



Article scientifique

Article

2002

Published version

Open Access

This is the published version of the publication, made available in accordance with the publisher's policy.

Bilateral subthalamic nucleus stimulation improves health-related quality of life in PD

Lagrange, Emmeline; Krack, Paul; Moro, Elena; Ardouin, Claire; Van Blercom, Nadege;
Chabardes, Stephan; Benabid, Alim-Louis; Pollak, Pierre

How to cite

LAGRANGE, Emmeline et al. Bilateral subthalamic nucleus stimulation improves health-related quality of life in PD. In: Neurology, 2002, vol. 59, n° 12, p. 1976–1978.

This publication URL: <https://archive-ouverte.unige.ch/unige:95874>

advise on prognosis and subsequent symptomatic therapy.

Our case shows that in a case of intermittent exercise-induced focal cramps, the possibility of an atypical presentation of PD should be kept in mind. In the absence of the cardinal physical signs of PD, detection of dopaminergic neurodegeneration by dopamine transporter SPECT would provide support for dopamine replacement therapy.

References

1. Purves Stewart J. Paralysis agitans with an account of a new symptom. *Lancet* 1898;2:1258–1260.
2. Lees AJ, Hardie RJ, Stern GM. Kinesigenic foot dystonia as a presenting feature of Parkinson's disease. *J Neurol Neurosurg Psychiatry* 1984;47:885.
3. Booij J, Habraken JBA, Bergmans P, et al. Imaging of dopamine transporters with iodine-123-FP-CIT SPECT in healthy controls and patients with Parkinson's disease. *J Nucl Med* 1998;39:1879–1884.
4. Blunt SB, Richards PG, Khalil N. Foot dystonia and lumbar canal stenosis. *Mov Disord* 1996;11:723–725.
5. McCrory P. An unusual cause of gait disturbance in an elite sprinter. *Mov Disord* 2000;15:176–177.
6. Bhatia KP, Soland VL, Bhatt MH, Quinn NP, Marsden CD. Paroxysmal exercise induced dystonia: eight new sporadic cases and a review of the literature. *Mov Disord* 1997;12:1007–1012.
7. Demirkian M, Jankovic J. Paroxysmal dyskinesias: clinical features and classification. *Ann Neurol* 1995;38:571–579.
8. Poewe WH, Lees AJ. The pharmacology of foot dystonia in parkinsonism. *Clin Neuropharmacol* 1987;10:47–56.
9. LeWitt PA, Burns RS, Newman RP. Dystonia in untreated parkinsonism. *Clin Neuropharmacol* 1986;9:293–297.
10. Kitada T, Asakawa S, Hattori N, et al. Mutations in the parkin gene cause autosomal recessive juvenile parkinsonism. *Nature* 1998;392:605–608.

Bilateral subthalamic nucleus stimulation improves health-related quality of life in PD

E. Lagrange, MD; P. Krack, MD, PhD; E. Moro, MD, PhD; C. Ardouin, MA; N. Van Blercom, MD; S. Chabardes, MD; A.L. Benabid, MD, PhD; and P. Pollak, MD

Abstract—In order to assess the impact of bilateral subthalamic nucleus (STN) stimulation in PD on quality of life, the PD Quality of Life questionnaire was assessed in 60 consecutive patients with PD before surgery and 12 months after surgery. All aspects of quality of life, including motor (+48%), systemic (+34%), emotional (+29%), and social (+63%) dimensions, significantly improved with long-term STN stimulation.

NEUROLOGY 2002;59:1976–1978

Bilateral subthalamic nucleus (STN) stimulation is a neurosurgical treatment for patients with advanced PD complicated by levodopa-induced motor fluctuations and dyskinesias. STN stimulation improves the motor symptoms of the disease in the “off” drug condition as well as activities of daily living as assessed by either part II of the Unified Parkinson's Disease Rating Scale (UPDRS) or the Schwab and England scale in “off” drug condition. Moreover, levodopa-induced dyskinesias are improved in the “on” drug condition.^{1,2} This motor improvement, however, may not reflect the therapeutic impact of the procedure as the scales used to assess the motor functioning hardly take into consideration the social and emotional dimensions of the disease. Social isolation, depression, and cognitive impairment may have a greater impact on quality of life in PD than the mo-

tor symptoms.^{3,4} Moreover, surgical side effects¹ or cognitive,^{5,6} psychiatric, and behavioral side effects^{7,8} related to surgery, STN stimulation, or changes in medication could mitigate the positive effects measured by scales based mainly on motor symptoms. Therefore, the objective of the present study was to evaluate the benefit of bilateral STN stimulation on quality of life using a health-specific scale, the PD Quality of Life (PDQL) scale,⁸ taking into account not only the physical aspects but also the patient's own perception and self-evaluation regarding the disease's effects and consequences on social and emotional functioning, over a period of 3 months.

