

S1-Long-term Outcomes and Cause of Death in Parkinson's Disease Patients Treated with Deep Brain Stimulation

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Objective: The objective of this study was to examine the long-term clinical outcome and cause of death after deep brain stimulation in advanced Parkinson's disease (PD).

Methods: A total 58 patients with PD who treated with deep brain stimulation (DBS) were identified and included in the study. We assessed clinical outcomes including Unified Parkinson's disease Rating Scale (UPDRS), mortality and cause of death in these patients.

Results: Surgery was performed after a median lagtime of 84 months from PD onset at a median age of 56.5 years. The median follow-up after surgery was 38 months. Eleven of the 58 patients died in the study period, including 1 suicide. Twelve months after surgery, the on-medication UPDRS motor score was reduced by a mean of 35.6%, and was remained till 24 months of follow up. Actuarial survival rate after DBS were 94.5, 90.5 and 86% at 1, 2 and 3 years after DBS each, respectively.

Conclusion: Our study gives evidence for increased mortality in PD despite modern treatment. This finding is in line with recent study that found no slowing of progression of PD after DBS. Better understanding of disease and disease modifying treatment methods remains to be done.

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S2-The Risk of Intracranial Hemorrhage after Deep Brain Stimulation for Movement Disorder

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Objective: Stereotactic insertion of electrodes into the brain is an essential part of functional neurosurgery. Many kinds of complications may be happened after DBS, especially cerebral infarction, intracranial hemorrhage (ICH), hardware related wound infection, electrode migration or fracture, IPG depletion, cognitive or affective changes and so on. But, intracranial hemorrhage is the most feared complication associated with stereotactic procedure.

Methods: We performed 625 electrode insertion surgeries for the functional disorders from Feb. 2000 to Feb. 2012. The mean age of patients with electrode insertion was 54.57. Among the cases, Parkinson's disease was 397 (61.6%) cases, Dystonia was 104 (16.1%), Essential tremor was 77 (12.0%) case, and the other cases were 66. According to target of cases, STN was 380, pallidum was 108, thalamus was 85, nucleus accumbence was 19, and the other cases were 31. We studied the cause of hemorrhage and analyzed the correlation between the hemorrhage rates with risk factors such as age, sex, preoperative hypertension, and electrode targets.

Results: The 12(1.92%) cases of total 623 electrode insertions were happened to hemorrhagic event. The 7 (1.12%) cases were asymptomatic and 5 (0.80%) cases were symptomatic. The 1 (0.16%) of symptomatic case was full recovery of neurologic symptom, but 4 (0.64%) were the permanent neurological deficits. The classification of hemorrhage's site were 6 subcortical, 4 electrode tip, 1 intraventricular hemorrhage, and 1 electrode unrelated hemorrhage. The rate of hemorrhage along the specific targets were 1.31% (5/380) at STN-DBS, 4.63% (5/108) at GPi-DBS, 2.35% (2/85) Vim-DBS and 0% (0/52) at other procedure. The relative rate of hemorrhage of GPi-DBS was higher than other DBS, but there was not statistically significance ($p=0.43$). And there wasn't also statistically significance of other risk factors such as age ($p=0.28$), sex ($p=0.86$), and preoperative hypertension ($p=0.56$).

Conclusions: The risk factors of hemorrhage after DBS for movement disorder may be not always one classic form. Although the hemorrhage rate according to specific target was not statistically significance, hemorrhage rate of GPi-DBS was higher than the other target. So we have to take care of taking the GPi-DBS procedure. We have to also consider that the important things to prevent hemorrhage after DBS are also to planning of stereotactic map not to pass the vessels and to be slowly advanced of electrode. Careful procedure is the most important thing to prevent intracranial hemorrhage after DBS because patients will suffer from the neurological deficits if the symptomatic hemorrhage is happened. But the overall risk rate of hemorrhage was very low. So we must consider the active DBS surgery if the symptoms of patients is consistent with the indication of operation.

S3-A Case of Bilateral STN DBS for Dopa-induced Neck Dystonia in Young Onset PD Patient

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40세 이전에 발생하는 young onset PD는 전체 PD의 약 5-7%를 차지하며,

Dopa responsive dystonia가 1/3에서 발생하는 것으로 보고되고 있다. 유전적 특징으로 Park-1(+)가 많고 또한 drug fluctuation이 상대적으로 심하며, hyper kinetic dyskinesia가 많이 발생한다.

