Seizure Outcome after Epilepsy Surgery in Patients with Intractable MRI Negative Epilepsy

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BACKGROUND

According to WHO report published in 2012, epilepsy affects around 50 million people world wide[1]. Approximately 30% of those with partial seizures are resistant to antiepileptic drugs and may need surgical treatment[2]. Magnetic resonance imaging (MRI) has become indispensable in the pre-surgical evaluation of intractable epilepsy patients. Identification of a focal epileptogenic lesion on pre-surgical imaging has favorable outcome on post- operative seizure frequency depending on location and pathology[3]. Similarly, few studies have shown poor postoperative seizure outcome when no lesion has been found on MRI[4]. Multimodal approach with advanced neuro-imaging (PET, SPECT, fMRI) and intracranial EEG is necessary to accurately delineate lesions in MRI negative epilepsy[5]. We report the current practice and outcome of MRI negative epilepsy surgery at a Level 4 comprehensive Epilepsy Center.

METHODS

We performed a retrospective review of patients who underwent surgical resection for intractable epilepsy during 78-month period (01/2006-7/2012) and had at least 1 year postoperative follow-up. Outcome was defined based on Engel classification.

RESULTS

- Total of 110 patients underwent surgical resection for intractable epilepsy (excluding high grade malignancies), of which 84 had 1 year follow-up.

- 20 patients had normal MRI (NL), 30 had unilateral MTS, and 34 had lesions other than unilateral MTS.

- In the NL group,
- Mean age of patient was 37. 6 years
- Male: Female ration was 1.5: 1
- Mean age of onset of epilepsy was 20.8 years age
- Mean duration of epilepsy before the surgical resection was 14.3 years

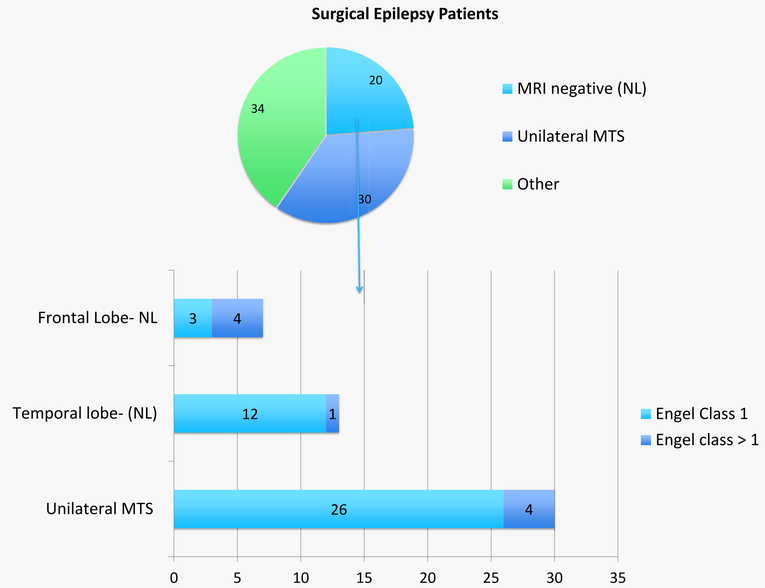
- 13 patients had a temporal seizure onset (NL-TLE) based on a noninvasive presurgical evaluation; of these, 5 underwent anterior temporal lobectomy (ATL) without electrocorticography (ECoG); 6 underwent ATL with intraoperative ECoG; and 2 underwent grid/depth evaluation followed by ATL. The remaining 7 NL patients had frontal seizure onset (NL-FLE) and underwent grid evaluation followed by resection.

RESULTS

Table 1: Patient characteristics and investigations

Variable	Data	
Variable	MRI negative (NL)	Unilateral MTS
Total number of patients	20	30
Mean Age (years)	37.6	44
Male: Female Ratio	1.5:1	1:2
Onset age (Mean - years)	20.8	15
Epilepsy duration (Mean – years)	14.3	25
Semiology:		
Temporal	12	18
Frontal	4	0
Inconclusive	4	12
vEEG		
Temporal	13	20
Frontal	4	1
Inconclusive/other	3	9
Semiology – vEEG concordance		
Temporal	12	18
Frontal	3	0
Inconclusive/ insufficient data	5	12
PET		
Performed	12	7
Concordant with vEEG	7	5
Ictal SPECT		
Performed	10	5
Concordant with vEEG	5	2
ECOG		
Performed	8	9
Grid / Depth electrode Evaluation		
Performed	9	1
Surgery		
Temporal	13	29
Frontal	7	1
Pathology		
Reactive astrocytosis	13	27
Normal	4	2
Other	3	1
Outcome @ 1 year (Engel class)		
1	15	26
>1	5	4

CLINICAL OUTCOME



At the one year follow-up, 15/20 (75%) patients in NL group reported an Engel class I outcome. There was no statistically significant difference in an Engel class I outcome between NL-TLE group (12/13, 92%) and unilateral MTS (26/30, 87%) group (p=0.8). Among NL subgroups, 12/13 NL-TLE (92%) and 3/7 NL-FLE (43%) patients had class I outcome (p=0.01).

CONCLUSIONS

Compared to patients with MTS, patients with normal MRI temporal lobe epilepsy can achieve a non-inferior surgical outcome with a multimodal, pre-surgical evaluation. However, the seizure-free rate remains low in non-lesional frontal lobe epilepsy and there is a need for more advanced localization techniques and surgical treatment this group

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