. Etiology and therapy of cochlear drops following stapedectomy. *Am J Otol* 1980;1:221-4.
8. Schuknecht HF. Sensorineural hearing loss following stapedectomy. *Acta Otolaryngol* 1962;54:336-48.
9. Shea JJ Jr. Complications of the stapedectomy operation. *Ann Otol Rhinol Laryngol* 1963;72:1108-23.
10. Hora JF. Treatment of delayed poststapedectomy hearing loss. *Arch Otolaryngol* 1964;80:485-8.

11. Lippy WH, Schuring AG, Ziv M. Stapedectomy revision. *Am J Otol* 1980;2:15-21.
12. Lippy WH, Schuring AG. Stapedectomy revision following sensorineural hearing loss. *Otolaryngol Head Neck Surg* 1984;92:580-2.
13. Wilson WR, Byl FM, Laird N. The efficacy of steroids in the treatment of idiopathic sudden hearing loss. A double-blind clinical study. *Arch Otolaryngol* 1980;106:772-6.
14. Moskowitz D, Lee KJ, Smith HW. Steroid use in idiopathic sudden sensorineural hearing loss. *Laryngoscope* 1984;94:664-6.
15. Chen CY, Halpin C, Rauch SD. Oral steroid treatment of sudden sensorineural hearing loss: a ten year retrospective analysis. *Otol Neurotol* 2003;24:728-33.
16. Slattery WH, Fisher LM, Iqbal Z, Liu N. Oral steroid regimens for idiopathic sudden sensorineural hearing loss. *Otolaryngol Head Neck Surg* 2005;132:5-10.
17. Wilson WR, Veltri RW, Laird N, Sprinkle PM. Viral and epidemiologic studies of idiopathic sudden hearing loss. *Otolaryngol Head Neck Surg* 1983;91:653-8.
18. Veltri RW, Wilson WR, Sprinkle PM, Rodman SM, Kavesh DA. The implication of viruses in idiopathic sudden hearing loss: primary infection or reactivation of latent viruses? *Otolaryngol Head Neck Surg* 1981;89:137-41.
19. Schuknecht HF, Donovan ED. The pathology of idiopathic sudden sensorineural hearing loss. *Arch Otorhinolaryngol* 1986;243:1-15.
20. McCabe BF. Autoimmune sensorineural hearing loss. *Ann Otol Rhinol Laryngol* 1979;88:585-9.