

Clinical evaluation of idiopathic Parkinson's disease speech disorders at six months of Deep Brain Stimulation



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Methodology

- 17 patients: 11 F, 6 M
- 45 to 70 years old (mean : 59,58 +/- 6,79)
- Parkinson's disease from 5 to 20 years

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Methodology

- The surgical target is bilateral DBS within subthalamic nucleus area
- Pre operative assessment DBS
 - UPDRS scale
 - L Dopa test
 - MRI
 - Neuropsychologic evaluation (Mattis test)
 - Psychiatric assessment (no dementia)

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Methodology

- Voice and speech evaluation by the french clinical dysathria battery
BECD (P Auzou)
- Two evaluations :
 - One before DBS
 - One after DBS at six months (stim-on)

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Methodology

- Voice intensity measured with a sound level meter
- Melodic variation measured with a chromatic tuner
- Voice profile quoted with HIRANO scale

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Methodology

- Maximum duration sustained vowel phonation (MTP) on three tries
- Conversation and text reading are recorded

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Methodology

- Each patient got a fiberoptic laryngeal examination before DBS
- All patients under anti- parkinsonian medications during evaluations

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BECD battery

Speech neuro-motor disorder is evaluated by three scores:

1 - Perceptual Score PS/20

2 - Intelligibility Score IS/24

3 - Phonetic Intelligibility Test PIT/52

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BECD -Perceptual Score

PS/20

Conversation speech sample and text reading
5 items, each on 4 points

- 1- Voice quality
- 2 - Phonetic
- 3 - Prosody
- 4 - Intelligibility
- 5 - Natural voice character

ÉVALUATION PERCEPTIVE	QUALITÉ VOCALE		PROSODIE	
	1	Qualité vocale	19	Altération de la prosodie
	2	Hauteur (+/-)	20	Perte des modulations de la hauteur
	3	Intensité (+/-)	21	Fluctuations excessives de la hauteur
	4	Voix rauque, enrouée	22	Perte des modulations de l'intensité vocale
	5	Voix éraillée	23	Fluctuations excessives de l'intensité vocale
	6	Voix soufflée, voilée	24	Débit (+/-)
	7	Voix mouillée, humide, gargouillante	25	Fluctuations du débit
	8	Voix étranglée, hyperfonctionnelle	26	Accélération paroxystiques du débit
	9	Tremblements de la voix	27	Ruptures de la fluence
	10	Voix avec fry	28	Silences inappropriés
	11	Dégradation de l'intensité vocale	29	Palilalie
	12	Périodes d'aphonie	30	Difficultés d'initiation motrice
	RÉALISATION PHONÉTIQUE		RESPIRATION	
	13	Réalisation phonétique	31	Inspirations-expirations forcées
	14	Modification de la durée des phonèmes	32	Bruit inspiratoire
	15	Imprécision des consonnes	33	Contrôle respiratoire
	16	Imprécision des voyelles	INTELLIGIBILITÉ	
	17	Trouble de la résonance nasale	34	Intelligibilité
	18	Souffle nasal	CARACTÈRE NATUREL	
			35	Caractère naturel

BECD- Perceptual score

The quotation of each item :

- 0:** No disorder identifiable
- 1:** Discret or rare disorder only audible by a speech pathologist
- 2:** Moderate or occasional disorder
- 3:** Important or frequent disorder
- 4:** Severe or nearly permanent disorder

PS 0 : normal speech

PS 20 :severe dysarthria

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BECD - Intelligibility Score

IS /24

10 reading words /8

10 reading sentences /8

Spontaneous expression /8

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BECD - Intelligibility score

- **18 to 23** **Mild dysathria**
- **12 to 17** **Moderate dysathria**
- **7 to 11** **Severe dysarthria**
- **0 to 6** **Massive dysarthria**

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BECD - Phonetic Intelligibility Test

PIT/ 52

52 reading words phonetically close

1 point / word identified by the examiner

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HIRANO scale - GRBAS

Profile voice is evaluated by GRBAS scale

R - rough	0 to 3
B - breathy	0 to 3
A - asthenic	0 to 3
S - strained	0 to 3
G – total grade	0 to 3

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Maximum duration sustained vowel in seconds

F : normal score 10 to 25 s

M : normal score 15 to 25 s

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VOICE HANDICAP INDEX

B JACOBSON - french validation V WOISARD

- 30 questions about voice and speech
in daily life :
- On 120 points
 - The lower the score, the better the speech

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Sc	Item	J	PJ	P	PT	T
F1	On m'entend difficilement à cause de ma voix					
P2	Je suis à cours de souffle quand je parle					
F3	On me comprend difficilement dans un milieu bruyant					
P4	Le son de ma voix varie au cours de la journée					
F5	Les membres de la famille ont du mal à m'entendre quand je les appelle dans la maison					
F6	Je téléphone moins souvent que je le voudrais					
E7	Je suis tendu(e) quand je parle avec d'autres à cause de ma voix					
FS	J'essaye d'éviter les groupes à cause de ma voix					
E9	Les gens semblent irrités par ma voix					
P10	On me demande ce qui ne va pas avec ma voix » ?					
F11	Je parle moins souvent avec mes amis					
F12	On me demande de répéter					

