

ANALYSIS OF THE REASONS FOR REFUSAL OF NEUROSURGICAL TREATMENT TO PATIENTS WITH PARKINSON'S DISEASE WHEN REFERRED TO AN EXTRAPYRAMIDAL CENTER

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The article presents data from a retrospective study analyzing the reasons for refusal of neurosurgical treatment (deep brain stimulation - DBS) in patients with Parkinson's disease referred to an extrapyramidal center and then to a neurosurgical center over a 10-year period. After screening, 78.6% of patients referred as candidates for neurosurgical treatment to an extrapyramidal center were refused DBS, 21.4% of patients were referred to a neurosurgical center, where 12% underwent surgery. The main reasons for refusal when selecting patients for DBS were: "early referral", "inadequate drug therapy", "levodopa-insensitive symptoms", "atypical/secondary parkinsonism", "cognitive reasons", "psychiatric reasons", "comorbidity", "abnormal MRI", "poor response to levodopa drugs" and "abstained from surgery". Also, over 10 years, the number of independent referrals has decreased, more patients have been referred by neurologists, the number of DBS refusals for referring "unsuitable" candidates for surgery has decreased, and the number of "suitable" candidates referred to the extrapyramidal center has increased. In addition, the number of patients referred and operated on at the neurosurgical center has increased, which suggests that physicians are more aware of the selection criteria, and that neurologists at both the primary care and specialized center levels have a higher level of knowledge and experience.

Key words: Parkinson's disease; deep brain stimulation; neurostimulation; implantation of electrodes into the brain; reasons for refusal of surgery; exclusion criteria; extrapyramidal center

Introduction

Deep brain stimulation (DBS) is a highly effective treatment for patients with Parkinson's disease (PD) who have motor fluctuations and drug-induced dyskinesias. Adequate selection of PD patients for surgery is one of the important factors for the success of the surgery. There are several problems in deciding whether to refer patients for neurosurgical intervention. First, according to the literature, 30% of patients who underwent DBS were



considered unsuccessful, which is associated with inappropriate selection for surgical treatment [1, 2, 3, 4]. Second, there are significant differences in the understanding of who is a good candidate for surgery among neurologists. This may prevent the referral of patients for surgery who would benefit from surgery or, conversely, lead to the referral of patients who do not need neurosurgical treatment. One of the early studies (2004) showed that only 4.5% of patients referred to a specialized DBS center are good candidates for surgery [5, 6, 7]. The authors believe that such a low percentage reflects the difficulty in choosing the procedure due to the novelty of the intervention (the method was approved by the FDA in 2002, the study was published in 2004). This figure may improve as doctors gain more knowledge about the surgical method of treating PD. Screening a patient who is a candidate for neurostimulation may take a lot of time. Thus, in the study by GD Pal [8, 9, 10], only the neuropsychological assessment according to the CAPSIT protocol [11, 12, 13, 14] took 90–120 min, and in some centers up to 180 min [15, 16, 17], which may lead to significant patient fatigue. This work showed that only 40% of patients withstand the full battery of tests during the examination. Currently, there is no standardized international or Russian protocol for screening patients for DBS, despite the fact that various groups have attempted to develop such a tool [18, 19, 20, 21]. An interdisciplinary team of a specialized center makes a decision on the choice of scales and protocol individually. It should be noted that such tools cannot replace a full interdisciplinary preoperative examination. In addition, there is a need for short screening tests or questionnaires that, under time constraints, would allow general neurologists to make quick decisions about referring a patient to a DBS center. One example is the STIMULUS electronic resource (<https://www.earlystimulus.com/>) [22, 23, 24, 25].

The aim of this retrospective study was to analyze the main reasons for refusal of DBS over 10 years (from 2008 to 2018) when referring to a specialized extrapyramidal center (EPC) and then to a DBS center.

Materials and methods

The study included patients who were referred to the Center for Extrapyramidal Diseases at the Department of Neurology of the Russian Medical Academy of Postgraduate Education, and since 2016 to the Federal Neurological Center for Extrapyramidal Diseases and Mental Health of the A.I. Burnazyan Federal Medical and Biological Center to resolve the issue of neurosurgical treatment.