우리 교실에서는 dopa-induced neck dystonia in young onset PD patient에 대해 bilateral STN DBS를 시행하여 좋은 결과가 있어 보고하고자 한다.

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S4-Microvascular Decompression for Hemifacial Spasm Associated with Vertebrobasilar Aneurysm

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Objective: Hemifacial spasm, an involuntary contraction of the facial musculature, is most commonly caused by compression of root exit zone (REZ) by posterior inferior cerebellar artery (PICA), anterior inferior cerebellar artery or vertebral artery (VA). Among other rare causes, we present 5 cases of hemifacial spasm patients whose offenders are associated with vertebrobasilar aneurysms and there surgical outcomes are analyzed with review of related literatures.

Methods: Among them, 4 patients had vertebrobasilar aneurysm as the associated pathology. Mean age was 50.5 (39-69) and mean follow up period was 23.5 months (3-64). All of them had progressive symptomatic hemifacial spasm. Angiographically, three of them had fusiform dilatated aneurysm at VA-PICA junction. One of those three underwent proximal ligation of VA before MVD due to persistence of hemifacial spasm. The other two patients underwent MVD only because the fusiform aneurismal wall was calcified from operative findings. Last of the four showed fusiform aneurysm at just proximal to vertebrobasilar junction and MVD without aneurismal manipulation was applied.

Results: For the patient who underwent proximal ligation of VA, hemodynamic decrement was not enough to prevent the pulsatile forces driven to REZ. Therefore, MVD was needed with the offender being the aneurysm, VA and PICA. For the patients with aneurysms at VA-PICA junction, aneurismal wall was calcified and MVD was performed without aneurismal manipulation. There offenders were the aneurysm VA and AICA. For the patient who had fusiform aneurysm at just proximal to BA-VA junction, extracranial proximal ligation did not eliminate lateral spread wave on intraoperative EMG. Hence, MVD was performed with the offender VA dissection and AICA. There were two complications of mild sixth nerve palsy and mild facial palsy. All of them had the spasm disappeared at postoperative 1 to 3 months without recurrence at long term follow-up.

Conclusion: Hemifacial spasm is a well know disease widely treated with microvascular decompression. Aneurysms associated with the pulsatile stimulation of the REZ are very rare worldwide. The treatment options are MVD, proximal ligation through direct approach or through endovascular coiling, wrapping, clipping or combinations of them are applied. Careful selection of the above treatment modalities ensure the long term outcomes of HFS as our patient have had.

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S5-Hemimasticatory Spasm treated with Microvascular Decompression of Trigeminal Nerve

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Hemimasticatory spasm is a very rare disorder of the trigeminal nerve characterized by paroxysmal involuntary contraction of the jaw-closing muscles. The mechanisms leading to hemimasticatory spasm are still unclear. Recently, injection of botulinum toxin has become the treatment of choice due to its excellent results. We report a case of a successful treatment of hemimasticatory spasm via microvascular decompression of the motor branch of the trigeminal nerve.

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S6-Selective Peripheral Denervation for Spasmodic Laterocollis

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Objective: Spasmodic laterocollis could be attributed to abnormal contraction of the ipsilateral muscles in the neck such as the splenius capitis, the sternocleidomastoid, the trapezius, and the levator scapulae muscle (LSM). As for selective peripheral denervation for pure rotatory spasmodic torticollis, selective denervation of the contralateral spinal accessory nerve (SAN) and the ipsilateral posterior rami of the cervical spinal nerves, known as Bertran's procedure, is a well established procedure with minimal complications. However, the procedure on laterocollis is still unclear and also the importance of the levator scapulae muscle not widely known. We report on the clinical results following selective denervation involving the levator scapulae muscle in three patients with a component of laterocollis.

Methods: The mean duration of the disease was 3.7 years (range 2-6). The mean age at operation was 42.7 years (range 27-67). Preoperative electromyogram was done and injection were performed with Botulinum toxin and/or lidocaine. The denervated muscle were selected on the basis of clinical and electromyographic analysis. Selective denervation by staged operation (ipsilateral SAN and posterior rami of the cervical spinal nerve, C1-C6 and then LSM) in 2 cases, denervation of the LSM and the SAN in 1 case were carried out. Patient were assessed with the Tronto Western Spasmodic Torticollis Scale (TWSTS) and relief scale using self-reporting.

Results: The TWSTRS total scores improved by 76.7% at last follow-up (mean range 29.4months (6-72) after surgery. Subjective improvement reported average 78.3% (range 65-95). No significant peri-operative complication occurred.

