The Safety, Efficacy, and Cost-Effectiveness of Ventriculoperitoneal Shunt and Percutaneous Gastrostomy Tube Placement in a Single Surgery

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Introduction

• Both VP shunts and PEG tube may be required due to neurologic injury or pathology

• Guidelines vary on placement of VP shunt and PEG tube together

• Co-placement is anecdotally reported to increase the risk of VP shunt infection

• Limited data for optimal timing and order of placement
Methods

Ventriculoperitoneal Shunt Placements (December 2014 - March 2017)

- 132 Patients
  - VPS and PEG Tube Placed in Simultaneous Procedures: 10 Patients
  - VPS and PEG Tube Placed in Separate Procedures: 21 Patients
  - 3 Patients Excluded due to Placement in Separate Hospital Admissions: 18 Patients

- Is it feasible, safe, and cost-effective to place a VP shunt and PEG tube simultaneously?
- Retrospective review
  - Separate Placement – VP Shunt and PEG Tube in 2 surgeries
  - Simultaneous Placement – VP Shunt and PEG Tube in 1 surgery
    - PEG placed first followed by VP Shunt
- Analyzed patient demographics, complications, and cost analysis between 2 groups
## Results - Patient Demographics

<table>
<thead>
<tr>
<th></th>
<th>Separate Surgeries</th>
<th>Simultaneous Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (n)</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Age (years)</td>
<td>59 ± 4</td>
<td>62 ± 3</td>
</tr>
<tr>
<td>Sex (M:F)</td>
<td>5:4</td>
<td>9:1</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aneurysmal SAH</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Tumor</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Trauma</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Followup (Months)</td>
<td>7 ± 2</td>
<td>9 ± 3</td>
</tr>
<tr>
<td>Length of Stay (Days)</td>
<td>43 ± 7</td>
<td>25 ± 2</td>
</tr>
</tbody>
</table>
### Results - Complications

<table>
<thead>
<tr>
<th>Complications</th>
<th>Procedure</th>
<th>Separate (n=18)</th>
<th>Simultaneous (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection</td>
<td></td>
<td>3 (16.7%)</td>
<td>0</td>
</tr>
<tr>
<td>Malfunction</td>
<td></td>
<td>1 (5.5%)</td>
<td>0</td>
</tr>
<tr>
<td>Bleeding</td>
<td></td>
<td>2 (11.1%)</td>
<td>0</td>
</tr>
<tr>
<td>Death within 30 days</td>
<td></td>
<td>2 (11.1%)</td>
<td>1 (10%)</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td>12 (66.6%)</td>
<td>9 (90%)</td>
</tr>
</tbody>
</table>

**Graph:**
- **Interventional Radiology:** 20% complication rate
- **General Surgery:** 50% complication rate
- **Gastroenterology:**

- Red = complication rate
Results - Average Hospital Billing

Average hospital billing of VP Shunt Placement = $44,248.50
Results - Estimated Cost Savings

Cost of Total OR Time for VP Shunt Placement + Cost of Total OR Time for PEG tube Placement - Average Cost of Non-Procedure Time for PEG Placement

Estimated Cost Savings $3614.72

Average Cost Savings of Simultaneous Placements $1246.09
Discussion

Benefits

• Limit general anesthesia
• No evidence for increased risk
• Improved procedure scheduling
• May help lower LOS
• Reduced cost to the healthcare system and patient
• Could improve patient and family satisfaction

Limitations

• Small series
• Retrospective data
• Short duration
• May underestimate complication rate
• Cost may not be universal
Summary Points

• Simultaneous placement of VP shunt and PEG tube is not associated with an increased risk of complications

• Combined surgeries may reduce overall length of stay

• Patients may benefit due to reduced trips to the OR and less exposure to general anesthesia

• Simultaneous placement of both VP shunt and PEG tube had lower costs than if accomplished separately

• It is estimated that nearly $35,000 would be saved in our case series