

Lumbar Puncture MCQ Pre-quiz – With Answers

1. Which of the following is an absolute contraindication to performing a lumbar puncture?
- Space occupying brain lesion
 - Overlying skin infection
 - INR of 2.0
 - Prior lumbar surgery

Answer B. An overlying skin infection or concern for an epidural abscess are absolute contraindications to performing an LP.

A) is incorrect. While cerebral herniation is the most feared complication of an LP, not all space occupying lesions lead to increased ICP and not all conditions with increased ICP will result in herniation following an LP. Patients with any of the following clinical findings should have a head CT prior to LP, and discussion with Neurosurgery should be considered prior to LP if there are concerning findings on CT:

- 1) Altered mentation
- 2) Focal neurologic signs
- 3) Papilledema
- 4) Seizure within the past week
- 5) Impaired cellular immunity

Hasbun, R., Abrahams, J., Jekel, J., & Quagliarello, V. J. (2001). Computed tomography of the head before lumbar puncture in adults with suspected meningitis. *New England Journal of Medicine*, 345(24), 1727-1733.

C) Is a relative contraindication. While an LP is low risk for bleeding, the consequences of a bleed are significant. Increased bleeding risk should be weighed against the urgency of the procedure and options for reducing the bleeding risk should be explored.

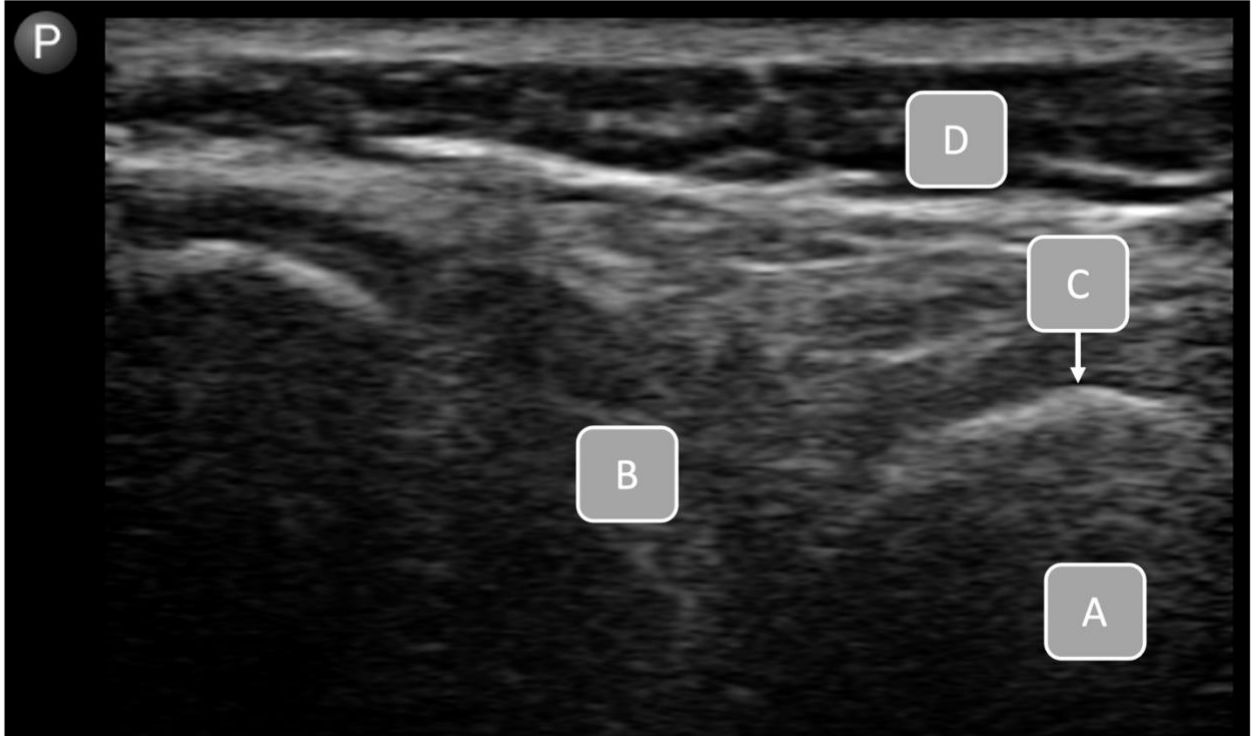
D) Is a relative contraindication. Hardware introduces increased risks and challenges with procedure related infections. Fusion of the targeted intervertebral space will obstruct access.

2. Which of the following is the best justification for performing a lumbar puncture in the lateral decubitus position instead of the upright position?
- Plan to obtain an opening pressure
 - Improved spacing of spinous processes
 - Reduced rates of post-LP headaches
 - Improved spinal alignment

Answer: A. Opening pressure cannot be accurately obtained in the upright positioning, as it will falsely elevate the measured OP.

