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# Estimated Subglottic Pressure Evaluation Evolution amongst 152 dysphonic patients.

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# E.S.G.P.

- Indirect physiological information about laryngeal valving activity (Zraick & al, 2012)
- Criteria of vocal strain, vocal effort (Giovanni & al, 2000; Rosenthal & al, 2014)
- Related to hyperfunctional voice (Hillman & al, 1989)
- Increased values with vocal pathologies (Tanaka, 1985; Isshiki, 1964; Stathopoulos, 1985; Sherla & al, 2013.)
- Decreased as breathiness of voice increases (Klich & Sabo, 1988)
- Reliable objective measure (Garrison, 2009)
- Used to guide clinical decision (Awan & al, 2013)

# Our aim

- Clinical interest of the ESGP
- Interpret the ESGP parameters
- Continue our investigation\*
  - Observing ESGP scores according to age, gender, voice pathology, Sound pressure level.
  - Examine the relationships between ESGP, DSI and VHI.
- Examine ESGP at T1 (initial vocal profile) and T2 (last vocal profile)

\* Morsomme, D, Chareix, H, Finck, C, Larrouy-Maestri, P. (2014, May 31). Estimated Subglottic Pressure Evaluation According to Vocal Pathology. Study on 418 Patients. Paper presented at the 43rd Annual Symposium: Care of the professional voice, Philadelphia, USA.



# METHOD



# Vocal profile

- Diagnosis
  - *VLS and/or High Speed Camera*
  - *Subjective and objective measures*
    - *Perceptual (GRBAS, VHI)*
    - *Acoustic (sustain [a])*
    - *Aerodynamic (MFR, MPT, PAS)*
    - *DSI*
- Computer Speech Lab Model 4500 (KayPentax)
  - *M.D.V.P., Voice Range Profile, CSL main program*
  - *Phonatory Aerodynamic System, Model 6600 (Kay Pentax).*

# Subjects

Groups	Men	Women	Total	Delay (T1-T2) (min/max)
<b>IMMOBILITY</b>	14 (61; 11,31)	40 (54; 11,56)	54 (56; 11,85)	136 (21, 580)
<b>OEDEMA</b>	3 (49; 12,66)	20 (50; 12,93)	23 (50; 12,61)	221 (48, 486)
<b>NODULES</b>	1 (54)	23 (30; 11,74)	24 (31; 12,24)	206 (32, 371)
<b>POLYP</b>	13 (43; 11,08)	16 (45; 13,25)	31 (44; 12,46)	141 (28, 683)
<b>TOTAL</b>	<b>31 (52; 13,92)</b>	<b>99 (46; 15,31)</b>	<b>130 (47; 12,65)</b>	<b>176 (21, 683)</b>

*Number of subjects by group of pathology. Mean age; Standart Deviation in parenthesis.*

- Data collected between December 2009 and January 2014.
- Patients grouped according to the pathology (classification from Finck, PhD thesis, 2008).

# E.S.G.P. Task

- [ipipipipi]
- 3 sequences:
  - At conversational SPL (IC)
    - « *Speak as you converse with me, be comfortable.* »
  - At low SPL (IL)
    - « *Speak as soft as possible, but do not whisper.* »
  - At high SPL (IH)
    - « *Speak as loud as possible.* »





# RESULTS

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# Control group vs pathological group

- Control groups: Holmberg & al (1988)  
Zraick & al (2012)
- ESGP pathological group > control group

Men	Holmberg et al	Zraick et al	Patho T1
PSGE C	6,3 (1,4)	6,4 (1,8)	<b>12,8 (4,4)</b>
PSGE low	5,1 (1,2)		<b>8,04 (6,78)</b>
PSGE high	9 (2,4)		<b>23,48 (12,27)</b>
Women			
PSGE C	5,8 (0,9)	6,4 (2,5)	<b>11,71 (8,41)</b>
PSGE low	4,6 (0,8)		<b>7,89 (2,78)</b>
PSGE high	8,2 (1,8)		<b>18,7 (6,51)</b>

