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LETTER TO THE EDITOR

Should Deep Brain Stimulation Programs Be Halted During the COVID-19 Pandemic? Balancing the Risk of COVID-19 Infection Against the Survival Benefits of DBS

To the Editor:

The COVID-19 pandemic has rapidly spread over the world. Numerous infections and fatalities have been reported in almost all countries. Facing the challenge of steadily increasing patients, limited amount of protection equipment and ventilators, resources have been relocated towards emergency departments and intensive care units. Nonemergency elective procedures such as deep brain stimulation (DBS) for patients with Parkinson's disease have been postponed.

It has been discussed that most functional neurosurgery patients are vulnerable to the COVID-19 pandemic and at a higher risk for becoming critically ill infected. Therefore, most centers have halted their DBS programs. Undisputed is that hardware infections and battery replacements require urgent action to prevent sepsis, neuroinfections or akinetic crisis and death, eventually (1,2).

We would like to highlight the fact that Parkinson's disease (PD) itself is a condition with high mortality rate and complement the rationale that for any functional neurosurgery procedure, and DBS for PD in particular, we should always weigh the imminent risk of a COVID-19 infection against the long term clinical benefits of the procedure. As it remains unclear how long the pandemic will last, and if there will be a second peak, this becomes crucially important.

Despite progress in medical management of PD, it does not appear to have altered the mortality rate nor significantly delayed the onset of nonmotor symptoms. Life expectancy remains decreased with the main cause of death being respiratory failure from aspiration pneumonia caused by dysphagia due to brady- or dyskinesia and rigidity of the muscles involved in the act of swallowing. Other causes of death include the deterioration of general condition, cardiovascular disease, traumatic injuries due to postural instability and sepsis. Co-evolving depression and dementia as well as the need for admittance to residential care facilities are associated with higher mortality and increased risk of suicide. All in all, 11 years is the median duration from the onset of PD until death (3).

DBS of the subthalamic nucleus has become an established pillar of the therapy continuum of patients with beginning motor fluctuations and suboptimal medical management, mainly improving motor symptoms (4). Moreover, it has shown to improve survival rates in PD patients. A prospective, open-labeled, nonrandomized study by Ngoga et al. followed 147 patients who

were offered a DBS procedure by a joint medical/surgical movement disorders clinic over the course of a 10 years period; 106 patients underwent DBS procedure whilst 41 patients preferred medical management. The mortality rate of patients who underwent DBS was significantly lower (17%) compared to patients who received medical management (41.5%), so was admittance to residential nursing care (5.7% vs. 36.6%) (5).

It has been widely discussed whether improvement of survival is related to ameliorated mobility and axial motor functions, perceived improvement in swallowing ability or reduction in dopaminergic medication and drug-related side effects.

DBS could prevent the development of motor complications at a much earlier time-point and before long-term sequelae occur, such as psychosocial limitations and deterioration of quality of life.

Given all these factors, we strongly believe that PD patients with motor fluctuations should not be treated as nonurgent but interdisciplinary teams of neurologists and neurosurgeons should carefully balance the risk of nosocomial COVID-19 infection against the long-term survival benefits.

Authorship Statements

Dr. Bara developed the idea and wrote the manuscript. Prof. Maciacyk supervised the work and performed the revisions. Both authors approved the final manuscript.

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REFERENCES

1. Miocinovic S, Ostrem JL, Okun MS, Bullinger KL, Riva-Posse P, Gross RE, Buetefisch CM. Recommendations for deep brain stimulation device management during a pandemic. *J Parkinsons Dis.* 2020;10:903–910. <https://doi.org/10.3233/JPD-202072>.
2. Gross RE et al. Letter: evaluation and surgical treatment of functional neurosurgery patients with implanted deep brain stimulation and vagus nerve stimulation pulse generators during the COVID-19 pandemic. *Neurosurgery.* 2020;87:E222–E226.
3. Duarte J, García Olmos LM, Mendoza A, Clavería LE. The natural history of Parkinson's disease in the province of Segovia: mortality in a longitudinal study (20-year follow-up). *Acta Neurol. Scand.* 2013;127:295–300. <https://doi.org/10.1111/ane.12003>.
4. Deuschl G, Schade-Brittinger C, Agid Y, EARLYSTIM Study Group. Neurostimulation for Parkinson's disease with early motor complications. *N Engl J Med* 2013;368:2038.
5. Ngoga D, Mitchell R, Kausar J, Hodson J, Harries A, Pall H. Deep brain stimulation improves survival in severe Parkinson's disease. *J Neurol Neurosurg Psychiatry* 2014;85:17–22. <https://doi.org/10.1136/jnnp-2012-304715>.