

S1-DBS Lead Fractures in 3 Movement Disorder Patients

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Objective: DBS is effective for movement disorder, pain, psychiatric disorders, etc. Sometimes, in Dystonia patient and parkinsonian-dystonia patient developed DBS lead fracture.

Methods: We operated 379 DBS and SCS, MCS operations during last 10 years.

Among 1 parkinsonian 43-year-male patient developed Rt DBS lead extension line fracture after 4 DBS operation. IPG showed battery was gone. We changed into new IPG and extension line.

Results: 56-year-male patient operated STN DBS surgery in other hospital. 2 year later, Rt DBS impedance was bad, we checked radiography of skull and lead extension line fracture was suspected. In operation view, we checked lead extension line fracture and changed into new one.

61-year-female patient operated Gpi- DBS surgery in other hospital. 3 years later, IPG connecting extension line fracture was developed and changed into new extension line.

Conclusion: DBS is safe and effective treatment for intractable movement disorder patients. If patient's symptom is aggravated after DBS surgery and should check radiography of skull and, chest but rarely developed lead fracture in dystonia or parkinsonism patients.



S2-Adult Congenital Muscular Torticollis Treated By Surgical Release: Experience in 13 Patients

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Objective: Congenital muscular torticollis (CMT), when untreated, sometimes results in cosmetic deformity including head tilting and limitation in the neck movement. The result of surgical release of the tightened muscle are good in the infants, even with older children. However, little importance is available on the surgical treatment of adult CMT. We assessed the surgical results of bipolar release in 13 patients with CMT in adult .

Methods: Thirteen patients underwent a bipolar release of the sternocleidomastoid muscle and were retrospectively analyzed. They have no history of operation on the torticollis. The mean follow-up period was 13.4 months (range, 3-36). The mean age at time of surgery was 30.1 years (range, 21-58). A soft cervical collar was applied for 2 or 3 weeks after surgery. Intermittent stretching exercise by themselves started 3 days after surgery. Patients were evaluated with modified Lee's scoring system and global satisfactory rating scale using patient self-reporting. Head tilt was measured by the cervicomandibular angle using the cervical spine anteriorposterior X-ray.

Results: According to the modified Lee's scoring system, excellent results were noted in 7 (53.7%) patients, good in 4 (30.7%) and fair in 2 (15.6%). The mean cervicomandibular angle was 16.6° (range, 8-37) preoperatively, which improved to a mean of 5.3° (range, 0-25) after surgery. Subjective improvement reported averaged 92.3% (range, 90-95%) at last follow-up. There were no surgical-related complications except for transitory sensory loss on the lower ear lobe in one case

Conclusions: This result shows that bipolar release as a safe and highly effective treatment option for the treatment of CMT in adult. Although the cervical spine changes remained, the patients are very gratified with the functional and cosmetic results without neurologic complication in the neck.



S3-Surgical Process Analysis for Deep Brain Stimulation of Parkinson's Disease

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Objective: Deep brain stimulation (DBS) are relatively time-consuming, and complicated procedure compared to previously destructive stereotactic procedure. A long time procedure occasionally induces unexpected complication, such as an irritability, a pneumocephalus, mallocation of electrode, and hemorrhage. To improve the surgical procedure, authors analysed the whole surgical procedure. We defined each surgical steps of DBS and evaluated the time for each steps.

Methods: Eight cases of Parkinson's disease were selected from July 2011 to Oct. 2012. We defined 33 surgical procedures for DBS. One surgeon operated 7 cases with bilateral insertion of electrode to STN and one case with unilateral insertion of electrode. An assistant observed each procedure and measured the time, personnels and instruments for each step. Surgical procedures are classified into 4 categories; preoperative, intraoperative, postoperative and insertion of IPG. Each categories are divided into several steps.

Results: Operations were well performed without complication. Preoperative step includes fixation of the frame and imaging of MRI including time of delivery. Postoperative step includes imaging of postoperative CT. Mean time of the whole operation is 6 hours 25 minutes. Mean time of each category is preoperative step 1:53, intraoperative step 2:22, postoperative step 0:27, and insertion of IPG 1:53.

