Levetiracetam for seizure prophylaxis after cerebrovascular surgery

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Background

- Cerebrovascular surgery is the operative treatment of blood vessel disease that affects circulation to the brain
- Cerebrovascular diseases include aneurysms, arteriovenous malformations (AVMs), cavernous malformations, and occlusive vascular diseases
- Type of surgery: elective (no hemorrhage) versus emergent surgery (hemorrhage)

Methodology

Study Design:
- Retrospective cohort study from August 1st, 2013 to July 31st, 2015
- (N=160)
- Patients ≥ 18 years old admitted for cerebrovascular surgery were reviewed and screened for exclusion criteria
- Surgical procedure reports were generated, electronic medical records and medications were reviewed

Exclusion Criteria:
- Past medical history of seizures
- Preoperative or intraoperative seizures
- Antiepileptic medications prior to surgery
- Antiepileptic medications besides LEV for prophylaxis

Statistics Analysis:
- Chi-square test and student’s t-test

Primary Outcome: Seizure occurrence in the early (≤ 7 days) postoperative period

Secondary Outcomes: Characteristics or potential risk factors in patients who experienced seizures or were initiated on LEV

Table 1. Baseline demographics

<table>
<thead>
<tr>
<th>Type</th>
<th>No LEV mean±SD</th>
<th>LEV mean±SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (%)</td>
<td>34 (20)</td>
<td>20 (44)</td>
<td>0.439</td>
</tr>
<tr>
<td>Female (%)</td>
<td>81 (70)</td>
<td>25 (56)</td>
<td>0.577</td>
</tr>
<tr>
<td>Age (Mean ± SD)</td>
<td>54 ± 15</td>
<td>52 ± 15.9</td>
<td>0.503</td>
</tr>
<tr>
<td>Height (cm, mean ± SD)</td>
<td>165 ± 10.6</td>
<td>167 ± 11.1</td>
<td>0.320</td>
</tr>
<tr>
<td>Weight (kg, mean ± SD)</td>
<td>76 ± 18.9</td>
<td>75 ± 21.1</td>
<td>0.764</td>
</tr>
</tbody>
</table>

Table 2. Seizure occurrences

<table>
<thead>
<tr>
<th>Type</th>
<th>No LEV mean±SD</th>
<th>LEV mean±SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Seizure (%)</td>
<td>2 (1.7)</td>
<td>0 (0)</td>
<td>0.373</td>
</tr>
<tr>
<td>Unruptured aneurysm (elective surgery)</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Ruptured aneurysm (aSAH)</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 3. Aneurysmal subarachnoid hemorrhages

<table>
<thead>
<tr>
<th>Type</th>
<th>No LEV mean±SD</th>
<th>LEV mean±SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No LEV</td>
<td>4</td>
<td>2</td>
<td>0.400</td>
</tr>
<tr>
<td>LEV</td>
<td>12</td>
<td>10</td>
<td>-</td>
</tr>
</tbody>
</table>

Results

- Of 160 patients who underwent cerebrovascular surgery, only 45 (28%) were started on LEV
- Although seizure occurrence did not reach statistical significance, out of 115 patients who did not receive LEV, only 2 (1.7%) patients experienced early postoperative seizures
- Patients started on LEV in the elective surgery group had a significantly longer length of stay
- There was no correlation between seizure occurrence and aSAH, type of procedure, or blood loss
- Of the aSAH patients, only 1 had early postoperative seizure and the hemorrhage did not extend into the IVH or IPH

Conclusions

- It is possible that cerebrovascular surgeries have a low incidence of early postoperative seizures, where prophylaxis with LEV may not be necessary in lower risk patients, but further studies are needed.
- Patients who are initiated on LEV may have prolonged length of stay

Discussion

Study Limitations
- Single-center study, retrospective, small sample size
- Many confounding factors that may contribute to prolonged length of stay
- Seizure occurrence beyond 7 days or after hospital discharge was not captured

Future Directions
- Increase sample size and duration of the study to meet power
- Case-control study design or prospective, randomized, placebo-controlled trial with adequate postoperative follow-up
- Consider other patient characteristics that may increase concern for seizure occurrence after surgery to incorporate into standard guidelines for initiating seizure prophylaxis
- Location of aneurysm, altered mental status, neurological deficits, and external

Acknowledgments

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References

3. ['/path/to/figure/1.png'](image)

Figure 1. Type of procedure

Figure 2. Estimated blood loss from procedure

Figure 3. Length of stay

Approved by the UCSF Committee on Human Research