Materials and methods. Sixty consecutive patients with PD (18 women and 42 men) with a mean age of 56 (± 10 SD) years at the time of surgery and a mean duration of disease of 14 (± 8 SD) years were bilaterally stimulated

From the Department of Clinical and Biological Neurosciences, Joseph Fourier University, Grenoble, France.

Received June 24, 2002. Accepted in final form August 20, 2002.

Address correspondence and reprint requests to Dr. Paul Krack, Department of Clinical and Biological Neurosciences, Joseph Fourier University, BP 217 38043, Grenoble CEDEX 9, France; e-mail: paul.krack@ujf-grenoble.fr

1976 Copyright © 2002 by AAN Enterprises, Inc.

Copyright © Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.

Table Clinical evaluation of 60 patients before and after bilateral subthalamic nucleus stimulation

Item (maximal score)	Medication	Before surgery	After surgery, on stimulation	Wilcoxon test
UPDRS I (16)		1.4 ± 1.1	2.5 ± 2.7	NS
UPDRS II (52)	"On"	11.3 ± 7.8	11.4 ± 6.4	NS
	"Off"	29.6 ± 8.8	13.4 ± 9.0	$p < 0.002$
UPDRS III (108)	"On"	20.3 ± 18.8	18.8 ± 12.7	NS
	"Off"	53.7 ± 19.1	24.3 ± 16.6	$p < 0.002$
S&E (100%)	"On"	77 ± 18	83 ± 14	NS
	"Off"	29 ± 19	70 ± 26	$p < 0.002$
Dyskinesias (28)	"On"	9.6 ± 4.0	5.8 ± 3.0	$p < 0.001$
LED		1,010 ± 425	522 ± 400	$p < 0.001$
BDI (63)		10.5 ± 6.6	8.5 ± 4.1	$p < 0.002$

Values are means ± SD. Except for the S&E, a reduction in the scores indicates an improvement in the function.

BDI = Beck Depression Inventory scale; LED = Levodopa equivalent dose in mg/d; NS = not significant; S&E = Schwab and England activities of daily living scale; UPDRS = Unified Parkinson's Disease Rating Scale.

in the STN as previously described.¹ The Ethics Committee of the University Hospital of Grenoble approved the study protocol and all patients gave their informed consent. Patient characteristics including the scores on the UPDRS, a dyskinesia scale evaluating dyskinesias in seven parts of the body,¹ the Beck Depression Inventory (BDI), and anti-parkinsonian drugs (dopaminergic treatment expressed as levodopa equivalent dosage²) are shown in the table.¹ The PDQL questionnaire was given to patients before surgery and 12 months later. The PDQL consists of four subscales: parkinsonian motor symptoms (14 items), systemic symptoms (7 items), emotional functioning (9 items), and social functioning (7 items). Each item is scored from 0 to 5, a higher score reflecting better quality of life. The total score is the sum of the scores of all items (maximal = 185) and each subscale is the sum of the scores of the corresponding items (maximal 70 for parkinsonian or motor, 35 for systemic, 45 for emotional, and 35 for social dimensions).⁸ The BDI scale was used to evaluate patients' mood in the pre- and postoperative state. BDI is a 21-item scale; each item scores from 0 to 3, with a maximal total score of 63. The higher the score, the more severe the depression.

Results are presented as mean (SD) values. Clinical data before and 12 months after surgery were compared using the Wilcoxon signed-rank test for nonparametric data. We used the Spearman test for correlation between the PDQL and UPDRS III scores and between the BDI and PDQL scores.

