Intraoperative evaluations: Tailored resection for minimalism by intraoperative acute recording (ECoG) and functional brain mapping with the electrical stimulation technique to identify the epileptic and essential areas related to language or sensorimotor are usually performed under local and intravenous propofol anesthesia.

Conclusion: Our protocols to decide the candidates of epilepsy surgery for patients with intractable epilepsy will be presented greater detail along with the subject of the procedural issues of epilepsy care as well.

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The treatment of foci resection and bipolar electro-coagulation on functional cortex in multifocal epilepsy associated with tuberous sclerosis complex involving eloquent cortex

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Objectives: Tuberous sclerosis complex (TSC)-associated epilepsy is medically refractory seizures secondary to cortical tubers and leads to mental retardation in childhood. TSC patients are often with refractory epilepsy involving eloquent and noneloquent cortex in multiple lobes and multiple independent seizure foci which made these patients poor candidates for conventional surgery. We have previously presented that the approach of pure bipolar electro-coagulation on functional cortex (BCFC) in the treatment of unifocal epilepsy involving eloquent areas is effective, safe and easy to use. This report describes our long-term follow-up for combined resective surgery and BCFC in TSC patients with refractory epilepsy involving eloquent and noneloquent cortex.

Methods: 8 patients aged from 8 to 31 years were admitted with epilepsy. The cranial computerized tomography (CT) showed cortical and subependymal calcification, magnetic resonance imaging (MRI) demonstrated multiple cortical tubers. All patients were with drug resistant epilepsy, despite treatment with two antiepileptic drugs (AEDs). Initiated combination therapy of foci resection and BCFC for epilepsy management between May 2004 and May 2012, the patients were retrospectively reviewed with regard to seizure outcome, postoperative complications.

Results: The combination therapy of foci resection and BCFC resulted in remarkable improvement in patient's ambulation and cessation of seizures. Engel class I outcome was achieved in 3 patients, Engel class II in 3 patients, Engel class III in 1 patient and Engel class IV in 1 patient. All patients were with no permanent neurological deficit noticed during a standard clinical examination. In addition, all patients showed some improvement in behavior or cognitive function (Figs. 1–3).

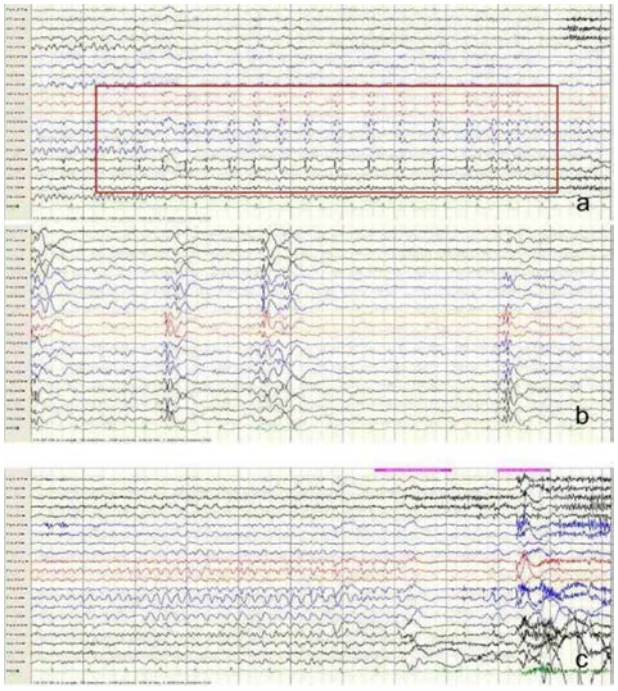

Fig. 1 – (a) Interictal-1 displays as bilateral symmetric high amplitude of multi-spike and slow waves during sleep. (b) Interictal-2 shows low to medial amplitude of awake multi-spike and slow waves on the right frontal (F4, F8), central (C4) and temporal (T4). Clinical seizures were characterized by tonic of left arm, laughing (Gelastic seizures) and followed by secondary generalized tonic seizures. (c) The corresponding ictal EEG revealed bilateral epileptiform discharge, more predominant over the right frontal (F4, F8), central (C4) and temporal.

Fig. 2 – (a) Pre-resection EcoG revealed significant spiking in the central (eloquent epileptogenic zone) (arrows). (b) Extremely active interictal spikes were noted in the post-resection EcoG (arrows). (C) No epileptiform discharges were present over right central cortex after the BCFC procedure.

