Lumbar Puncture Workshop

Neurology Clerkship
Washington University
Workshop Objectives

* Explain the procedure to the patient and obtain written consent.

* Position the patient properly, set-up LP tray, and prepare the patient by sterilizing skin and injecting local anesthetic.

* Perform proper technique to measure opening pressure and obtain fluid.

* Obtain proper studies and write procedure note.
Keys to Successful Procedure

- Good patient education and preparation, so they are reassured, relaxed, and cooperative.
- Proper positioning of the patient!
- Ensure your own comfort for the procedure!
- Proper identification of landmarks and entry techniques.
What is a Lumbar Puncture?

- CSF is a filtrate of venous blood at the choroid plexus, produced at a rate of 500 ml/day (20 ml/h).
- Total CSF volume is approximately 140 ml.
- CSF equalizes the pressure inside the brain and outside the brain and spinal cord.
- CSF serves as a physical support and cushion.
- CSF also provides biochemical support for homeostasis of inflammation, neural-endocrine transport, and excretion of metabolites and degradation products.
Why do a Lumbar Puncture?

* Evaluate for acute infection.
  * Bacterial infections (i.e. pneumococcal, Neiseria)
  * Viral infections (i.e. HSV, enterovirus)

* Evaluate for subacute or chronic infection.
  * Bacterial infections (i.e. syphilis, TB, cryptococcus)

* Measure opening pressure.
  * Idiopathic intracranial hypertension

* Evaluate for a tumor.
  * Carcinomatous meningitis (mets, lymphoma)

* Evaluate inflammatory and biomarker profile for diagnosis.
  * Multiple sclerosis
  * Neuromyelitis optica
  * Creutzfeldt-Jakob disease
What are the contraindications?

- Brain mass
  - Large intracranial mass lesion with midline shift.
  - Brain lesions with potential to expand over the next couple days.
  - Obstruction of CSF pathways (i.e. non-communicating hydrocephalus)

- Bleeding disorder
  - Coumadin
  - Platelet count <50,000
  - INR >1.5

- Overlying skin abscess or cellulitis
What are the Risks?

COMMON
* Post LP Headache (10 – 20%)
* Sore Back
* Brief Radicular symptoms during procedure

UNCOMMON
* Bleeding (hematoma with nerve root compression)
* Infection (sterile technique)
Pearls for the Consenting Process.

- Simple, common, and safe procedure.
- Very important for proper diagnosis and treatment.
- CSF will be replenished within hours after the procedure.
- We will use a lot of lidocaine to minimize any discomfort.
- Possible side-effects are...
- Unlikely complications are...
- Questions or concerns?

- Almost all are reassured after you talk to them. If anxiety remains very high, can try alprazolam 0.125 – 0.25 mg before procedure.
- Sometimes, recruiting a family member to be with the patient can be helpful.
* Entire back should be exposed to ensure no twisting or sagging.
* Back should be aligned to the edge of the bed or table.
* Support head with 1-2 pillows.
* When you begin, patient should bring knees-to-chest and chin-to-chest.
* Feel for hips and find the L₃-₄ interspace. Mark the space with a big ‘X’, or make an impression with a retractable pen.
Procedure Set-Up

- Perform entire procedure sitting with everything within reach (chair, tray, bed height, waste basket).
- Need kit, Sprotte needle, 5 cc syringe, extra tube of 1% or 2% lidocaine, sterile gloves, and Betadine.
- Helpful to have a partner, or tape extra lidocaine to table.
- Take top off kit, unfold sterile kit coverings holding outside, add Betadine, Sprotte needle, and 5cc syringe to kit.
- Start kit prep: Put on gloves, fill syringe with large needle then replace with small needle.
Soak sponge with Betadine and remove all excess.
Start with demarcated entry point and make concentric circles.
Add drape, and dry entry point with gauze.
Warn patient, make a lidocaine wheal with the small needle.
Switch to the larger needle and inject 1 cc into 4 quadrants.
Finish kit prep: Open and stand-up tubes, assemble manometer.
Needle Insertion

* Ask patient to curl tight, arch back, and take deep breaths.
* Insert cutting needle between spinous processes, aiming towards navel.
* Insert Sprott needle towards the navel.
* If the needle stops short, you are probably hitting a pedicle, and you need to back-up and move towards center.
* If your needle hits the hub, you are probably in the psoas muscle. You need to take-out the needle and restart.
* If your needle goes deep and stops, you probably hit the vertebral body. Back-up a touch, and check for fluid.
Opening Pressure and Fluid Collection

* Get manometer ready. Have patient relax their fetal-position and take deep breaths.
* Remove the stylus and add the manometer.
* Record the level once it stabilizes.
* Move the stopcock and collect the manometer fluid.
* Continue to fill vials.
* If fluid stops, try giving needle a quarter turn, push it in a nudge, or back it out a touch. Never aspirate CSF.
Finishing the Procedure

- Replace stylet, remove needle, clean back with warm water and towel, dry and add band-aid.
- Ensure ALL sharps are accounted and disposed.
- Patient can get-up when they feel ready.
- No strenuous activity for the rest of the day.
- If they get a headache, take OTC analgesic, drink fluids, lie down.
- If headache is severe or persistent, call for prescription meds or a blood patch.
Studies


* Tube 2: Cytology (if indicated) or hold for add-on studies.

* Tube 3 (Chemistry/Immunology): Protein, glucose, VDRL, CSF immunoglobulin index (requires paired serum sample).

* Tube 4 (Hematology): Cell count with differential.

* Personally ensure labs go immediately to lab. Each tube needs patient name, DOB, and hospital number.
Review of coag studies and imaging.
Sterile prepping and draping procedure.
Amount of lidocaine.
Needle type.
Patient position and interspace entered.
Opening pressure.
Amount of fluid.
Patient tolerance and disposition.
Clerkship group will be divided, with separate start times.

Stations:
- Patient explanation, consent, and positioning
- Opening tray, gloving, set-up tray, anesthetize
- Mannequin for obtaining opening pressure and fluid