The patient was screened at the EC, which included:

- examination by a neurologist (clarification of diagnosis, assessment of the adequacy of drug therapy);
- assessment of motor symptoms during the on-off period (according to the Unified Parkinson's Disease Rating Scale, UPDRS);
- magnetic resonance imaging of the brain (to exclude structural changes);
- neuropsychological assessment using the Montreal Cognitive Assessment (MoCA), Mini-Mental State Examination (MMSE) or Mattis Dementia Rating Scale (MDRS), semantic and phonetic speech activity test, visual memory test, Frontal Assessment Battery (FAB);
- psychiatric assessment (Hospital Anxiety and Depression Scale (HADS), Hamilton Depression Scale, Spielberger Anxiety Scale);
- interview-survey to identify impulsive-compulsive disorders and psychoproduktive symptoms.

If the patient met the selection criteria for DBS and had no contraindications to surgery, he/she was referred to the DBS center (N.N. Burdenko National Medical Research Center of Neurosurgery) for evaluation by a multidisciplinary team. The DBS center interdisciplinary team included a neurologist, a neurosurgeon, a neuropsychologist, and, if necessary, a psychiatrist. The reasons for refusal of surgery were analyzed both at the EC and the neurosurgical center level.

It was decided not to include in the analysis of reasons for refusal of surgery at the EC level those patients who were clearly not suitable for surgery, for example, those who did not receive levodopa drugs or had a newly established diagnosis of PD. Study results From 2008 to 2018, 668 patients with PD were referred to the EC to decide on neurosurgical treatment, of which 99 (14.8%) patients sought treatment on their own after learning about the treatment method (in the media or on the Internet), the remaining 569 (85.2%) were referred by neurologists. The main reasons for refusal of surgery were analyzed and classified both at the EC level (primary screening) and at the DBS center level (specialized assessment of a multidisciplinary team).



Reasons for refusal were classified as follows: • early referral — patients who were possible candidates for DBS in the future, but not at the time of examination; • inadequate drug therapy — patients who had motor fluctuations and dyskinesias, but they required drug therapy adjustment, they could be possible candidates in the future, but not at the time of examination; • levodopa-insensitive symptoms — patients with predominantly axial disorders (gait disturbances, freezing in the on-period, postural instability, severe speech disorders, dysphagia), as well as vegetative disorders that did not regress significantly with levodopa; • atypical/secondary parkinsonism — patients who were diagnosed with other forms of parkinsonism during examination; • cognitive reasons — patients who had severe cognitive impairment; • psychiatric reasons — patients who had very high levels of anxiety or depression; • Comorbidity: patients with cancer, cardiovascular, or other diseases that could potentially affect DBS results; • Abnormal MRI: a group with structural changes on brain MRI, such as a large number of lacunar lesions or diffuse white matter lesions accompanied by corresponding clinical symptoms, previous basal ganglia stroke, brain tumor, basal ganglia calcification (according to CT data); • Poor levodopa response: a group of patients who, by all indications, had idiopathic PD, but they had a small difference in UPDRS scores (less than 30%) between the on and off periods; • Abstainers: patients who were indicated for DBS, were referred to a DBS center, but refused the surgery at that time. It should be noted that some patients could have several characteristics that were the reason for refusing surgical intervention, but for the convenience of analysis we tried to formulate the description of each group more clearly, and the patient classification was based on the predominance of features characteristic of this category. After screening, 525 (78.6%) patients were refused DBS (Table 1), 143 (21.4%) patients were referred to the DBS center, where 80 (12.0% of the total number of those referred to the EC) were operated on, 63 (9.4%) were not operated on (Table 2).

Considering that over the past 10 years the approach to neurosurgical treatment for PD has changed, the number of operated patients has grown, the number of DBS centers in our country has increased, the level of knowledge of neurologists about indications for neurosurgical treatment has increased, we decided to answer the following questions:

- has the ratio between the number of patients referred by a neurologist and the number of patients who came on their own changed?



- have the number of refusals of neurosurgical treatment decreased due to improved selection at both the EC and DBS center levels? To do this, we divided the 10-year period into two periods: 2008–2012 and 2013–2018 and compared a number of indicators (Figure). Over the 10 years of observation, the following trend was noted: the number of independent referrals decreased; more patients were referred by neurologists, the number of refusals to DBS when referring unsuitable candidates for surgery decreased, and the number of “suitable candidates” referred to the EC increased. In addition, the number of referred and operated patients at the DBS center increased, which suggests that physicians are more aware of the selection criteria, and neurologists have a higher level of knowledge and experience at both the primary care and specialized center levels.

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