



Cochlear Implantation Is Successful in Lightning Strike Related Hearing Loss



HEALTH
UNIVERSITY OF UTAH

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INTRODUCTION

- Hearing loss (HL) after lightning strike is rare
 - Most commonly a conductive HL due to tympanic membrane (TM) rupture or ossicular damage.¹⁻³
- Sparse literature on hearing outcomes or efficacy of treatment modalities for patients with sensorineural hearing loss (SNHL) after lightning strike.
 - Range of treatments: observation with hearing aids, systemic therapies including steroids, and cochlear implant (CI).⁴⁻⁶
- Pathophysiology: possibly due to electrical damage to cochlea itself rather than blast injury.
 - Autopsy of patient with severe SNHL after lightning showed absent organ of Corti, rupture/collapse of Reisner's membrane, stria degeneration, and decrease spiral ganglion cell population.⁷

METHODS

- Patients selected from a single academic institution between 2017-2023 with bilateral severe to profound SNHL after lightning injury.
- Interventions: systemic/intratympanic steroids, hearing aids, and cochlear implantation.
- Outcomes measured included audiograms with word recognition assessments.

CONCLUSIONS

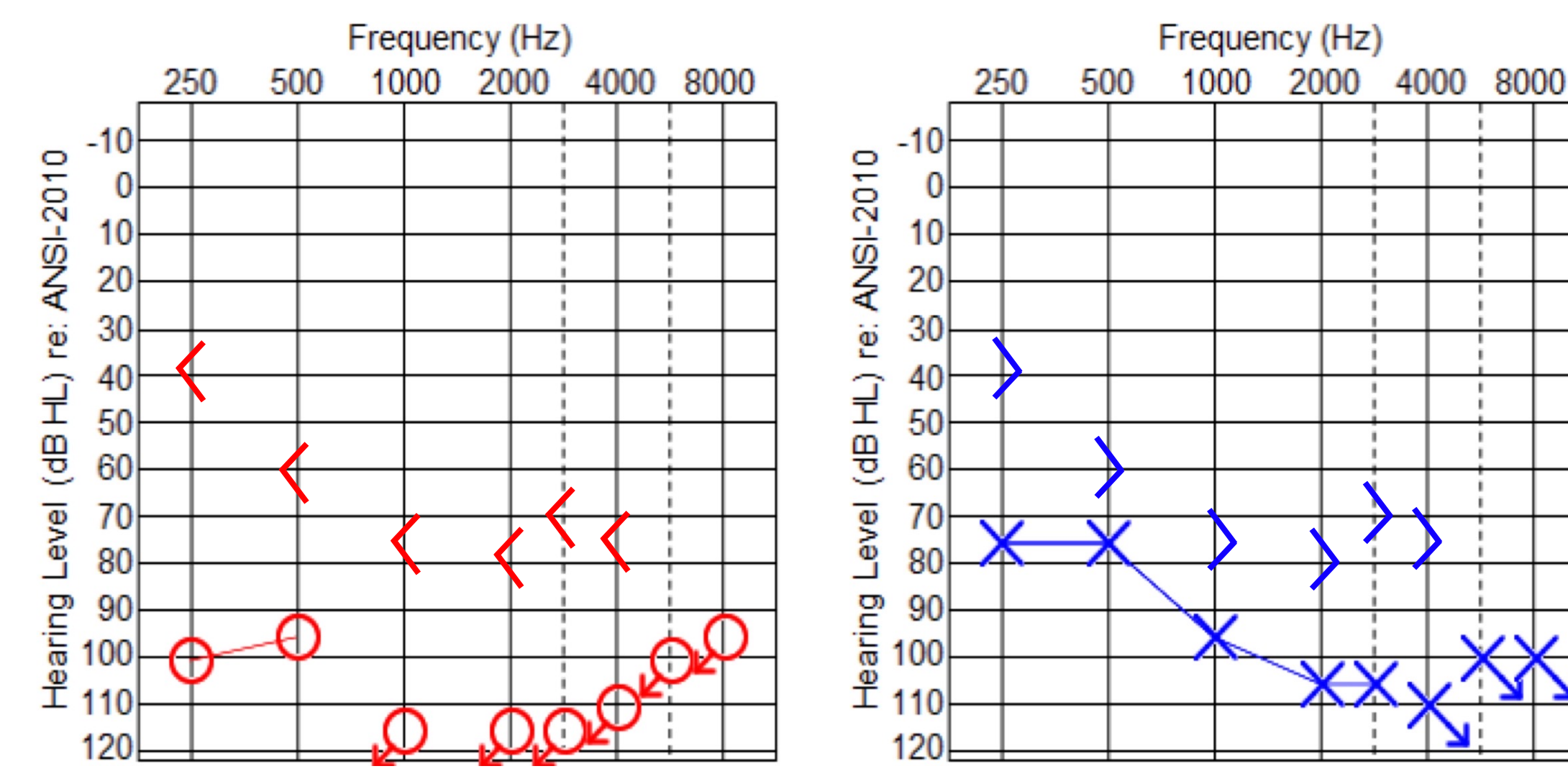
- Sensorineural hearing loss due to lightning strike is an exceedingly rare phenomenon, therefore there is very little published research regarding treatment or outcomes.
- While another case report has touted efficacy of systemic steroids,⁵ our patient did not have durable success with systemic or intratympanic steroids.
- Successful cochlear implantation has occurred in similar patients.⁴
- In patients with severe to profound SNHL after lightning strike, it is reasonable to counsel patients that while systemic/intratympanic steroids can be attempted, cochlear implantation has been shown to be an effective rehabilitation tool in a small population of patients.

