

# Case Report

## Acute Temporary Hearing Loss Following Lumbar Subarachnoid Blockade

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### Abstract

Transient hearing loss following subarachnoid block, though reported, is a rare entity<sup>1</sup>. The relation between subarachnoid block and hearing loss is not well understood. We report one such case, where the patient experienced sudden sensorineural hearing loss after receiving subarachnoid block for an elective urological procedure.

**Key Words:** Hearing impairment, Sensorineural hearing loss, Subarachnoid block.

### Introduction

Hearing loss following non-otological causes is a rare phenomenon. Sensorineural hearing loss following subarachnoid block has been poorly reported. Hearing loss can be conductive or sensorineural, unilateral or bilateral, transient or permanent.

The most common causes for sensorineural hearing loss are listed in Table 1:

Trauma	iatrogenic & idiopathic
Noise induced	Acoustic neuroma
Meniere's disease	Infection
Vascular	Autoimmune
Hypoxia	Drugs

**Table 1 - Common causes for sensorineural hearing loss**

Often hearing loss following subarachnoid block appears to be transient and resolves spontaneously. The mechanism behind hearing loss is still questionable. The most likely cause could be reduction in cerebrospinal fluid (CSF) volume leading to decreased intracranial pressure which gets transmitted to perilymph of inner ear via cochlear aqueduct<sup>1</sup>.

### Case Description

A 45 year old male, diagnosed with right upper ureteric calculus, reported for his pre-anesthetic evaluation in our institute for a planned ureteroscopic lithotripsy with double J stenting. He did not have any previous co-morbidities or ear disease. His routine pre anesthetic work up included complete blood count, renal function tests, blood sugar levels, ECG and chest X-Ray, which were within normal limits. He was assessed as ASA-PS grade I. His preoperative orders included 8 hours starvation prior to surgery, oral

Ranitidine(150 mg) and Alprazolam(0.25mg) at bed time and on the day of surgery.

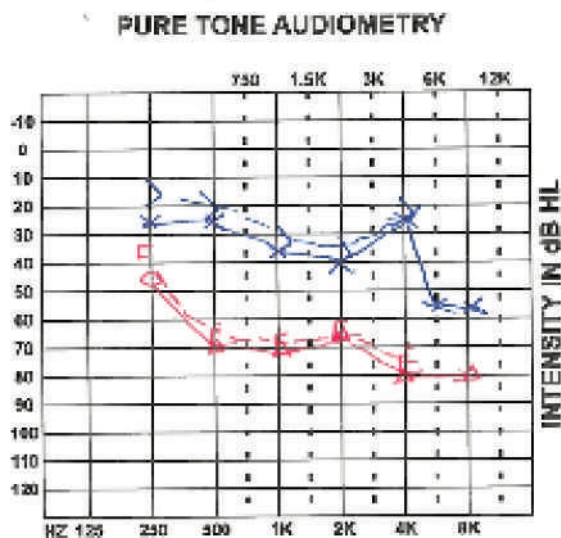
After obtaining informed consent, the patient was taken up for surgery. He was preloaded with 500ml of Hartmann's solution through 18G IV cannula. With baseline hemodynamic measurements, patient was made to sit up and subarachnoid block was performed after infiltrating skin with 2ml of 2% lignocaine. After receiving 15mg of Bupivacaine heavy with 25mcg of Fentanyl in subarachnoid space at the level of L4-L5 in a single attempt using 26G Quincke needle using midline approach and was made to lie supine. O<sub>2</sub> at the rate of 4litre/min was administered through face mask.

Intraoperatively patient received Hartmann's solution and Inj. Midazolam 1mg IV for sedation and antibiotics included Inj. Cefotaxim 1g and did not receive any ototoxic antibiotics or diuretics. Normal saline was used for irrigation by the urologist. The procedure lasted for around 1 hour, and the patient was stable throughout the procedure. Patient was shifted to recovery room following completion of the procedure and was not mobilized out of bed for 24 hours. Adequate hydration was maintained postoperatively and analgesics were supplemented as required.

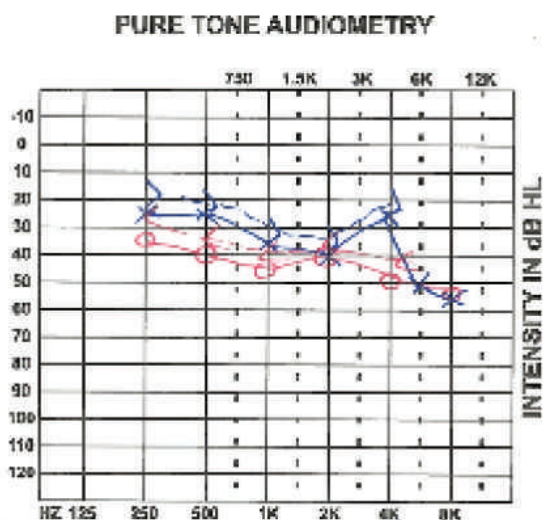
He was shifted out to the ward on the same day evening. On the 1<sup>st</sup> postoperative day, the patient was comfortable and was mobilized. On the 2<sup>nd</sup> postoperative day patient complained of partial deafness-right side, which he had noticed since the time he was shifted out of operation room but attributed it to the blockade of ear due to the ambient temperature. He did not experience any associated tinnitus, headache or vomiting. It was not associated with any signs and symptoms suggestive of Post Dural Puncture Headache (PDPH). ENT examination showed bilateral tympanic membrane to be intact and mobile. Tuning fork tests showed a Positive Rinne's test on the right, Weber's test was lateralized to the left and Absolute Bone

