Ville Strasbourg

A post-thyroidectomy aerodynamic study in patients suffering or not from Recurrent Laryngeal Paralysis

Ming XIU[1], Camille FAUTH[1], Béatrice VAXELAIRE[1], Jean-François RODIER[2], Pierre-Philippe Volkmar[2], Rudolph SOCK[1,3]

(1) U.R. Parole & Cognition, E.A. 1339 Linguistique, Langues et Parole (LiLPa) et Institut de Phonétique de Strasbourg (IPS) - Université de Strasbourg

(2) Groupement Hospitalier Saint Vincent – Clinique Sainte Anne – Strasbourg

(3) Language, Information and Communication Laboratory – LICOLAB, Université Pavol Jozef Šafárik, Košice, Slovaquie

Programme doctoral international
International doctoral programme

Projet IdEX
Initiative d'excellence

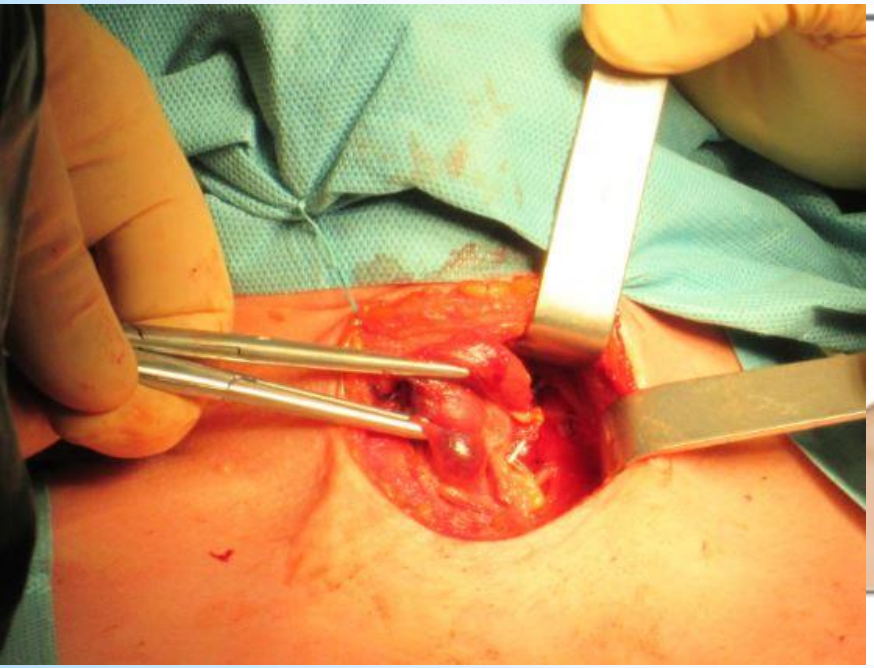
Attention

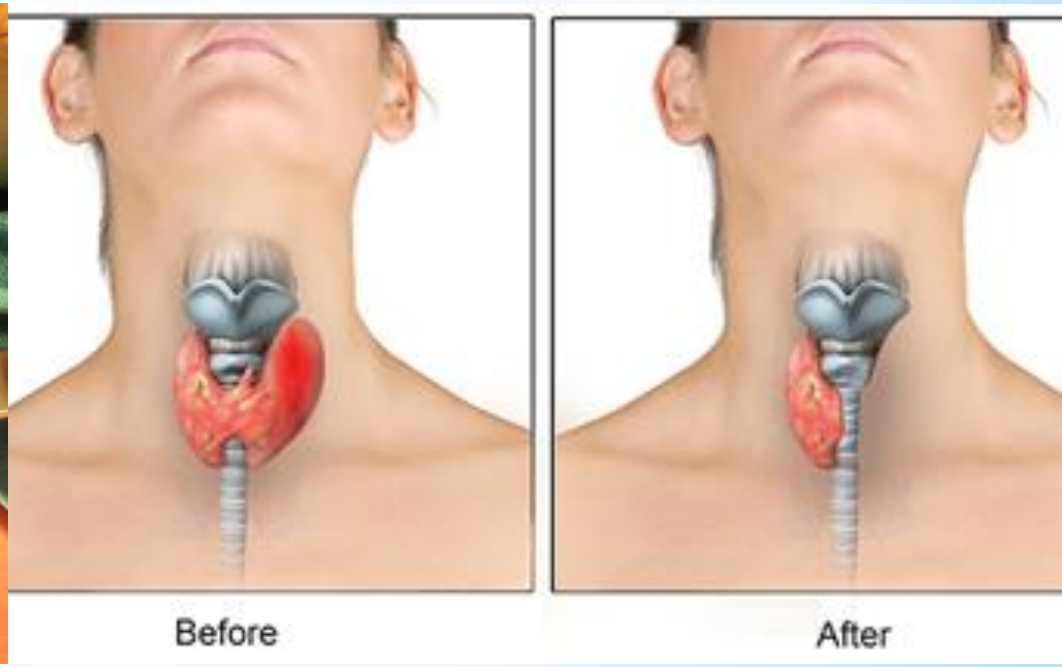
The following slideshow contains images that may offend the sensibilities of the audience

VIEWER DISCRETION ADVISED

Thyroidectomy

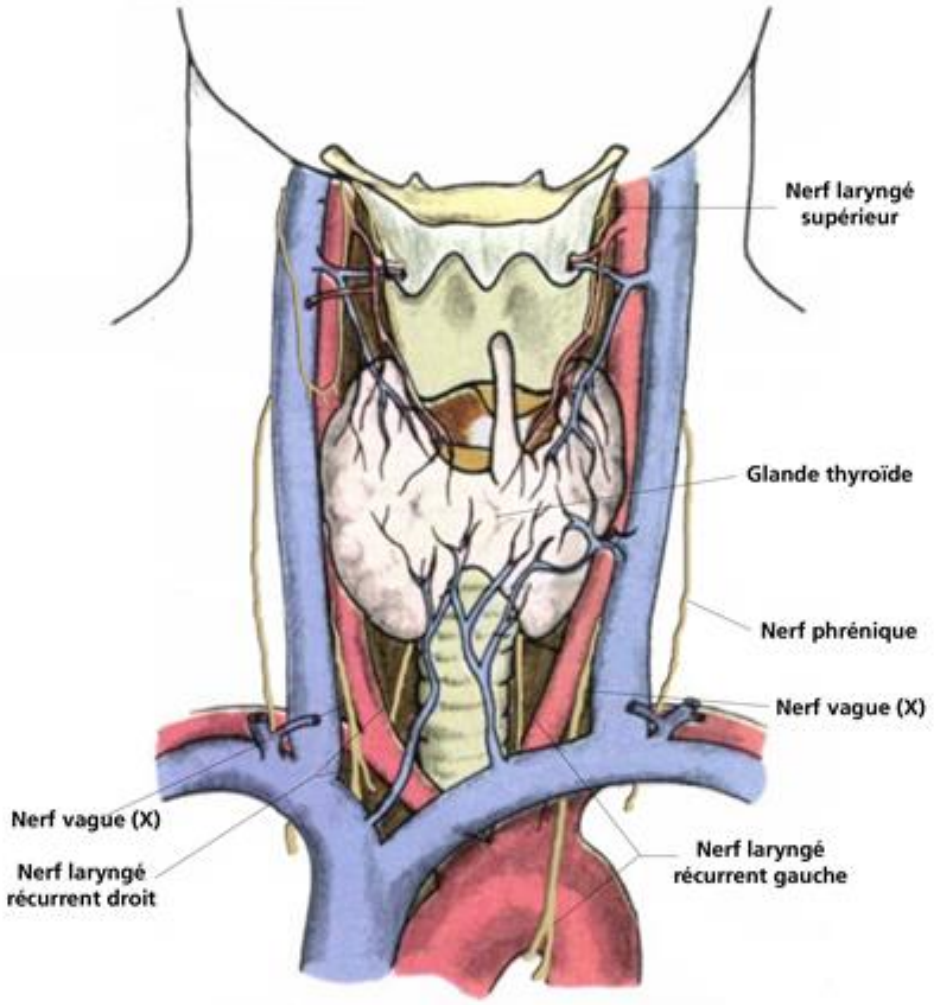
Our research aims to study the consequences of total thyroidectomy or isthmolobectomy on the voice quality of patients