Conclusion: Actual intraoperative time is one third of the time of whole procedure. If the time of image acquisition, delivery of patient and other idle time can be reduced, we will be able to reduce operation time below 4 hours. To do that, advancement of intraoperative imaging technique and registration will be needed. And new automatized stereotactic surgical instrument might be helpful to reduce more consuming time, unnecessary procedures and improve accuracy.



S4-Antidyskinetic Effects of Subthalamic Deep Brain Stimulation in Patients with Idiopathic Parkinson's Disease

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Objective: Deep brain stimulation (DBS) of the subthalamic nucleus (STN) is an established treatment for the motor complications in patients with Parkinson's disease (PD). Levodopa-induced dyskinesia (LID), especially peakdose dyskinesia, can also be controlled by an indirect effect of DBS of the STN (STN-DBS) through a reduced requirement in the levodopa dosage. In addition some authors have reported that LID can be directly attenuated by STN-DBS. The objective of this study was to evaluate the effect of STN-DBS on LID in patients with PD.

Methods: We conducted a retrospective review of all patients who underwent STN-DBS for idiopathic Parkinson's disease. The outcome measures included Unified Parkinson's Disease Rating Scale (UPDRS) part IV and the levodopa equivalent dose (LED). The subjects were divided into three groups based on their pre- to postoperative LED change at the last evaluation from the surgery; group 1 – a LED change of less than 15%, group 2 – a minimum LED increase of 15%, and group 3 – a LED decrease of more than 15%. Direct dyskinesia suppression was derived from the combination of group 1 and 2. Direct dyskinesia suppression was defined as improvement in the dyskinesia subscore of the UPDRS part IV (i.e., sum of items 32-34) at the last evaluation from the surgery as compared to the baseline score despite lack of reduction in dopaminergic dose. Subsequently we analyzed the choice of contact in group 1 and 2.

Results: There were two hundred seventy-four leads implanted in one hundred thirty-seven patients between March 2002 and July 2012. At the last evaluation, dyskinesia subscore of the UPDRS part IV significantly improved in both group 1 and 2 ($p=0.003$) and group 3 ($p=0.000$). Group 1 and 2 revealed an improvement in dyskinesia subscore of 47.1%, and this improvement was 51.6% in group 3. Group 3 was more likely than the group 1 and 2 to experience dyskinesia suppression, however, the association between group and dyskinesia suppression was not statistically significant ($p=0.303$). We reported that in thirty-five of forty-one patients stimulation of a proximal electrode contacts may lead to a reduction of dyskinesia associated with STN-DBS.

Conclusion: The results of this study demonstrated that LID attenuated by STN-DBS without reducing the levodopa dosage. Also, the present study indicated that LID could be effectively inhibited by stimulation using proximal electrode contacts located within the areas above the STN.



S5-Nonconvulsive Posttraumatic Seizures During the Neurosurgical Hospitalization

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Objective: Seizures are common consequence of traumatic brain injury and have been reported in clinical series as an incidence of 4 to 10%. Among them, nonconvulsive seizures (NCS) are often unrecognized during the period of hospitalization because it can only be confirmed by electroencephalographic (EEG) recording. NCS after traumatic brain injury may cause worse outcome, early diagnosis and treatment is important. We report our clinical cases of nonconvulsive posttraumatic seizures.

Methods: We retrospectively reviewed our clinical database of traumatic brain injury (TBI) patients admitted between March 2008 and September 2012. Seventeen patients with a suspicion of NCS were included. Inclusion criteria were patient with symptoms such as decrease of consciousness, aphasia and irritability, which were not explained by imaging studies. Routine 30 minutes or continuous EEG recordings were done in all patients.

Results: The underlying traumatic injuries were acute subdural hemorrhage, cerebral contusion, depressed skull fracture and chronic subdural hemorrhage. Ten out of seventeen patients showed epileptiform activities on EEG. Ictal discharges were documented on 5 patients. Based on clinical symptoms and EEG findings, these 5 patients were diagnosed as NCS. Another 5 patients with interictal activities on EEG were considered as ‘suspicious NCS’ because increasing dose or adding on antiepileptic drugs relieved their symptoms. Two out of five NCS patients showed prolonged ictal EEG findings more than 30 minutes and diagnosed as nonconvulsive status epilepticus (NCSE). All NCS/NCSE were successfully controlled by appropriate antiepileptic medication.

