Hearing Outcomes Of Lateral Wall Vs Perimodiolar Electrodes Among Unilateral Cochlear Implant Recipients

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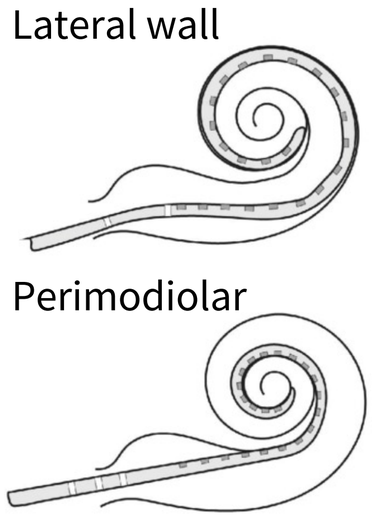
Introduction

- Modern cochlear implants (CI) follow one of two designs: perimodiolar (PM) or lateral wall (LW) electrodes
- PM electrodes are pre-curved to wrap more closely to the auditory nerve, but increase risk of scalar translocation
- LW electrodes reduce the risk of scalar by following the natural curve of the cochlear duct, but increase electrode-neuron distance
- The prior evidence of which is more beneficial remains an open question



Methods

- Adults (age ≥ 18) that underwent unilateral cochlear implantation (CI) were categorized based on implanted electrode (i.e., lateral wall vs perimodiolar)
- Medicare eligible patients qualified if their AzBio score was ≤40% and non-Medicare eligible patients qualified if their AzBio score was ≤60%
- Primary outcome: difference between preoperative and 12-month postoperative ipsilateral CNC
- Multivariable linear regression was used to evaluate the impact of electrode on difference between preoperative and 12-month postoperative ipsilateral CNC.

Results

Table 1. Clinical and demographic characteristics.

	Perimodiolar (n=841)	Lateral Wall (n=617)	p-value
Age			
Mean (SD)	66.3 (16.4)	70.0 (16.1)	<0.001
Sex			
Female	386 (45.9%)	281 (45.5%)	0.991
Male	455 (54.1%)	336 (54.5%)	
Race			
Non-White	258 (30.7%)	90 (14.6%)	<0.001
White	583 (69.3%)	527 (85.4%)	
Hearing Loss Duration, ipsilateral (years)			
Mean (SD)	26.4 (17.9)	27.4 (18.0)	0.793
Hearing Loss Duration, contralateral (years)			
Mean (SD)	26.2 (17.7)	27.2 (18.3)	0.322
Three Frequency PTA, ipsilateral (dB)			
Mean (SD)	85.4 (19.2)	83.2 (19.4)	<0.001
Three Frequency PTA, contralateral (dB)			
Mean (SD)	78.0 (20.0)	76.0 (19.9)	<0.001

Table 2. Hearing outcomes of cohort by electrode type.

	Speech Perception Measure	Perimodiolar (n=841)	Lateral Wall (n=617)	p-value
Preoperative	CNC ipsilateral Mean (SD)	12.4 (13.9)	13.5 (14.5)	0.537
	AzBio in quiet binaural Mean (SD)	31.8 (27.2)	34.1 (25.7)	0.09
	AzBio +10 dB SNR binaural Mean (SD)	26.3 (17.0)	19.5 (15.8)	<0.001
12 Months Postoperative	CNC ipsilateral Mean (SD)	54.5 (21.3)	54.0 (20.9)	0.912
	AzBio in quiet binaural Mean (SD)	74.6 (22.2)	69.2 (22.0)	<0.001
	AzBio +10 dB SNR binaural Mean (SD)	60.6 (21.8)	48.7 (21.0)	<0.001
Δ Speech Perception Measure	CNC ipsilateral Mean (SD)	39.4 (25.8)	39.0 (23.9)	0.834
	AzBio in quiet binaural Mean (SD)	34.4 (29.6)	29.8 (28.6)	0.0886
	AzBio +10 dB SNR binaural Mean (SD)	29.5 (22.3)	27.2 (21.7)	0.589