This type of intervention generally disrupts the speech production system and often causes degradation of voice quality permanently or temporarily

The Thyroid Gland & Recurrent nerve

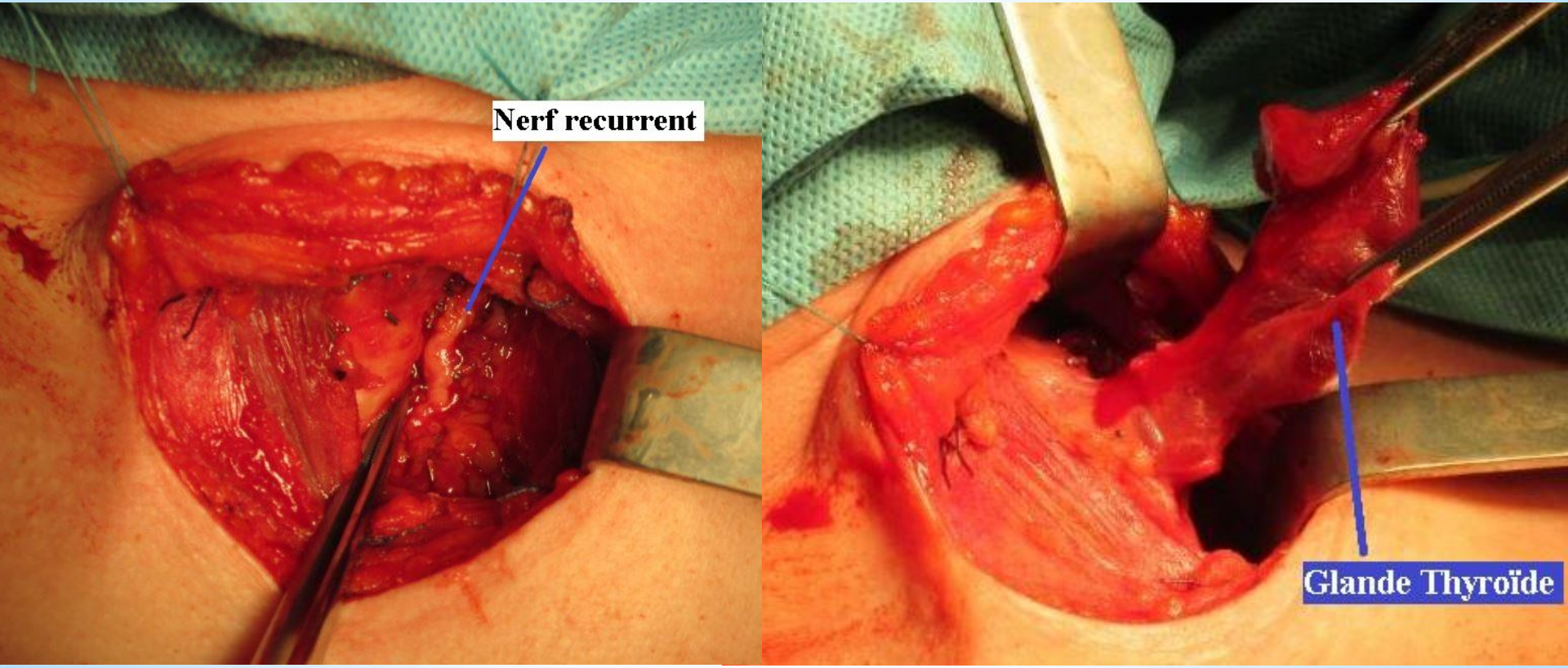


Located at the base of the neck

Responsible for the secretion of hormones essential for regulation of important functions of the body such as:

-heartbeat
-motility of the intestine
-body temperature
-processing of fats and sugars
-appetite
-mood
-sleep
-balance of body weight
-etc.

Recurrent nerve in real



A laryngeal mobility problem may occur even when the recurrent nerves have been preserved

Consequences:

Without recurrent nerve paralysis :

-No significant changes in voice quality
-Transient and non-persistent

With recurrent nerve paralysis :

-Significant voice quality changes
-Often transitory but sometimes persistent

Stojadinovic et *al*. (2002), Debruyne et *al*. (1997, Hong & Kim (1997), Hartl et al (2001), Morsomme et al (2001) par ex.

Acoustic:

-Less fundamental frequency

-Reduced amplitude of fundamental frequency

-Decreased intensity

-Increased jitter and shimmer

Aerodynamic:

-Maximum phonation time reduced

-Average oral airflow increased

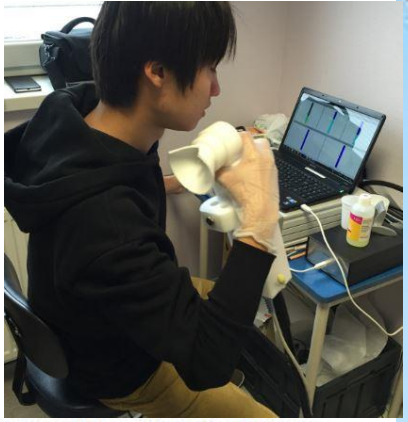
Perceptual:

-VHI scores increased

EVA© Device
(SQLab-LPL, France)

eva2

Evaluation Vocale Assistée

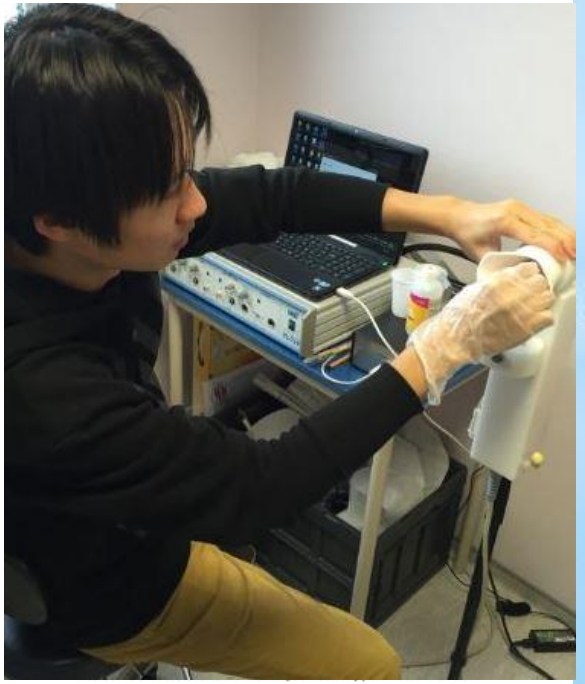


Le système d'Evaluation Vocale Assistée EVA2 est un dispositif d'analyse des mécanismes de production de la parole. Doté de nombreux capteurs, il permet d'enregistrer non seulement le son de parole mais aussi des signaux physiologiques tels que le débit d'air oral et nasal, la pression intra-orale, l'accolement des cordes vocales (Electroglottographie)...

