Lumbar Puncture

1. **Indications**: Examination of spinal fluid for suspected infection, inflammatory disorder, or malignancy, instillation of intrathecal chemotherapy, or measurement of opening pressure.\
2. **Complications**: Local pain, infection, bleeding, spinal fluid leak, hematoma, spinal headache, and acquired epidermal spinal cord tumor (caused by implantation of epidermal material into the spinal canal if no stylet is used on skin entry).
3. **Cautions and contraindications** :
   a. Increased intracranial pressure (ICP): Before lumbar puncture (LP), perform a funduscopic examination. Presence of papilledema, retinal hemorrhage, or clinical suspicion of increased ICP should prompt further evaluation and may be a contraindication to the procedure. A sudden drop in spinal canal fluid pressure by rapid release of CSF may cause fatal herniation.
   b**. Bleeding diathesis**: Platelet count >50,000/mm3 is desirable before LP, and correction of any clotting factor deficiencies can minimize the risk for bleeding and subsequent cord or nerve root compression.
   c**. Overlying skin infection** may result in inoculation of CSF with organisms should be deferred in unstable patients, and appropriate therapy should be initiated, including antibiotics, if indicated.
4. **Procedure:**
   a. Apply local anesthetic cream if sufficient time is available.\
   b. Position child in either the sitting position, or lateral recumbent position , with hips, knees, and neck flexed. Keep shoulders and hips aligned (perpendicular to the examining table in recumbent position) to avoid rotating the spine. Do not compromise small infant's cardiorespiratory status with positioning.
   c. Locate the desired intervertebral space (either L3-4 or L4-5) by drawing an imaginary line between the top of the iliac crests. Alternatively, ultrasound can be used to mark the intervertebral space
   d. Prepare the skin in a sterile fashion. Drape conservatively to make monitoring the infant possible. Use a 20G to 22G spinal needle with stylet (1.5 or 3.5 inch depending on the size of the child). A smaller-gauge needle will decrease the incidence of spinal headache and CSF leak.

e. Overlying skin and interspinous tissue can be anesthetized with 1% lidocaine using a 25G needle.

f. Puncture the skin in the midline just caudal to the palpated spinous process, angling slightly towards the umbilicus. Advance several millimeters at a time, and withdraw stylet frequently to check for CSF flow. Needle may be advanced without the stylet once it is completely through the skin. In small infants, one may not feel a change in resistance or "pop" as the dura is penetrated.

g. If resistance is met initially (you hit bone), withdraw needle to just under the skin surface and redirect the angle of the needle slightly.

h. Send the first tube for culture and Gram stain, the second tube for measurement of glucose and protein levels, and the last tube for cell count and differential. An additional tube can be collected for viral cultures, polymerase chain reaction (PCR), or CSF metabolic studies, if indicated. If subarachnoid hemorrhage or traumatic tap is suspected, send the first and fourth tubes for cell count, and ask the laboratory to examine the CSF for xanthochromia.

i. Accurate measurement of CSF pressure can be made only with the patient lying quietly on his or her side in an unflexed position. It is not a reliable measurement in the sitting position. Once the free flow of spinal fluid is obtained, attach the manometer and measure CSF pressure.