



Sudden sensorineural hearing loss on chronic kidney disease patient

I Made Wiranadha, I Putu Yupindra Pradiptha*

Department of Otorhinolaryngology, Medical Faculty of Udayana University, Sanglah Hospital, Denpasar, Indonesia

Abstract

Sudden sensorineural hearing loss is one of the emergencies in the ENT-HN field that requires immediate treatment since the cochlea damage could be permanent. One case was reported, a 61-years-old woman, Balinese, live at Denpasar, a housewife who came to the ENT-HN Outpatient of Sanglah Hospital after being consulted by the Nephrology Department with Chronic Kidney Disease (CKD) on regular HD and sudden hearing loss in the left ear. The patient was diagnosed with sudden left sensorineural hearing loss. She was given oral therapy of Methylprednisolone 2x16 mg, Pentoxifiline 2x400 mg, Mecobalamin 3x500 µgr and Bio ATP 3x1 tablets. The patient is also provided with hearing aids.

Keywords: sudden sensorineural hearing loss, chronic kidney disease, hearing aid

Introduction

Sudden Sensorineural Hearing Loss (SSNHL) is one of the emergencies in the ENT-HN field. In the United States, the incidence of sudden hearing loss is found in 5-20 per 100,000 people per year with 4000 new cases each year. The distribution of men and women is almost the same. Sudden hearing loss can be found in all age groups, generally in the 40-50 years age range, with a peak incidence in the sixth decade ^[1].

Sudden hearing loss is one of the emergency cases requiring immediate treatment, although some literature states that it can recover spontaneously. The recovery rate for untreated patients is 28-65%, mostly within 2 weeks of symptom onset. The problem commonly found in these cases is the delayed diagnosis which causes a delay in treatment and ultimately leads to permanent hearing loss. Therefore, it is important to recognize and detect the abnormalities early so that hearing function recovery and quality of life of patients can be maintained ^[1].

Hemodialysis is a procedure of cleaning the blood through an artificial kidney (Dialyzer) and assisted in its implementation by a kind of machine. A semipermeable synthetic membrane replaces the glomerulus and renal tubule and acts as a filter for the impaired kidney. The purpose of hemodialysis is to remove toxic nitrogen from the blood and remove excess water. Sudden SNHL in patients with chronic renal failure who undergo hemodialysis, occurs at different frequencies. Audiometric examination decreased at high frequencies, namely the frequencies of 4000 Hz and 8000 Hz. The etiopathogenetic mechanisms include osmotic disturbances that result in loss of hair cells, collapsing endolymphatic space, edema and hearing-

specific cell atrophy suspected of hemodialysis.^[2] We reported a case of a 58-year-old female with moderate-severe unilateral Sudden SNHL on regular hemodialysis. The purpose of this paper is to study the pathogenesis of hearing loss due to hemodialysis.

Case Report

AMR patient, female, age 61, Balinese, lives at Denpasar, occupation as a housewife, came to the ENT-HN Outpatient, Sanglah Hospital on September 12, 2017. She was consulted by the Nephrology Department with Chronic Kidney Disease (CKD) on regular HD and suddenly decreased hearing in the left ear. The patient complained of a sudden decrease in left hearing since 1 day ago. She also complained of ringing in the left ear without dizziness. The history of hearing loss was refuted. History of cough, runny nose, ear discharge, and head trauma also refuted. The patient has been diagnosed with CKD Stage V and performed routine hemodialysis. She also routinely went to the nephrology polyclinic.

On physical examination, the general condition was good with alert awareness, blood pressure 110/70 mmHg, pulse 84 x/min, respiration 22 x/min, axillary temperature 36.5°C. Ear examination found no abnormalities, normal findings in left and right external acoustic canal, both tympanic membranes are intact and positive ear light reflex. No abnormalities of the nose and throat. On neck examination, there was no lymph node enlargement. On the tuning test using a 512 Hz fork, Rinne was positive in both ears and Weber had lateralization to the right ear. Type A was found in both ears on tympanometry.