Conclusion: NCS can be unrecognized during the treatment of traumatic brain injury because decrease of consciousness or irritability is a common finding. Though limited by a small number of patients, our data shows that NCS was diagnosed in about 30% of patients with suspicious symptoms. Considering routine EEG could have recorded silent period in ‘suspicious NCS’ patient, there’s a possibility that actual NCS might have been more. Continuous EEG recording of all delirious TBI patients is practically not feasible in usual neurosurgical department. Because untreated NCS may be related to worse clinical outcome of TBI, careful observation and urgent EEG recordings should be considered in a patient with suspicious NCS symptom such as unexplained change of consciousness.

Though limited by a small number of patients, our result shows that NCS can be developed relatively large portion of patients with suspicious symptoms.



S6-Relationship Between Resection Extents of Broadband Interictal Electrocorticographic Activities and Seizure Outcomes

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Objective: We investigated the relationship between locations of broadband interictal electrocorticographic activities determined by the semi-automatic maximum wavecluster detection method and seizure outcomes in medically intractable epilepsy patients.

Methods: Included were 22 patients with medically intractable epilepsy who underwent chronic electrocorticography. Seizure outcomes were followed more than 1 year. Investigated interictal periods had 20s durations and spikes with or without slowings. Prominent electrocorticographic activities were extracted in the wavelet transformed domain in 28 scales from 600 Hz to 0.07 Hz separately. Wavecluster, a continuous activity in wavelet transformed domain, was detected by thresholdings. Subsequently we selected one electrode having the maximum wavecluster amplitude in each seizure. Thereafter we compared the mean resection percentage of maximum electrodes between seizure outcome groups between the seizure-free and the not-seizure-free groups by Mann-Whitney U tests. Benjamini-Hochberg false discovery rate corrections were done for 28 scales. Significances were judged at the adjusted p-value of 0.05 level. Thresholds were automatically optimized with the genetic algorithm to find the greatest difference between seizure outcome groups.

Results: Resection extents of maximum amplitude waveclusters were significantly different between seizure outcome groups in 6 scales including 2 Hz, 1 Hz, 0.7 Hz, 0.5 Hz, 0.13 Hz and 0.09 Hz scales (adjusted p values=0.024, 0.031, 0.024, 0.024, 0.031 and 0.024). Fast ripples in 307 and 431 Hz scales were significantly different before multiple comparison corrections (unadjusted p=0.031 and 0.022). However, after multiple comparison corrections, there were not significantly related with seizure outcomes.

Conclusions: The significant relationship between resection extents of zones with slow oscillations and seizure outcomes was found in the interictal electrocorticography. The automatic analysis of short 20 duration of interictal period with abnormal activities were sufficient to find differences between differences between seizure outcome groups.

Significance: Better delineation of resection targets may be possible in future by broadband electrocorticography.



S7-Tactics for Minimizing Errors in the Steps of Computerized Planning for DBS Surgery Using FrameLink

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Objective: There are several steps in developing errors during deep brain stimulation (DBS) surgery. Computerized planning with the registered images also has its own error rates in the process of image merging, frame detection and during adjustment of sagittal angle according to anterior and posterior commissure (AC-PC). We examined the extent of the errors, which steps are more likely to make errors, which directions are mostly affected and how we can minimize the errors.

Methods: Using a planning software (FrameLink 5.2.4, Medtronic), errors in 10 different images which were taken with Leksell frame were tested in the steps of image merging; compared with computerized auto-merging and manual merging, proper slices for frame detection; slice close to the DBS target versus slice close to the brain base or vertex, adjustment of image angle; designation of AC, PC and midlines, registered images; axial versus coronal. Error rates were obtained automatically or calculated manually with final targets of lateral, anteroposterior and vertical dimensions with its coordinates.

Results: Computerized auto-fusion of images produced less error rates than manual fusion. Using coronal images, AC-PC points showed maximal 1.2 mm antero-posterior displacement compared with using axial images. Sagittal angle was adjusted automatically with midlines designation as well as AC-PC. Vertical coordinates varied from 0.4 to 1.4 mm according to midline designation.

Conclusion: When we use FrameLink as a planning software, it would minimize the error rates using axial images, registration with the slice close to the target and designation of midlines close to AC-PC line.



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