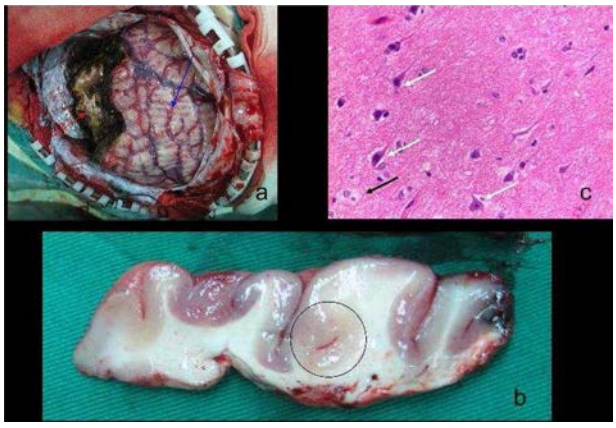

Fig. 3 – (a) Selective resection of the epileptogenic zone in the right frontal lobe (red arrows) and BCFC in the central (blue arrows) and the electrocoagulated cortex presented red and white stripes at regular intervals. (b) Brain specimen showing the tubers (circle). (c) Immunohistology image showing giant cells (balloon cells) and dysmorphic neurons.

Conclusions: The combination therapy of foci resection and BCFC is an effective and safe surgical approach for the treatment of TSC-associated epilepsy involving eloquent cortex.

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How do I do it? Selective amygdalohippocampectomy

Navigation-assisted trans-inferotemporal cortex selective amygdalohippocampectomy for mesial temporal lobe epilepsy

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Purpose: To achieve satisfactory memory outcomes, we hypothesized that preserving the temporal stem might play an important role. To preserve the temporal stem, we developed a minimally invasive surgical procedure, "neuronavigation-assisted trans-inferotemporal cortex SAH" (TITC-SAH), performed via a small cortical incision in the middle or inferior temporal gyrus. We analyzed outcomes of the procedure in terms of both seizure control and memory function.

Methods: TITC-SAH was performed in 20 patients with MTLE. The inferior horn of the lateral ventricle was approached via the inferior or middle temporal gyrus along the inferior temporal sulcus under neuronavigation guidance. The hippocampus was dissected in a subpial manner and resected en bloc together with the parahippocampal gyrus. During follow-up for more than 1 year, seizure control in the first year of follow-up and memory function at 6 months postoperatively were evaluated using the International League Against Epilepsy (ILAE) classification system and Wechsler Memory Scale-Revised (WMS-R), respectively.

Results: One year after TITC-SAH, 17 of the 20 patients were seizure-free (ILAE class 1), 2 experienced auras only (ILAE class 2), and 1 experienced 3 seizures per year (ILAE class 3). Verbal memory improved significantly and improvements were seen regardless of whether the SAH was on the language-dominant or non-dominant hemisphere.

Conclusion: Navigation-assisted TITC-SAH performed for MTLE via a cortical incision in the middle or inferior temporal gyrus offers a simple, minimally invasive procedure that appears to yield excellent outcomes in terms of seizure control and improvement of memory function.

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High and low frequency oscillations in epileptic seizures

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Objectives: The correlation between the amplitude of higher frequency component (30–150 Hz) and phase of lower frequency component interacts to brain activities. This phenomenon is called phase-amplitude coupling (PAC) and it may play an important role within brain for information processing. We hypothesizes that alternation of PAC would correlate epileptic attacks.

Method: We included 7 patients who had diagnosed as lateral temporal epilepsy with non-invasive studies. The video-electroencephalography with chronic intracranial electrodes (V-iEEG) was performed in all 7 patients. V-iEEG was recorded for 7–14 days continually including ictal and inter-ictal periods with the sample rate of 10,000 Hz. PAC, that is between the phase of low frequency components (theta, alpha, beta: 4–30 Hz) and the amplitude of high frequency components (high-gamma: 80–130 Hz), was analyzed using MATLAB (ver.2013b). The strength of PAC was computed as synchronization index (SI). Mean SI in every 1 min was shown serially during the long-term examination including both ictal and inter-ictal periods.

Result: Although SI scores were stable during inter-ictal period, significantly higher SI scores were observed during peri-ictal periods compared to inter-ictal periods.

Conclusion: Alteration of CFC should correlate the epileptic attack in patients with lateral temporal epilepsy. We conclude that CFC might be a parameter of prediction of epileptic seizure and that it would contribute to investigate the pathology of epilepsy.

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