



# Delayed Complete Spontaneous Hearing Recovery in a Pediatric Chemotherapy Patient – a Case Report



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## Objective

- Chemotherapy is a cornerstone of pediatric oncology, but high-frequency sensorineural hearing loss (HF SNHL) is a well-known, often permanent, side effect.
- We report a unique instance of complete delayed spontaneous resolution of chemotherapy-induced HF SNHL in a pediatric patient.
- The patient’s spontaneous delayed complete recovery 45 months after cessation of chemotherapy challenges the common belief that chemotherapy-induced auditory damage is permanent.

## Methods

- A retrospective chart review was performed. Parental consent was provided for data collection, analysis, drafting, and publication. This study was considered IRB exempt.

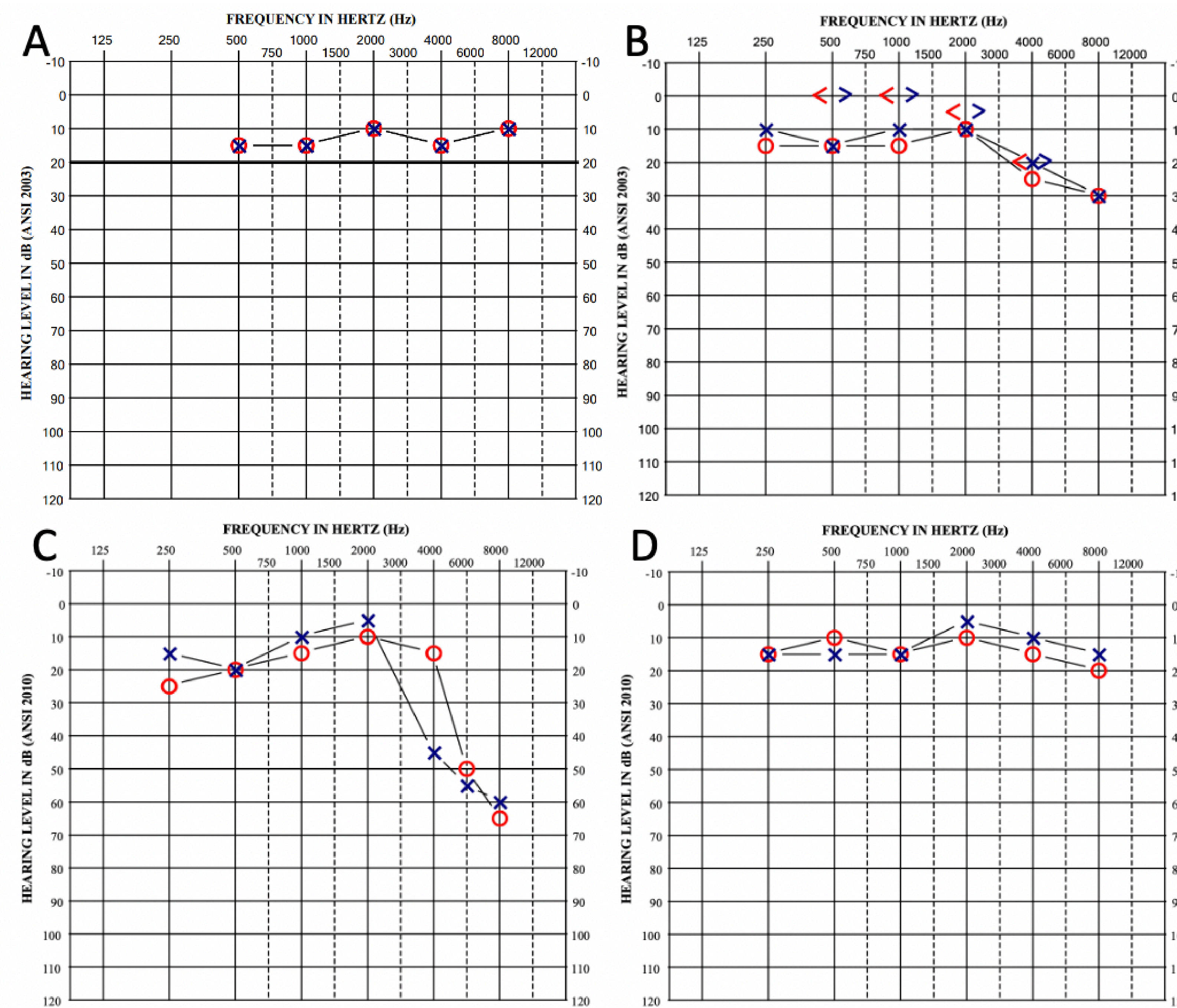
## Table

Chemotherapy drugs and dosages

Drug	Cumulative Dose (mg)
Carboplatin	1,645
Cisplatin	252
Cyclophosphamide	5,580
Methotrexate	25,055
Vincristine	13.5

## Figure

Audiograms



Legend: A. Baseline audiogram, December 2018. B. Audiogram June 2020, 3 months post chemotherapy. C. Audiogram, June 2023, 39 months post chemotherapy. D. Audiogram, December 2023, 45 months post chemotherapy. Red circles represent unmasked air conduction of right ear. Blue “X” represents unmasked air conduction of left ear.

## Results

- A previously healthy 18-month-old female presented to ED in November 2018 with right eye and mouth twitching, concerning for seizure-like activity
- Imaging demonstrated isolated, left-sided supratentorial fronto-parietal mass
- Total gross resection revealed grade 3 anaplastic ependymoma, <2.5% RERA+
- Post resection, presented for initiation of Grundy’s protocol for primary postoperative chemotherapy without radiotherapy for intracranial ependymoma in children<sup>1</sup> (Table 1)
- Baseline Audiogram, 12/2018 (Figure 1, A):  
 -normal bilateral DPOAE & VRA responses, SATs at 15db
