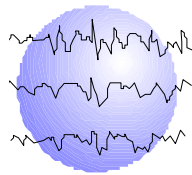


# **PEDIATRIC EPILEPSY SURGERY SERIES: RETROSPECTIVE REVIEW OF CLINICAL VARIABLES & OUTCOMES**

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This paper has been prepared specifically for:

American Epilepsy Society Annual Meeting  
San Diego, CA  
December 1 - 5, 2006

Please consider this information to be preliminary findings.

Abstract published: *Epilepsia* 47(S4);349-350[4.173]2006

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## **Introduction:**

Selection of pediatric epilepsy surgical candidates requires analysis of many variables to identify patients likely to significantly benefit with minimal complication. This retrospective review strengthens predictive trends between multiple diagnostic variables and clinical outcomes.

## **Methods:**

We analyzed patients who underwent initial resective epilepsy surgery at Minnesota Epilepsy Group, PA from January 2000 through December 2002. Clinical variables analyzed between outcome groups Engel I-II vs Engel III-IV included the attainment of early childhood milestones, presence of nocturnal seizures, history of febrile seizures, history of status epilepticus, symptomatic v. cryptogenic etiology, temporal v. extra-temporal location, complete v. partial resection, as well as the presence of multiple contralateral diagnostic abnormalities.

Diagnostic variables were analyzed in relationship to the epileptogenic zone resected and compared to outcomes. Seizure semiology, ictal/interictal scalp EEG, and MRI were analyzed on all patients. Neuropsychological testing, MRS, PET, and SPECT studies were reviewed if obtained in the presurgical investigation. PET studies utilized glucose, alpha-methyl-L-tryptophan, and/or flumazenil isotopes. Diagnostic abnormalities were characterized by their lobar location and lateralization to the surgical resection. Lobar determinations included frontal, temporal, parietal, or occipital. Findings were categorized by support, neutrality or conflict with the region of resection. Neutral findings were ipsilateral but not in the region of resection. Any diffuse or contralateral abnormality to the region was defined as a conflicting variable. Diffuse cognitive dysfunction or mental retardation was the only variable excluded.

Patients were scored at follow-up intervals of 6-, 12-, and 24-months following surgery using a modified Engel classification. Statistical method utilized Fisher's Exact Test.

## **Results**

46 consecutive subjects were identified and reviewed. 23 (50%) underwent temporal lobe only resection; extra-temporal resections included 10 (22%) frontal, 1 (2%) parietal, and 12 (26%) multi-lobe. In subjects with available follow-up data, 19/33 (58%) were seizure free at 24-months.

Subjects without a history of status epilepticus (18/24, 75%) had beneficial outcomes at 24-months compared to those with prior status epilepticus (6/12, 50%)( $p < 0.046$ ). Temporal lobe surgery was statistically more successful in achieving a beneficial outcome of Engel I-II in 15/17 (88%) subjects compared to 9/16 (56%) of the extra-temporal group ( $p < 0.046$ ). Complete resection of the epileptogenic zone was associated with beneficial outcome in 20/24 (83%) subjects compared to partial resections 4/9 subjects (44%)( $p < 0.039$ ).

