

EFFECTS ON HEARING OF VENTRICULOPERITONEAL SHUNT PLACEMENT IN PATIENTS WITH NORMAL PRESSURE HYDROCEPHALUS : A CASE SERIES

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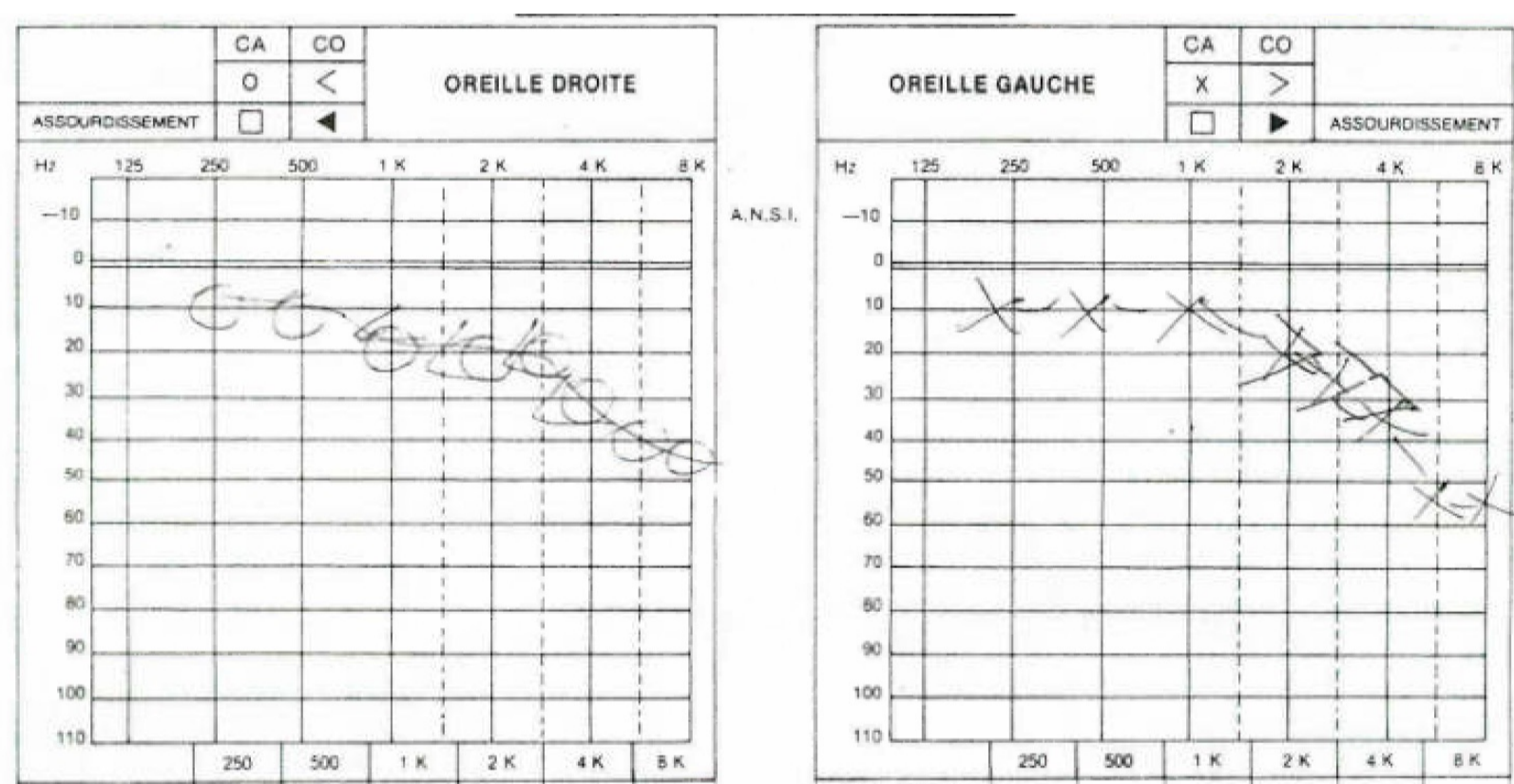
BACKGROUND

- Normal pressure hydrocephalus (NPH) is defined by a triad of dementia, gait disturbance and urinary incontinence.
- Treatment usually implies surgery for ventriculoperitoneal shunt placement
- Complaint of subjective hearing loss is a frequent complication following ventriculoperitoneal shunt for NPH. It is seldom documented with audiometric testing.
- This case series reports two patients who developed hearing loss after shunt placement for NPH documented with pre- and post-operative audiograms.