# Comparison T1 – T2 (Wilcoxon)

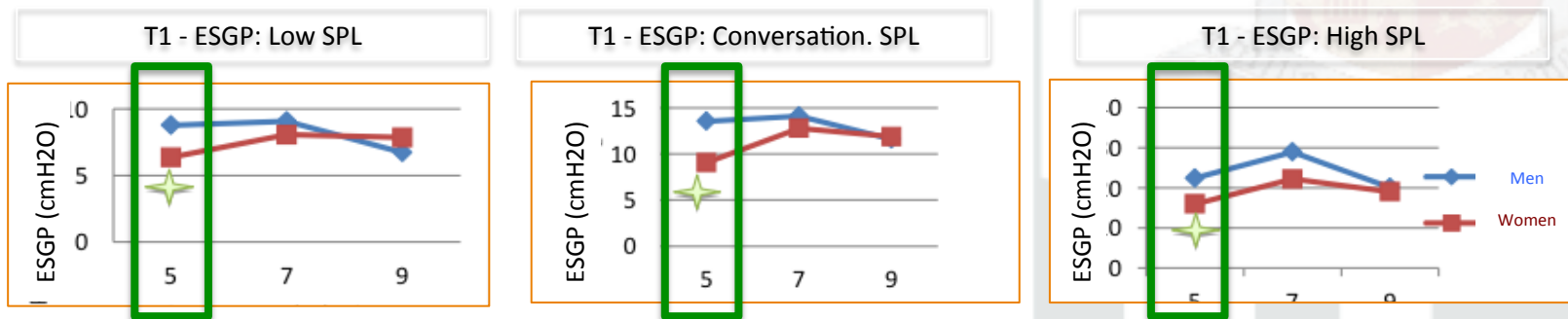
- For the all group: PSGE T2 < PSGE T1

Comparison T1 – T2	N	T	Z	p
ESGP convers.	129	2547,000	3,866830*	0,000*
ESGP low	128	2971,500	2,750330*	0,005*
ESGP high	124	3468,500	1,013679	0,31

- For ESGP at high SPL: high variability between patients

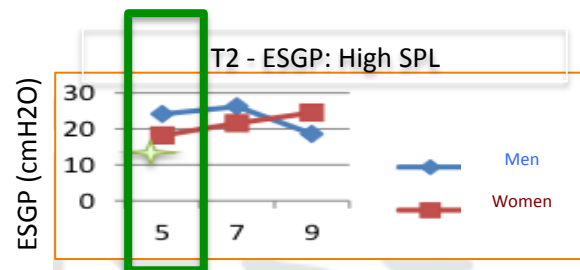
# ESGP & pathological groups

- For immobility:
  - At T1 for the 3 SPL: (Conversational, low , high SPL):



Groups: 5 → immobility, 7 → oedema, 9 → polyp

- At T2 for the high SPL:



## ESGP & Gender

- At T1, for conversational and low SPL:
  - ESGP M > ESGP W for **Immobility group**
  - Awan & al (2013)

## ESGP & age

- NS
  - Holmberg et al (1988); Zraick et al (2012).



# Correlations: ESGP & SPL

Pathology Groups	ESGP & SPL	T1	T2
IMMOBILITY	Conv.	*	**
	Low		**
	High		**
OEDEMA	Conv.	**	**
	Low		
	High		
NODULES	Conv.	---	**
	Low	---	**
	High	---	**
POLYPS	Conv.		**
	Low		**
	High		**

Closure Gap  
Lack of adduction

Flexibility of the lesion  
Preserved mucosal wave

Flexibility of the lesion  
Preserved mucosal wave

+: Positive correlation ( $0,20 < r < 0,40$ ); ++: Positive correlation ( $0,40 < r < 0,60$ ) +++: Positive correlation ( $0,60 < r < 0,80$ );  
- : Negative correlation

# Correlations: ESGP & VHI

Pathology Groups	ESGP & VHI	T1	T2
IMMOBILITY	Conv.	**	
	Low	**	*(F) **(E)
	High	×	×
OEDEMA	Conv.	*(F)	
	Low		
	High	×	×
NODULES	Conv.	**	
	Low	**	
	High	×	×
POLYPS	Conv.	** (P)	
	Low		
	High	×	×

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Flexibility of the lesion  
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+: Positive correlation (0,20<r<0,40); ++: Positive correlation (0,40<r<0,60) +++: Positive correlation (0,60<r<0,80);  
- : Negative correlation

# Correlation: ESGP & DSI

- For polyp group:

- At T1, high SPL:

ESGP ↗ DSI ↘

- For Immobility group

- At T1 and T2, low SPL:

ESGP ↗ DSI ↘

# To conclude

- Include ESGP in the vocal profile.
- Patients with vocal pathology: high ESGP.
- At T2, improvement of ESGP
- Can help the therapist in his/her clinical approach
- Correlations between SPL and ESGP:
  - Depending on the patient's pathology.
- Next step: focus on the immobility group

Angélique



Catherine



Camille



Lionel



Pauline



Dominique



Martine



Thank you for your attention!