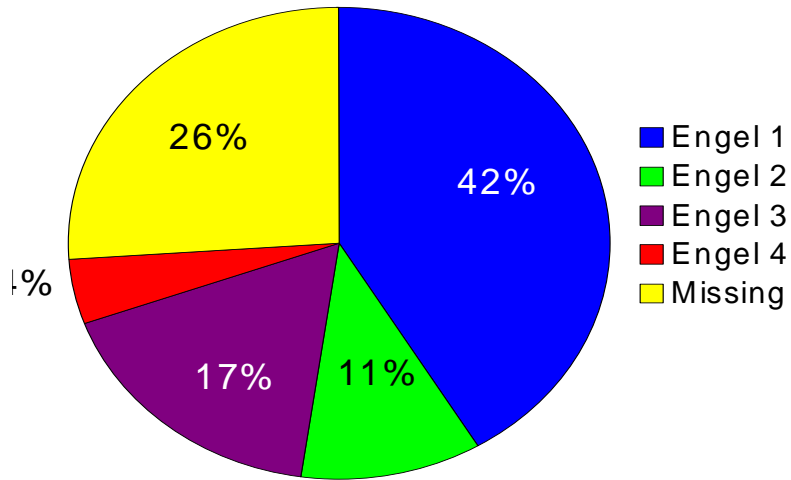
The absence of multiple conflicting diagnostic variables was the strongest predictor of beneficial outcome as 24/27 (89%) subjects achieved Engel I-II compared to none of the 6 subjects with >1 contralateral diagnostic variable (Fisher's Exact test  $p < 0.001$ ). At 24 months following surgery, 19/27 (70%) were seizure free and 5/27 (19%) were classified as Engel II. Supporting and neutral variables did not differ between the outcome groups. The majority of conflicting variables were noted through scalp EEG recording, however conflicting MRI and neuropsychological variables also contributed to poor outcome.

Achievement of early childhood milestones was not associated with beneficial seizure outcome. The clinical history of nocturnal seizures or febrile seizures did not statistically separate beneficial outcomes groups. Etiology was not a statistically significant influence on beneficial outcome at 24-months (symptomatic 23/30: 77%; cryptogenic 1/3: 33%;  $p < 0.174$ ); however, this is may be influenced by low numbers within the cryptogenic group.

### **Conclusion:**

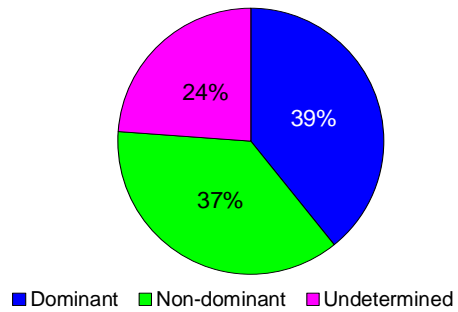
Favorable diagnostic variables associated with an Engel class I-II outcome following epilepsy surgery include temporal lobe resections, no recognized history of status epilepticus, complete resections, and absence of multiple contralateral diagnostic variables. In this retrospective review, the absence of multiple contralateral variables was the strongest predictor.

