Management of Neurosurgical Devices in the Pre-Operative Setting and PACU

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Management of Neurosurgical Devices

A. Cerebral Spinal Fluid
   CSF is produced within the ventricular system
   CSF bathes the brain and spinal cord, and provides buoyancy
   Approximately 500 cc of CSF is produced daily (or 22 cc/hr)

B. CSF flow dynamics
   CSF flows from the lateral ventricles to the third ventricle, through the aqueduct of Sylvius, to the fourth ventricle and out through the central canal to the spinal cord, finally being reabsorbed through the subarachnoid villi within the meninges.

C. Indications for the placement of a CSF device
   1. blockage of intra-ventricular flow
      (ie. Obstruction at the aqueduct: congenital stenosis or mass)
   2. Blockage of reabsorption of CSF
      (hemorrhage, trauma)
   3. CSF leak from traumatic or surgical site with conditions of increased intracranial pressure
   4. Ventriculomegaly and hydrocephalus
      blockage of intra-ventricular flow

D. Care of the external CSF device:
EVD (extra-ventricular device)
   1. placement: The proximal catheter is positioned within the lateral ventricle
   The system is based on pressure and gravity (there is no valve in the system)
   The distal bag is “zero’ed” to an anatomical setpoint, and the fluid collection device is “leveled” according to a column of fluid
   Astute nursing care will limit complications
   2. indications: monitoring of intracranial pressure, or drainage of CSF, or both
   3. complications: can include infection, inadequate drainage, hemorrhage

E. Care of the external CSF device:
   (Lumbar drain)
1. Placement: The proximal catheter is positioned within the spinal intrathecal space. The system is based on pressure and gravity (there is no valve in the system). The distal bag is “zero’ed” to an anatomical setpoint, and the fluid collection device is “leveled” according to a column of fluid. Astute nursing care will limit complications.

2. Indications: CSF leak, evaluation of increase ICP, necessity of CSF divergence.

F. Care of the patient with an implanted CSF device
   Omaya reservoir (place for CSF sampling or intrathecal medication administration)
   Ventricular-peritoneal/artial/pleural shunt (place for alternative CSF pathway)
   Lumbar-peritoneal/pleural shunt
   Foramen Magnum –peritoneal shunt

G. Ventricular shunts
   Indications: hydrocephalus, acquired or congenital; trauma, subarachnoid hemorrhage, intraventricular hemorrhage, normal pressure hydrocephalus.
   Complications: can include infection and meningitis, inadequate pressure management, peritonitis, bowel perforation, endocarditis, and pleural effusions.

H. Lumbar Shunts
   Indications: CSF management with complex hydrocephalus, or pseudotumor cerebrii, and chronic symptoms.
   Complications: can include infection and meningitis, inadequate pressure management, peritonitis, bowel perforation, and shunt failure, breakage.

I. Formen Magnum shunts

J. General post operative considerations
   ABCs
   ICP, CPP, and hemodynamics parameters
   Pain assessment
   Is and Os of patient, as well as the drains