

## Sudden Deafness

Toru SEKITANI and Shoichi HONJO

*Department of Otolaryngology, Yamaguchi University  
School of Medicine*

(Received February 7, 1975)

It is generally accepted by otologists that the term "sudden deafness" is used to describe hearing disturbances which occur with sudden onset and are of unknown etiology (Lindsay and Zuidema, 1950)<sup>1)</sup>. Therefore, abrupt hearing disturbances due to head injury, mumps, measles, Meniere's disease, otitis media, drugs, leukemia and thrombosis of the cerebellar artery will be excluded (Schuknecht et al. 1962)<sup>2)</sup>.

De klyen (1944)<sup>3)</sup> reported 21 cases with sudden deafness and considered central vascular lesions to be a cause in all cases because any evidence of a peripheral cause was absent. Lindsay and Zuidema accepted for 12 of their 16 cases a peripheral vascular or toxic lesion. Rasmussen (1649)<sup>4)</sup> described 18 cases with sudden deafness, and in the majority of cases considered a neuritis and in only three cases a thrombosis in the cochlea as a cause. Hallberg reported 178 cases with sudden deafness. In 89 cases a vascular accident and 56 cases Meniere's disease seems to be the underlying cause. Seventeen cases could not be classified under these two headings.

We propose now to review five cases with sudden deafness in the present study, made possible through the courtesy of our colleagues at Yamaguchi University Hospital for a few years.

Case 1. T.S. A 38-year-old house wife had the first attack of vertigo with nausea on Feb. 24, 1963, following a sudden hearing loss on both sides accompanied by severe tinnitus on the left side for one week. During the onset of the vertigo she felt turning sensation of her body lasting about five minutes. There is no history of any serious diseases. On examination her ear drums are clear, and both nostrils and pharyngolaryngeal areas are normal. Her audiogram shows 90 db loss on both air conduction. X-rays of the mastoids reveal normal in condition (Feb. 28). There is a spontaneous or positional nystagmus towards the right side. Caloric responses shows canal paresis on the left side. On Romberg's test abnormalities of balance falling towards the left side are present.

Case 2. T.N. A 29-year-old business man had sudden onset of hearing loss accompanied by tinnitus on the right side on Jan. 26, 1963, following by the first attack of vertigo lasting for 3 days. No history of any serious diseases. On examination his ear drums are clear. The nose, pharynx and larynx are clear. X-ray of the mastoids is normal. His audiogram shows 70 db loss of hearing on the right side and the left sided air conduction curve is normal (Feb. 16). There is a spontaneous or positional nystagmus towards the left side (direction-fixed in type). Caloric responses present a canal paresis on the right side (Feb. 14). Mann's test shows of-balance falling towards the right side (Feb. 16).

Case 3. S.K. A 41-year-old house wife had a sudden loss of hearing with tinnitus on the left side on Dec. 10, 1963. At the almost same time she had the first onset of vertigo associated by vomiting lasting three hours. She felt of-balance when she walks or moves her head quickly. On examination her ear drums are clear and the nose, pharynx and larynx are clear. X-ray of the mastoids is normal and her audiograms shows 60 db of hearing loss on the left side. There is no spontaneous or positional nystagmus in any head postures. Caloric responses show a canal paresis on the left side. Equilibrium is normal.

Case 4. H.A. A 43-year-old wife had an onset of hearing loss on both sides on Sept. 26, 1963. She never complained of tinnitus and vertigo. Her drums are clear. The nose, pharynx and larynx are normal. There is no history of any serious diseases. Her hearing loss is severe and almost deaf in condition. Vestibular responses are normal on the tests.

Case 5. N.Y. A 36-year-old man had a sudden hearing loss on both sides with tinnitus on June 16, 1963. He gave us the episode of catching cold one week before the onset. The ear drums are clear and the nose, pharynx and larynx are normal. X-ray of the mastoids is normal. His audiograms show 90 db of hearing loss on both sides (June 25). The vestibular responses are normal on the tests.

It is of importance to note that in three of 5 cases with sudden deafness in the present study vestibular responses were disturbed, particularly caloric responses showing canal paresis (Table 1). Two of 3 cases with vestibular disturbances presented a direction-fixed spontaneous and positional nystagmus and fell down towards the opposite direction to the quick component of nystagmus. Vertigo complained in three cases decreased during the course and subsided from one month to 8 days after onsets. In all 3 cases suffering from vertigo in our study this complaint was present some hours, such as four, six and eight hours, after the onset of hearing loss.

