Journal Club Handout

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<table>
<thead>
<tr>
<th>Background and Overview</th>
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**Article Title/Citation:**

**Study objectives/purpose: (and research hypothesis if applicable)**
Does the type of ICP monitor (intraparenchymal Vs EVD) influence outcome after traumatic brain injury at one month?

**Brief Background: (why issue is important, summary of previous literature)**
ICP monitoring is considered standard of care in North America. Little evidence supports the use of one type of ICP monitor over another, however EVDs are considered standard of care in many institutions.

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<th>Methods</th>
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**Study design and Methodology: (type of trial, Randomization, blinding, Controls, study groups, Length of study, etc.)**
Prospective Cohort Study
All patients > 18 years of age at a single level I trauma center between 2005-2010 with traumatic brain injury.

Indications for ICP monitoring insertion: GCS of 8 or less with an abnormal CT; GCS of 12 or less with an abnormal CT and the need to undergo sedation, evidence of severe TBI with a normal CT and 2 of the following on admission: age > 40 years, motor posturing or systolic blood pressure < 90 mmHg.

**Interventions:**
Insertion of IPM or EVD
- EVD: patients with severe TBI and evidence of IVH on CT or if CSF drainage was anticipated.
- IPM: absence of EVD criteria (i.e.: no IVH), or if lateral ventricles were too effaced to allow safe insertion of an EVD.

Both groups treated for increased ICP according to predetermined escalation protocol: elevation of HOB, hyperventilation to PCO2 32-36 mmHg, deepening of sedation, hyperosmolar therapy, pharmacologic paralysis, hypothermia, and surgical decompression.

**Outcome measures/Endpoints:**
Glasgow outcome score at one month. Secondary outcomes: mortality, monitoring-related complications, length of ICU and hospital stay.

**Statistical analysis:**
Regression and Chi-squared testing. Univariate and multivariate regression analysis to determine factors influencing outcome measures.

## Results

### Enrollment & Baseline Characteristics:

N = 377. However some degree of cross over between groups. Actual N= 339. Majority of patients were heavily injured with high AIS/ ISS score.

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<thead>
<tr>
<th>Variable</th>
<th>IPM group</th>
<th>EVD group</th>
<th>p Value</th>
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<tbody>
<tr>
<td>n</td>
<td>210</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>Age, y</td>
<td>47.3 ± 20.2</td>
<td>48.7 ± 21.5</td>
<td>0.54</td>
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<tr>
<td>Admission GCS</td>
<td>6.6 ± 3.9</td>
<td>6.7 ± 4.1</td>
<td>0.6</td>
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<tr>
<td>Opening ICP, mmHg</td>
<td>15 ± 14.3</td>
<td>13.1 ± 8</td>
<td>0.26</td>
</tr>
<tr>
<td>Head and neck AIS</td>
<td>4.5 ± 0.7</td>
<td>4.4 ± 0.6</td>
<td>0.23</td>
</tr>
<tr>
<td>ISS</td>
<td>31.3 ± 9.4</td>
<td>27.5 ± 11.2</td>
<td>0.001</td>
</tr>
<tr>
<td>Midline shift size, mm</td>
<td>4.9 ± 6.2</td>
<td>3.5 ± 4.7</td>
<td>0.026</td>
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<tr>
<td>Intraventricular hemorrhage, %</td>
<td>16.3</td>
<td>37</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Surgical decompression, %</td>
<td>51.9</td>
<td>33.6</td>
<td>0.001</td>
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### Summary of primary & secondary outcomes:

No difference in GOS at one month. No difference in mortality, hospital length of stay. Increased duration of ICP monitoring and ICU length of stay in EVD group. Increased rate of device related complications in EVD group.

### Author’s Discussion and Conclusions

**Brief summary of Authors’ main discussion points:** Briefly reviewed the unproven benefit of ICP monitoring Vs the use of ICP monitoring to aggressively treat ↑ ICP. Author recognized different protocol for EVD removal likely responsible for some degree of ↑ length of monitoring duration and ICU stay.

**Author’s conclusions:** Type of ICP monitor does not influence outcome at 1 month post TBI. Increased device related complications, and ICU length of stay in EVD group.

### Your Discussion and Conclusions

**Study strengths:** Study likely represents the best evidence achievable in most North American institutions were a randomized trial of IPM Vs EVD Vs Control is not possible. Patient and device related outcomes were assessed.

**Study limits, weaknesses, Potentials for bias:** Criteria for IPM Vs EVD insertion were different— ↑ degree of selection bias. Significant differences in group characteristics at baseline—see Table 2. IPM group had a high rate of surgical decompression. Confounding of treatment effect of IPM (high rate of surgical decompression) Vs CSF drainage in EVVD group. Limited number of outcome variable assessed in regression analysis; unknown if much more common factors such as (gender, education,
hypotension, hypoxia, glucose control etc) influenced outcome in GOS at one month. Increased midline shift in IPM a confounder for GOS.

**Applicability & impact:** Within the restraints of this cohort study, this study suggests that choice of monitoring device has limited influence on outcome post TBI at one month. EVD effects in lengthing ICU stay in this study is constrained by methodological issues.

**Conclusions and Recommendations:** Randomized trial of EVD Vs IPM in TBI patients is needed. The applicability of this cohort study is limited due to selection bias and methodological issues in the timing of EVD removal and underlying differences in groups. Suggests association of EVD insertion and increased rate of device related complications.