LONG-TERM SEIZURE OUTCOME AFTER EPILEPSY SURGERY

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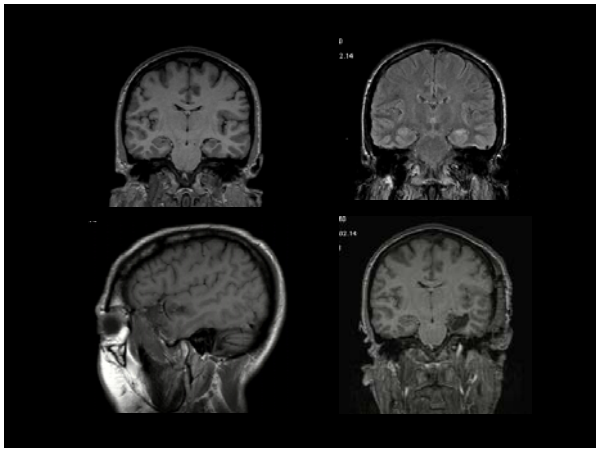
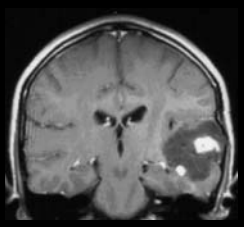
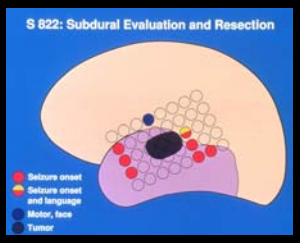
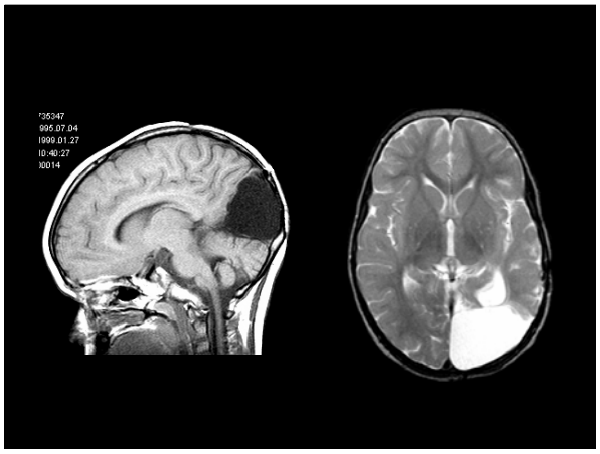


LEFT TEMPORAL LOBE ASTROCYTOMA







SEIZURE OUTCOME 1 YEAR AFTER EPILEPSY SURGERY IN ADULTS

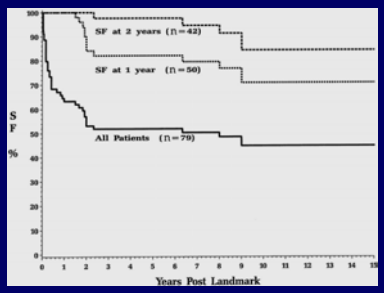
	Temporal	XTL	XTL Lesion	Frontal
Seizure free	68%	45%	67%	23%
Significantly improved	24%	35%	23%	32%
Little or no improvement	8%	20%	12%	44%

Rasmussen T. Advances in Neurology, 1975;8:197-205.
Engel J Jr. Neurology 1993;43(8):1612-1617.

Evaluation of Surgical Outcome:
Seizure free from surgery at one year:

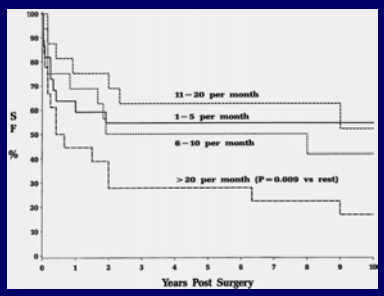
Study	Cohort	N	% sz free
Tuunainen et al, Epilepsia 1994;35	1988-1991	32	53
Foldvary et al, Neurology 2000:54	1962-1984	79	63
Jutila et al, JNNP 2002; 73	1988-1999	140	64
Manno et al,Neurology 1994; 44	1989-1992	43	74
Loring et al, Neurology 1994;44	1988-1992	55	80
Yoon et al, Neurology 2003	1972-1992	371	51
Wiebe et al, New Engl J Med. 2001; 345	1996-2000	40	58

Long-term Seizure Freedom After Temporal Lobectomy



Foldvary N et al. Neurology 2000;54:630-634.

Long-term Seizure Freedom After Temporal Lobectomy



Foldvary N et al. Neurology 2000;54:630-634.