Two cases

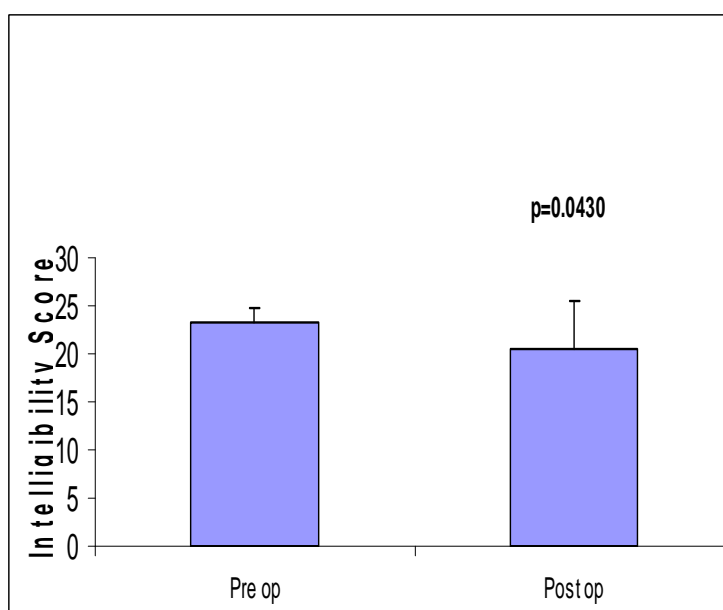
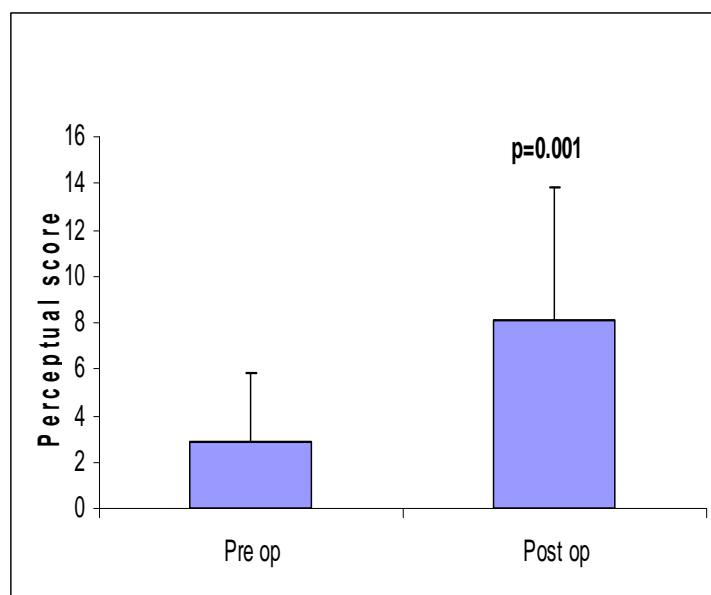
PATIENTS	SEXE	AGE	PS/20		IS/24		PIT/52		CHANGE	VHI	
			Pré	Post	Pré	Post	Pré	Post		Pré	Post
Q-L	M	67	<u>3</u>	<u>8</u>	24	21	50	51	Mild dysarthria	0	<u>27</u>
A-B	M	45	<u>0</u>	<u>5</u>	24	24	52	52	Mild dysarthria	6	<u>70</u>