Développé au LPL, il fait l'objet d'une opération de valorisation notamment dans une utilisation clinique pour les troubles de la voix et de la parole.

Utilisation :

- Phonétique expérimentale
- Voix chantée
- Troubles de la voix et de la parole



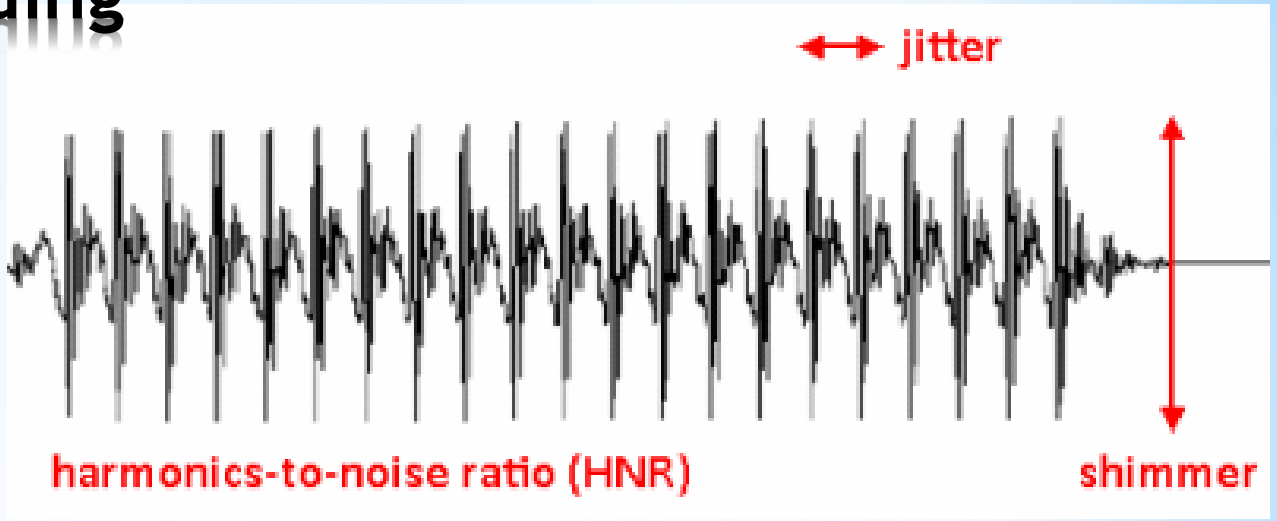
Constructeur :

SQLab

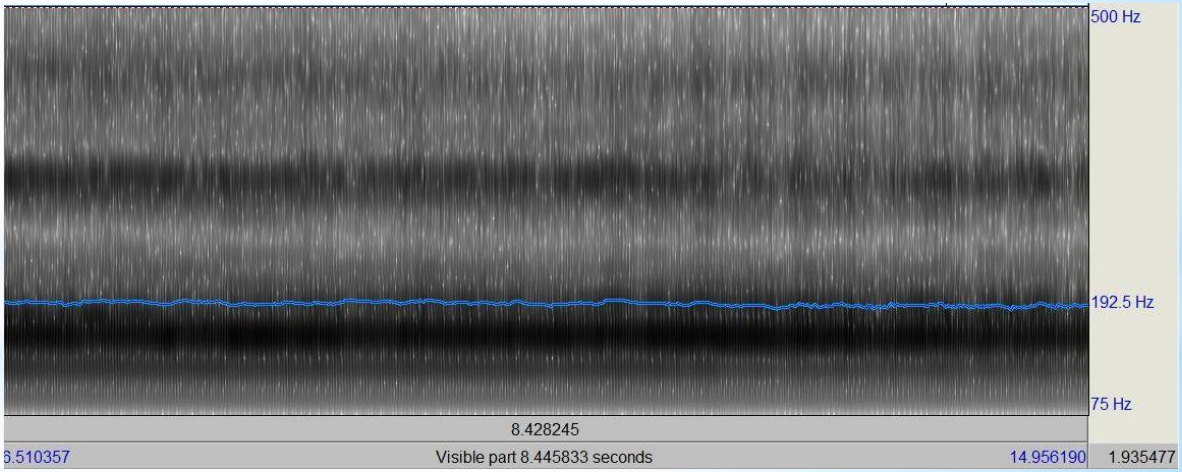
http://www.sqlab.fr/

UMR 7309 | CNRS | AMU
PAROLE ET LANGAGE

Acoustic recording



Indexes of disturbances: Jitter, Shimmer and HNR



F0 (Pitch)

VHI (Jacobson et al., 1997) :

The Voice Handicap Index

VOICE HANDICAP INDEX

Name: _____ Date: _____

These are statements that many people have used to describe their voices and the effects of their voices on their lives. Circle the response that indicates how frequently you have the same experience.

0-never 1-almost never 2-sometimes 3-almost always 4-always

Part I-F

My voice makes it difficult for people to hear me.	0	1	2	3	4
People have difficulty understanding me in a noisy room.	0	1	2	3	4
My family has difficulty hearing me when I call them throughout the house.	0	1	2	3	4
I use the phone less often than I would like to.	0	1	2	3	4
I tend to avoid groups of people because of my voice.	0	1	2	3	4
I speak with friends, neighbors, or relatives less often because of my voice.	0	1	2	3	4
People ask me to repeat myself when speaking face-to-face.	0	1	2	3	4
My voice difficulties restrict my personal and social life.	0	1	2	3	4
I feel left out of conversations because of my voice.	0	1	2	3	4
My voice problem causes me to lose income.	0	1	2	3	4

SUBTOTAL _____

Part II-P

I run out of air when I talk.	0	1	2	3	4
The sound of my voice varies throughout the day.	0	1	2	3	4
People ask, "What's wrong with your voice?"	0	1	2	3	4
My voice sounds creaky and dry.	0	1	2	3	4
I feel as though I have to strain to produce voice.	0	1	2	3	4
The clarity of my voice is unpredictable.	0	1	2	3	4
I try to change my voice to sound different.	0	1	2	3	4
I use a great deal of effort to speak.	0	1	2	3	4
My voice is worse in the evening.	0	1	2	3	4
My voice "gives out" on me in the middle of speaking.	0	1	2	3	4

SUBTOTAL _____

Part III-E

I am tense when talking to others because of my voice.	0	1	2	3	4
People seem irritated with my voice.	0	1	2	3	4
I find other people don't understand my voice problem.	0	1	2	3	4
My voice problem upsets me.	0	1	2	3	4
I am less outgoing because of my voice problem.	0	1	2	3	4
My voice makes me feels handicapped.	0	1	2	3	4
I feel annoyed when people ask me to repeat.	0	1	2	3	4
I feel embarrassed when people ask me to repeat.	0	1	2	3	4
My voice makes me feel incompetent.	0	1	2	3	4
I am ashamed of my voice problem.	0	1	2	3	4

