

Lumbar Puncture (LP) Training Program



Department of Neurology

Indications for a LP

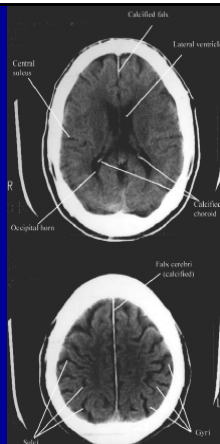
- Suspect CNS Infection
- Suspect Demyelinating/Inflammatory CNS Process
- Suspect SAH with Negative CT of the Head
- Diagnose NPH/Pseudo tumor Cerebri
- Obtain CSF for Cytological Analysis
- Infuse Anesthetic or Contrast Agents
- Intrathecal Treatment
 - Chemotherapy
 - Antibiotics
 - Remove CSF to Treat NPH

Contraindications for LP

- Skin Infection over the lower lumbar area
- Uncorrected Coagulopathy
 - INR > 1.5
 - Platelets < 50,000
 - After correction, LP is safe
 - Hold Heparin Drip for 6 hours prior to LP
- Suspect Increased Intracranial Pressure (ICP)
 - Alteration in Consciousness
 - Focal Neurological Deficits
 - Papilledema
 - CT Findings
- Acute Spinal Cord Trauma
- Cardio respiratory Compromise

What to Look for on Non-Contrast CT Head

- Symmetry
- Open Cisternal Spaces/
Ventricles without Distortion
 - Especially 4th Ventricle
- Sulcal Preservation



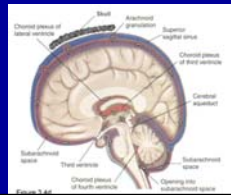
CSF Dynamics

Produced in the **choroid plexus** of the lateral ventricles (LV)

Flows Through:

- Interventricular Foramina of Monro (yellow)
- Third Ventricle (TV)
- Aqueduct of Sylvius (Green)
- Fourth Ventricle (FV)
- Lateral Foramina of Luschka
- Foramen of Magendie (Blue)
- Cisterna Magna (CM)
- Spinal Cord

CSF flows over the Convexities of the Brain, Cerebellum, and Brainstem



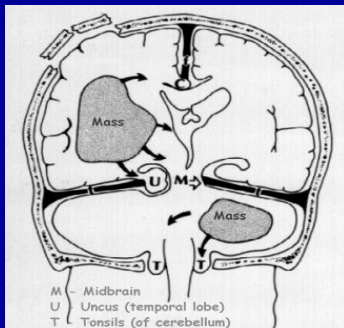
CSF Dynamics

- Adults have **140 mL** of CSF
- CSF is Produced at 0.3 mL/min
- **9-10 mL** – “Standard” amount removed
Replaced in 30 Minutes

LP Complications

2. **Localized Back Pain – 30%**
 - Due to Muscle Trauma From Needle
 - **Treat with NSAIDs**
3. **Rare Complications (< 0.5%)**
 - CSF Infection
 - Spinal hematoma
 - Herniation
 - Spinal Cord Damage if done above L3 spine level
 - Disc Herniation

Brain Herniation



CSF Studies Interpretation

- **Increased OP - can be due to any intracranial abnormality**
 - Patients with CHF or dialysis may have variable OP due to oncotic fluctuations, so interpret with caution
- **Appearance**
 - **Cloudy fluid** is most often seen in bacterial meningitis so, start treatment immediately
 - **Bright red** – probable traumatic tap
 - **Xanthochromic** – yellow fluid - Always pathologic
 - Blood > 12 hours old
 - SAH, HSV Encephalitis

CSF Studies Interpretation

- RBCs and WBCs should be < 0-5 cells/hpf
 - In traumatic tap, Tube #1 should have more bright red blood than Tube #4
 - WBC:RBC ratio the same as peripheral blood
 - Blood clots that form in the CSF collection tubes are from a traumatic tap
- Glucose
 - Always a comparison – **normally 60% of serum** blood glucose levels

CSF “Profiles”

Test	Bacterial Meningitis	Viral Meningitis	SAH
Opening Pressure	Elevated	Elevated	Elevated
Appearance	Clear/turbid	Clear	Clear/bloody
Xanthochromia	Negative	Negative	Present
RBC's	< 5 /hpf	< 5/hpf	> 50/mm ³
WBC's	Elevated, PMNs	Elevated, lymphs	Increased
Glucose	Low	Normal	Normal
Protein	Elevated	Elevated	Elevated
Gram Stain	Organisms	Normal	Normal