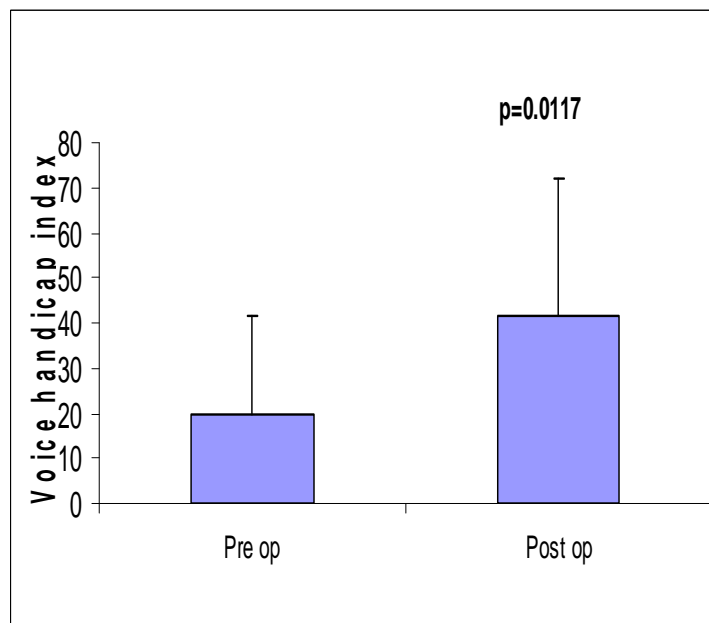
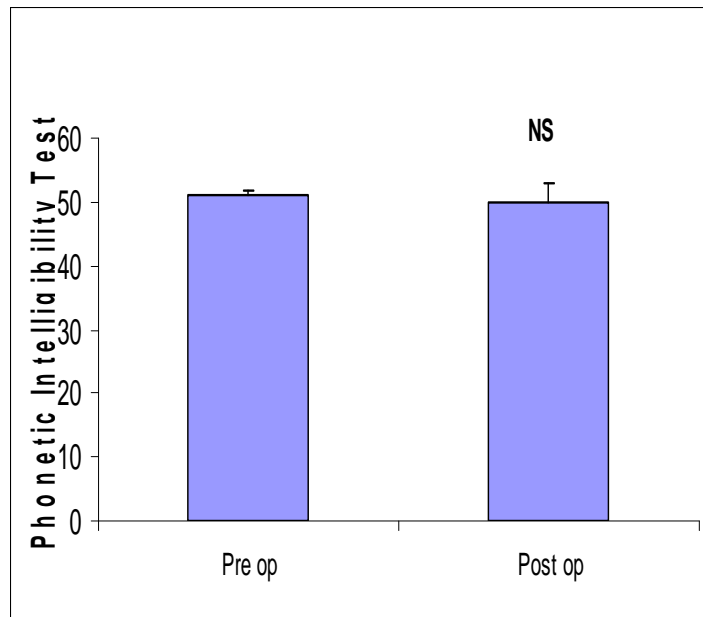
19

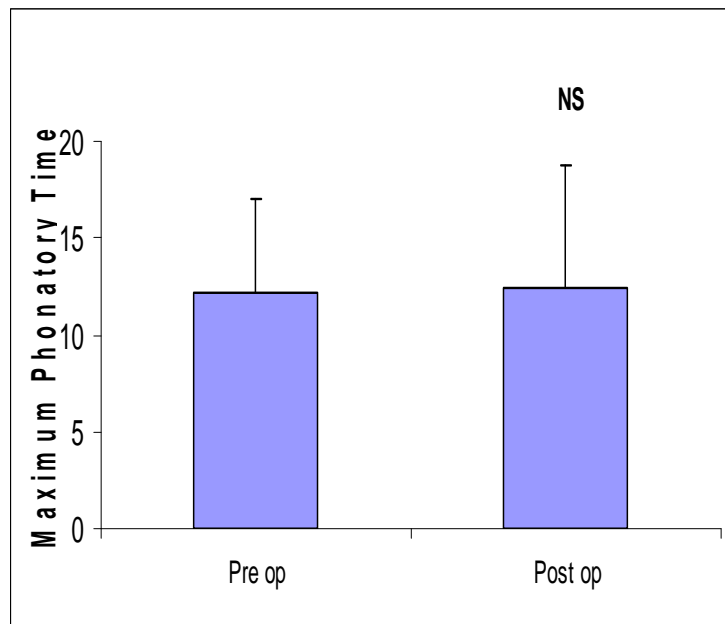
Other cases

Patients	SEXE	AGE	PS/20		IS/24		PIT/52		CHANGE	VHI	
D-J	F	65	<u>5</u>	<u>20</u>	24	<u>6</u>	51	<u>40</u>	Severe dysarthria	54	94
R-M	F	57	<u>4</u>	<u>12</u>	24	<u>20</u>	52	50	Moderate dysarthria	9	40

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Conclusion on 17 patients

	Pre op	Post op
DYSARTHRIA		
0	3	1
MILD	13	10
MODERATE	1	4
SEVERE	0	2

- 11/17 worsening
- 6 unchanged

Conclusion for the voice

GRBAS	Pre op	Post op
total grade G0 (normal voice)	7	5
total grade G1	7	7
total grade G2	3	4
total grade G3	0	1

- 6 alterations of voice (+ astheny or + rough)
- 1 improvement
- 10 unchanged

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Conclusion

Voice and speech levels in pre op
are not predictive
of the post op dysarthria

DBS is still a risk for speech

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Conclusion

An objective evaluation is difficult because
of dysarthria variability

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Conclusion

The evaluation depends on :

1 the procedure :

reading or repeat a sentence with or without

technical measures **is not**

a free conversation at home !

2 the time of the day

3 emotion and tiredness

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Conclusion

- This auditory speech analysis intended to be as closed as possible of patient's daily life ...
- A mild dysarthria for the therapist may not be so for the patient !

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Conclusion

- In pre op : the patient is informed of the risk
- In post op : a speech therapy (LSVT) is often suggested

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Conclusion

This study will be extended on more patients to try to have a best evaluation of this side-effect .