SENSORY SYMPTOMS IN ADVANCED PARKINSON DISEASE: THE EFFECT OF DEEP BRAIN STIMULATION

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BACKGROUND

Even though Parkinson Disease (PD) is classified as a movement disorder, recent literature stressed on the importance of non-motor symptoms. In particular, pain and sensory symptoms (SS) are frequent in PD patients and have a severe impact on quality of life (1). The association between pain and motor or neuropsychological aspects of PD and the extent to which pain is relieved by levodopa or deep brain stimulation (DBS) are still not completely understood (2,3).

OBJECTIVES

The aim of this study was to assess the relationship between SS and motor/neuropsychological outcome in patients with advanced PD treated with subthalamic nucleus deep brain stimulation (STN-DBS).

METHODS

Assessments were performed before surgery and after one year. SS were assessed using UPDRS II item 17, while UPDRS subscales were used to assess motor outcome, motor complications, activities of daily living (ADLs); severity of PD was assessed using the Hoen and Yahr score, depression using the BDI scale. Multiple linear regression analyses were performed to identify correlations between SS and clinical/demographic variables (gender, age of onset, PD duration, age at DBS Total UPDRSI,II,III,IV, BDI, Hoen and Yahr score), both at baseline and at follow up.

RESULTS

Out of 255 patients, complete baseline and follow-up data were available for 122 patients.

BASELINE

- **PAIN**: 75.9% of patients had no pain at baseline (UPDRS17=0), 16,2% had UPDRS17 0-1, 3.6% UPDRS17 2-1, 2.6% UPDRS 3-2, 1.6% UPDRS17=4
- **DEPRESSION**: 41.8% of patients had no mood disorder at baseline (BDI<10), 35.1% had a mild mood disorder (BDI 10-17), 10.6% had borderline depression (BDI 17-20) 10% had moderate depression (BDI 21-30) and 2.5% had severe (BDI 31-40) depression.

CORRELATIONS:

- At baseline, pain (updrd17) showed a correlation with total UPDRIiI score (CC=0.45) , total UPDRS IIIscore (CC=0.33) , and Hoen and Yahr score (CC=0.42) ; p was <0.001 in all cases.
- There was no correlation with age at onset, age at DBS, duration of PD, Total UPDRS I and IV and depression (BDI score).
- There was no difference between male and females (test U Mann-Whitney).

- **REGRESSION**: In a linear regression with “UPDRS17 at baseline” as dependent variable that took account of demographic features (gender, aget of onset, PD duration, age at DBS) and clinical features (Total UPDRSI,II,III,IV, BDI, Hoen and Yahr score) at baseline, determining factors were: Hoen and Yahr score (p<0.001, beta 0,56), UPDRS III (p= 0.005, beta 0,43), UPDRS II (p=0.008, beta 0,45). R squared was 0.65.

ONE YEAR FOLLOW UP

- **DIFFERENCES AFTER ONE YEAR**: After one year, there was a significant modification in BDI scores (p=0.02, mean BDI at baseline 12.22, after one year 10.47), total UPDRSIV score (at baseline=7,58, after one year 1,92, p<0.001) and in UPDRS17 (at baseline 1.48, after one year 0.34), when this difference was measured exclusively in the patients who had sensory symptoms (UPDRS17>0) at baseline (N=31).
- **PAIN** When the difference in UPDRS17 score after one year follow up was taken into account, a correlation was found with the variation over one year in UPDRSII (CC=0.45, p<0.001) and UPDRSIII (CC=0.36, p<0.05). There was no correlation with the difference in UPDRSI, IV and BDI scores. There was no significant difference in ain variation over one year between males and females.
- **DEPRESSION**: There was a significant change in BDI scores at one year follow up, 55.8% of patients had no mood disorder at baseline (BDI<10), 24.6% had a mild mood disorder (BDI 10-17), 8.6% had borderline depression (BDI 17-20) 10.2% had moderate depression (BDI 21-30) and 0.8% had severe (BDI 31-40) depression.

- **REGRESSION** : In a linear regression with “difference in UPDRS17 after one year” as dependent variable that took account of demographic features (gender, aget of onset, PD duration, age at DBS) and clinical features (Total UPDRSI,II,III,IV and BDI difference after one year), the determining factors were the difference in UPDRS II (p=0.016, beta 0.45), III (p<0.001, beta 0.89), IV (p=0.009, beta 0.42). The R square was 0,89 (TABLE 1)

Table 1 : regression analysis

DEPENDENT VARIABLE : Δ UPDRS 17 1Y					
Model	B	SD	Beta	t	Sig.
	-	1,598		-	,679
PD DURATION	,038	,049	,105	,776	,451
GENDER	,653	,387	,273	1,685	,114
AGE AT DBS	,016	,027	,081	,588	,566
D UPDRSI 1Y	,100	,076	,206	1,319	,208
D UPDRSII 1Y	**,059**	**,022**	**,412**	**2,708**	**,017**
D UPDRSIII 1Y	**-**	**,014**	**-**	**-**	**,000**
D UPDRSIV 1Y	**-**	**,035**	**-**	**-**	**,009**
D BDI 1Y	-	,027	-	-	,302

CONCLUSIONS

We found a relevant improvement in SS in PD patients who underwent STN-DBS, significantly associated with improvement in motor outcome, reduction of complications and improvement in ADLs. In our experience, STN-DBS shows satisfactory results in patients who complaint SS, even more significant in those reporting good motor outcomes. This phenomenon could account, at least in part, for the improvement of quality of life in PD patient who undergo DBS.

References: 1.Quittenbaum, B. H. & Grahn, B. Quality of life and pain in Parkinson’s disease: a controlled cross-sectional study. Parkinsonism Relat. Disord. ***10,*** *129–136 (2004).2.Cury, R. G. et al. Sensory abnormalities and pain in Parkinson disease and its modulation by treatment of motor symptoms. Eur. J. Pain Lond. Engl.* ***20,*** *151–165 (2016).3.Geroin, C., Gandolfi, M., Bruno, V., Smania, N. & Tinazzi, M. Integrated Approach for Pain Management in Parkinson Disease. Curr. Neurol. Neurosci. Rep.* ***16,*** *28 (2016).*