SUBTOTAL _____

TOTAL _____

The Voice Handicap Index (VHI): Development and Validation
Barbara H. Jacobson, Alex Johnson, Cynthia Grywalski, Alice Silbergleit, Gary Jaconsen, Michael S. Benninger

Research Hypotheses

-Lowering F0

-A decrease in Maximum Phonation Time (TMP)

-Instability of the Oral Airflow (Oaf)

-The acoustic signal disturbance measurements (HNR, Jitter and Shimmer) would increase

-Highest scores of V.H.I in early postoperative

-Inter- and intra speaker xxx

-Time (and speech therapy in cases of laryngeal paralysis) should favor voice recovery

Method

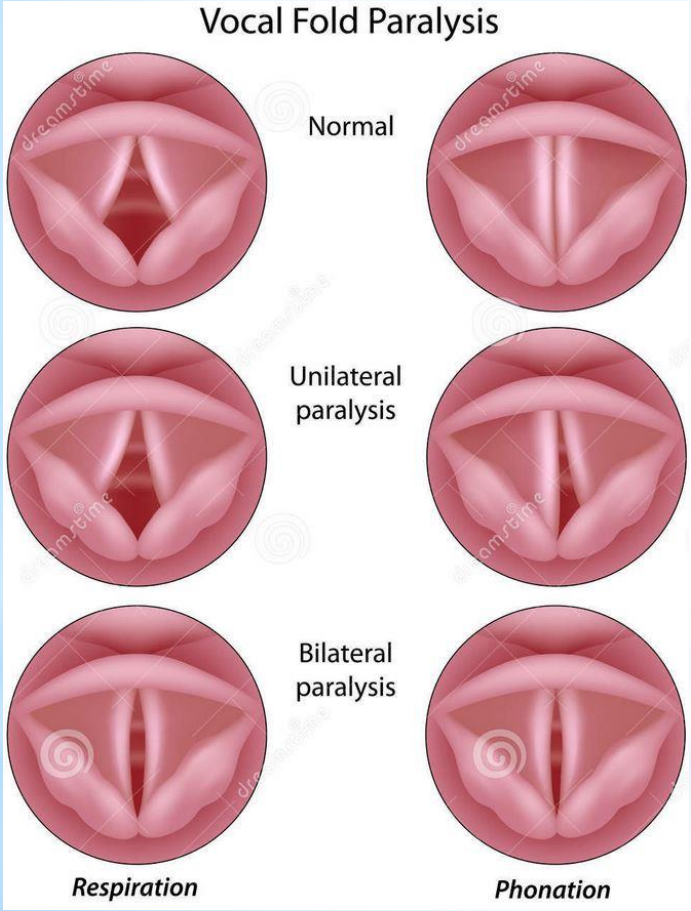
13 thyroidectomy patients

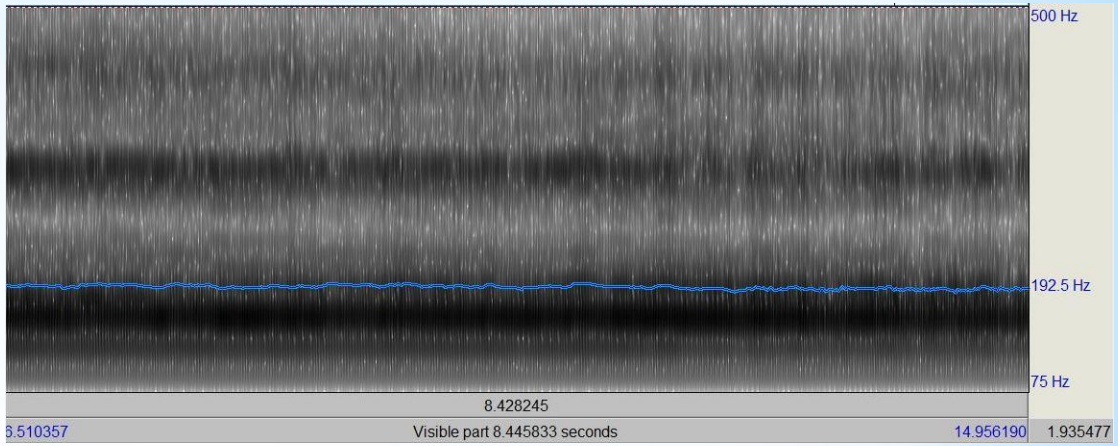
Vowel [a] Maximum Phonation Time produced 2 times
-aerodynamic analyses
-acoustic analyses

Subjective analyses (VHI)