References

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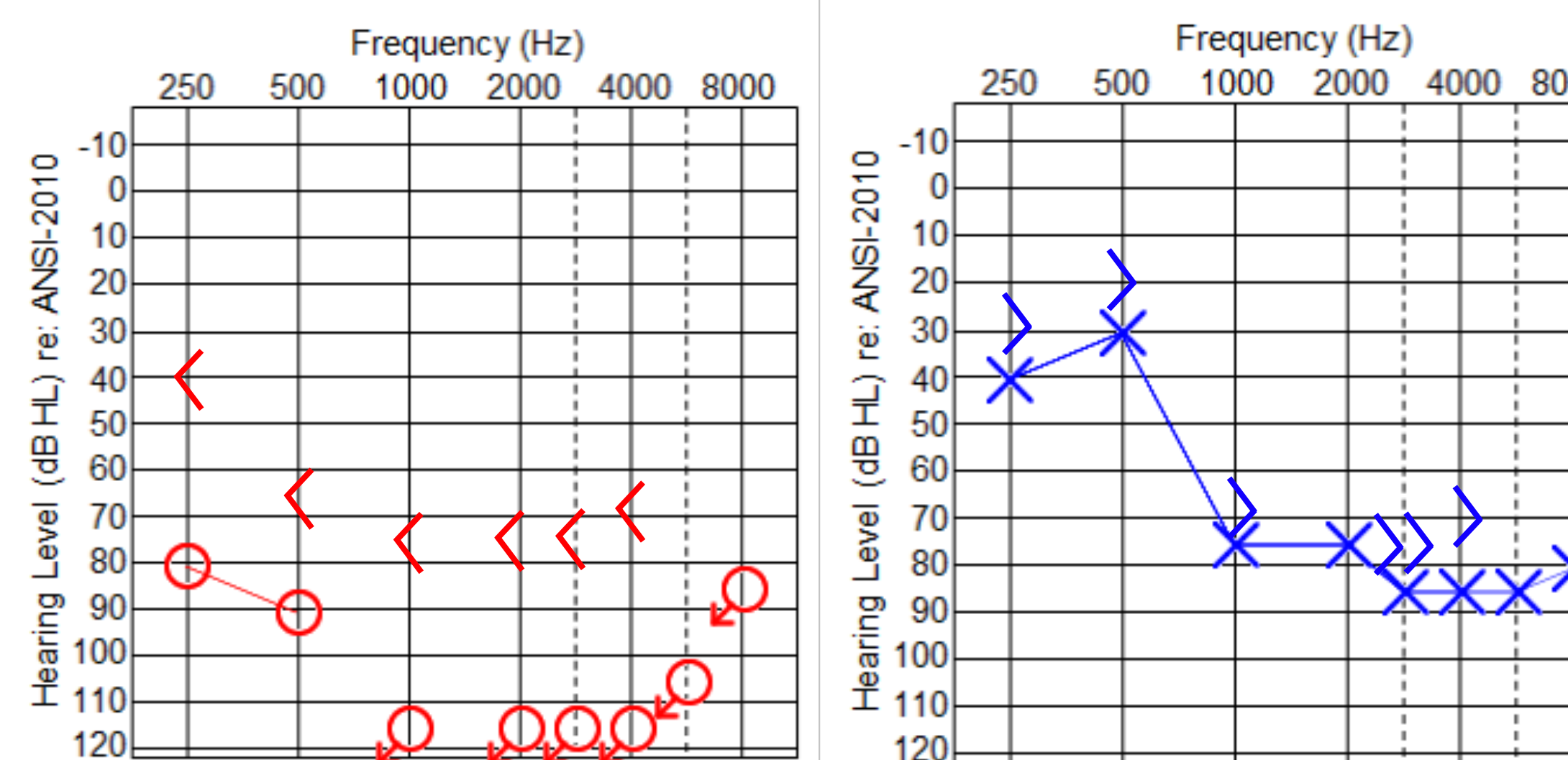
PATIENT A