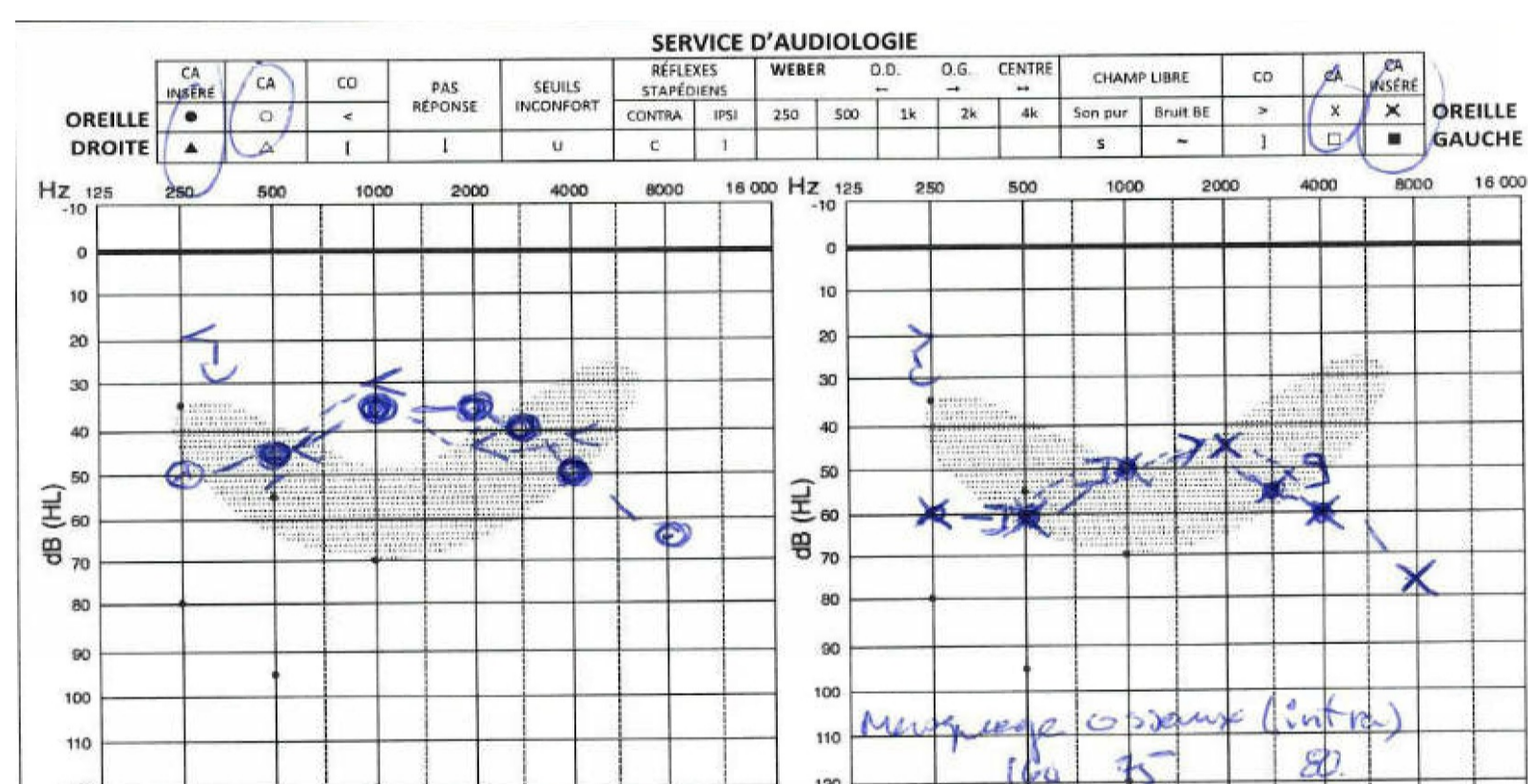
PATIENT #1

- 82-year-old female, with a history of meningitis at a young age. Complains of gait disturbance and urinary incontinence for the past three years. No memory issues or hearing loss. Hydrocephalus on CT scan with good response to lumbar puncture. Decision to proceed with ventriculoperitoneal shunt placement in September 2021. Codman Certas® valve adjusted to 3 installed.
- Subjective sensorineural hearing loss two months after shunt placement. Loss of 30 dB for the right ear and 50 dB for the left ear at 500 Hz was shown compared to an audiogram realized four years prior. Speech recognition threshold dropped from 20 dB (for both ears) to 40 dB for the right ear and 55 dB for the left ear.