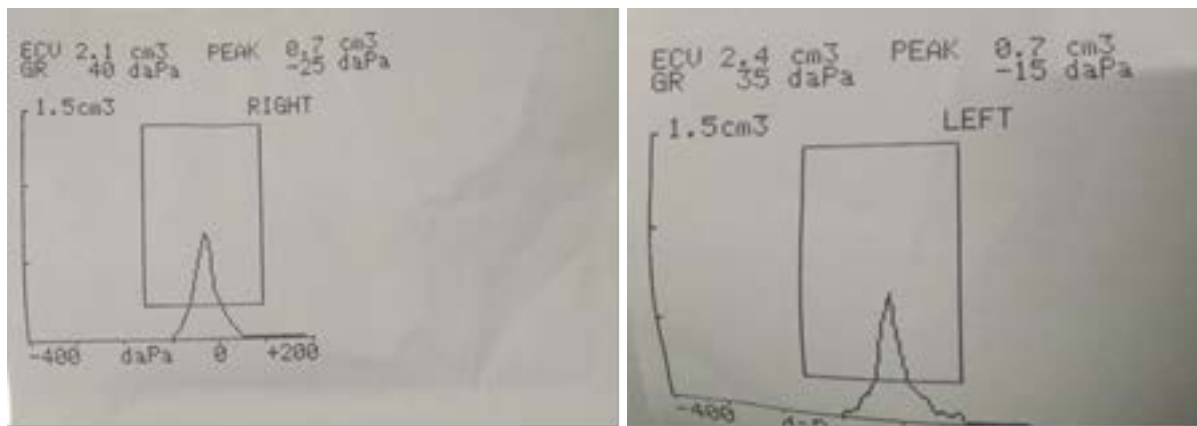


Fig 1: Tympanogram on September 12, 2017

Audiometry was also examined and we found normal results of hearing in the right ear (AC = 21.25 dB / BC = 18.75 dB) and moderate degree of sensorineural deafness in the left ear (AC = 65 dB / BC = 55 dB).

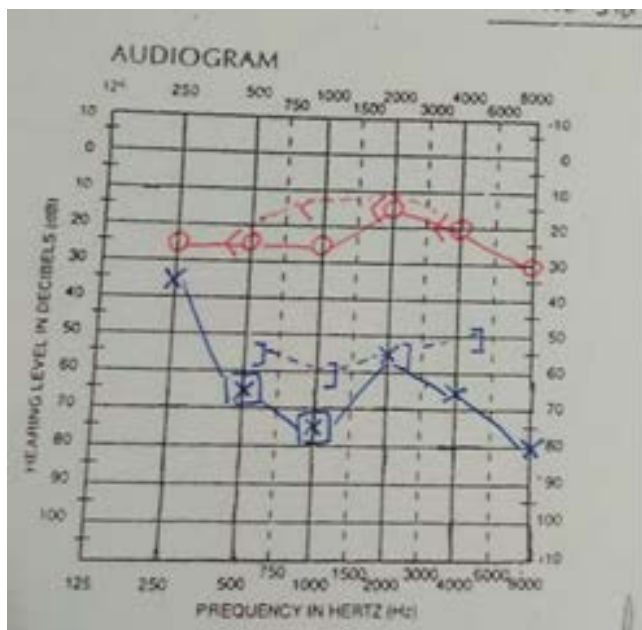


Fig 2: Audiogram on September 12, 2017

The patient was diagnosed with sudden left sensorineural hearing loss. She then was given oral therapy of Methylprednisolone 2x16 mg, Pentoxifiline 2x400 mg, Mecobalamin 3x500 µgr, and Bio ATP 3x1 tablets. She also was provided with hearing aids.

Discussion

Sudden sensorineural hearing loss is defined as rapid sensorineural hearing loss in one or both ears that occur over 72 hours with audiometric criteria of hearing loss >30 dB at least 3 consecutive audiometric frequencies. In the United States, the incidence of sudden sensorineural hearing loss is found in 5-20 per 100,000 people per year with 4,000 new cases each year. In several studies, there were as many as 7500 cases in America, Europe, and Japan [3].

In this case, we reported a 61-years-old woman, Balinese, lives at Denpasar, a housewife, who came to the ENT-KL Outpatient of

Sanglah Hospital after being consulted by the Nephrology Department with Chronic Kidney Disease (CKD) on regular HD and sudden hearing loss in the left ear. The patient complained of a sudden decrease in hearing in the left ear since 1 day ago. She also complained of ringing in the left ear without dizziness. The history of hearing loss was refuted. History of cough, runny nose, ear discharge, and history of head trauma was refuted. She has been diagnosed with CKD Stage V and performed routine hemodialysis. She also routinely went to the nephrology polyclinic.