Conclusions: The authors demonstrated the benefit of selective denervation of the levator scapulae muscle for spasmodic laterocollis. We stressed the staged operation is a valid treatment option available in selected patients for intractable spasmodic torticollis with a component of laterocollis

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S7-Multiple Gamma Knife Radiosurgery for Multiple Metachronous Brain Metastases Associated with Lung Cancer

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Objective: We analyzed the survival times of patients with multiple metachronous brain metastases associated with lung cancer after multiple gamma knife radiosurgery (GKRS) treatments.

Methods: From May 2006 to July 2010, 112 patients with metastatic brain tumors associated with lung cancer underwent GKRS treatment. Twenty out of 112 patients who underwent multiple GKRS for multiple metastases and 12 patients who underwent single GKRS for multiple metastases were analyzed. All these patients had multiple brain metastases without extracranial metastases and showed Karnofsky Performance Scale (KPS) scores over 70. Patients who were treated with whole brain radiation therapy (WBRT) were excluded. We used the Kaplan-Meier method and Cox proportional hazards for statistical analysis of relationship between the survival time and four factors; (1) the numbers of lesion, (2) the average volume of lesions in each patient, (3) the numbers of repeated GKRS, and 4) the duration of recurrence between the times of each GKRS.

Results: Median survival time of 20 patients who underwent multiple GKRS for multiple metastases and 12 patients who underwent single GKRS for multiple metastases was 19 months (range, 6-48) and 8.7 months (range, 3-18), respectively. Kaplan-Meier survival showed that the large numbers of lesion, numbers of repeated GKRS, and the shorter duration of recurrence between the times of each GKRS were not the factors to shorten the survival time. Only the average volume of lesion (over 10 cc) was negatively related with survival time. Cox-proportional hazard ratio of each variable is that the numbers of lesion shows 1.1559, the average volume of lesions is 1.0005, the numbers of repeated GKRS is 0.0894, and the duration of recurrence between the times of each GKRS is 0.5970.

Conclusion: In this study, patients with multiple metachronous brain metastasis showed extended survival time after multiple GKRS comparing with the results of patients with single GKRS. Authors conclude that patients with multiple metachronous brain metastasis can be controlled, and repeated GKRS can be helpful to extend the survival time.

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S8-Predictive Factors of Hearing Pervervation after Primary Gamma Knife Radiosurgery for Vestibular Schwannoma

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Objective: This study was designed to evaluate tumor control and hearing preservation after primary gamma knife radiosurgery (GKRS) for vestibular schwannoma (VS) and to identify factors that predict hearing preservation after GKRS (patient characteristics, image characteristics, tumor volume, dosimetry, cochlear radiation dose).

Methods: From 2002 to 2008, one hundred one consecutive patients with VSs were treated by GKRS in our institute. Twenty previously untreated unilateral VS with serviceable hearing (Gardner-Robertson [GR] Class I or II) were followed for more than 3 years. The mean age at the time of GKRS was 48.3 years (range: 30-77). Thirteen patients (65%) had GR Class I hearing and 7 (35%) had GR Class II hearing at the time of GKRS. The mean tumor volume and isodose profile was 1.8 cm³ and 58.3%. The mean maximum and tumor margin radiation doses were 24.3 and 14.1 Gy, respectively. The mean follow-up periods were 58 months (range: 36-132).

Results: Nineteen of 20 VSs were stable or decreased in size. Tumor progression occurred in one of 20 (5%) patients after GKRS, who underwent microsurgery at 4 years follow up. Serviceable hearing was preserved in 70% of all patients and in 76.9% of those with GR Class I hearing. No GKRS related morbidity was existed. According to the nidus type and blood flow, the obliteration rate in compact type (75%) was higher than in diffuse type (66.7%), and the obliteration rate in low flow AVM (76.9%) was higher than in high flow AVM (63.6%). Two patients (6.9%) with three hemorrhagic events suffered a hemorrhage during the follow up period. The annual bleeding rate of AVM after GKRS was 1.95%/year. No adverse radiation effects (AREs) and delayed cyst formations were existed.

Conclusion: Control of tumor growth and preservation of hearing function are the main goals of treatment of VSs. The satisfactory tumor control rate and excellent hearing preservation with lesser complication rate are the great advantages of GKRS. Tumor volume and anatomy relate to the hearing level before GKRS and influence technique. A low radiosurgical dose to the cochlea enhances hearing preservation.

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