Demographics: 35-year-old female
Otologic injuries: right auricle avulsion, right TM near total perforation, and bilateral severe to profound SNHL
Treatment: observation/hearing aids for 3 months, then cochlear implant



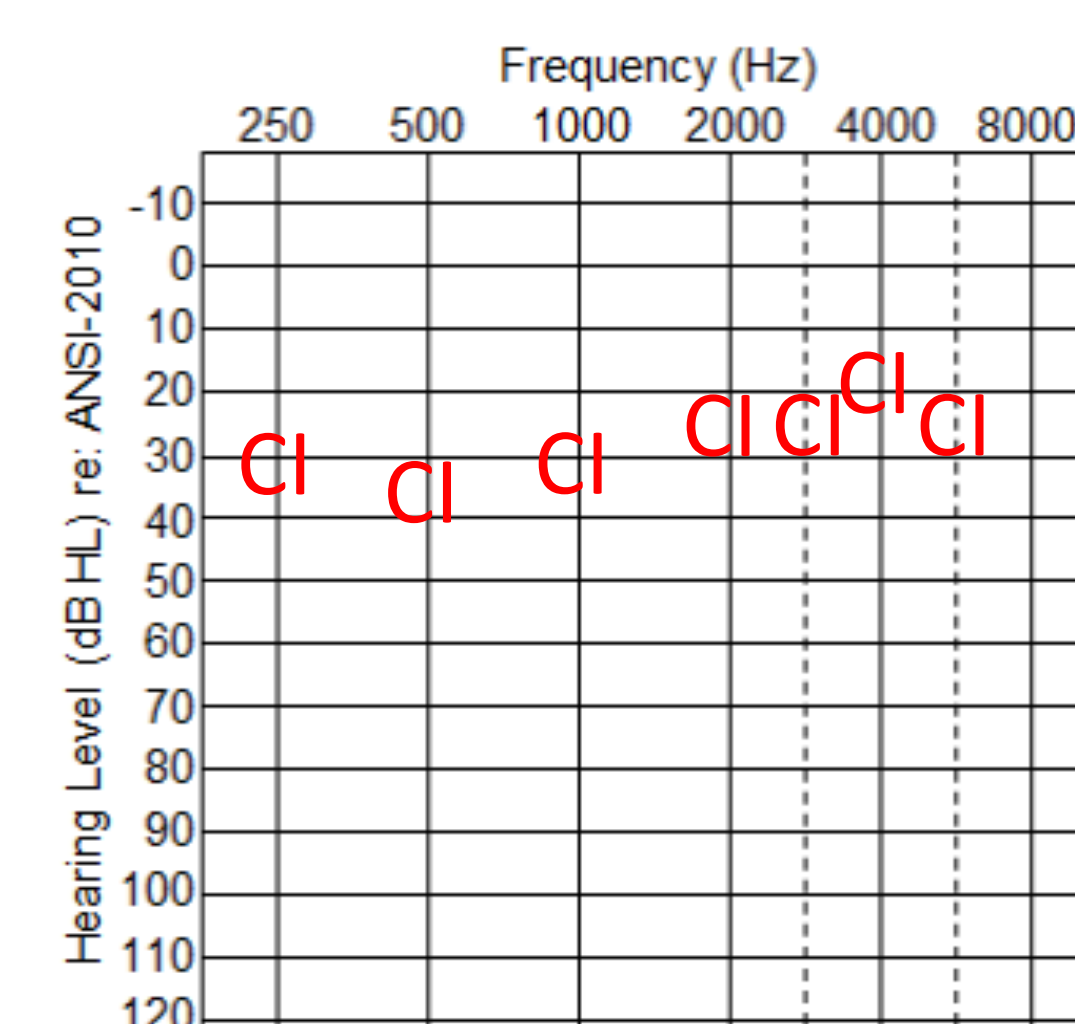
Pure Tone Average (PTA)	Air Conduction		Speech Detection Threshold (SDT)	Word Recognition Score (WRS)	Uncomfortable Loudness (UCL)
	Right	Left			
Right	—	95	dB HL	%	dB HL
Left	95	70	95	0.0	100
			70	4.0	95