Results. At 12-month follow-up, bilateral STN stimulation greatly improved motor symptoms (UPDRS III -55%), activities of daily living (UPDRS II -45%, Schwab and England Scale +142%) in the "off" drug condition, and dyskinesias in the "on" drug condition (-40%). Dopaminergic treatment was decreased by 50%. On average, patients were mildly depressed before surgery (BDI 10.4 ± 6.6) and there was a small but significant improvement of mood after surgery (BDI 8.5 ± 4.1, $p < 0.002$). No significant differences were found in "on" medication condition for the

motor score, activities of daily living, or "mentation and behavior" as assessed by UPDRS I (see the table). In this series of 60 patients, five neurosurgical complications occurred (two hematomas and three focal cerebral contusions), but only one patient had a residual permanent deficit consisting of mild aphasia. There were five transient psychiatric complications (one mania, one delusion, and three depressions, including two with suicide attempts).

The PDQL total score (figure) improved from 90.3 (12.6) to 129 (27) (+43%, $p < 0.001$); parkinsonian symptoms from 33.2 (5.3) to 49.1 (11.1) (+48%, $p < 0.001$); systemic symptoms from 17.3 (3) to 23.1 (5.7) (+34%, $p < 0.001$); emotional functioning from 24.2 (4.2) to 31.2 (7.2) (+29%,

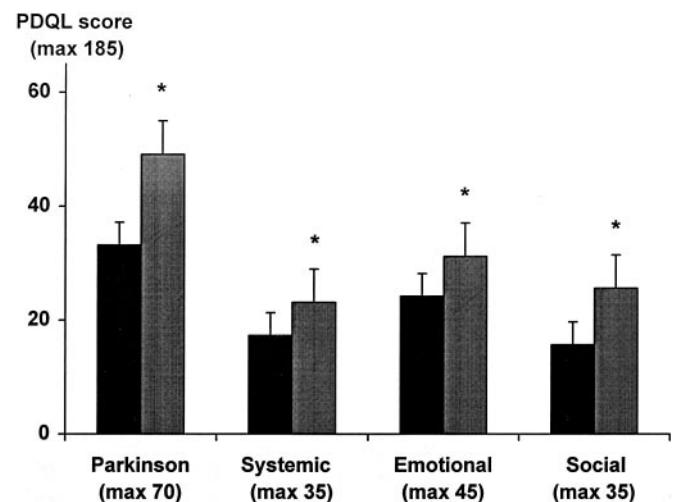


Figure. Changes in the four different subscores of the PD Quality of Life (PDQL) in all 60 patients. The maximal theoretical subscores are indicated in parentheses. The four dimensions of the scale (parkinsonian symptoms, systemic symptoms, emotional functioning, and social functioning) are all improved. Black bars = PDQL scores before surgery; gray bars = PDQL scores 12 months after surgery. * $p < 0.001$.

$p < 0.001$); and social functioning from 15.7 (3.4) to 25.6 (3.5) (+63%, $p < 0.001$). Some items were dramatically improved such as “doing hobbies” (100%), during “off” periods (90%), whereas others were not, such as “shuffling” or “exhaustion.”

The improvement in the score of the UPDRS III was correlated with the improvement in the total PDQL score ($r = 0.7$, $p < 0.001$), but not with the improvement in the BDI ($r = -1.5$, $p = 0.34$).

Discussion. We found an improvement of health-related quality of life after 12 months of bilateral STN stimulation, confirming two recent studies in smaller series.^{9,10} The present study shows that bilateral STN stimulation improves all aspects of health-related quality of life in PD, including emotional and social functioning. In this consecutive series of patients with advanced PD and severe “off” period disability, the quality of life improved to the level of a large population of patients with mild PD.⁸ This finding is not surprising as bilateral STN stimulation greatly but incompletely improves the motor symptoms in “off” drug condition, whereas “on” period symptoms show little or no improvement.

The current study shows that quality of life is correlated with motor improvement in “off” drug condition, and more particularly with social functioning. A better social life can be explained by both improvement in “off” drug motor symptoms and dyskinesias, as they interfere with social functioning, not only by their functional disability but also by the stigma of these symptoms. Some social items such as “doing hobbies” increased in 100% of patients. Decrease of the social isolation of patients with PD is the real success of STN stimulation.

