1.0 Introduction

Patients with hydrocephalus requiring cerebrospinal fluid diversion via a shunt were identified as a population that Neurosurgery cared for that required streamlining of care due to high volumes and complications such as infection which were relatively high compared to other procedures. This clinical practice guideline has been updated to reflect emerging changes in evidence (initial document developed 1997/98).

Target Population

- Inclusion: (May include cysto-peritoneal shunting and subdural peritoneal shunts)
- Infant/child with hydrocephalus requiring 1st shunt intervention.
- Child with existing shunt for hydrocephalus management.
- Newborn to 18 years of age with signs/symptoms of shunt malfunction (i.e. nausea/vomiting, headache, lethargy, irritability &/or altered level of consciousness (LOC))

Target Users

- All health care providers who may encounter a patient with a shunt or requiring a shunt.

2.0 Definitions

- **Shunt**: Referring only to a ventricular-peritoneal shunt
- **Shunt Revision**: Surgical replacement or change to an existing shunt

3.0 Clinical Practice Recommendations

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<table>
<thead>
<tr>
<th>PRE-ADMISSION</th>
<th>ADMISSION/PRD</th>
<th>INTRA-OPERATIVE</th>
<th>POST-OP</th>
<th>DISCHARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>History &amp; physical assessment (includingfontanelle assessment and head circumference if less than 10 months)</td>
<td>Neurological Vital Signs Q1-4h; assess if the patient requires closed/monitoring observation and notify if required</td>
<td>Neurosurgical Protocol: Before Seeking Authorisation</td>
<td>Neurological Vital Signs Q1-4h</td>
<td>Vital signs &amp; Neurological Vital Signs per discharge</td>
</tr>
<tr>
<td>CT scan or MRI (new diagnosis should have a 4.4 MRI, otherwise could just be FAST MRI) to assess ventricular size or Head US if infant and clinically appropriate</td>
<td>8-16 months of age, check and record fontanelle Q3-4h and head circumference daily</td>
<td></td>
<td>Head circumference recorded</td>
<td>Head circumference recorded</td>
</tr>
<tr>
<td>Neurosurgeon to review brain scan results &amp; consult appropriate services if any abnormalities</td>
<td>Monitor for signs of increased ICP</td>
<td>Neurosurgeon to review brain scan results &amp; consult appropriate services if any abnormalities</td>
<td></td>
<td>Signs and symptoms of increased ICP</td>
</tr>
<tr>
<td></td>
<td>Pre-op bathing as per policy pre-op bathing policy</td>
<td>For all Aldara X2.0 mg/4 mL (max 2g)</td>
<td></td>
<td>Child and family verbalize pain &amp; nurse well controlled for pain</td>
</tr>
<tr>
<td></td>
<td>Antibiotics as needed, not shown</td>
<td></td>
<td></td>
<td>Male post-op shunt is not required—will only be ordered when specifically indicated</td>
</tr>
<tr>
<td></td>
<td>Post-op bathing as per policy pre-op bathing policy</td>
<td></td>
<td></td>
<td>Vital signs &amp; Neurological Vital Signs per discharge</td>
</tr>
</tbody>
</table>

Consults

- Neurosurgery consult if indicated
- Neurosurgeon to complete pre-operative orders in electronic system
- IV therapy for hydration and/or antibiotics if indicated
- Neurosurgeon to obtain consent from patient/parent/child
- Consults based on individualities (for example Endocrinology, Hematology, General Pediatrics, General Surgery)
- Social Work, Child Life consult as indicated

Skin preparation

- Shampoo hair, shave, & adhesive material
- Chlorhexidine applied to surgical field & not washed off
- Sterile™, over surgical field
- DuraSeal™ was administered

Shunt implanted or removed as per usual practice

- Bone flap repositioned (if not reattached)
- Postop scalp wound not available

- Regular bowel regimen with Antibiotic injection – Intragastric
  - N-acetylcysteine (80mg to 1g, of normal saline)
  - Decamom (4mg in 2 mL of normal saline)

