Olfactory Dysfunction in Adults Undergoing Cochlear Implantation

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Background

- Multiple sensory impairments, such as hearing, olfaction, and vision loss, affect nearly 65% of older adults
- Hearing loss (HL) has been identified as the biggest modifiable risk factor in the development of dementia
- Olfactory dysfunction (OD) is another classical sensory modality that predicts early cognitive dysfunction
- The prevalence of OD increases with age and is present in about 35% of adults over 55 years old
- When severe enough, cochlear implantation (CI) is the only option to restore hearing
- Pre-operative cognitive impairment leads to worse hearing outcomes after CI
- CI has been shown to improve markers of cognitive function as assessed by visual memory, working memory, and executive functioning

The Problem

There is large variability in post-CI speech outcomes and current research has only identified risk factors that ultimately account for less than half of the variability

Current risk factors include:

- Greater age at implantation
- Lower age at HL onset
- Increased duration of hearing loss
- Etiology of hearing loss
- Worse pre-operative hearing

It is difficult to counsel patients on their expected performance and to identify patients that would benefit from more intensive aural rehab.

Hypothesis

Pre-operative anosmia (absent olfaction) or hyposmia (reduced olfaction) is associated with smaller improvements in post-CI audiometric testing

Current Aims

Describe the prevalence of olfactory dysfunction in adults undergoing CI

Describe the relationship between pre-operative olfactory function and CI performance

Methods

Prospective study of adults > 50 yrs old meeting criteria for CI at a single academic center with two surgeons

Preoperatively, a 5 question Sniffin' Sticks identification test is administered.

Anosmia: 0-1 correct

Hyposmia: 2-3 correct

Normosmia: 4-5 correct

Audiometric speech perception testing with AzBio sentences is performed at 6 and 12 months postop and compared to preop scores

Results

11 patients have been enrolled to date

Female	8 (73%)
Age range (yrs.)	58 – 94
Median age (yrs.)	75
Duration of any HL range (yrs.)	1 – 80
Median duration of HL (yrs.)	20
Etiology of HL	
Presbycusis	7 (63%)
Sudden	3 (27%)
Noise induced	1 (9%)

Smell loss Cofounders	
Hx of COVID-19	3 (27%)
COVID associated smell loss	1 (9%)
Serious head trauma	3 (27%)
Post-viral smell loss	0
Diagnosis of CRS or AR	0
Hx of sinus or brain surgery	0
Recent URI	1 (9%)
Yes to any of the above	6 (55%)

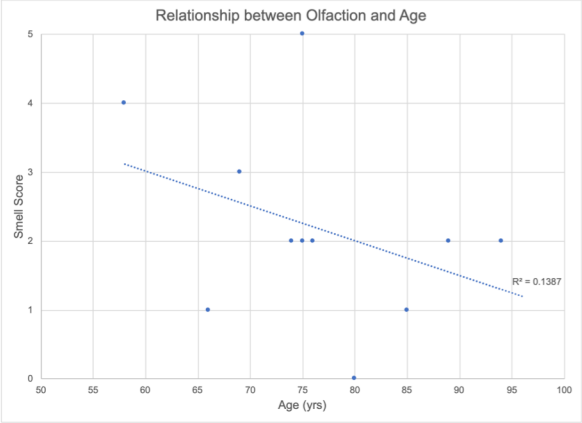
Smell loss

Score on Odor Identification	
Anosmia (0-1 correct)	3 (27%)
Hyposmia (2-3 correct)	6 (54%)
Normosmia (4-5 correct)	2 (18%)

Percentage Correctly Identifying Odorant	
Rose	18%
Leather	36%
Orange	45%
Fish	45%
Peppermint	73%

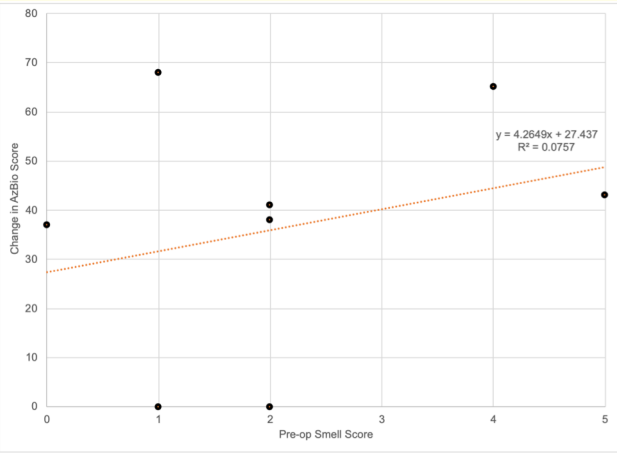
Olfactory dysfunction is very common in this population, with the rate of anosmia and hyposmia being 82%

Rose was the least commonly identified odorant, while peppermint was most commonly identified



There is an association between worsening olfaction and increasing age in this cohort, but the association is weak

CI performance and Olfaction



With our preliminary data, there is a small positive association between improvements in speech outcomes and higher pre-operative smell score

Future Aims

- Aim to enroll 50 patients in the study
- If there is a robust association between poor preoperative smell score and postop audiometric testing, we will plan to design a study in assessing more intensive aural rehab for patients with poor pre-op smell score
- Assess to see if CI can improve olfactory function

Conclusions

- Olfactory dysfunction is exceedingly common (82%) among CI candidates
- Multisensory dysfunction is common in CI candidates and could share a common pathophysiology
- A short smell test eminently feasible to administer in clinic may be useful to identify patients at risk for poor hearing outcomes for enrollment into intensive aural rehabilitation

References

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