- April 2020, chemotherapy terminated (completed 25/28 courses) given parental concerns for COVID-19 and no evidence of disease recurrence
- Audiogram, 06/2020, 3 months post chemotherapy (Figure 1, B)  
 -Left: normal hearing (NH) 250-4000Hz sloping to mild SNHL at 8kHz  
 -Right: NH 250-2000Hz sloping to mild SNHL from 4-8kHz
- Audiogram, 06/2023, 39 months post chemotherapy (Figure 1, C)  
 -Left: NH 250-2000Hz sloping to moderate/moderately severe SNHL 4-8kHz  
 -Right: NH 250-4000Hz sloping to moderate/moderately severe SNHL 6-8kHz
- Audiogram, 12/2023, 45 months post chemotherapy (Figure 1, D)  
 -Absent DPOAE bilaterally, PTA showed complete normalization of hearing bilaterally across 250-8000Hz. SRT confirmed recovery.

## Conclusion

- While spontaneous partial recovery is an, albeit rare, documented phenomenon,<sup>2,3</sup> no literature exists demonstrating a complete delayed spontaneous recovery.
- We propose several hypotheses to explain this exceptional recovery:
- The activation of endogenous repair mechanisms within the cochlea, which could have been augmented by the absence of ongoing chemotherapeutic insult, could suggest a delayed but effective response to ototoxic injury, potentially involving compensatory neural plasticity.<sup>2</sup>
- Given the patient’s young age, neural adaptability could explain the recovery. The absence of DPOAE despite a normal PTA could suggest more central adaptation mechanisms occurring at the level of the auditory nerve (or proximally) rather than actual hair cell recovery or regrowth.
- Another consideration is the role of individual genetic variability in susceptibility to and recovery from ototoxicity, which could account for the patient’s unique audiological trajectory.<sup>4</sup>
- Clinically, this case report offers new hope for recovery from chemotherapy-induced HF SNHL; academically, it challenges the prevailing notion of the irreversibility of ototoxicity and encourages further investigation into cochlear damage and healing processes.

## References

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