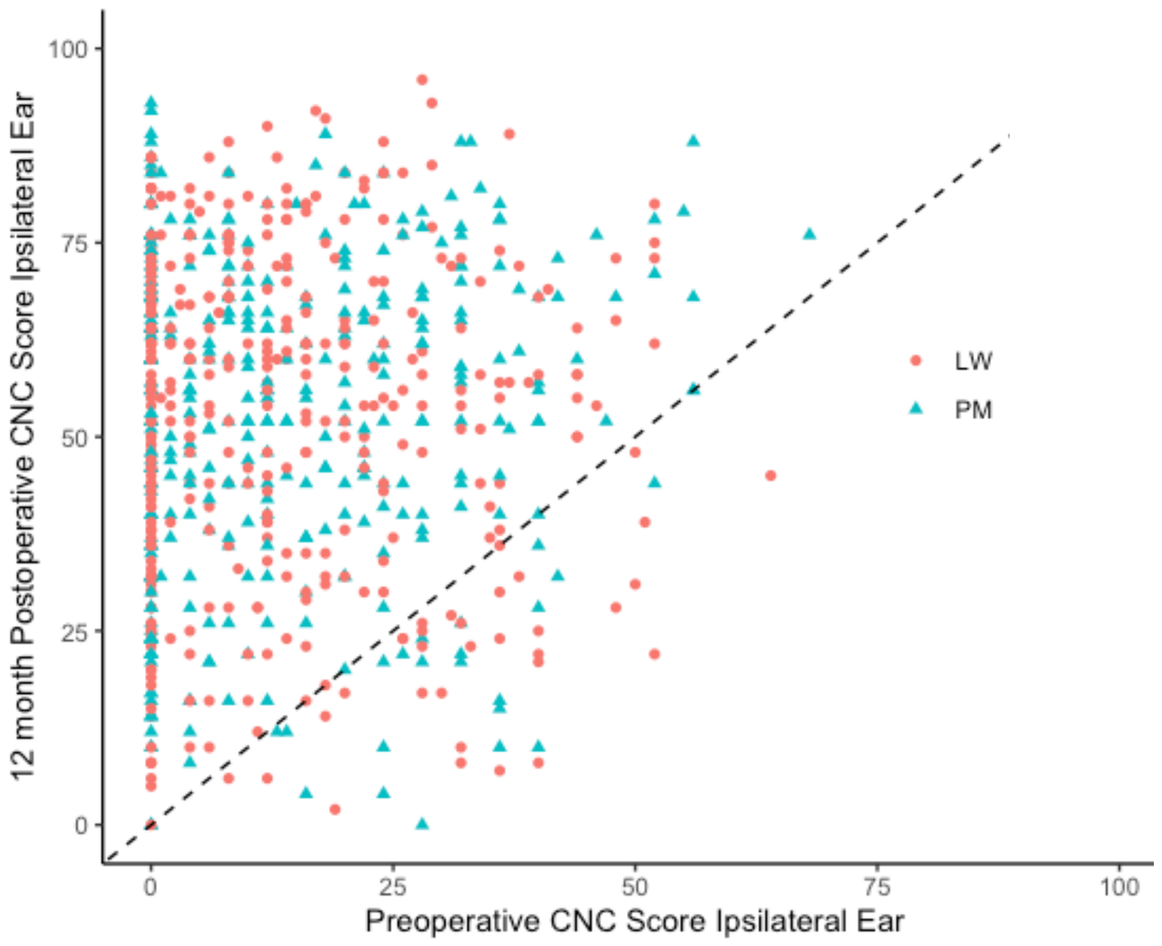


Figure 1. Scatterplot of CNC ipsilateral preop and postop scores.

Table 3. Effect of electrode type on CNC ipsilateral speech perception.

Variable	Estimate	95% Confidence Interval	p-value
Age	-0.29	-0.41 to -0.16	<0.001
Hearing Loss Duration, ipsilateral	-0.17	-0.27 to -0.06	<0.001
Three Frequency PTA, ipsilateral	0.36	0.26 to 0.46	<0.001
Perimodiolar Electrode	3.13	-0.40 to 6.66	0.08
Constant	33.2		
Adjusted R2	0.14		
F-statistic	28.11		<0.001
n	660		

Conclusions

- LW and PM electrodes both improve hearing outcomes among unilateral CI recipients
- When controlling for factors associated with hearing outcomes, neither demonstrated clinically meaningful superiority over the other

Limitations

- EAS not individually evaluated
- Incomplete data on translocation

References

MacPhail et al. Otolaryngology – Head and Neck Surgery. 2021. Doi: 10.1177/01945998211036339.