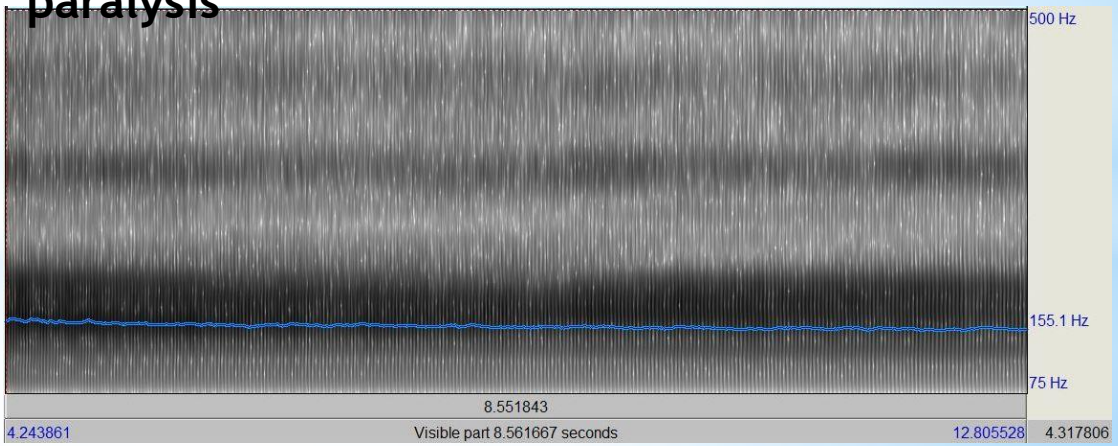
Different recording phases

Subject without paralysis





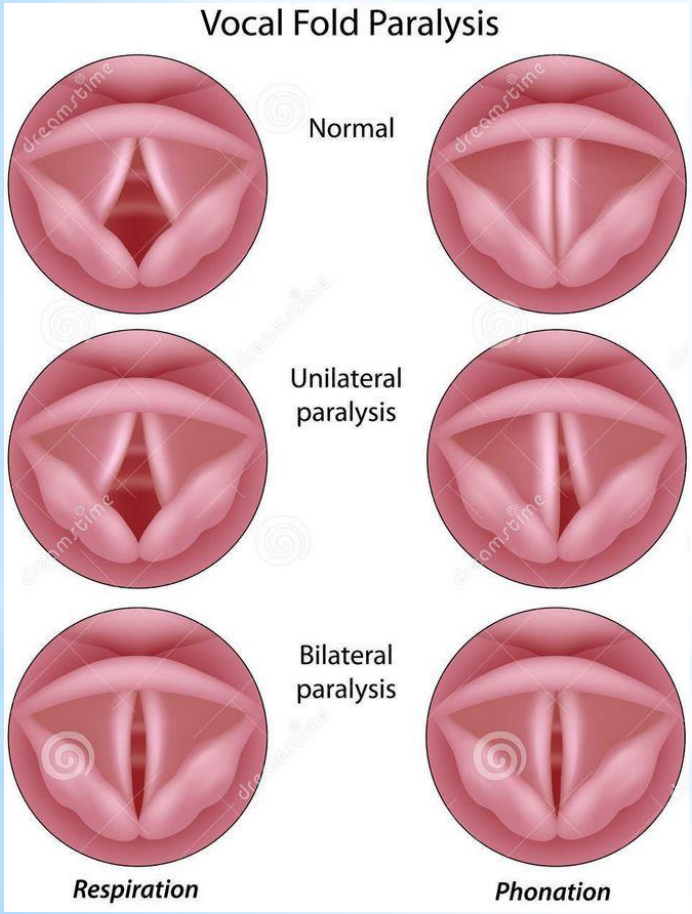
Preoperative phase: subject without paralysis