**Table 1.** Vestibular symptoms in cases with sudden deafness

Case	Vertigo	Vomiting	Spont. and posit. nystagmus	Caloric responses	Equilibrium
1. 38 year Female	+	+	To right	cp on both	Fall to left.
2. 29— Male	+	+	To left	cp on right	Fall to right
3. 41— Female	+	+	—	cp on left	Normal
4. 43— Female	—	—	—	Normal	—
5. 36— Male	—	—	—	—	—

Van Dishoeck and Bierman (1958) described and analyzed a consecutive series of 100 cases with sudden deafness. They found that vertigo occurred temporarily in 45 cases. In 17 cases the vertigo was present before and in 8 cases some days after the onset of deafness. Rotation of the surroundings, as is considered to be common in true vestibular vertigo in nature, was present only one case. Caloric responses were examined by Dix and Hallpike technique in sixty seven of 100 cases with sudden deafness and the following results were obtained: normal response in 36 cases; no response in 12; diminished reaction in 13; hypersensitive in 1; and predominance in 5. It appeared that nearly one-half presented som lesion.

We come, now, to consider cochlear disturbances of sudden deafness. In all five cases of the present study we found three cases were bilateral sudden deafness and the remaining two cases were unilateral, and two of five cases were male and three were female. Hearing disturbances in five cases ranged from total deaf to 60 db hearing loss proving perceptive in nature. Tinnitus was present in four cases (unilateral in 3 and bilateral in 1). In two cases the tinnitus was present before the hearing loss, proving that cochlear disturbance had already started before the onset of hearing loss. In one case tinnitus and hearing loss were present simultaneously and in other on case the tinnitus appeared about six hours after the onset of the hearing loss. Van Dishoeck and Bierman stated that in 100 cases tinnitus was present in 69 cases. In 14 cases this symptom started before the onset of deafness, in 49 cases tinnitus and deafness weren noticed simultaneously and only in 5 cases the tinnitus appeared some days after the onset of the deafness.

We propose finally to consider the pathological changes of sudden deafness. Schuknecht et al. (1973)<sup>7)</sup> performed pathological study in eight cases of sudden deafness and described the following findings. The most spectacular and consistent pathological changes in these eight ears is atrophy of the organ of Corti. In four cochleae these changes are limited to the basal turns, with two showing shrinkage of the organ of Corti without loss of hair cells. The other four cochleae exhibit severe atrophy of the organ of Corti in all three turns, with three showing changes of decreasing severity from basal to apical end. The tectorial membrane is atrophied throughout the cochlear duct in three ears. In one it is shrunken and in two it is atrophied, displaced into the inner sulcus or onto the limbus, and encapsulated. The stria vascularis shows atrophic changes greater than those of the opposite ear in five cases, being shrunken throughout in one, severely atrophied in three and partially atrophied in one. The six ears from cases with unilateral sudden deafness show the cochlear neural population of the involved ear in each case to be the same as the opposite ear. The neural deficits, which are mild in four ears and severe in two ears, logically evolve as debenerative changes of aging which are unrelated to the sudden deafness. In all of the specimens it is possible visualized the external and internal radiating arterioles, capillaries of the spiral ligment, capillaries of the stria vascularis and limbs, as well as the vessels of the tympanic lip and basal membran.

As to the pathological changes of sudden deafness Beal, Hemenway and Lindsay<sup>5),6)</sup> also reported that the histopathological findings which was most consistent was the type of change in the tectorial membrane and secondly the degeneration of the stria vascularis and Corti's organ with collapse of Reissner's membrane onto the remnants of these structures.

In summary, five cases with sudden deafness have been presented.

## REFERENCES

- 1) Lindsay, J. R., and Zuidema, J. J.: Inner ear deafness of sudden onset. *Laryngoscope*, 60 : 238-263, 1950.
- 2) Schuknecht, H. F., Benitez, J., Beekuis, J., Igarashi, M., Singleton, G. and Ruidi, L.: The pathology of sudden deafness. *Laryngoscope*, 72 : 1142-1157, 1962.
- 3) Dekleyn, A.: Sudden complete or partial loss of function of the octavus-system in apparently normal persons. *Acta otolaryngology*, 32 : 407-429, 1944.
- 4) Rasmussen, H.: Sudden deafness. *Acta otolaryngology*, 37 : 65-70, 1949.
- 5) Beal, D. D., Hemenway, W. G. and Lindsay, J. R.: Inner ear pathology of sudden deafness, *Arch. otolaryng.* 85 : 591, 1967.
- 6) Lindsay, J. R., Davey, P. and Ward, P.: Inner ear pathology in deafness due to mumpus. *Ann. Otol.* 69 : 918, 1960.
- 7) Schuknecht, R. S., Kimura, R. S. and Naufal, P. M.: The pathology of sudden deafness, *Acta otolaryngology*, 76 : 76-97, 1973.