Conduction test was reduced on the right side. Cranial nerve examination was clinically normal except for the right VIII nerve which showed a unilateral sensorineural hearing loss. Puretone audiometry revealed right sided moderately severe SNHL of 68.3dBHL and left side of 33.3dBHL. Right ear hearing threshold at 250Hz was about 48dBHL while the threshold from 500Hz and above was around 70-80dBHL, so the average hearing threshold for the right ear was 68.3dBHL. (Fig 1)

Hearing loss on both sides are not uniform because majority of cases of sudden Sensorineural hearing loss are unilateral. Less than 2% of patients have bilateral involvement and typically bilateral involvement is sequential<sup>2</sup>. Patient was started on methylprednisolone 8mg Presuming that hearing impairment following spinal anesthesia or dural puncture has the same etiology as PDPH and tapered over 2 weeks, improvement was appreciated in subsequent audiometry. (Fig 2)



**Fig 1 :** Before initiating treatments shows left ear mild Sensorineural hearing loss (33.3dBHL) and right ear moderately severe sensorineural hearing loss (68.3dBHL).



**Fig 2 :** After 2 weeks of treatment shows left ear mild Sensorineural hearing loss (33.3dBHL) and right ear moderate sensorineural hearing loss (41.6dBHL).

## Discussion

Hearing impairment following subarachnoid block has been studied and reported in the literature, but incidence is estimated to be varying from as low as 0.4% and as high as 50%<sup>3,4</sup>. The exact mechanism behind the cause is not very clear. It is considered to be due to CSF leakage causing imbalance in fluid dynamics between perilymph and endolymph.

The decrease in CSF pressure after subarachnoid block decreases peri-lymphatic pressure leading to endolymphatic pressure formation, displacing basement membrane hair cells and results in low frequency hearing loss<sup>5</sup>. Hearing loss for higher frequencies was noted in elderly individuals, probably because they are more susceptible to minute changes in inner ear pressure and CSF changes. Fog et al outlined a study in patients receiving spinal anesthesia for TURP and reported 92% incidence in hearing loss for frequency >10 dB with 22G spinal needle and incidence of 29% with 26G spinal needle<sup>6</sup>. We had used 26G Quincke needle in our patient.

Panning B et al conducted a study on 100 urology patients, out of which eight patients had significant hearing loss following subarachnoid block and recovered without any treatment<sup>7</sup>.

Dreyer M et al reported a study on 100 general and urology patient receiving subarachnoid block, of which 16 patients had documented low frequency hearing impairment. The affected patients recovered without any treatment in a period of three days<sup>8</sup>.

Rosenberg et al demonstrated audiometric study on 20 patients who received interscalene brachial plexus block and reported hearing loss at various frequencies and claims to be caused by a combined effect on central nervous system of the anesthetic and analgesic medications<sup>9</sup>.

Hearing loss following general anesthesia more significantly with cardiac bypass surgeries and laparoscopic surgeries has been reported in few literatures. The causes behind it is assumed to be due to various pressure changes that directly or indirectly affect the inner ear structures<sup>3,10,11</sup>. Hearing loss following nitrous oxide has been found to be due to its rapid filling in air spaces causing significant inter-tympanic pressure changes and sometimes leading to perforation and disarticulation of inner ear structures<sup>12</sup>.

In our case, patient reported hearing loss on the 2<sup>nd</sup> postoperative day and the symptoms resolved in 2 weeks' time with oral Methylprednisolone. The size and type of the spinal needle appears to be a significant factor in producing hearing impairment. 22G needle produced a greater incidence of hearing loss over 26G spinal needle<sup>13</sup>. There is no reported hearing impairment with 27G spinal needle in the literature so far. Literature suggests that mechanism of hearing impairment and PDPH may be similar but not necessarily PDPH should be associated with hearing impairment or vice versa<sup>14</sup>.

Usually symptoms resolve spontaneously. If treatment is required, options include restricted mobility, sufficient hydration, cochlear vasodilators, steroids, hyperbaric oxygen therapy, antivirals, antioxidants, vitamins, epidural blood patch, plasma expanders, and carbogen inhalation<sup>1,15</sup>. Our patient was prescribed oral steroid, which as an anti-inflammatory reduces endolymphatic pressure<sup>16,17</sup>. Although steroids have been routinely used, exact role of steroids still remains unclear. However, modalities of treatment mentioned for the recovery of hearing impairment are inconclusive.

## Conclusion

Very few anesthesiologists are aware of the possibility of hearing loss following subarachnoid block, because of poor documentation of subclinical hearing loss and lack of large scale audiometric study of hearing loss. Since SNHL carries an uncertain outcome and does not have a definite treatment, it is essential for anesthesiologists to be aware of the chances of developing hearing loss following neuraxial blockade especially in patients who are at high risk for developing it and discussing it with the patient preoperatively may be a good medico legal advice.

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## Conflicts of interest

There are no conflicts of interest.

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