2 months
Observation
with HA



Aided word recognition testing		
	CNC Monosyllabic Words	AzBio Q Sentences (Quiet)
Right	0% words, 13% phonemes	1%
Left	8% words, 38% phonemes	12%
Bilateral	—	17%

1 month after
Right Cochlear
Implant

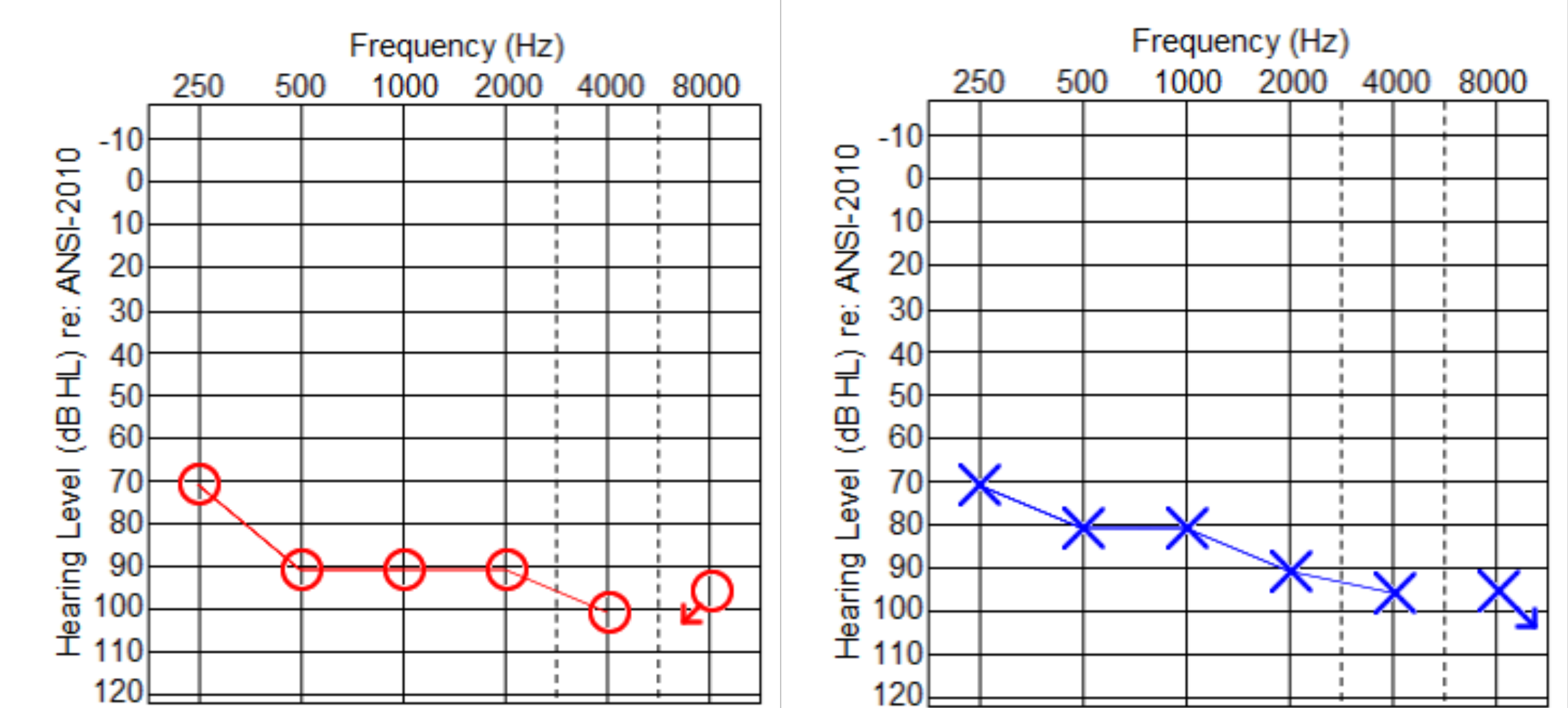


Aided word recognition testing		
	CNC Monosyllabic Words	AzBio Q Sentences (Quiet)
Right (CI) (left ear masked)	56% words, 71% phonemes	71%
Bilateral (CI + HA)	—	100%

