EPILEPSY 2010:
DEFINING THE NEXT DECADE IN TREATMENT AND MANAGEMENT

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Surgical Grading Scale in the Evaluation of Patients with Treatment Resistant Epilepsy

Patricia C. Dugan, MD
Instructor of Neurology
New York University Langone Medical Center
New York, New York
Disclosure

Patricia C. Dugan, MD, has no financial conflicts of interest to disclose.
Despite advances in epilepsy pharmacotherapy, 30%-40% of patients with epilepsy remain refractory to medical management.

Resective surgical treatment can be curative in a large subset of these patients.

Referring physicians may have only a cursory understanding of who is a “good” candidate and who is a “poor” candidate.

May not understand that differentiation into prognostic categories may be possible at an early stage.

Virtually all areas of medicine make use of grading and staging tools.

There is no systematic, user-friendly method for identifying an individual patient’s likelihood of positive (or negative) outcome following surgical treatment.
What Would a Successful Scale Do for Us?

- Identify optimal candidates earlier, if neurologists have an easy way of “picking them out”
- Identify less optimal candidates: Help to quickly communicate risk:benefit when considering alternative therapies
- Provide common language for research, assess if new diagnostic techniques are helpful (for example, if patients not expected to do well are shown to do better)
- Improve ability to track epidemiology (eg, are “easy patients” really disappearing?)
Hypotheses

• The grading scale will predict the likelihood of undergoing surgery and the likelihood of seizure freedom postoperatively.
• We predict that Grade 1 patients are most likely to be referred for surgery early and are more likely to be seizure free following surgery.
• We predict that Grade 3 patients are least likely to be referred for surgery early, if at all, and are more likely to have a poor postsurgical outcome.
• We predict that Grade 2 patients will have an intermediate course.
Methodology

• Cohort from all patients admitted to the New York University (NYU) Epilepsy Monitoring Unit (EMU) from January 2007-July 2008

• INCLUSION CRITERIA
  1. Patients have had partial epilepsy for at least 2 years / failed at least one medication
  2. Patients have had at least one seizure in the 3 months prior to admission to the EMU
  3. 18 years of age or older

• EXCLUSION CRITERIA
  1. Mixed epilepsy syndromes
  2. Progressive neurological or medical disease
  3. Comorbid alcohol and / or drug addiction
1207
1105: Unique patients admitted to NYU EMU from 7/1/2007 to 7/31/2008
102: Additional patients presented in surgical conference from 1/1/2007 to 3/31/2010

423
Total number of patients analyzed

193
Presented in surgical conference

203
Not presented in surgical conference
## Epilepsy Surgery Grading Scale (ESGS)

| Intelligence Quotient (IQ) | An IQ below 70 receives a score of -1.  
<table>
<thead>
<tr>
<th></th>
<th>An IQ above 70, or Unknown, receives a score of 0.</th>
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</thead>
</table>
| Semiology                 | Unilateral focal sensory, focal motor activity, or formed visual phenomena each receive a score of -3.  
|                           | Semiology classified as Other or Unknown receive a score of 0. |
| MRI                       | Normal | Non-resectable lesion or multilobar | Unilateral MTS | Bilateral MTS | Resectable temporal lesion | Resectable extra-temporal lesion |
| Normal                    | 2.5    | 2.5                              | 2.5            | 2.5         | 2.5                          | 2.5                           |
| Unifocal temporal consistent with MRI | NA    | 3.0                              | 5.0            | 2.5         | 5.0                          | NA                            |
| Unifocal temporal         | 5.0    | 2.0                              | 2.0            | 2.5         | 2.0                          | 2.0                           |
| Unifocal extra-temporal consistent with MRI | NA    | 3.0                              | NA             | NA          | NA                           | 4.0                           |
| Unifocal extra-temporal   | 2.0    | 2.0                              | 2.0            | 2.0         | 2.0                          | 2.0                           |
| Bilateral temporal        | 3.0    | 2.0                              | 3.0            | 2.0         | 3.0                          | 3.0                           |
| Bilateral extra-temporal  | 2.5    | 2.0                              | 2.5            | 2.0         | 2.5                          | 2.5                           |
| Bisynchronous or generalized | 2.0    | 2.0                              | 2.0            | 2.0         | 2.0                          | 2.0                           |
| Multilobar                | 1.0    | 1.0                              | 1.0            | 1.0         | 1.0                          | 1.0                           |

**ESGS 1 = ≥7.5**  
**ESGS 2 = 4.6-7.4**  
**ESGS 3 = ≤4.5**
## ESGS Grade and Outcome Crosstabulation

<table>
<thead>
<tr>
<th></th>
<th>Entire Cohort Outcomes</th>
<th>Surgical Conference Only Outcomes</th>
<th>Resection Only Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Seizure Free From Surgery/No Resection</td>
<td>Seizure Free From Surgery</td>
<td>Total</td>
</tr>
<tr>
<td><strong>ESGS Grade 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>77</td>
<td>33</td>
<td>110</td>
</tr>
<tr>
<td>% within ESGS Grade</td>
<td>70.0%</td>
<td>30.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>ESGS Grade 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>103</td>
<td>15</td>
<td>118</td>
</tr>
<tr>
<td>% within ESGS Grade</td>
<td>87.3%</td>
<td>12.7%</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>ESGS Grade 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>180</td>
<td>15</td>
<td>195</td>
</tr>
<tr>
<td>% within ESGS Grade</td>
<td>92.3%</td>
<td>7.7%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Results

Analysis of cohort of patients presented in surgical conference

- Significant differences between ESGS Grades 1 and 3 ($P=0.0001$), and between ESGS Grades 2 and 3 ($P=0.0463$) were seen.
- Trend was seen between Grades 1 and 2 ($P=0.0743$).
- Using basic information obtainable in a doctor’s office, patients with treatment resistant epilepsy may be stratified into clinically meaningful groups based upon their likelihood of achieving seizure freedom as a result of resective surgery.
Future Directions

- The predictive value of the individual elements will be assessed to optimize differentiation between grades.
- Further validation utilizing data from additional centers will be required to account for local and regional differences in presurgical and surgical treatment approaches.
- These retrospective analyses will be the foundation for a multi-center prospective study to assess the prognostic utility of the ESGS.
- If Grade 1 patients can be easily identified as these data indicate, it is possible that referral of all Grade 1 patients for presurgical evaluation may become standard of care.