STANFORD LUMBAR PUNCTURE GUIDELINES

BEFORE YOU BEGIN

Image prior to a LP:
- history of brain mass/tumor
- history of subdural or epidural hematoma
- focal neurologic signs on exam
- altered mental status on exam
- HIV infection

Contraindications to LP:
- intracranial mass or lesion causing shift or mass effect
- INR > 1.4
- platelets < 50,000
- epidural infection or overlying cellulitis

Informed consent for a LP:
- Explain benefits of procedure and why you are doing the procedure
- Explain risks
  - most common is post-LP headache in 1 of 4 patients (using the cutting needle), 1 of 8 (using the atraumatic needle), see below
  - pain at insertion site
  - allergic reaction to anesthetic
  - bleeding
  - infection
  - nerve injury (very rare) to cauda equina

Post-LP headache:
- usually self-limited
- 40% resolve in 3-4 days
- 75% resolve in 1 week with increased fluids and bed rest
- others may need IV caffeine or epidural blood patch (up to 2-3 times)
- extremely rare to have persistent CSF leak requiring surgery to repair it

Gather supplies:
- LP kit
- chlorhexidine
- sterile gloves
- ultrasound for marking if the patient is very obese
- patient labels for you sample tubes

TECHNIQUE STEP-BY-STEP

Preparation:
- Patient removes shirt/top. Women can keep bras on.
• Pants or bottoms and underwear can be kept on as long as the waist band can be lowered and/or folded down.
• Give pt gown to wear, leave open in back, and offer a blanket

Positioning:
• If you are going to measure opening pressure, you must position patient in Left Lateral Decubitus.
• Left Lateral Decubitus Position –
  • Patient lays on Left side, chin tucked to chest, knees/legs tucked into chest in a fetal position. You may need someone to help you hold the patient into this position if they can’t follow commands or have physical limitations.
• Shoulders must be vertically aligned (stacked directly on top of each other, not twisted or rotated). Make sure the shoulder on top (should be the Right shoulder is directly stacked on top of the Left shoulder).
• Hips must be vertically aligned (stacked directly on top of each other, not twisted or rotated).
• In general, lumbar punctures are easier to obtain in the Sitting Up position, but opening pressure cannot be easily measured in this position. To measure the opening pressure with patient Sitting Up, you need to read what the pressure is above the sternal notch. Most LP kits do not contain enough manometer extensions to reach this high level.
• Sitting Up Postion – Patient sits at the side of bed, elbows on a steady table in front of them, head down, hunched over into a curled ball position. Make sure pt is not leaning to either side (i.e. shoulders should be even with each other and with hips).

Palpation:
• Spend a fair amount of time palpating prior to beginning the procedure.
• To find the approximate level of L4, feel for the patient’s anterior superior iliac spine (iliac crest). In obese patients in which it is difficult to palpate the ASIS, you may ask the patient to put their hand on their “hip bone” so that you may then palpate it.
• Palpate the vertebral processes and find a vertebral space. Feel at multiple levels below and above the approximated L4 space.
• In normal weight patients, the midline groove of the back can be misleading when patient is lying in the left lateral decubitus position. In the left lateral decubitus position, the midline groove of the back may shift and does NOT always overlie the vertebral column. Use two fingers to palpate on either side of the vertebral column to make sure you are centered over the vertebral column and not just following the skin groove.
• Mark your location for needle insertion with a skin marking pen or make an indentation in the skin using gentle pressure and cap of a pen.

Cleaning and Setup/Anesthesia:
• Clean and drape the patient using sterile technique. Assure skin cleaned with chlorhexidine. Allow skin to dry.
• Set up the manometer and your CSF collection tubes before you begin the procedure.
• Palpate again to find the vertebral space where you will be inserting the cutting needle. Once you injected lidocaine you may not be able to palpate the area again because the anatomical landmarks will be obscured.
• Draw up lidocaine. Use the shorter, smaller needle to numb the skin and subcutaneous tissue. Numb in different angles around the chosen site. Hub this shorter needle while numbing. Use between 2-3 cc of lidocaine for this. Then switch to the longer, larger gauge needle to numb the deeper subcutaneous tissues. Pull back before injecting and after each advancement of the needle. Inject at various angles in the area. Hub this needle. Use about 2-3 cc of lidocaine for this.

**Needle Insertion:**

• Insert the 22 gauge 2 ½ inch spinal needle with the bevel up, angling toward the umbilicus initially. Advance the needle slowly. If you feel resistance that you can’t pass the needle through, this is likely bone. If you’ve hit bone relatively superficial, this likely means you’ve hit the vertebral process and you need to withdraw the needle completely and try a different location. If you’ve hit bone relatively deeper, you may be able to draw back the needle part of the way and re-angle and re-advance without completely taking out the needle. Try different angles of the needle. Although penetrating the dura is often described as a “pop,” it may be more of a giveaway of resistance. Remove the stylet of the needle often to check for CSF flashback.

**Following Flashback:**

• Once you have gotten flashback of CSF, quickly attach the manometer or replace the stylet until you can attach the manometer. Try not to lose too much CSF during the process so as to not effect the opening pressure. During the measurement of opening pressure you must instruct the patient to slightly straighten their legs and head or have the person helping you do this. Opening pressure will be falsely elevated if you measure it while the patient is in the fetal position. Once the meniscus has leveled out in the manometer (Normal CSF pressure as measured with a manometer is considered to be less than 200 mm H20), take note of the opening pressure and then drain the manometer into CSF collection tube 1.

• Collect CSF in the sequential tubes. Generally you want to collect more CSF than you think you need – typically 8-15mL, but avoid collecting more than this amount if possible. If you are sending special studies, more CSF may be required. If the patient is able to cooperate, in order to collect fluid faster, you may slowly move the patient from the left lateral decubitus position into a sitting up position.

• If CSF flow slows/stops, you may consider rotating the needle.

• When completed, replace the stylet and withdraw the needle.

• You may have been taught that patients must lay flat following a lumbar puncture; however, there is no evidence to support that this reduces post lumbar puncture headache.

**AFTER THE PROCEDURE**

• Properly dispose of all sharps

• Date, label and initial all samples to be sent to the lab