In a general population of patients with PD, depression is a significant predictor of variability in quality of life.^{3,4} In our study, BDI scores were mildly improved, but this improvement did not correlate with changes in quality of life. Thus, in our population of selected, highly levodopa-sensitive patients, having motor complications of dopaminergic treatment, and without severe depression, the motor complications seem to be the main determinant of quality of life. Side effects related to surgery, stimulation, or changes in medication are likely to influence quality of life. In this group of 60 patients, four had transient and one had permanent neurologic deficits related to surgery. Five patients had severe but reversible psychiatric complications. At an indi-

vidual level, however, quality of life may worsen in a patient having a severe side effect.⁵ For this reason, perhaps surgery should be restricted to patients who are severely disabled from motor fluctuations or levodopa-induced dyskinesias. Moreover, as evaluation of quality of life is based on subjective appreciation by the patient, placebo effects cannot be excluded. However, the overall study tends to confirm that the motor benefit from surgery largely outweighs the impact of side effects on quality of life and that it is worth taking the relatively small risk and operating on patients before they have reached a too-low level in quality of life. Future studies should also address the impact of the therapy on caregivers.

Acknowledgment

The authors thank INSERM, Department of Rhône Alpes, France.

References

1. Limousin P, Krack P, Pollak P, et al. Electrical stimulation of the subthalamic nucleus in advanced Parkinson's disease. *N Engl J Med* 1998;339:1105–1111.
2. The Deep-Brain Stimulation for Parkinson's Disease Study Group. Deep brain stimulation of the subthalamic nucleus or the pars interna of the globus pallidus in Parkinson's disease. *N Engl J Med* 2001;345:956–963.
3. Schrag A, Jahanshahi M, Quinn N. What contributes to quality of life in patients with Parkinson's disease? *J Neurol Neurosurg Psychiatry* 2000;69:308–312.
4. The Global Parkinson's Disease Survey (GPDS) Steering Committee. Factors impacting on quality of life in Parkinson's disease: results from an international survey. *Mov Disord* 2002;17:60–67.
5. Hariz M, Johansson F, Shamsgovara P, Johansson E, Hariz GM, Fagerlund M. Bilateral subthalamic nucleus stimulation in a parkinsonian patient with preoperative deficits in speech and cognition: persistent improvement in mobility but increased dependency: a case study. *Mov Disord* 2000;15:136–139.
6. Saint-Cyr JA, Trépanier LL, Kumar R, Lozano A. Neuropsychological consequences of chronic bilateral stimulation of the subthalamic nucleus in Parkinson's disease. *Brain* 2000;123:2091–2108.
7. Houeto JL, Mesnage V, Mallet L, et al. Behavioural disorders, Parkinson's disease and subthalamic stimulation. *J Neurol Neurosurg Psychiatry* 2002;72:701–707.
8. de Boer AGEM, Wjker W, Speelman JD, Dehaes JCJM. Quality of life in patients with Parkinson's disease: development of a questionnaire. *J Neurol Neurosurg Psychiatry* 1996; 61:70–74.
9. Martinez-Martin P, Valdeoriola F, Tolosa E, et al. Bilateral subthalamic nucleus stimulation and quality of life in advanced Parkinson's disease. *Mov Disord* 2002;17:372–377.
10. Just H, Ostergaard K. Health-related quality of life in patients with advanced Parkinson's disease treated with deep brain stimulation of the subthalamic nuclei. *Mov Disord* 2002; 17:539–545.

Neurology®

Bilateral subthalamic nucleus stimulation improves health-related quality of life in PD

E. Lagrange, P. Krack, E. Moro, et al.

Neurology 2002;59;1976-1978

DOI 10.1212/01.WNL.0000037486.82390.1C

This information is current as of December 24, 2002

Updated Information & Services	including high resolution figures, can be found at: http://www.neurology.org/content/59/12/1976.full.html
References	This article cites 10 articles, 4 of which you can access for free at: http://www.neurology.org/content/59/12/1976.full.html##ref-list-1
Citations	This article has been cited by 7 HighWire-hosted articles: http://www.neurology.org/content/59/12/1976.full.html##otherarticles
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): Clinical trials Observational study (Cohort, Case control) http://www.neurology.org/cgi/collection/clinical_trials_observational_study_cohort_case_control Parkinson's disease/Parkinsonism http://www.neurology.org/cgi/collection/parkinsons_disease_parkinsonism Surgery/Stimulation http://www.neurology.org/cgi/collection/surgery-stimulation
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.neurology.org/misc/about.xhtml#permissions
Reprints	Information about ordering reprints can be found online: http://www.neurology.org/misc/addir.xhtml#reprintsus

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright . All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.

