

CLINICAL IMPROVEMENT OF PARKINSONIAN SYMPTOMS MAY NOT BE UNCOUPLED BY LEVODOPA-INDUCED DYSKINESIAS RESOLUTION BY INTERNAL GLOBUS PALLIDUS STIMULATION IN PARKINSON'S DISEASE

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Background: In Parkinson's disease (PD) surgery, some authors reported that the best clinical effects on akinesia and rigidity may be obtained stimulating or lesioning sites different from those producing the resolution of levodopa-induced dyskinesias (LID). Similar considerations may support a larger eligibility of Subthalamic nucleus (STN) as the major target for PD surgery in spite of internal Globus Pallidus (GPi).

Methods: In three consecutive PD patients implanted with bilateral GPi quadripolar electrodes for deep brain stimulation (DBS), we performed pre- and post-operative (six months) apomorphine tests with increasing doses of drug to study the dose-response curve for dyskinesias with different sites of stimulation within the GPi. The clinical status was also assessed before and six months after surgery with stimulation switched on and off. During surgery extracellular recordings and apomorphine challenge were used to establish cells responsiveness to the drug and dyskinesias sensitivity to DBS in the selected area.

Findings: At six months postoperative, in two patients bilateral GPi bipolar stimulation, between the uppermost and lowermost contacts of the electrodes, was able to produce such a relevant clinical amelioration of parkinsonian symptoms (akinesia and rigidity) to withdraw antiparkinsonian therapy during stimulation time (day time). Moreover, bipolar DBS was able to counteract dyskinetic movements induced by apomorphine, clearly shifting to the right the dose-response curve of apomorphine test in these patients utilising the same couple of electrode contacts producing the clinical amelioration. None of the other electrode contacts combination (either bipolar either monopolar) produced similar results. The third patient showed good clinical amelioration only with monopolar stimulation, but did not show such a large decrease of dyskinetic movements induced by apomorphine. Bipolar stimulation in this subject did not produce optimal motor results. Postoperative MRI did not show a homogeneous positing of the permanent electrodes within the GPi able to identify the "ideal" positioning for the permanent-stimulating electrode.

Interpretation: We suggest that the discrepancy with other groups results may be explained by: i) bipolar stimulation, if applicable, is able to affect both dorsal and ventral GPi obtaining all the effects seen separately with monopolar stimulation in other and in the present study; ii) a more functional than anatomical determination of the target within the GPi may help for the optimal positioning of the electrode. Our intraoperative assessment of extracellular firing changes by apomorphine as well as of the ability of the selected area to suppress by DBS the apomorphine-induced dyskinesias, could be a more appropriate procedure in order to place the permanent electrodes in a GPi site able to produce both antiparkinsonian and anti LID effects.