이상운동질환에서의 침습적 신경자극

윤 정 한
아주대학교 의과대학 신경과학교실, 파킨슨센터

Invasive neurostimulation in movement (DBS+ECT)

Jung Han Yoon, MD, PhD
Department of Neurology, Ajou University School of Medicine, Suwon, South Korea

Neurostimulation has been used to treat various movement disorders (Parkinson's disease, Essential tremor, Dystonia, Catatonia) for over a century. I briefly touch the surgical procedure and current clinical applications of Deep brain stimulation (DBS) and Electroconvulsive therapy (ECT) in movement disorders

1. DBS in Parkinson's disease

Deep brain stimulation (DBS) is a surgical procedure used to treat the disabling symptoms of Parkinson's disease (PD), such as medication-resistant tremor, motor fluctuations, and dyskinesia. Currently, the subthalamic nucleus and the globus pallidus internus are the two most widely used targets, with individual advantages and disadvantages influencing patient selection. DBS uses a surgically implanted, battery-operated medical device called a neurostimulator to deliver electrical stimulation to targeted areas in the brain that control movement, blocking the abnormal nerve signals that cause PD symptoms. Before the procedure, Magnetic resonance imaging (MRI) or computed tomography (CT) imaging are used to locate the exact target within the brain where electrical nerve signals generate the PD symptoms. In addition, microelectrode recording (MER) which involves a small wire that monitors the activity of nerve cells in the target area, is helpful to identify exact target. Programmed settings vary based on institution- or physician-specific protocols designed to maximize benefits and limit adverse effects. Although most patients still need to take medication after undergoing DBS, many patients experience marked reduction of PD symptoms and are able to greatly reduce their medications. The reduction in dose of medication leads to a significant improvement in motor complication such dyskinesia and motor fluctuation.

2. DBS in Essential tremor

While there is no breakthrough progress in the medical treatment of essential tremor (ET), several remarkable achievements happened in the surgical field, such as thalamic deep brain stimulation, and MRI-guided focused ultrasound. Medically intractable ET can be treated by DBS of the ventral intermediate nucleus of thalamus (VIM).

3. DBS in Dystonia

Although several clinical trials have proven the ben-

Jung Han Yoon, MD, PhD
Parkinson Center, Department of Neurology, Ajou University School of Medicine, 164 World cup-ro, Yeongtong-gu, Suwon 16499, South Korea
E-mail: jhyoon@ajou.ac.kr

efit and safety of DBS for inherited and idiopathic isolated dystonia, there is still insufficient evidence in combined and acquired dystonia. The globus pallidus internus (GPi) is the target with the best evidence. Evidence suggests that younger patients with shorter disease duration experience greater benefit following DBS. Identifying the best candidates to surgery on acquired and combined dystonias is still necessary.

4. Electroconvulsive therapy (ECT) in Catatonia

ECT is the definitive treatment for catatonia, but access to ECT for the treatment of catatonia remains inappropriately limited. Catatonia is not uncommon, detectable, and relevant to various medical specialties, but underdiagnosis impedes the delivery of appropriate treatment and heightens risk of serious complications. Current understanding of catatonia's pathophysiology links it to the current understanding of ECT's mechanism of action. Catatonia requires recognition of the syndrome, workup to identify and treat the underlying cause, and effective management including appropriate referral for ECT.

Conclusion

DBS took over all procedures as the dominant surgical intervention and drove widespread use of surgery for movement disorders. The recent successes of DBS along the clinical and technological aspects are changing the current practice of neuromodulation. However, expectations should be realistic and clearly defined during the evaluation process and disabling symptom should be addressed in the context of building the risk-benefit profile.