PREDICTING LONG TERM SEIZURE OUTCOME AFTER EPILEPSY SURGERY

- 339 patients from 7 epilepsy centers in US
- Type of surgery:
  - Mesial temporal resection 297
  - Neocortical resection 42
- Median follow-up 4.6 years
- Overall 223 patients (66%) were seizure free:
  - Mesial TLE 68% seizure free
  - Neocortical resection 50% seizure free (NS)
- 25% relapsed after being seizure free 2 years
- Factors predicting good outcome for MTLE:
  - Absence of grand mal seizures
  - Presence of an atrophic hippocampus

Spencer SS et al.Neurology 2005;65:012-8

Seizure Freedom at 1, 2, 5, 10 years postoperatively

	1 yr	2 yrs	5 yrs	10 yrs	N
MTS	76%	71%	64%	55%	219
Neocortical lesional	77%	68%	59%	47%	35
Neocortical nonlesional	76%	65%	57%	33%	52
Tumor	70%	68%	54%	54%	52
Vascular	85%	85%	73%	73%	13
Dual pathology	83%	77%	64%	48%	40
Total	76%	71%	61%	50%	371 (p=0.78)
Follow-up available	371	324	182	50	

Timing of Recurrence

- Of the 371 patients studied, 140 had seizure recurrence.
- Timing of recurrence:
  - **< 1 year in 87 (62%)**
  - **1- 2 years in 17 (cumulative 74%)**
  - 2- 5 years in 27 (cumulative 94%)
  - > 5 years in additional 9 patients.

Predictors of Recurrence

Predictors of early recurrence	Predictor of late recurrence
Seizure frequency (>20/mo)	Non-specific pathology
History of GTC	
Bilateral MRI abnormalities	
Subdural electrodes used	
Epileptiform 6 months postop EEG	

Surgical Outcomes: TLE

- Seizure free outcomes drop over 5-10 years for uncertain reasons.
- Predictors of less successful outcomes include high preop seizure frequency, h/o GTC seizures, bilateral MRI abnormalities, postop epileptiform EEG, non-specific pathology.
- Patients with these risk factors should be counseled and withdrawal of AED's undertaken cautiously or not at all.

LATE SEIZURES IN PATIENTS SEIZURE FREE AFTER EPILEPSY SURGERY

- 285 patients from 2 epilepsy centers, seizure free > 1 year after surgery
- 254 MTLE, 31 neocortical epilepsy patients
- Excluded those with vascular lesions and tumors
- Probability of having a single seizure:
  - 18% at 5 years
  - 33% at 10 years
- Factors predicting late recurrences:
  - Grand mal seizures preoperatively
  - Late age at time of surgery in patients with MTLE
- However late occurrence of intractability is low and only 13% were not seizure free at the last follow-up

Schwartz TH, Jeha L, Tanner A, Bingaman W, Sperling MR. Epilepsia 2006;47:567-73

SEIZURE FREEDOM 1 YEAR AFTER EPILEPSY SURGERY IN CHILDREN

Resection	Children	Adolescents	All Patients
Temporal	74%	80%	78%
Extratemporal or multilobar	58%	52%	54%
Hemispherectomy	67%	75%	69%
All surgeries	67%	69%	68%

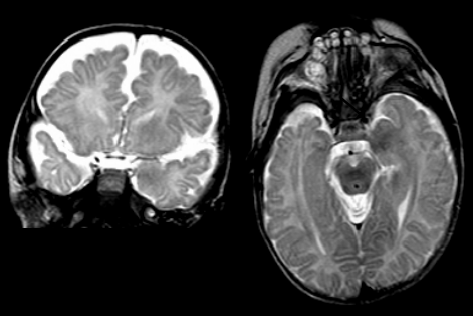
Wyllie E et al. Ann Neurol 1998;44:740-748.

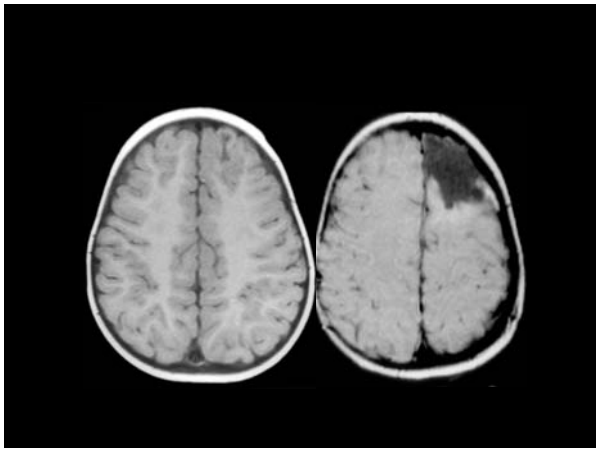
SEIZURE FREEDOM 1 YEAR AFTER EPILEPSY SURGERY IN CHILDREN

	Temporal n=20	Extratemporal n=18
Lesional		
Seizure free	70%	61%
> 90% reduction	10%	17%
>50%	10%	6%
No change	10%	17%
Non-lesional		
Seizure free	56%	63%
> 90% reduction	11%	26%
> 50% reduction	11%	0%
No change	22%	11%