Hemodialysis is a procedure of cleaning the blood through an artificial kidney and its execution is assisted by a machine. Its purpose is to remove toxic nitrogen from the blood and excrete excess water. Three principles underlie the work of hemodialysis, namely diffusion, osmosis, and ultrafiltration. Toxins and waste substances in the blood are excreted by diffusion through moving from the blood, which has a higher concentration, to the dialysate liquid which has a lower concentration. Excess water is removed from the body by osmosis. The discharge of water can be controlled by creating a pressure gradient (difference): in other words, water moves from a higher-pressure area (the patient's body) to lower pressure (dialysate fluid). This gradient can be increased by adding negative pressure which is known as ultrafiltration on a dialysis machine. Negative pressure is applied to this device as a suction force on the membrane and facilitates the expulsion of water, since the patient is unable to excrete water, this force is required to discharge fluid until an isovolumic state (fluid balance) is achieved [4].

Hearing loss in CKD is still difficult to distinguish between the effects and implications of renal failure itself or the effects of hemodialysis. Factors that are considered to influence the occurrence of SNHL in patients with CKD who undergo hemodialysis are progressive kidney function disorders, age, hypertension, and diabetes mellitus. In CKD, there is damage to the nephrons so that the excretory function of the kidneys decreases and causes accumulation of toxins, electrolyte disturbances, metabolic acidosis, and disorders of calcium metabolism which can affect the cationic gradient in the cochlea and can interfere with hearing function.

Sensorineural hearing loss in CKD patients who underwent hemodialysis occurred at various frequencies which turned out to be different. Audiometric examination decreased at high frequencies, namely the frequencies of 4,000 Hz and 8,000 Hz. [6] Research by Lasisi *et al.* reported that sensorineural hearing loss

due to hemodialysis has etiopathogenetic of osmotic disturbances that resulted in the loss of hair cells, endolymphatic space collapse, edema and atrophy of supporting cells, as well as changes in fluid and electrolyte composition of endolymph and possible exposure to cellulose acetate membranes from the dialyzer used so that the acetate degradation products enter the bloodstream. Lasisi *et al* reported 67% of sensorineural hearing loss in CKD patients before hemodialysis and 79% after undergoing three hemodialysis sessions.^[5] Gatland *et al.* reported the incidence of sensorineural hearing loss in 41% mild, 15% moderate, 53% severe from 66 samples examined after hemodialysis. Factors that are thought to affect sensorineural hearing loss in patients with CKD who undergo hemodialysis are age, hypertension, and diabetes mellitus.^[6] Lee *et al.* found an association of age with a decrease in the mean hearing threshold in the elderly. Hearing threshold values increase by 1 dB annually at age 60 and above and there is a significant difference in decreasing the hearing threshold at frequencies of 4 and 8 kHz between males and females ^[7].

Conclusions

Sudden sensorineural hearing loss is one of the emergencies in the ENT-HN field that requires immediate treatment because damage to the cochlea can be permanent. One case of sudden sensorineural hearing loss has been reported in a patient with chronic kidney disease undergoing hemodialysis who received medical therapy and hearing aids to improve the hearing threshold.

References

1. Loriana U, Muyassaroh, Zulfikar N, Arwedi A, Ita M. Pengaruh Hemodialisis terhadap Kejadian Kurang Pendengaran Sensorineural pada Penderita Gagal Ginjal Kronik. *MKB*. 2016; 48(2):98-104
2. Muyassaroh Loriana U. Gangguan pendengaran sensorineural pada gagal ginjal kronis yang dilakukan hemodialysis. *ORLI*. 2013; 43(2):163-171.
3. 3Stevani N, Natalia Y. Diagnosis dan Tata Laksana Tuli Mendadak. *Cermin Dunia Kedokteran*. 2013; 40(11):820-826
4. Andry Nicolas Gede. Terapi Hemodialisis Sustained Low Efficiency Daily Dialysis Pada Pasien Gagal Ginjal Kronik Di Ruang Terapi Intensif. *SMF Anestesiologi dan Terapi Intensif, Fakultas Kedokteran, Universitas Udayana Rumah Sakit Sanglah Denpasar*.
5. Lasisi AO, Salako BL, Osowole O. Effect of hemodialysis on the hearing function of Patients with chronic renal failure. *Afr J Health Sci*. 2006; 13:29-32.
6. Gatland D, Tucker B, Chalstrey S, Keene M, Baker L. Hearing loss in chronic renal failure—threshold changes following hemodialysis. *J R Soc Med*. 2010; 84(10):587.
7. Lee FS, Matthew LJ, Dubno JR, Mills JH. Longitudinal study of pure-tone thresholds in older persons. *Ear Hear*. 2005; 26(1):1-11.