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How To Manage the Stimulation Parameters of STN-DBS For Long Term Clinical Effect in Cases with Parkinson Disease

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Introduction: The deep brain stimulation (DBS) of the subthalamic nucleus (STN) is currently recognized as one of the standard therapy for the patients with advanced Parkinson disease (PD). It is essential to adapt optimally stimulation parameters of the STN-DBS for maintaining best motor response for long term. Individually tailored stimulation parameters are required and the infinite number of theoretically possible parameter combinations seems to make programming a complex and time-consuming art. We occasionally experience the example of not following to the basic programming algorithms for STN-DBS in PD. We study the change of the optimally stimulation parameters and the relation to the symptom in the long time period.

Materials and Methods: Thirty patients who had treated with bilateral STN-DBS for two years or more were included in this study. The optimally amplitude, pulse width, and rate of stimulation were observed every 3 months at OPD after the operation. The association between stimulation parameters and various motor symptoms including gait disturbance, tremor etc were evaluated. To evaluate the change of the stimulation parameters were submitted to Student t tests.

Results: The amplitude and the pulse width showed the tendency to be going to increase in 24 months though it was a little that one year needed the change in the stimulus parameter after operation. The frequency usually varied from 130 Hz to 145 Hz in many cases, however, the rate of 100Hz was optimal for some patients with the gait disturbance. While the rate of 160 Hz was optimal for some patients with tremor.

Discussion: As for an increase of the amplitude and the pulse width, it is thought whether the change in impedance according to the gliosis of the electrode surrounding tissue and the progress of neurodegenerative are related.

Conclusion: The fine adjustment of paramers are necessary to obtain the best clinical effectiveness. There is a possibility where the optimally frequency exists by clinical conditions.

Keywords: Deep brain stimulation, subthalamic nucleus, Parkinson disease

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Conflict of Interest: There is no conflict of interest.

Learning Objectives:

1. The programming of the stimulation parameters for the patients with STN-DBS
2. The change of the optimal stimulation parameters for the best clinical effects at the time of passing
3. The relationship between the frequency and clinical effects

発表の要旨

脳深部刺激療法で長期効果を得るには、術後の刺激の調節が重要である。

具体的には、60 ~ 120 μ sec の刺激幅で、100Hz ~ 170Hz の刺激を用いる。

一般に長期経過するほど、電圧は上げる必要がある。

通常は 130Hz 前後の刺激が用いられるが、歩行障害では 100Hz、振戦では

160Hz ~ 170Hz の刺激で良好な結果が得られることがある