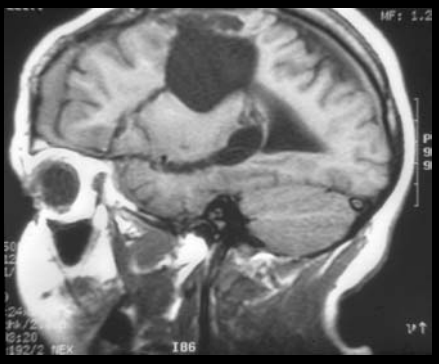
Paolicchi et al. Neurology 2000;54:642-7

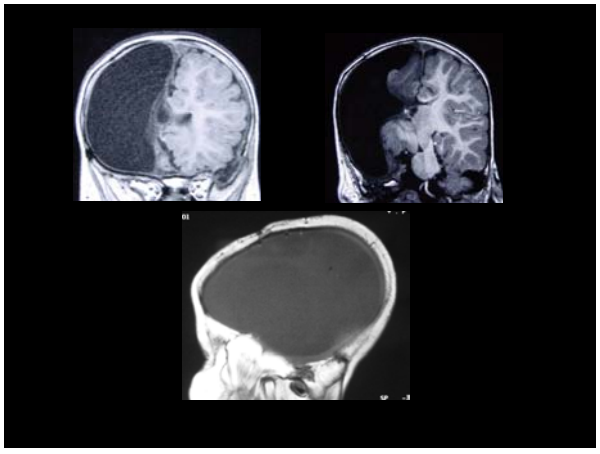
LEFT TEMPORAL LOBE LESION



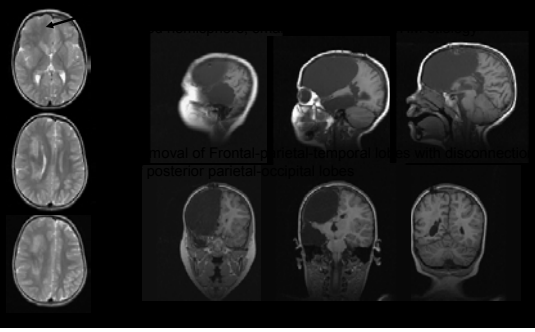


FUNCTIONAL HEMISPHERECTOMY





Modified Anatomic Hemispherectomy



2 YEAR SEIZURE FREEDOM: UCLA EXPERIENCE 1986-1997

	N	SZ FREE
Hemispherectomy	40	64%
Multilobar resection	16	52%
Lobar resection	5	45%
Other surgery	4	57%

- At 2 years, outcome was similar for cortical dysplasia versus other causes
- However, at 5 years, more cortical dysplasia patients had recurrences (25%)
- Better long term seizure outcome noted for young children less than three comparing with adult series 3 years old (65% versus 38% at 5 years)
- Likelihood of staying on AEDs depended on seizure control

Mathern GW et al. Epilepsia 1999;40:1740-9

LONG TERM SEIZURE OUTCOME AFTER TEMPORAL LOBECTOMY: MNI DATA

- 109 children underwent temporal lobectomy between 1985-2000
- Median age at surgery 5.5 years
- Mean follow-up 10.9 years
- Pathology: MTS in 45%, low-grade tumors in 35%
- Seizure freedom or >90% reduction noted in 86%

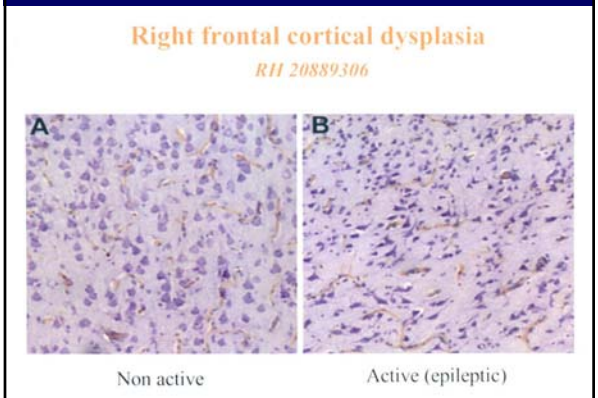
Mittal S et al. Journal of Neurosurgery 2005;103(Suppl 5):401-12