PATIENT B

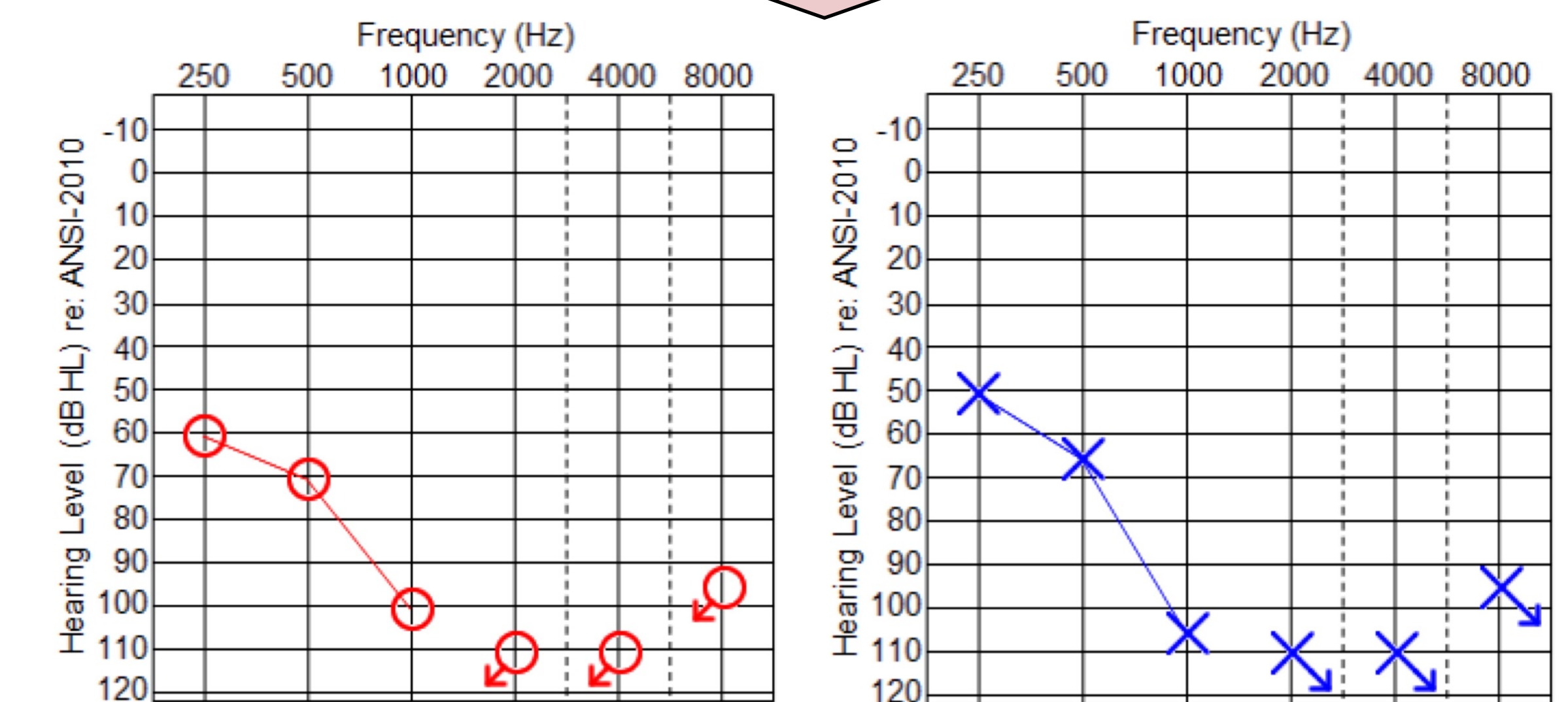
Demographics: 8-year-old female
Otologic injuries: bilateral TM perforation, bilateral severe to profound SNHL
Treatment: systemic steroids, intratympanic steroids (via tympanostomy tubes) for 6 months. Hearing aid for 1.5 years, then cochlear implant

Audiogram after intratympanic steroids (via tympanostomy tubes) for 6 months.



