A Case Report and Literature Review of Temporal Lobe Resection Failure Associated with Temporal Plus Epilepsy

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Introduction

To describe the feasibility, safety, and seizure outcome of a patient with temporal plus epilepsy who underwent tailored resection guided by SEEG.

Chief complaint

The patient had a history of repetitive generalized tonic 1-2 years prior to admission

Present medical history

A twenty-five-year-old man got a bachelor's degree in engineering. He works with his mother selling traditional Thai food at his home town. Seizure onset was at the age of 9. At the time, seizures began with a whole-body stiffening, predominately at night. The patient noticed that sometimes he had a dizzy sensation before an episode. Seizures recurred three times before being treated by a doctor. In 2016 he was referred to the epilepsy clinic at the Neurological Institute of Thailand from another hospital due to medically intractable epilepsy. Later on, the epileptologist adjusted many antiepileptic drugs, including carbamazepine 1200 mg/day, topiramate 425 mg/day, levetiracetam 2250 mg/day, phenytoin 225 mg/day, he still had a generalized tonic seizure once a week.

Past medical history

- he denied underlying diseases
- no history of head trauma
- no history of illicit drugs
- no allergy
- no febrile convulsion

Physical examination

Vital sign: BT 36.0°C, BP supine 123/83 mmHg, standing for 3 minute 120/79 mmHg, PR 64 bpm, body weight 50 kg, height 160 cm. The physical examination and detail neurological examination was unremarkable.

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Discussion

The first long-term VEEEG discovered his semiology consisted of complex motor seizures followed by the left head versive, then generalized tonic-clonic seizure. The EEG seizure was arising from the right frontotemporal area (FT10). Unfortunately, at first VEEG monitoring he did not notice the vertiginous aura. His 3-tesla epilepsy protocol MRI brain was unremarkable studies, later on, the patient underwent interictal SPECT and ictal SPECT, the ictal SPECT at (10 seconds after habitual seizure) pointed to bifrontal. Due to inconclusive presurgical evaluation, the patient underwent the FDG-PET in Feb, 2017. The interictal FDG-PET revealed a large area of likely epileptogenic foci involving the right lateral anterior and mesial temporal lobe and the right inferior lateral region of the right frontal lobe. After gathering information from the PMC discussions, the patient underwent right anterior temporal lobectomy in March 2017.[1] The surgical specimens obtained from patients were consisted of hippocampus's parts with numerous red neurons in CA3, compatible with right mesial temporal sclerosis.[2] He became seizure-free for two months after surgery.[1]

In June, 2017, his seizure recurred again with the same semiology, and especially he still had the vertiginous sensation before he had a seizure. He underwent second long-term video monitoring using more compact electrodes (Goldman Montage) in 2018. His seizure was still arising from the right frontotemporal area (FC6>T10). In August, 2019, he underwent an SEEG implant under robotic-assisted. The stereo electroencephalography (SEEG) planning was based on anatomo-electrical and imaging correlations as a scheme.[3]

The invasive monitoring showed interictal and Ictal activity arose consistently from the right posterior superior temporal sulcus, followed by rapid synchronization over the right frontal operculum and right frontal region within 20-50 ms.

The 50 Hz high-frequency cortical stimulated right posterior superior temporal sulcus contacts induced the typical aura using an electrical current at 1-2 mA and typical seizure at electrical current 3-4 mA.[4]

Finally, the patient underwent the right posterior superior temporal tailored resection. Post-operatively patient became seizure-free but experienced left homonymous hemianopia. At 30 months follow up, the patient is still seizure-free after reduced two antiepileptic drugs. The second surgery operation's pathology showed Type IIb focal cortical dysplasia.[5]

Conclusion

The present case illustrates that temporal plus epilepsy may mimic features of temporal lobe epilepsy.[6, 7] In our case, at first long-term VEEG monitoring, the patient did not mention his aura, which is crucial for localization of the epileptogenic zone.[8] After the first surgical operation, the patient remained only focal impaired awareness motor seizure.[9] Therefore, he could easily recognize the vertiginous aura before his typical seizures. The second-long term video monitor did in 2017, we integrated the further non-invasive study, including Morphometric MRI analysis (MAP18)[10, 11], Source Analysis of Interictal Spikes (BESA)[12] and ictal arterial spine labeling for delineated actual epileptogenic lesions. The second presurgical evaluation focused on anatomy-electro-clinical correlations including temporo-parieto-occipital junction, insular, orbital frontal, anterior cingulate, and the residual part of the temporal lobe.[3, 7] Finally, we form the hypothesis and suggest the patient underwent invasive monitoring.[13, 14] Finally, the epileptogenic zone actually extended to the residual part of the right

temporal lobe.[15] According to the previous study, temporal plus epilepsy is a significant cause of temporal lobe surgery failures[7], and there was no definite maker for observing patients.[16, 17] A distinguishable form of focal temporal epilepsy should not be offered standard ATL like our case[7, 15], anterior temporal lobectomy alone could not control seizures.[15] The more extensive resection of temporal guided by SEEG provides a greater chance of post-operative seizure freedom.[14]

