

# Surgical Outcome in Non-lesional Intractable Pediatric Epilepsy.

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## Introduction

Surgical treatment of intractable epilepsy in children is an accepted treatment option in properly selected patients. Seizure outcome is greater when an identifiable epileptic lesion can be identified on pre surgical MR imaging. The purpose of this study was to review our results of the surgical treatment of epilepsy in pediatric patients with normal MR imaging.

## Methods

We retrospectively identified patients that had surgery for intractable epilepsy between 2001 and 2011 at the Alberta Children's Hospital and who had normal MR imaging. The patients' medical charts were reviewed for demographic data, pre-surgical evaluation [which included any combination of: EEG, Video/EEG, MRI, ictal/interictal SPECT, MEG and neuropsychological assessment], surgical procedure and pathology. All but 1 patient had invasive monitoring prior to surgery. 5 patients had frontal resection, 4 had temporal resection and 5 had multilobar resection. Seizure outcome was assessed using the Engel Classification.

| CLINICAL CHARACTERISTICS OF THE OVERALL COHORT |                      |
|--|----------------------|
|  | Overall group (n=16) |
| Gender, Male/Female                            | 8/8                  |
| Mean age at seizure onset, years (range)       | 4 (0.5-14)           |
| Mean age at the time of surgery, years (range) | 10 (1-17)            |
| History of head trauma                         | 1 (6.25%)            |
| History of corpus callosum agenesis            | 1 (6.25%)            |
| History of status epilepticus                  | 1 (6.25%)            |
| No known epilepsy risk factors                 | 13 (81.25%)          |

## Results

16 patients were identified for the study. The average patient age at surgery was 10 years (range: 1-17 yrs) and they were followed for 0.5-5 years (mean of 2 yrs) post surgery. After the first procedure 39.6% of patients had favorable outcome (Engel Class 1&II). Following additional resections 50.0% of patients had a favorable outcome (Engel Class I&II), 16.7% had Engel Class 3 and 33.3% had Engel Class 4 outcome. Histopathology of surgical specimens reported 7(46.7%) of the specimen however had no abnormal findings and 9(53.3%) had positive pathology including gliosis, cortical dysplasia and malformation of cortical development. Favorable outcome was correlated with temporal/frontal resections as well as negative pathology.

| TYPE OF SURGERY N, (%)        | POSTSURGICAL SEIZURE OUTCOME |
|-------------------------------|------------------------------|
| Lobectomy 10 (62.5)           | Engel Classification         |
| Frontal 5 (31.3)              | I 5 (31.3)                   |
| Temporal 4 (25)               | II 1 (6.3)                   |
| Parietal 1 (6.25)             | III 1 (6.3)                  |
| Multilobar resection 5 (31.3) | IV 9 (56.3)                  |
| VNS 1 (6.25)                  |                              |

| SEIZURE OUTCOME RELATED TO SEIZURE TYPE |           |                |                   |                |                |
|---|-----------|----------------|-------------------|----------------|----------------|
| Engel Class                             | CPS (n=6) | CPS+2*GS (n=7) | CPS+2*GS+DA (n=1) | SPS+2*GS (n=1) | SPS+ CPS (n=1) |
| I                                       | 2 (33.3%) | 3 (42.9%)      | 0                 | 0              | 0              |
| II                                      | 0         | 1 (14.3%)      | 0                 | 0              | 0              |
| III                                     | 1 (16.7%) | 0 (0.0%)       | 0                 | 0              | 0              |
| IV                                      | 3 (50.0%) | 3 (42.9%)      | 1                 | 1              | 1              |

\*Complex partial seizure (CPS), Drop Attacks (DA), Secondary generalized seizure (2\*GS), Simple partial seizure (SPS).

| SEIZURE OUTCOME RELATED TO TYPE OF SURGERY |                              |                               |                               |                            |
|--|------------------------------|-------------------------------|-------------------------------|----------------------------|
| Engel Class                                | Frontal lobe resection (n=5) | Temporal lobe resection (n=4) | Parietal lobe resection (n=1) | Multilobar resection (n=5) |
| I  | 2 (40%)                      | 2 (50%)                       | 0                             | 1                          |
| II   | 1 (20%)                      | 0                             | 0                             | 0                          |
| III  | 1 (20%)                      | 0                             | 0                             | 0                          |
| IV   | 1 (20%)                      | 2 (50%)                       | 1                             | 4 (80%)                    |

| SEIZURE OUTCOME RELATED TO POSTSURGICAL PATHOLOGY. |                          |                          |
|--|--------------------------|--------------------------|
| Engel Class  | Positive pathology (N=8) | Negative pathology (N=7) |
| I  | 2 (25%)                  | 3 (42.9%)                |
| II   | 1 (12.5%)                | 0 (0%)                   |
| III  | 0 (0%)                   | 1 (14.3)                 |
| IV   | 5 (62.5%)                | 3 (42.9%)                |

## Conclusions

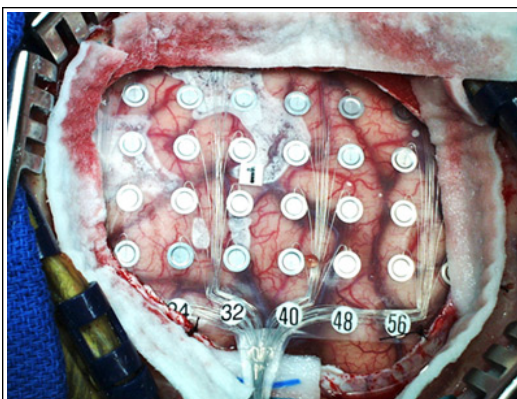
Surgical treatment of intractable epilepsy in children with normal MR imaging can result in good seizure outcome in up to one half of patients. While malformations of cortical development can be identified, the majority of surgical specimens exhibit normal or non-specific pathological abnormalities.

## References

1. Fisher RS, van Emde Boas W, Blume W, Elger C, Genton P, Lee P, Engel J, Jr.: Epileptic seizures and epilepsy: Definitions proposed by the international league against epilepsy (ilae) and the international bureau for epilepsy (ibe). *Epilepsia* 2005;46:470-472.
2. Forsgren L, Beghi E, Oun A, Sillanpaa M: The epidemiology of epilepsy in europe - a systematic review. *Eur J Neurol* 2005;12:245-253.

## Learning Objectives

- 1) Investigating postsurgical seizure outcome in children with intractable epilepsy with normal pre-surgical MR imaging findings.
- 2) What factors influence the outcome of patients with non-lesional epilepsy after surgical treatment. Factors such as the type pathology, time between age of onset and surgery, the use of either non-invasive or invasive evaluations to localize the seizure foci preoperatively can be valuable to outcomes.



Subdural Electrode Placement (Source: Google Images)