



Background

- Patulous Eustachian tube (PET) : a condition where the Eustachian tube remains abnormally open or fails to close adequately.
- autophony, breathing autophony, aural fullness, tinnitus, hypernasality.
- This case study reports the acoustic characteristics of a PET patient with hypernasality, evaluates changes in symptoms before and after conservative therapy, and demonstrates the utility of objective assessment through speech evaluation and subjective symptom assessment.

Case presentation

Diagnosis

ENT evaluation

- Otoscopic examination → Retracted tympanic membranes
- Puretone audiometry → No abnormalities
- Tympanometry → Movement of the tympanometric

RM evaluation

- Acoustic evaluation
- Nasometer → changes Nasalance
- MDVP → changes Vocal quality

Result

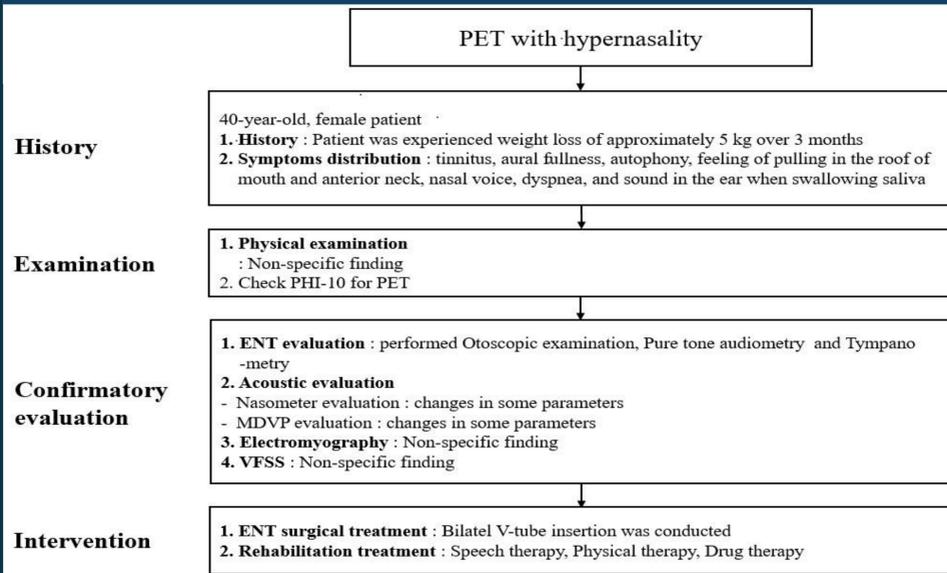


Figure 1. Flow chart of grading system for PET. PET = patulous eustachian tube, PHI = patulous eustachian tube handicap inventory, MDVP = multi-dimensionalvoice program.

Table 1. Nasalance Scores(%) for Vowels and Sente-nce, Oral, Nasal sound

Variable	Nasalance score(%)	
	Before treatment	After treatment
/a/	46	37
/i/	91	67
/e/	60	39
/o/	41	23
/u/	51	36
Sentence	27	23
Oral sound	41.5	18
Nasal sound	72.7	66.2

Table 2. Voice analysis parameters for vowel /a/

Analysis parameter	value		Normal
	Before treatment	After treatment	
Fo(Hz)	228.0	215.9	219.795 ±17.896
Jitter(%)	1.797	0.443	0.816 ±0.444
Shimmer(%)	4.159	2.557	2.973 ±0.803
NHR	0.130	0.117	0.122 ±0.016