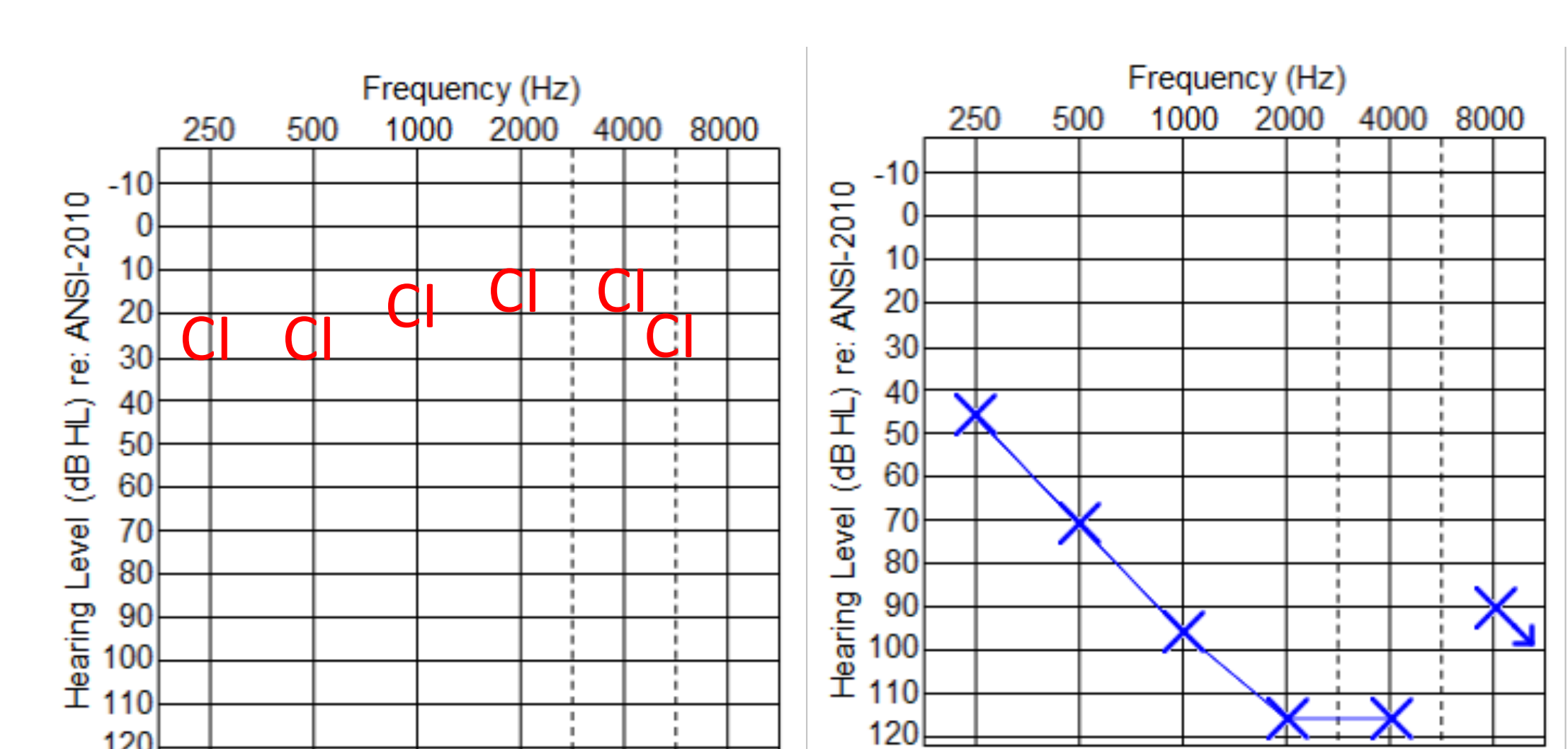
Pure Tone Average (PTA)	
Air Conduction	
Right	90
Left	85

6 months
Observation
with HA



	Speech Recognition Threshold (SRT)		Central Institute of the Deaf (CID) Words
	Aided (dB)	Unaided (dB)	
Bilateral	30	75	12%

1.3 years after
Right Cochlear
Implant



Aided word recognition testing			
	CNC Monosyllabic Words	AzBio Q Sentences (Quiet)	AzBio Sentences + 10
Bilateral (CI + HA)	96%	97%	93%

Key		
Right	○ Air Conduction	× Left
<	○ Bone Conduction	>
CI	○ Cochlear Implant	CI