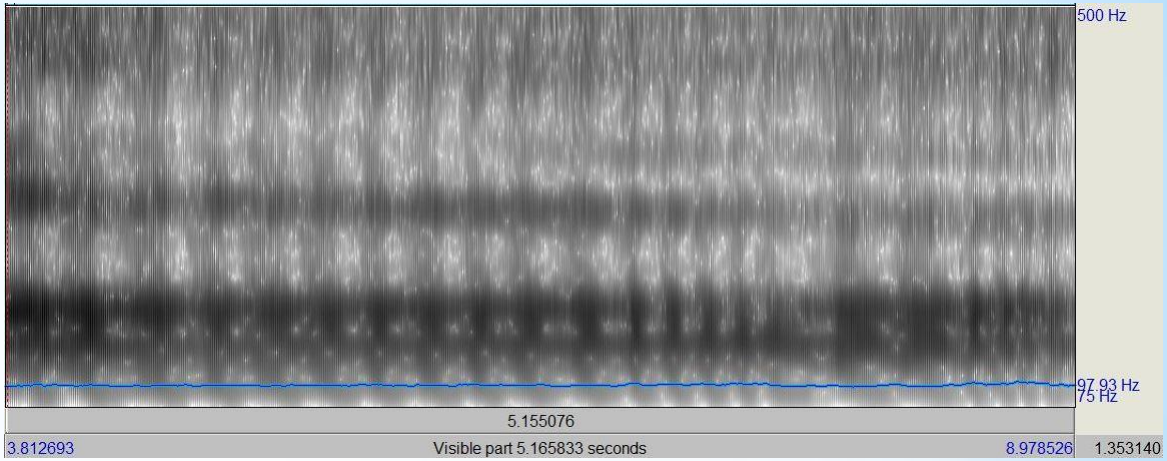


Post-operatively phase: Sujet non-paralysed

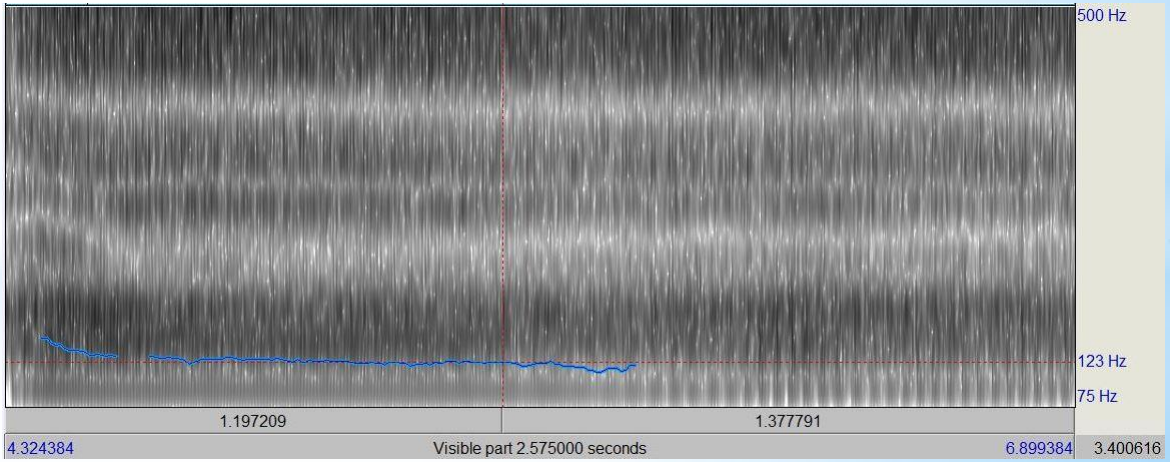
isthmolobectomie

Subject with paralysis





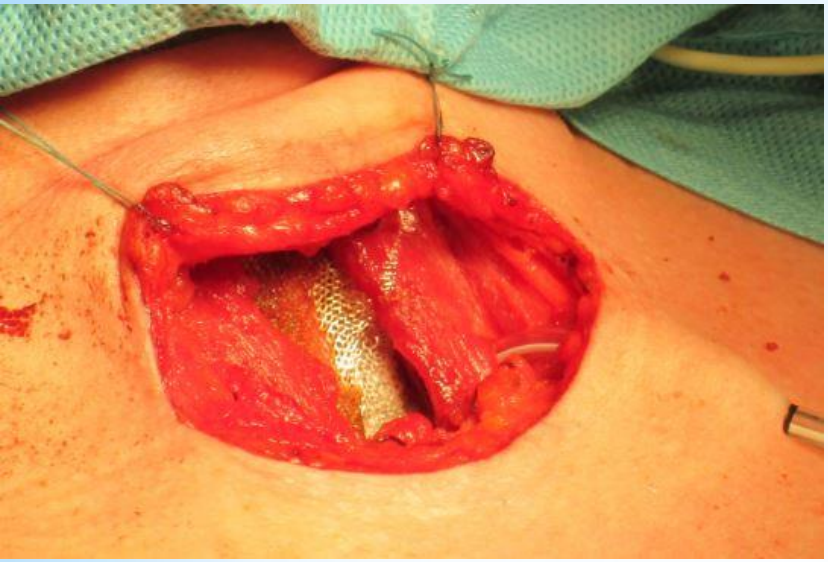
Preoperatively phase: Sujet paralysed

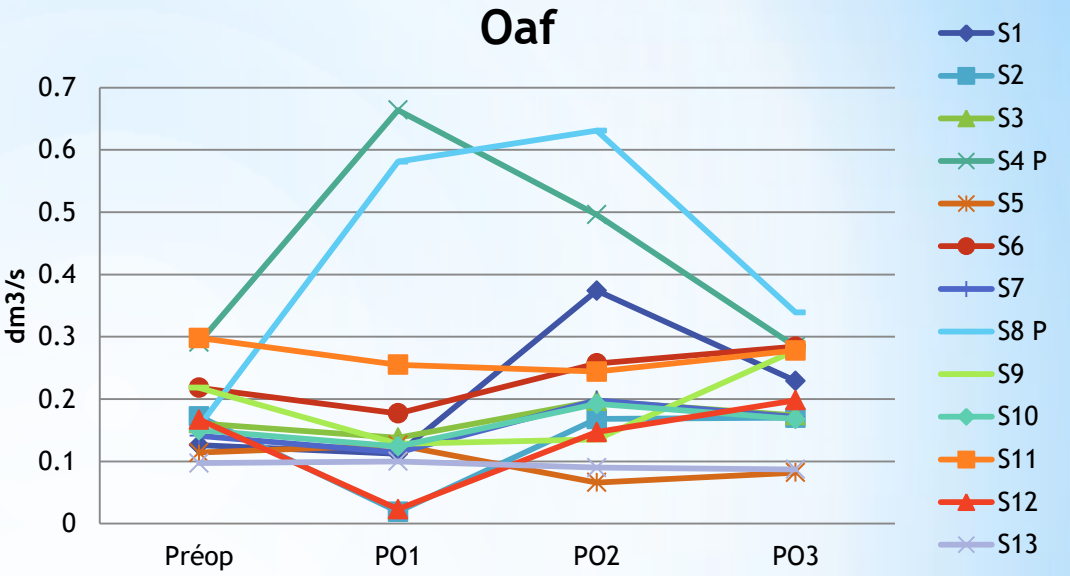


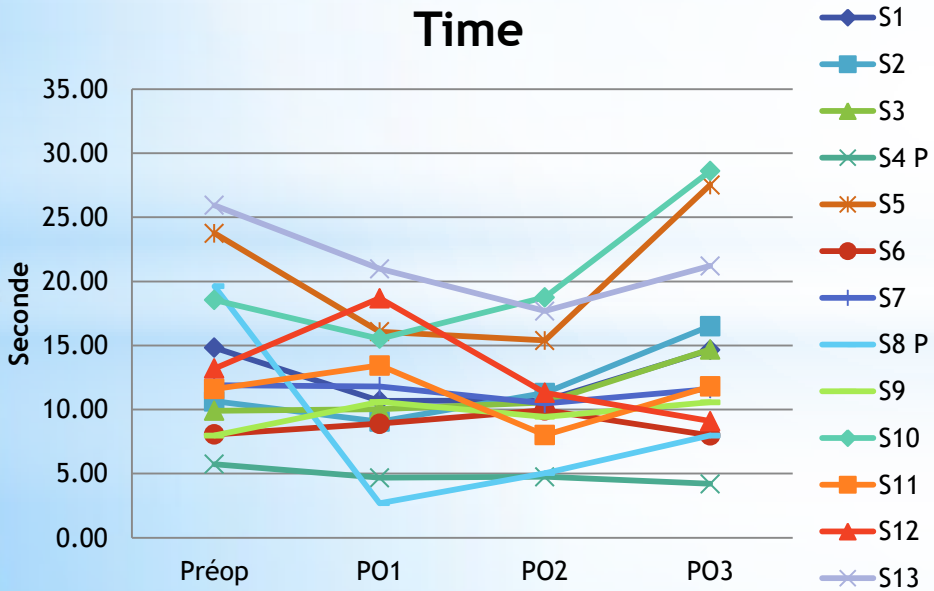
Post-operatively phase: Sujet paralysed

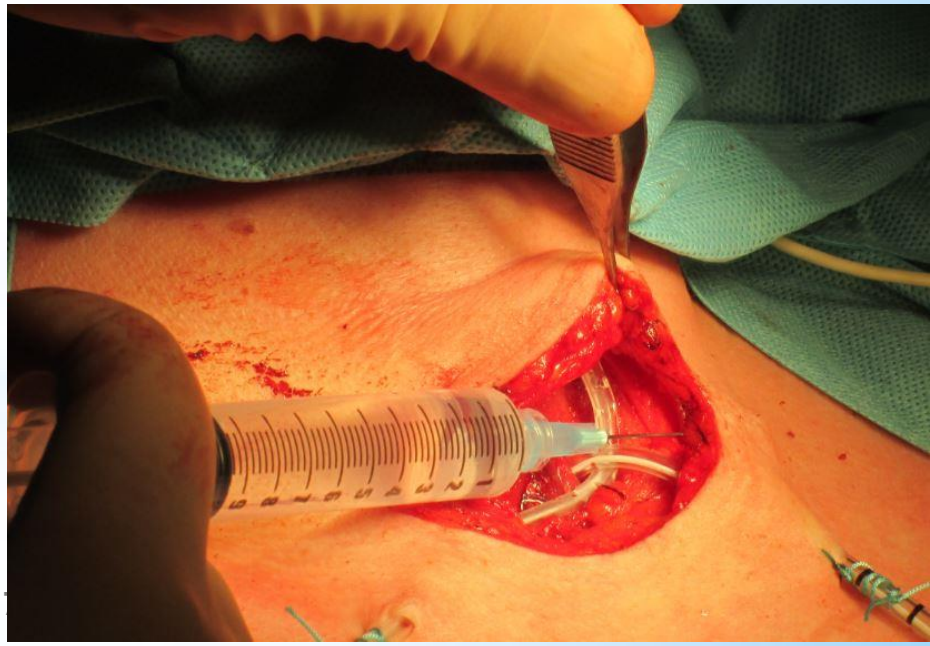

Results...

Aerodynamic results:

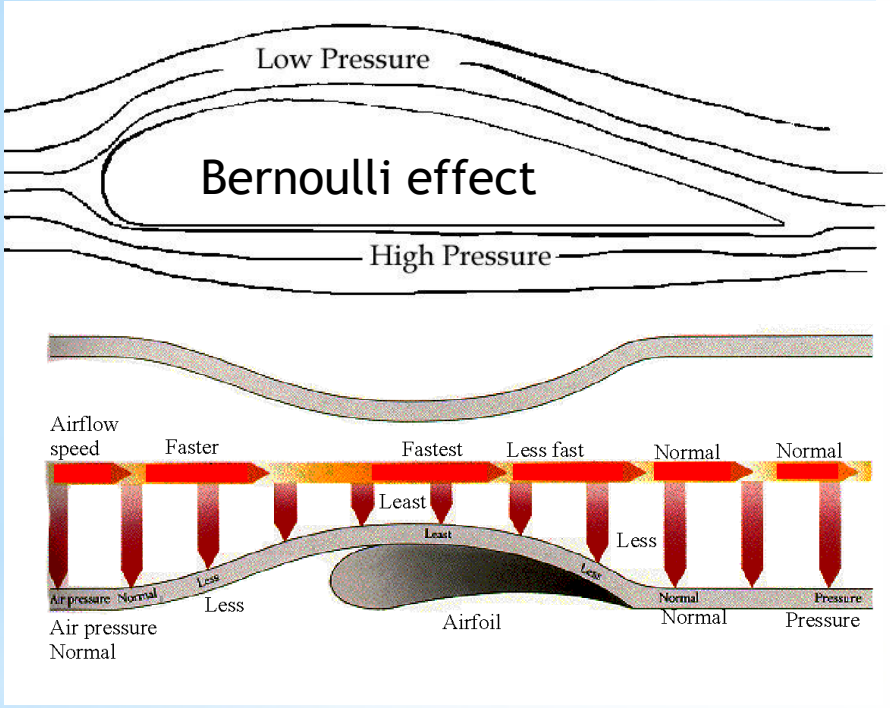


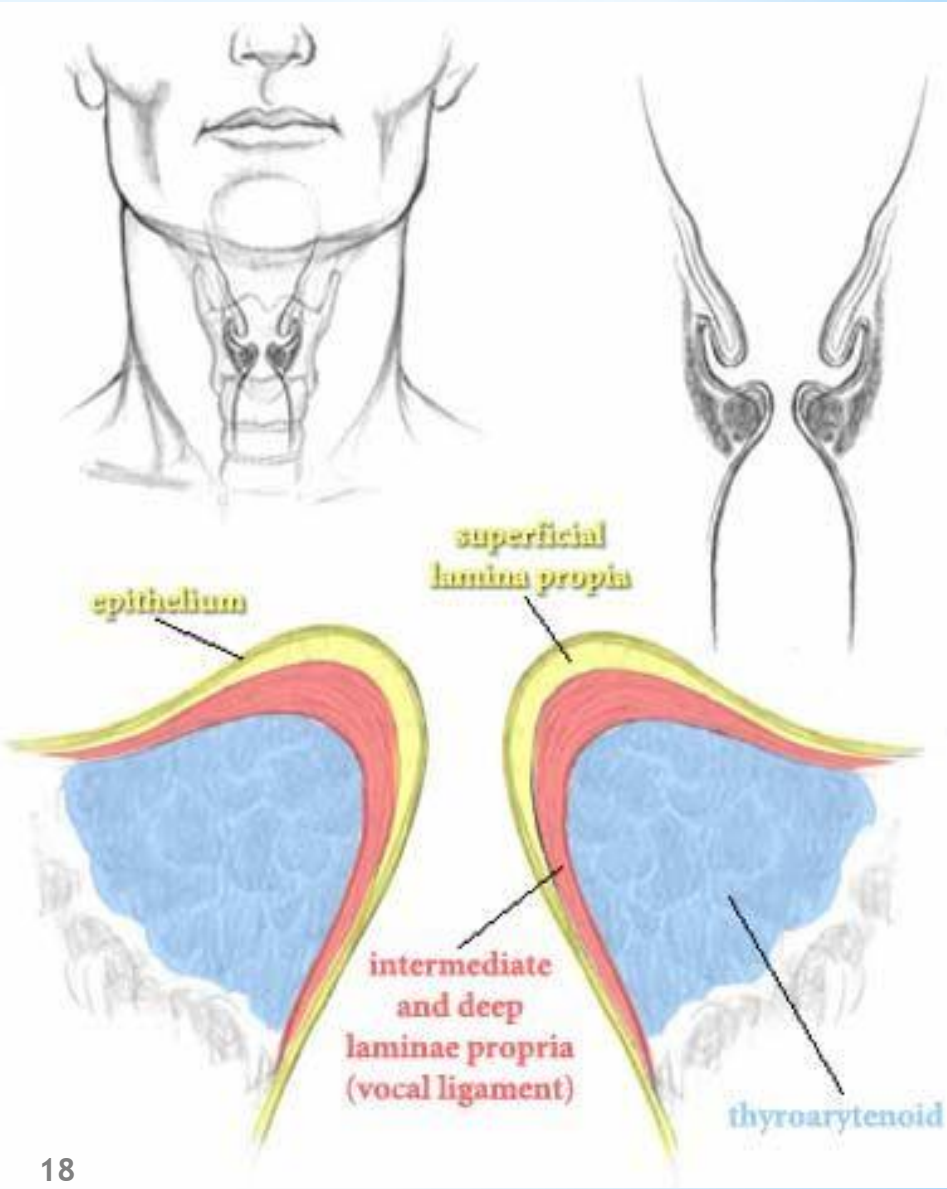






Where does all the air go?