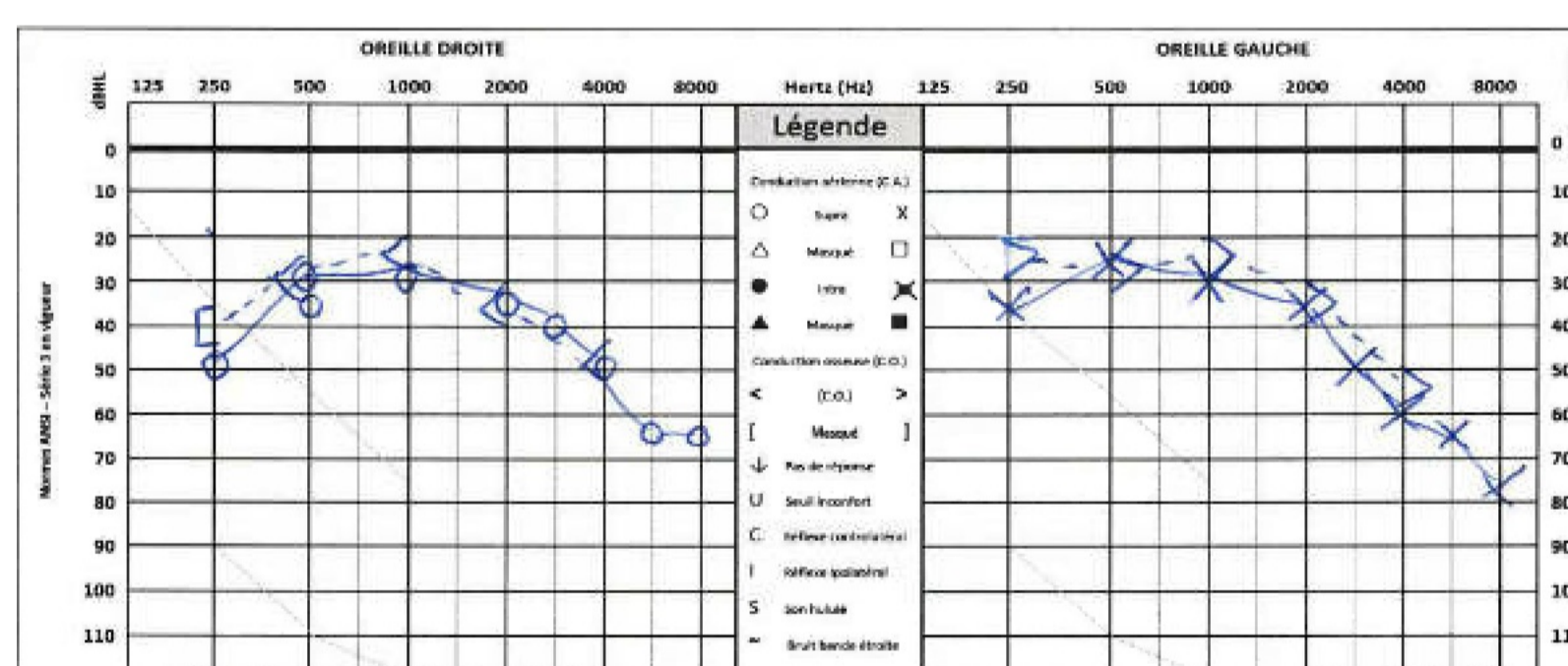
Baseline
December 2014



2 months post-op
November 2021



After valve adjustment
June 2022

