Surgical Management of Parkinson's Disease

Thesis
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in Neurological Surgery

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Mohammed Eid Mohammed

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List of Abbreviations

Abb.	Full term
AC	*Anterior commissure*
ADL	*Activities of daily living*
BG	*Basal ganglia*
C	*Celsius*
CB	*The calcium binding protein calbindin D28k*
CBT	*Corticobulbar tract*
CM	*Centromedian*
CNS	*Central nervous system*
CST	*Cortisospinal tract*
DA	*Dopamine*
DBS	*Deep brain stimulation*
GABA	*γ-aminobutyric acid*
GAD	*Glutamatevdecarboxylase*
GBA	*Glucocerebrosidase*
GDNF	*Glial cell line–derived neurotrophic factor*
GPe	*Globus pallidus external*
GPi	*Globus pallidus internus*
HCB	*Hemichorea*
HFS	*High-frequency stimulation*
ICP	*Intercommissural point*
IPG	*Implantable pulse generator*
LB	*Lewy body*
L-DOPA	*Levodopa*
mA	*Milliampere*
MCS	*Motor cortex stimulation*
MD	*Mediodorsal nucleus*
MER	*Microelectrode recording*
mm	*Millimeter*
MPTP	*1-methyl-4-phenyl-1,2,3,6-tetrahydorpyridine*

List of Abbreviations (Cont…)

Abb.	Full term
MRI	*Magnetic resonance imaging*
MSA	*Multiple system atrophy*
MSNs	*Medium spiny neurons*
OT	*Optic tract*
PC	*Posterior commissure*
PD	*Parkinson disease*
PF	*Parafascicular*
PFdl	*Dorsolateral extension of the PF*
PPN	*Pedunculopontine nucleus*
PPNc	*Pedunculopontine nucleus pars compacta*
PPNd	*PPN pars diffusa*
PSP	*Progressive supranuclear palsy*
QOL	*Quality of life*
RRF	*Retrorubral field*
S	*Second*
SMA	*Supplementary motor area*
SNc	*Substantia nigra pars compacta*
SNC-v	*Ventral tier SNc*
SNr	*Substantia nigra pars reticulata*
SNr	*Substantia nigra pars reticulate*
SP	*Substance P*
STN	*Subthalamic nucleus*
TMS	*Transcranial magnetic stimulation*
UPDRS	*Unified Parkinson's disease rating scale*
VA	*Ventral anterior nucleus*
VIM	*The ventral intermediate nucleus of the thalamus*
VL	*Ventral lateral nucleus*
VLd	*Dorsal VL*

List of Abbreviations (Cont…)

Abb.	Full term
VLp	*Posterior VL*
VM	*Ventromedial nucleus*
VOP	*Ventralis oralis nucleus*
VPL	*Ventral posterolateral nucleus*
VPM	*Ventral posteromedial nucleus*
VTA	*Ventral tegmental area*
α –Syn	*α-synuclein*

Abstract

Background: Parkinson's disease is the second most common neurological disorder. Surgical therapy for Parkinson's disease has a long history beginning in the 1930s. recently, with better understanding of the pathophysiological basis underlying the development of PD in addition to the advances in imaging technology and electrophysiological techniques used for localization of brain structures have improved the ability to accurately identify and targeting deep brain nucleus as a management to Parkinson's disease.

Objectives: Evaluation of outcome of treatment of Parkinson disease using different surgical modalities (ablation or stimulation procedures) and different targets mainly (VIM, GPI, or STN).

Methods: Twenty five patients underwent surgeries to control the symptoms of Parkinson's Disease. Unilateral pallidotomy was done in eleven patients, unilateral thalamotomy was done in ten patients and bilateral DBS was done in four patients. The pa□ents were evaluated preoperatively and 1 month, 6 and 18 months post-operatively both clinically and using the Unified Parkinson's Disease Rating Scale (UPDRS).

Results: twenty one ablative procedures, thalamotomy and pallidotomy were done without using microelectrode recording for patients with advanced Parkinson's disease. After pallidotomy, the severity of contralateral dyskinesias decreased by 80% and was maintained at 18 months, after thalamotomy, the improvement of contralateral dyskinesia was 13% with total abolition of the tremors and was maintained at 18 months. After bilateral STN DBS the mean dyskinesia score improved from 2.9 at baseline to.9 the mean dyskinesia score improved from 2.9 at baseline to.9 and the daily medication doses was declined significantly after surgery.

Conclusion: DBS is effective and safe surgical procedure as management of Parkinson's disease, but The Ablative procedures, namely thalmotomy and pallidotomy for the Parkinson's disease can achieve useful functional improvement and relatively safe, thus ablative procedures depending on macrostimulation should still be a very good surgical option for the patients with Parkinson's disease in the low income countries even in the era of stimulation and MER.

Keywords: Management of Parkinsonism, Ablative Surgery, Deep Brain Stimulation, Thalamotomy, Pallidotomy.

Introduction

Parkinson's disease is one of the most common neurological conditions and occurs with more or less equal frequency in all countries around the world. It has a much higher incidence in older people. However, 'young-onset' (between 20 and 40 years of age) and 'juvenile-onset' (less than 20 years of age) can occur, though much less frequently ***(Charles et al., 2002).***

Parkinson's disease is a progressive disorder of the central nervous system and it can cause a broad spectrum of symptoms. However, three symptoms are clearly fundamental to Parkinson's disease and often develop as the early signs:

- Hypokinesia and bradykinesia
- Rigidity
- Tremor.

The other signs and symptoms are postural instability, dysphagia, speech problems, depression, hallucination, dementia, decrease sense of smell, bladder problems e.g. nocturia, constipation, sleep problems and sexual problems ***(Charles et al., 2002).***

Surgical therapy for Parkinson's disease has a long history beginning in the 1930s with procedures such as resection of primary motor cortex, extirpation of the caudate, and open resection of the pallidum and ansa lenticularis. These