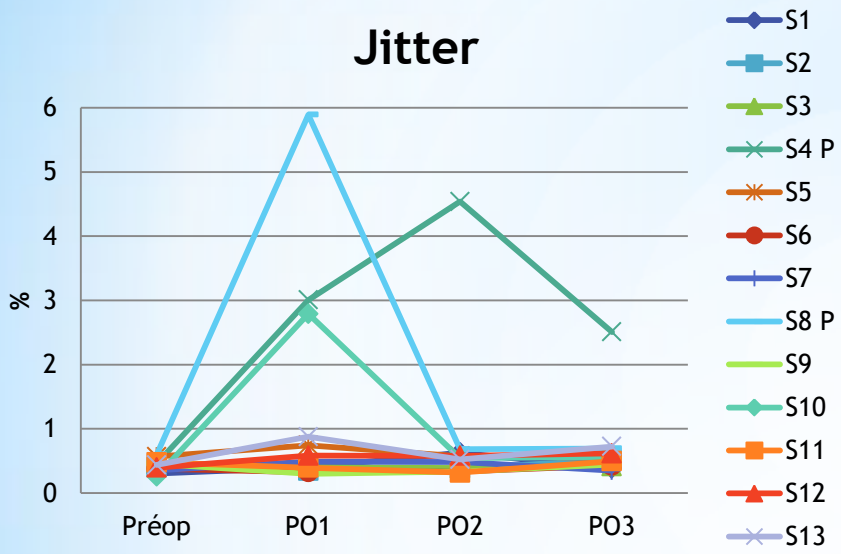


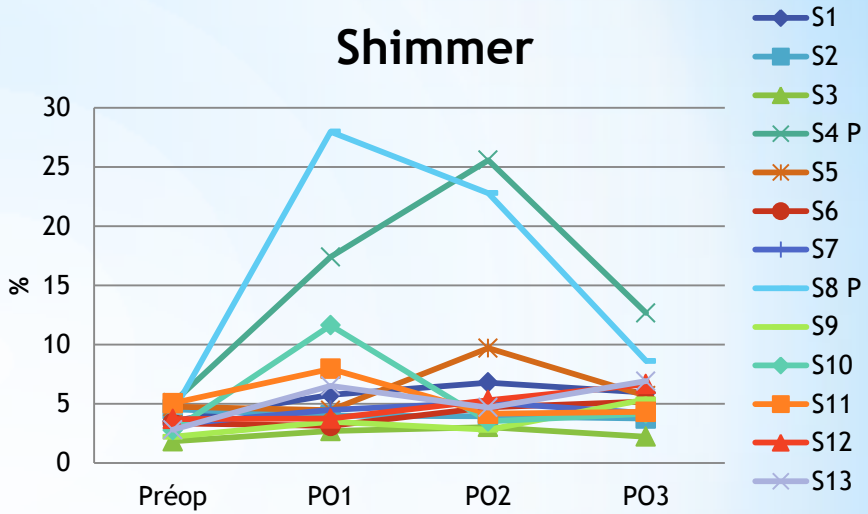


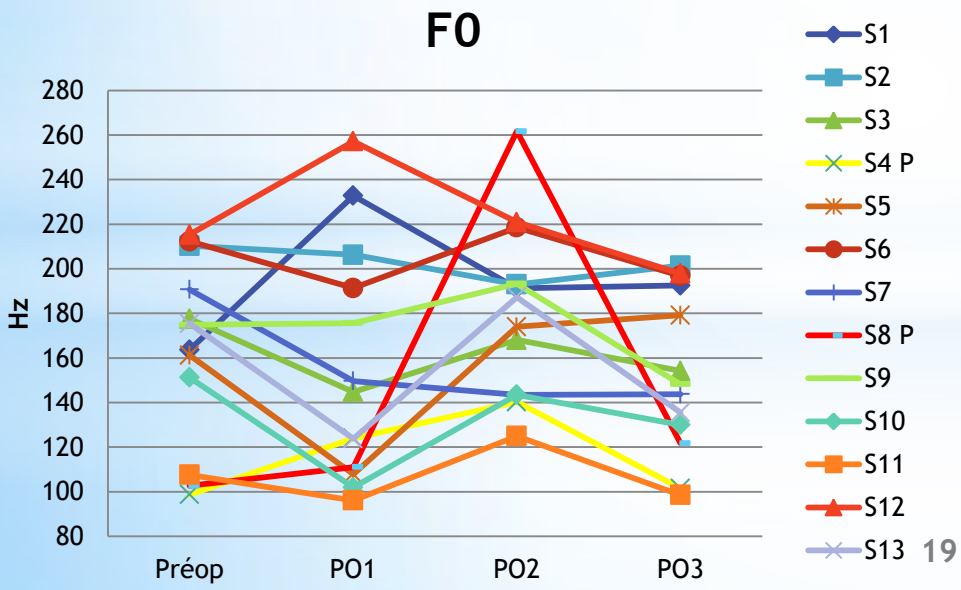
- A change of Oaf is possibly caused by patients trying to implement a compensation strategy that aims to overcome irregular glottal activities

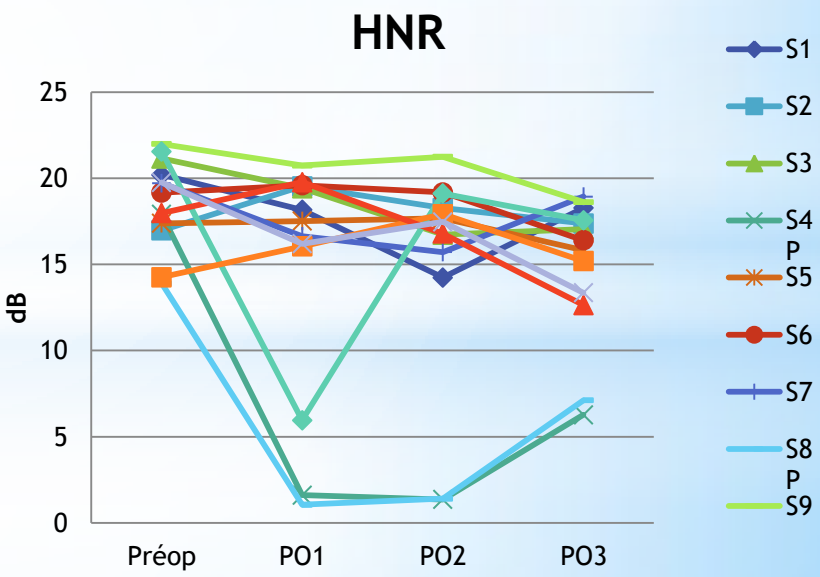
- « over-consommation" of air may be responsible for reduction of TMP

Acoustic results:

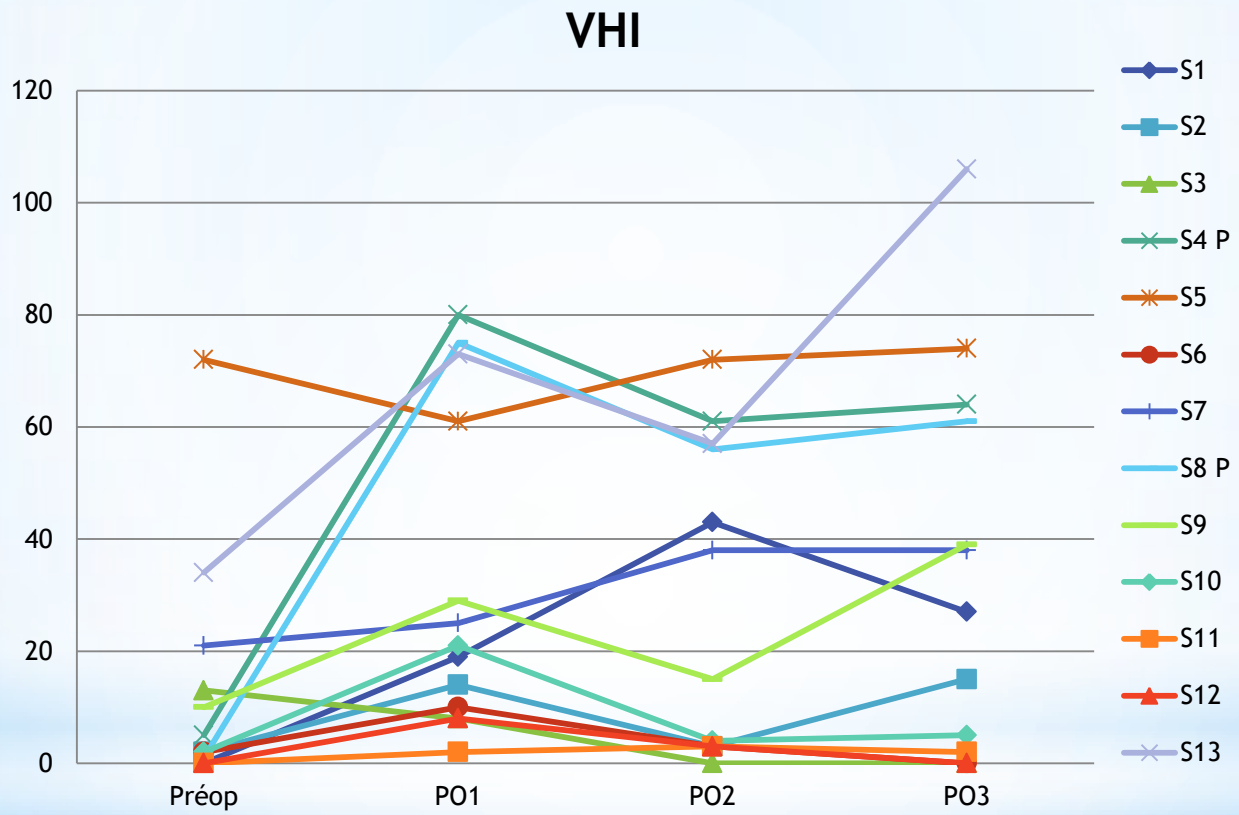








Self-evaluation results:



* No single measure allows diagnosis of dysphonia → complementary approaches
* Instrumental analyses ++for longitudinal monitoring of dysphonia, the judgment of the effectiveness of a treatment
* Voice =perceptual phenomenon from the point of view of :

- the one who emits it (the patient) than…
- the one who evaluates it(the clinician)

PROSPECT

Further studies on different patients to further explore individual strategies of patients following perturbation of the speech production system

Other methodologies: nonsense words, sustained vowels, testing fatigue, discrimination tests …

lilpa
linguistique, langues, parole

ips
Institut de Phonétique de Strasbourg

Fondation Vincent de Paul
Groupe Hospitalier Saint Vincent

Investissements d'avenir

In theory, there's no difference between theory and practice. In practice, there is.
-Yogi Berra

Université de Strasbourg

Projet IdEX
Initiative d'excellence