Laser Interstitial Thermal Therapy (LITT) in Children

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Disclosures: None
Background

• Callosotomy first described in 1940 by Van Wagene when seizure frequency decreased in GBM patients after tumor progression

• 1960’s callosotomy gained acceptance to reduce generalized seizure burden

• Over time become an effective procedure for drop attacks
Laser Interstitial Thermal Therapy

• LITT is an MRI brain guided thermal ablation of a target

• 1980’s conceived LITT as a procedure to treat small brain tumors

• 1990’s incorporated MRI guided thermography to treat brain pathology

• 2012 Curry described the use of LITT for medically refractory epilepsy
Objective: Why Minimally Invasive?

- Surgical appeal to the families
- Less blood loss
- Easier recovery
- Lower risk of complications
  - Intraoperative
  - Post-operative
- Less cost with shortened hospital stays
Methods

• Retrospective chart review of all patient < age of 18 years with refractory epilepsy (drop attacks)

• Patient’ demographics, preop seizure burden, operative variables, outcome, complications, revisions, use/duration of steroid, disposition to rehab facility or home, and Engel class (recovery from seizure burden) were recorded

• Performed by a single surgeon from 2004-2018
  
  • 2004-2016 open craniotomy
  • 2017-2018 LITT
Results

• 20 patients (M to F ratio of 3:1 & mean age 11 years {OCC versus LITT, (10.8 vs. 10.6)}) were operated for medically refractory epilepsy

• Of total 24 epilepsy operations, 16 OCC and 8 LITT surgical procedures

• Compared with OCC cohort, significant decrease in EBL (in ml) 84 vs. 7 (p<0.007), and decreasing trend towards LOS (5.7 vs 4.4, p<0.09) was observed in LITT cohort (1 patient had a CSF leak)
### Demographics/Indications

<table>
<thead>
<tr>
<th></th>
<th>Open Craniotomy</th>
<th>LITT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Sex M:F</td>
<td>10M:6F</td>
<td>8M</td>
</tr>
<tr>
<td>Age (years)</td>
<td>10.9 (4-19)</td>
<td>10.6 (5-17)</td>
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</tbody>
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**Indications for surgery**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Open Craniotomy</th>
<th>LITT</th>
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</thead>
<tbody>
<tr>
<td>Refractory Drop Seizures</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Disconnection following previous procedure</td>
<td>0</td>
<td>1</td>
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### Results

<table>
<thead>
<tr>
<th></th>
<th>Open Craniotomy</th>
<th>LITT</th>
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</thead>
<tbody>
<tr>
<td>Surgical Time (mins)</td>
<td>251</td>
<td>473</td>
</tr>
<tr>
<td>EBL (cc)</td>
<td>84.1</td>
<td>7.1</td>
</tr>
<tr>
<td>LOS-PICU</td>
<td>2.3</td>
<td>1</td>
</tr>
<tr>
<td>LOS-Hospital</td>
<td>5.8</td>
<td>4 (6.3)</td>
</tr>
<tr>
<td>Discharge to Rehab</td>
<td>Unsure</td>
<td>1</td>
</tr>
<tr>
<td>Steroid Duration (days)</td>
<td>4.4</td>
<td>13.8</td>
</tr>
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Seizures Outcomes

Engle Class Following Callosotomy Procedure

Engle 1
Engle 2
Engle 3
Engle 4

Open
LITT
Is Minimally Invasive Worthwhile?

- Open Callosotomy post-operative challenges
  - Stunned patients immediately after surgery
  - CSF from the ventricles into the subdural space

- LITT
  - Patients appear/function normally after unless disconnection syndrome
  - Quicker recovery and discharge from hospital
  - Less blood loss
Conclusions

• LITT is a feasible minimally invasive procedure for corpus callosotomy
  • Useful technique to complete other disconnection procedures
  • Can used a staged approach for callosotomy

• LITT is associated with reduced blood loss and quicker recovery