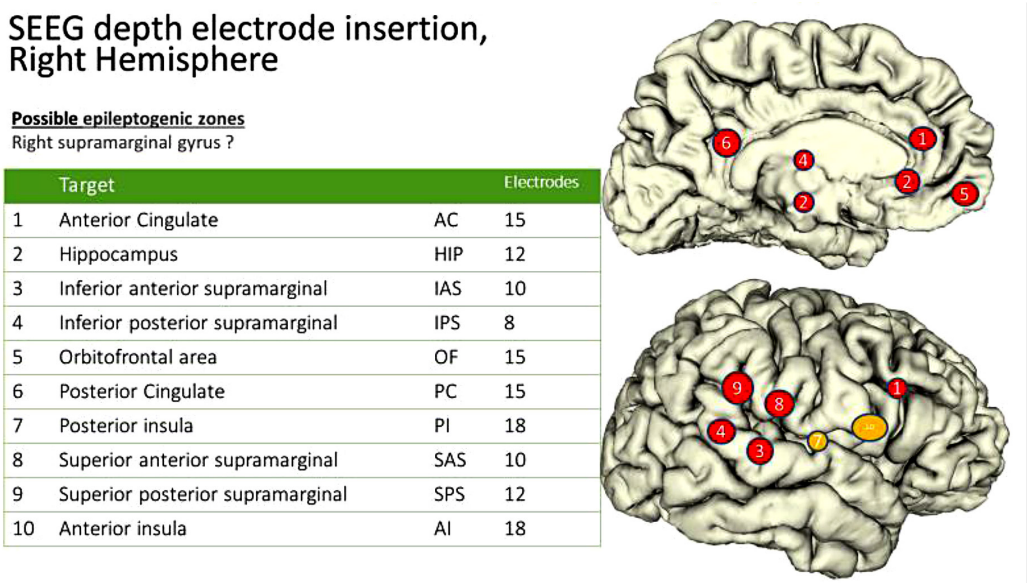

Figure 1 The picture shows The Stereo electroencephalography (SEEG) planning based on anatomo-electrical and imaging correlations

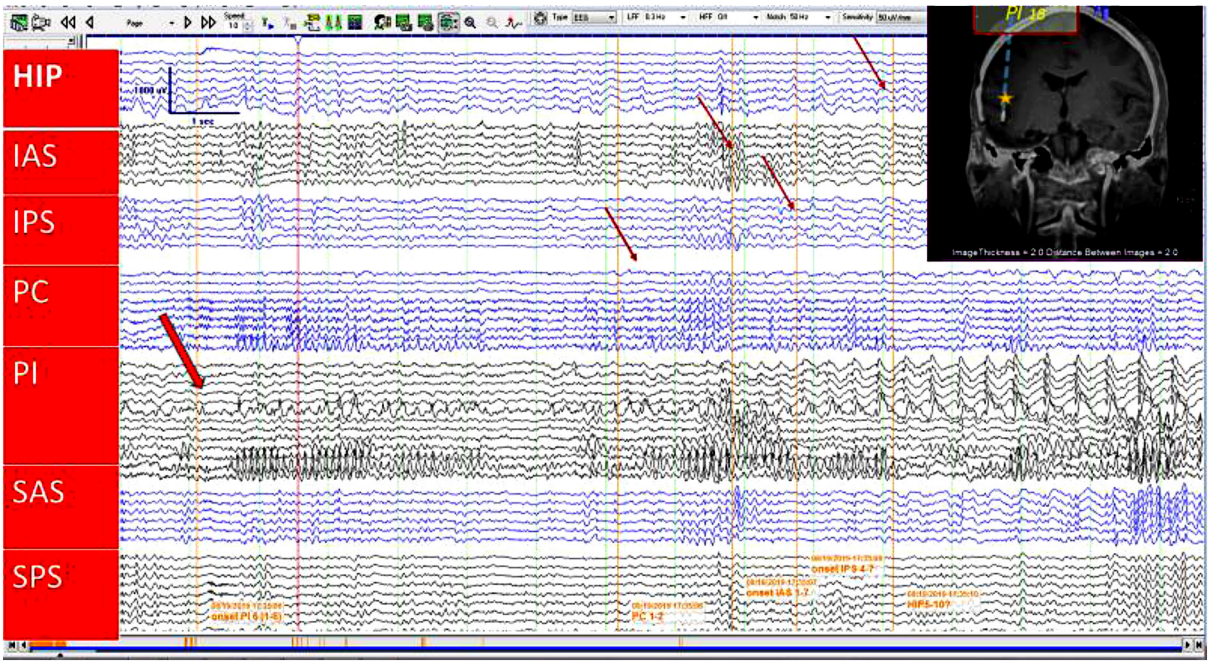

Figure 2 The picture shows that ictal activity arose consistently from the right posterior superior temporal sulcus, followed by rapid synchronization over the right frontal and right frontal regions within 20–50 ms.

High frequency (50 Hz), pulse width 1,000 ms, duration 8 ms					
Locations		Intensity (mA)	Clinical		
PI	1-2	3	Vertiginous aura		
	2-3	2	Vertiginous aura (more)		
	3-4	3	Vertiginous aura		
	4-5	3	Vertiginous aura		
IAS	2-3	1	Vertiginous aura (more)		
	3-4	1	Vertiginous aura		
PC	2-3	1	Vertiginous aura	Left head turning	Tonic left arm and leg
	3-4	1		Left head turning	Tonic left arm
	4-5	1		Left head turning	
	5-6	1.5	Vertiginous aura	Left head turning	
PC	9-10	1			Tonic left ring and little fingers
	10-11	1			Tonic left little finger
PI	5-6	1			Electrical shocked left thumb and index fingers
	12-13	1			Clonic left hand
	13-14	1			Clonic left arm
	14-15	1			Clonic left arm

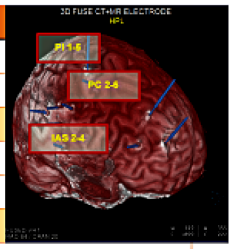

Figure 3 The picture shows That high-frequency cortical stimulated right posterior superior temporal sulcus contacts induced the typical aura using an electrical current at 1-2 mA and a typical seizure at 3-4 mA.

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