SEIZURES OCCURRING SOON AFTER EPILEPSY SURGERY

- Direct irritation of cortex resulting from operation, nearby blood products, chemical inflammation and edema (brain swelling)
- Change in blood levels of antiepileptic drugs
- Changes in blood electrolytes, particularly sodium level
- Fever, pain and lack of sleep
- Seizures during the first week are usually thought to have no impact on long-term seizure outcome
- Incomplete resection of seizure focus
- Failure to find pathology in resected tissue

LATE SEIZURE RECURRENCE: POSSIBLE REASONS

- Remaining abnormal tissue which could not be resected (tumor cells, dysplasia)
- Persisting sharp waves on ECOG and postoperative EEG
- Development of scarring
- Progression of underlying disease or tumor recurrence
- Withdrawal of antiepileptic medications



STOPPING AEDs FOLLOWING EPILEPSY SURGERY IN CHILDREN & ADOLESCENTS

- Studied 97 patients operated between 1987-2001
  - Operated before age 18 years of age
  - No seizures / rare non-disabling auras at 6 mo post-op visit
  - Followed up for 7-134 months (median 3 yrs)
  - Followed for > 12 months after stopping AEDs
- AEDs stopped at 2-126 months (median 13mo)
- 57 patients (84%) remained seizure free after stopping AEDs
- 11 (16%) had seizure recurrence and 7 of them (64%) became seizure free again
- Overall, 92 (95%) patients who were seizure free during first 6 months remained seizure free at last follow-up

Lachhwani D et al. Neurology 2003;60(Suppl 1):A259

SEIZURES OCCURRING LATER THAN 1 YEAR AFTER EPILEPSY SURGERY

- In 4 adult series, seizure recurrence after planned discontinuation of AEDs occurred in 33%
- In one series of children with TLE, recurrence was 20%
- 50%-90% regain seizure control when AEDs are resumed (adult series); 64% in children
- Seizure recurrence unaffected by duration of AED use
- Reasonable to discontinue AEDs if patient remains seizure free for 1 year in a child or for 2 years in an adult
- Occurrence of rare seizures or auras does not mean AEDs cannot be withdrawn successfully

Schmidt D et al. Epilepsia 2004;45:179-86

Lachhwani D et al. Neurology 2003;60(Suppl 1):A259

SEIZURES WITHIN FIRST WEEK AFTER SURGERY:CCF EXPERIENCE

- 132 children and adolescents younger than 18 at time of surgery operated 1995-2002
- 34 (26%) had seizures in first week, of whom 15 (44%) had seizures in first 24 hours
- Causes of epilepsy included:-
  - Cortical Dysplasia 59%
  - Tumor 14%
  - Scarring, brain damage 10%
  - Rasmussen's Encephalitis 6%
  - Normal MRI 5%
  - Bilateral abnormalities 7%

Mani J et al. Neurology 2006;66:1038-43.

SEIZURES DURING FIRST WEEK AFTER SURGERY: CCF EXPERIENCE

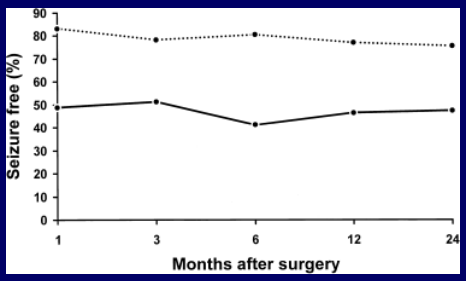
- Less likely after hemispherectomy (14%) versus focal resection (36%)
- Long term seizure outcome:-

	6 months	1 year	2 years
No acute seizure	79%	79%	80%
Acute seizures	50%	45%	34%
Odds of seizure freedom	0.27	0.22	0.13

- Redo surgery done during first year for 10 patients with extratemporal resection and 4 with hemispherectomy
- APOS may not be as benign as once thought

Mani J et al. Neurology 2006;66:1038-43.

LONG TERM SEIZURE FREEDOM AFTER ACUTE POSTOP SEIZURES: MAYO CLINIC XPERIENCE



** Excludes 6 patients who underwent re-operation*
Park K et al. Epilepsia 2002;43:874-81

CONCLUSIONS

- Seizure outcome at 6, 12 and 24 months after epilepsy surgery indicate long-term outcome
- Seizures in immediate postoperative period may be indication of long term seizure outcome
- Reasonable to consider withdrawal of AEDs after 1 year seizure freedom in a child and 2 years for an adult
- Clinician's judgement is based on clinical details, MRI and EEG findings
- Patient and family choices also play a part: fear of having seizure at school or work, loss of driving license, etc.
- Late seizure recurrence ≠ recurrent intractability
- Patients operated at younger age may do better than who are older with longer seizure duration and more grand-mal seizures