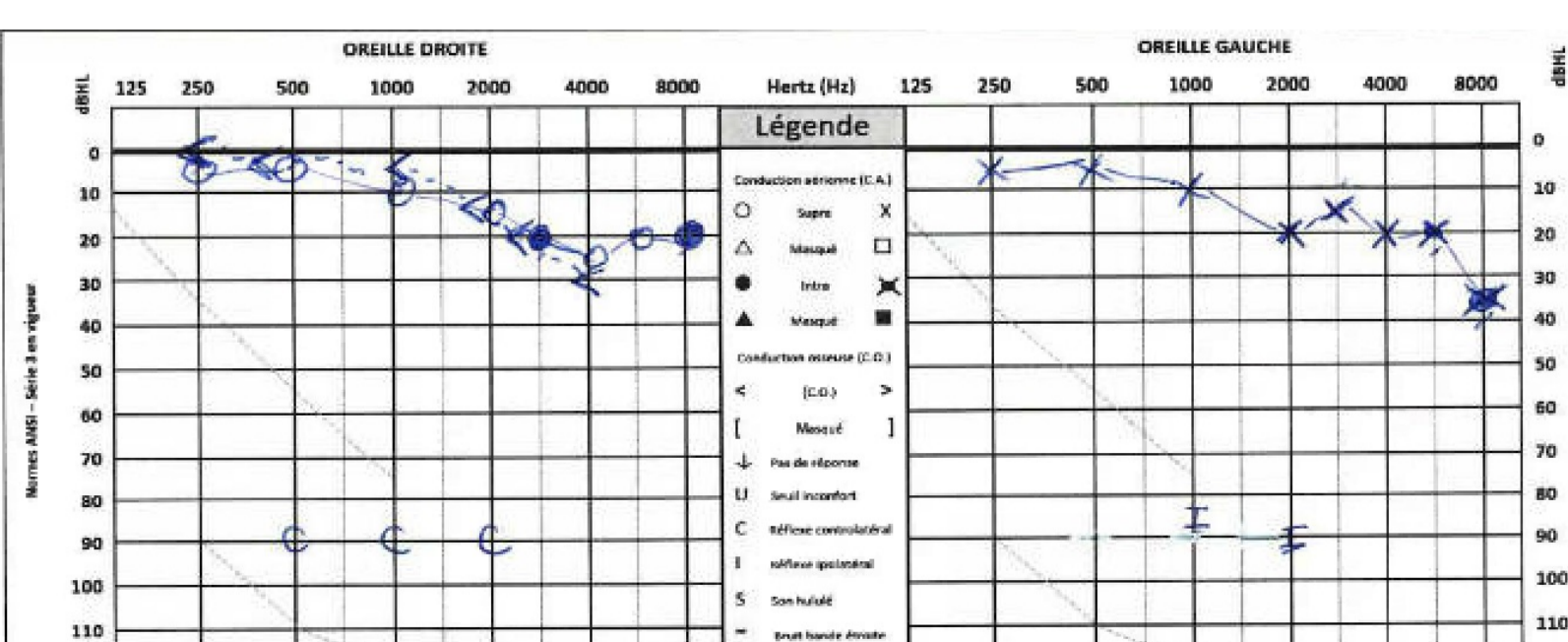


After valve adjustment, hearing significantly improved by more than 10 dB bilaterally at 500 Hz.