Table 3. PHI(Patulous eustachian tube Handicap Inventory)-10 score

Variable	PHI-10 score value	
	Before treatment	After treatment
Score	80	7

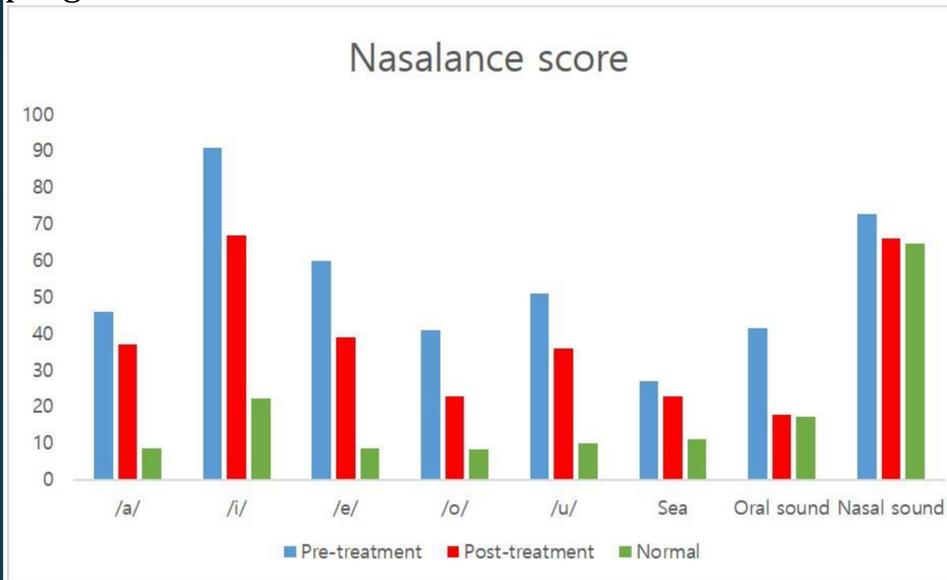


Figure 2. Nasalance score (vowel,sentence:sea passage, oral, nasal sound)

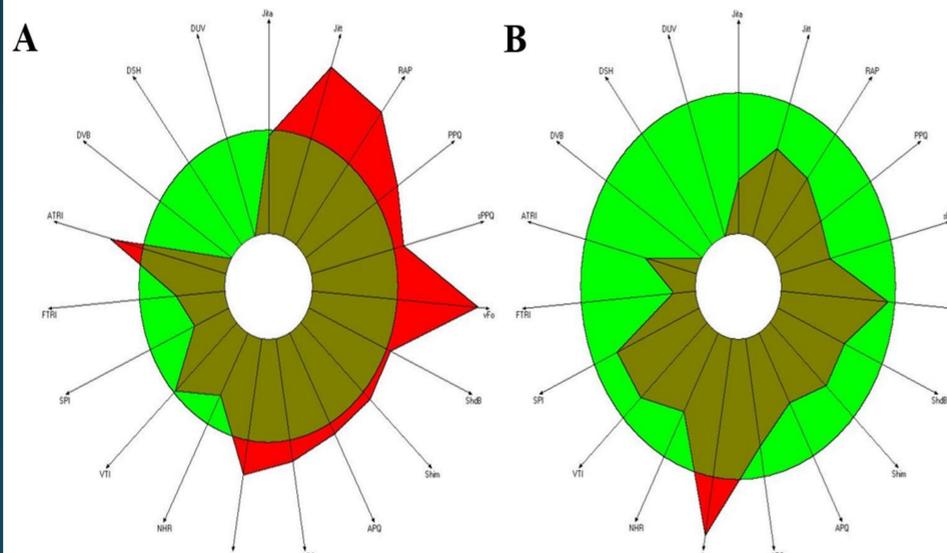


Figure 3. In MDVP (A) Before treatment. (B) After treatment.

Intervention

ENT surgical treatment

- Bilater V-tube insertion

RM evaluation

- Speech therapy
- Visual Biofeedback using Nasometer, Visi-Pitch insterments.
- Physical therapy
- SCM, scalene muscle stretching technique
- Medication
- Muscle relaxants

Conclusion

- Studies focusing on PET with hypernasality, changes in acoustic data, and questionnaire assessments are extremely rare.
- This case is significant in demonstrating that PET with hypernasality improved after conservative therapy and that changes in nasalance, voice quality, and questionnaire results were observed.