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► To cite this version:

Philippe Derost, Dominique Morand, Bérengère Debilly, Jean-Jacques Lemaire, Jerome Coste, et al.. Deep brain subthalamic stimulation in Parkinson's disease: Effect of age. 8th International Congress of Parkinson's Disease and Movement Disorders, International Parkinson and Movement Disorders Society, Jun 2004, Rome, Italy. pp.S298/P862, 10.1002/mds.20178 . hal-01895459

HAL Id: hal-01895459

<https://hal.science/hal-01895459>

Submitted on 15 Oct 2018

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Deep brain subthalamic stimulation in Parkinson's disease: Effect of age

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Objective: To assess subthalamic nucleus deep brain stimulation long term outcomes in a young (Age<65 years old) and an older (Age>65 years old) parkinsonian's population.

Background: Subthalamic nucleus deep brain stimulation improves motor fluctuations and levodopa-induced dyskinesia. There is few data available about the effect of age at the moment of surgery on long term efficacy.

Design: We studied 53 consecutive patients (group I age 58.4 +/- 4.9; n = 32), (group II age 69.6 +/- 2.8; n = 21) who received implants from November 1997 through July 2003. All patients fulfilling the requirement for the United Kingdom Parkinson's Disease Society Brain Bank. They all suffered from severe motor fluctuations and dyskinesias unresponsive to medical treatment. The stereotactic procedure was based on direct MRI images targeting of subthalamic nucleus. Clinical assessment was performed preoperatively in the off-state after 12 hr withdrawal of antiparkinsonian medication. Response to L-DOPA was evaluated after taking the 1.5-fold of the usual morning levodopa equivalent dose. Tests that were performed included UPDRS part I-IV, tapping test, stand walk and sit, classification by Hoehn&Yahr stage, Schwab and England scale and cognitive functions. At the 3-month follow-up, we systematically explored the effects of the four contacts on each side to select the most effective one.

Three months and 1 year after surgery, the efficacy was assessed during an acute levodopa challenge using UPDRS III in four conditions: medication ON and OFF, and stimulation ON and OFF. The same tests than preoperatively were also performed.

Results: There were not statistical differences in the two groups for sex ratio, duration of the disease, response to L-DOPA and cognitive functions (MMS, Mattis scale). For the group I stimulation reduced significantly the motor score of 62% at 3 months and 50% 1 year after surgery. For group II a decrease of 58% at 3 months and 34% at 1 year of the motor score was observed. A great reduction of levodopa-induced dyskinesia in both populations (group I: $P < 0.0001$ at 3 months, $P = 0.0028$ at 12 months; group II: $P = 0.004$ at 3 months, $P = 0.03$ at 12 months) was also observed. Intergroup comparison shown a reduction of the response to L-DOPA in group II at 12 months ($P = 0.04$). We didn't found any differences concerning tapping tests. One year after surgery the evolution of on medication Hoehn and Yahr stage evolution was worse in group II (+ 0.92) than in the first group (- 0.42) ($P = 0.01$).

Conclusion: Despite an immediate great functional result in all patients, the time-course evolution especially for axial functions, response to L-DOPA and to stimulation are worse in the older patient group. However, a significant improvement of levodopa-induced dyskinesia was observed at 1 year in the two groups.