- Skin closure as per standard practice
- Neurosurgeon to document in electronic patient chart: nature of surgery, type of shunt device

Postoperative care

- Ventriculostomy dressing applied to all wounds. Leave in place overnight
- Drip: as per medical orders
- Vital signs & Neurological Vital Signs per discharge
- Head circumference recorded
- Signs and symptoms of increased ICP
- Child and family verbalize pain & nurse well controlled for pain
- Male post-op shunt is not required—will only be ordered when specifically indicated

Pre-op bathing as per policy pre-op bathing policy

Ventricular Peritoneal Shunt Insertion or Revision

Page 2 of 5
### Activity
- Complete falls assessment, document in care plan and on patient record (falls and CSE guidelines)
- Activity As Tolerated

### Nutrition & Diet
- NPO or Diet As Tolerated (Anesthesia NPO guidelines)
- Activity As Tolerated

#### Routine Management

**Pain Assessment**
- Age appropriate pain assessment using [pain assessment guide](#)
- Infants: [Gardner-Robinson bundle](#)
- Parent's observation
- [Pain assessment tools](#) (please select appropriate):
  - PPO
  - FLACC
  - Goal
  - Numeric
  - Faces
  - NCCPC-R
  - NCCPC-PV
  - Age appropriate pain assessment as per previous section pain assessment policy

**Nursing & Diet**
- NPO or Diet As Tolerated (Anesthesia NPO guidelines)
- Activity As Tolerated

**Dressing & Wound Care**
- Neurosurgeon to remove in short type of closure (staples/stitches)
- Incision to remain covered for 24-48 hours post-op
- Notify MD if dressing will or cannot be removed
- Change gauze twice daily and per

**Fixed Management**
- Discontinue IV when antibiotics completed, tolerating full fluids and no nausea and no further investigations pending (CT, MRI)

**Activity**
- Activity As Tolerated
- Nutrition & Diet
- Diet As Tolerated

**Dressing & Wound Care**
- Neurosurgeon to remove in short type of closure (staples/stitches)
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- Notify MD if dressing will or cannot be removed

**Fixed Management**
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**Ventricular Peritoneal Shunt Insertion or Revision**

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<thead>
<tr>
<th><strong>Ventricular Peritoneal Shunt Insertion or Revision</strong></th>
<th><strong>Pre-operative teaching:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Complete medication reconciliation. Ensure to evaluate if child is on any anticoagulants or other medications (prescription or over-the-counter) that may affect surgery or G.A. medication reconciliation policy.</td>
<td>• NPO instructions.</td>
</tr>
<tr>
<td>• Anticoagulant ordered.</td>
<td>• OR insertion.</td>
</tr>
<tr>
<td>• Based on pain assessment give:</td>
<td>• Transport to OR.</td>
</tr>
<tr>
<td>• Morphine</td>
<td>• Answer questions or offer resources for short related questions.</td>
</tr>
<tr>
<td>• Anti-emetics as required (dexamethasone or ondansetron)</td>
<td>• Recovery room.</td>
</tr>
<tr>
<td>• See Anesthesia Guidelines</td>
<td>• Post-op medications/Pain management.</td>
</tr>
<tr>
<td>• Anesthesia ordered based on pain assessment.</td>
<td>• Assess child &amp; family’s understanding.</td>
</tr>
<tr>
<td>• Morphine or Ketamine.</td>
<td>• Child and family understand awareness/understanding of plan of care.</td>
</tr>
<tr>
<td>• Antibiotics to be given in OR Room – See intra-operative plan.</td>
<td></td>
</tr>
</tbody>
</table>
4.0 Guideline Group and Reviewers

Guideline Group Membership:
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2. Dr. Mandeep Tamber MD, PhD, FRCS: Assistant Professor, Pediatric Neurosurgery University of Pittsburgh School of Medicine Children’s Hospital of Pittsburgh

5.0 References


Attachments:

Shunt protocol.pdf
ventricular shunt_CPG_September 2021.pdf