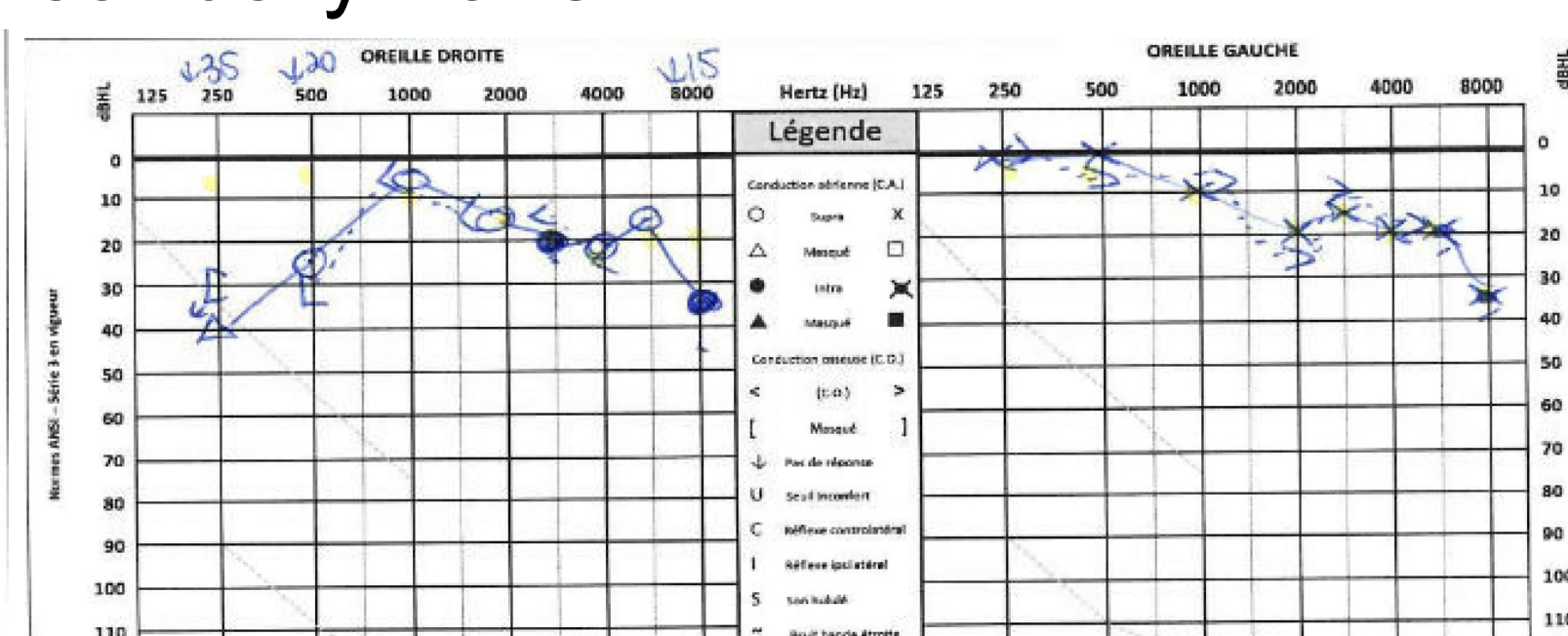
PATIENT #2

- 65-year-old female, known prior only for sensorineural hearing loss in high frequencies compatible with presbycusis. Complains of gait disturbances and slight urinary urgency for the past year. MRI compatible with NPH. Good response to lumbar puncture. Surgery for ventriculoperitoneal shunt placement in November 2022. Strata® valve adjusted at 1.5.
- The patient herself did not complain of hearing loss. She developed asymmetrical hearing loss three months following shunt placement. Pure tone audiometry was done as part of an ongoing research project.

Baseline
November 2022



3 months post-op
January 2023



PATIENT #2 - continued

- Loss of 35 dB was noted in the right ear for 250 Hz, 20 dB at 500 Hz, and 15 dB at 8000 Hz. The left ear was stable. Asymmetrical hearing loss according to Obholzer and al (2004). Interaural difference of 40 dB at 250 Hz and 25 dB at 500 Hz.

LITERATURE REVIEW

- There is a limited number of case reports documenting hearing loss following ventriculoperitoneal shunt placement in adults with hydrocephalus (Miyazaki, 1997; Lee, 2007).
- Some authors report hearing improvement following shunt revision surgery for a high-pressure valve or shunt adjustment for lower drainage settings (Stoekli, 1999; Russell, 2001; Albanese, 2007).
- Two clinical studies with small number of patients have looked at hearing loss after shunting with documented audiometry before and after in the setting of adult hydrocephalus/NPH (Van Veelen-Vincent, 2001; Lim, 2014)

DISCUSSION

- Hearing loss following cerebrospinal fluid (CSF) loss is well-documented for procedures implying acute CSF loss (spinal tap, spinal anesthesia, neurosurgery, etc.)
- The cochlear aqueduct is a narrow canal that allows communication between the perilymph and cerebrospinal fluid (CSF) between the scala tympani and cisterna magna.
- **Hydrodynamic theory** of hearing loss speculates that pressure equilibration between CSF and perilymph via the cochlear aqueduct is the cause of a cochlear endolymphatic hydrops leading to hearing loss.

CONCLUSION

- We report two patients presenting documented sensorineural hearing loss following shunt placement for NPH. Persistent and severe hearing loss seems to be under-documented in this at-risk population. Audiograms are not routinely performed post-operatively for these patient.
- Ongoing cohort study on the topic with pre- and post-operative imagery and audiometry to better understand hearing loss in this population.

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