### 24 Month: Engel Class

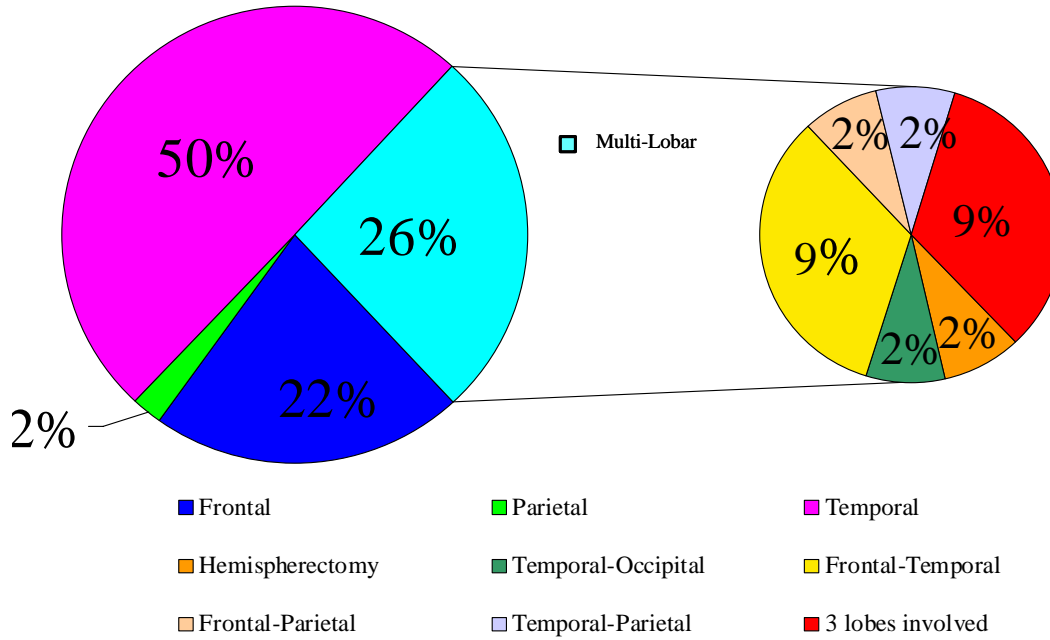


Demographics	% of Patients
<b>Gender: N=46</b>	
Male	54
Female	46
<b>Hand Dominance</b>	
Right	74
Left	20
Undetermined	6
<b>Developmental Assessment</b>	
Normal	33
Global Delay	52
Behavioral	2
Speech Delay	9
Motor Delay	4
<b>Pre-surgical Etiology</b>	
Mesial Temporal Sclerosis	28
Encephalomalacia	7
Trauma	2
Tumor	22
Genetic/Degenerative	2
Congenital	17
Undetermined	20

Resection Lateralization: Language Dominance

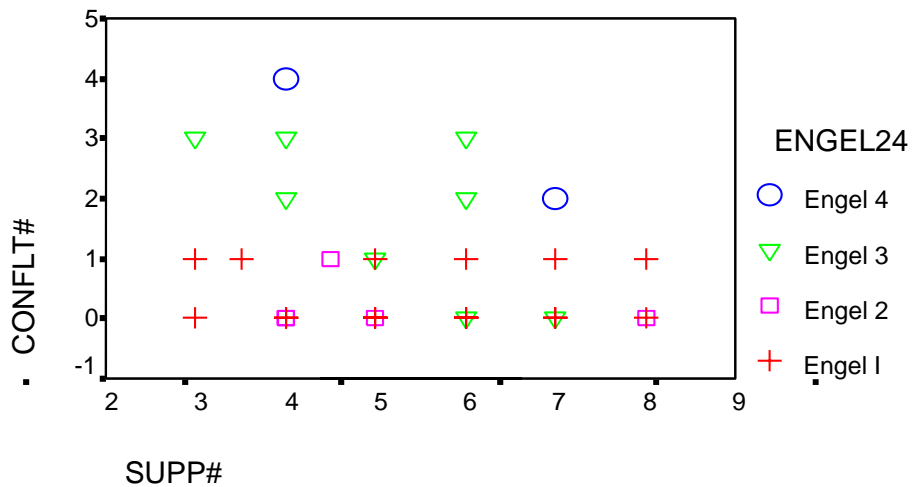


## Area of Resection



## 24-Month Outcome: Engel Class

Presurgical Conflicting v. Supporting Variables



**Temporal & Extra-temporal resections v. 24 month Engel Class Outcome  
(p=0.046)**

Count

		BENF24		Total
		Engel I or II	Engel III or IV	
TMP_V_TM	temporal	15	2	17
	extra-temporal/multi	9	7	16
Total		24	9	33

**History of status epilepticus v. 24 month Engel class Outcome  
(p=0.044)**

Count

		BENF24		Total
		Engel I or II	Engel III or IV	
HXSTATUS	Yes	6	6	12
	No	18	3	21
Total		24	9	33

**Degree of surgical resection v. 24 month Engel Class Outcome  
(p=0.039)**

Count

		BENF24		Total
		Engel I or II	Engel III or IV	
SURGCOMP	complete	20	4	24
	partial	4	5	9
Total		24	9	33

**Conflicting diagnostic variables v. 24 month Engel Class Outcome  
(p<0.001)**

Count

		BENF24		Total
		Engel I or II	Engel III or IV	
SIGCONF	1 or fewer variables conflicting	24	3	27
	2 or more variables conflicting		6	6
Total		24	9	33