Epilepsy surgery is safe and efficacious treatment for refractory epilepsy. However, many patients suffer with refractory epilepsy for years before surgery referral. Through retrospective chart review, I determined the overall efficiency of epilepsy surgery workup at Michigan Medicine. Over time patients who were diagnosed with medically refractory epilepsy have experienced shorter delays between a refractory diagnosis being made to when they are first taken to the operating room. However, there are certain steps in the epilepsy surgery workup pathway that can be made more efficient.

Introduction

Antiseizure medications fail to control seizures effectively in almost 40% of patients with epilepsy, leaving a significant number of patients who continue to suffer from medication-resistant epilepsy. Epilepsy surgery is known to be a safe and efficacious treatment for refractory epilepsy. Less than 1% of patients, however, are actually referred for surgery, and many of those patients are referred after suffering with epilepsy for several years. This can lead to worsened quality of life, psychological decrease, and even death.

Michigan Medicine has a pediatric epilepsy surgery program; however, data has never been collected and analyzed to determine if the surgery workup pathway for patients with refractory epilepsy can be made more efficient.

Methods and Materials

I carried out retrospective chart review, collecting and analyzing data from the charts of all patients who ultimately underwent epilepsy surgery at Michigan Medicine. I determined how long each step of the surgery workup pathway took to be completed for each patient. After collecting this data, I then determined which steps in the epilepsy surgery workup pathway caused the most significant delays.

Finally, also through retrospective chart review, I determined whether the epilepsy surgery workup pathway as a whole became more efficient over time at Michigan Medicine.

Results

Over time patients who were diagnosed with medically refractory epilepsy at Michigan Medicine have experienced shorter delays between a refractory diagnosis being made to when they are first taken to the operating room (Figure 1).

My results have also shown that certain steps in the epilepsy surgery workup pathway are responsible for the most significant delays in the overall workup process. The two steps that caused the most significant delays in epilepsy surgery workup were: (1) refractory epilepsy patients being referred for surgical evaluation and (2) completing neuropsychology testing after it was ordered (Figure 2).

Discussion

My results have revealed some encouraging data. Over time, the epilepsy surgery workup pathway at Michigan Medicine has become more efficient (Figure 1).

While epilepsy surgery workup has become more efficient over time at Michigan Medicine, there is still room for improvement. Future directions include implementing countermeasures designed to improve their efficiency, thereby continuing to minimize the time from a refractory epilepsy diagnosis being made to a resective operation. By improving the efficiency of the epilepsy surgery program at Michigan Medicine, a larger number of patients will be able to undergo epilepsy surgery evaluation in a shorter period of time, thereby improving overall quality of life and minimizing disease burden for these patients.

References

1. Engel J Jr, McDermott MP, Wiebe S, Blume WT. Surgical evaluation referral and completion of neuropsychology testing were the two steps that caused the most significant delays in epilepsy surgery workup.

Figure 1. The average time from a refractory epilepsy diagnosis being made to patients undergoing an operation (in days) has decreased over time from fiscal year 2011 to fiscal year 2018.

Figure 2. This graph shows the time (in days) for each step of the epilepsy surgery workup pathway to be completed. The placement of a surgery referral and completion of neuropsychology testing were the two steps that caused the most significant delays in epilepsy surgery workup.

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Abstract

Epilepsy surgery is a safe and efficacious treatment for refractory epilepsy. However, many patients suffer with refractory epilepsy for years before surgery referral. Through retrospective chart review, I determined the overall efficiency of epilepsy surgery workup at Michigan Medicine. Over time patients who were diagnosed with medically refractory epilepsy have experienced shorter delays between a refractory diagnosis being made to when they are first taken to the operating room. However, there are certain steps in the epilepsy surgery workup pathway that can be made more efficient.

Future studies can develop countermeasures to reduce the time needed to undergo surgery workup, leading to improved quality of life and decreased disease burden for refractory epilepsy patients.

Table: Average Delays for Each Step of Epilepsy Surgery Workup

<table>
<thead>
<tr>
<th>Step</th>
<th>Average Delay (in days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI report</td>
<td>350 ± 300</td>
</tr>
<tr>
<td>PET report</td>
<td>400 ± 400</td>
</tr>
<tr>
<td>MEG report</td>
<td>450 ± 450</td>
</tr>
<tr>
<td>PET completion</td>
<td>500 ± 400</td>
</tr>
<tr>
<td>LTM initiation</td>
<td>100 ± 100</td>
</tr>
<tr>
<td>SLP evaluation</td>
<td>200 ± 200</td>
</tr>
<tr>
<td>Neuropsychology testing</td>
<td>350 ± 300</td>
</tr>
<tr>
<td>MEG completion</td>
<td>400 ± 400</td>
</tr>
</tbody>
</table>

Conclusions

While epilepsy surgery workup has become more efficient over time at Michigan Medicine, there is still room for improvement. Future directions include implementing countermeasures to target the most inefficient steps in the surgery workup pathway and then determining if those interventions led to a decrease in time from when a patient is diagnosed with refractory epilepsy to when they undergo resective surgery.