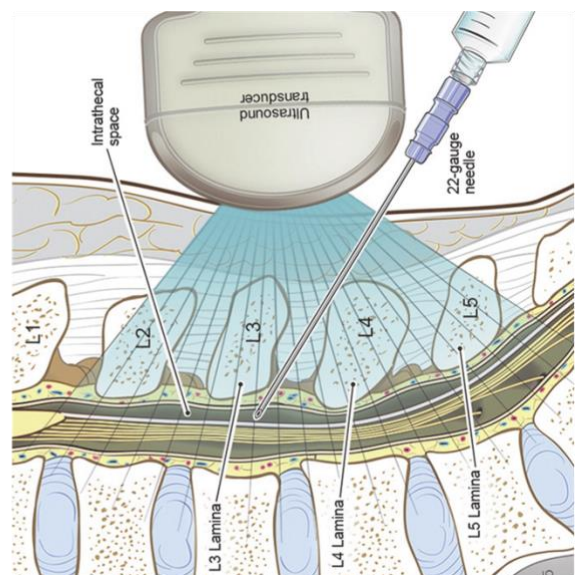
B), C), and D) are incorrect as the upright position has not been shown to reduce spacing between lumbar spinous process, reduce alignment or increase rates of post dural puncture headaches (PDPH).

3. Which letter in the image below represents the interspinous space?



Answer: B. Use of ultrasound to identify alignment of the spinous processes and mark the interspinous space has been shown to improve success of lumbar punctures and reduce the number of needle passes.

Millington SJ, Silva Restrepo M, Koenig S. Better With Ultrasound: Lumbar Puncture. *Chest*. 2018 Nov;154(5):1223-1229. doi: 10.1016/j.chest.2018.07.010. Epub 2018 Jul 20. PMID: 30036497.



4. If CSF from a lumbar puncture is being sent for cytology or fungal cultures, which of the following best describes the amount of CSF needed?

- Minimum of 1ml in each of 4 vials
- Minimum of 2ml in each of the 4 vials
- Minimum of 30ml distributed over 4 vials
- Minimum of 100ml distributed over 4 vials

Answer: C. Cytology and slow growing cultures, such as fungal and AFB, require larger volumes that standard chemistries, viral studies and typical bacterial cultures (which typically require no more than ~8-12mL distributed over 4 vials).

5. Which of the following is the most preferred intervention to reduce risk of post-LP headache?

- Replacing the stylet before removing the needle
- Having the patient lie supine for 30 minutes following the procedure
- Performing the procedure in lateral decubitus rather than upright position
- Performing a prophylactic epidural blood patch
- Use of a pencil point (atraumatic) needle

Answer: E.



Upon withdrawal, a Quincke (cutting) needle leaves a marked opening in the skin and tissue layers with resultant CSF loss. The Sprotte (atraumatic) needle by comparison displaces tissue rather than cutting it – causing minimal injury.⁽⁵⁾ Upon withdrawal of the needle the multi-layered dura, consisting of collogens and elastic fibres, closes again.

Nath S, Koziarz A, Badhiwala JH, Alhazzani W, Jaeschke R, Sharma S, Banfield L, Shoamanesh A, Singh S, Nassiri F, Oczkowski W, Belley-Côté E, Truant R, Reddy K, Meade MO, Farrokhyar F, Bala MM, Alshamsi F, Krag M, Etzeandia-Ikobaltzeta I, Kunz R, Nishida O, Matouk C, Selim M, Rhodes A, Hawryluk G, Almenawer SA. Atraumatic versus conventional lumbar puncture needles: a systematic review and meta-analysis. *Lancet*. 2018 Mar 24;391(10126):1197-1204. doi: 10.1016/S0140-6736(17)32451-0. Epub 2017 Dec 7. PMID: 29223694.

Thoennissen J, Herkner H, Lang W, Domanovits H, Laggner AN, Müllner M. Does bed rest after cervical or lumbar puncture prevent headache? A systematic review and meta-analysis. CMAJ. 2001 Nov 13;165(10):1311-6. PMID: 11760976; PMCID: PMC81623.

Arevalo-Rodriguez I, Ciapponi A, Munoz L, Roqué i Figuls M, Bonfill Cosp X. Posture and fluids for preventing post-dural puncture headache. Cochrane Database Syst Rev. 2013 Jul 12;(7):CD009199. doi: 10.1002/14651858.CD009199.pub2. Update in: Cochrane Database Syst Rev. 2016;3:CD009199. PMID: 23846960.

6. **35-year-old woman presents with a complaint of headache. She reports that her pain is worse in the morning. She has also had some faint blurring of her vision, and on lying she experiences a buzzing sound in her ears. She denies any confusion, fevers, chills, recent URI symptoms. Her medical history is notable for obesity and dysfunctional uterine bleeding for which she uses an OCP. Her neurologic examination is non-focal. An MRI with gadolinium shows faint enhancement of the optic nerve but is otherwise normal. An LP is planned. Which of the following should be obtained?**
- Cytology
 - Opening pressure
 - Fungal culture
 - Oligoclonal IgG bands
 - All of the above

Answer: B Opening pressure should be obtained along with routine testing including bacteriology, cell counts, protein, and glucose. In the presence of a syndrome highly consistent with Idiopathic Intracranial Hypertension and a compatible MRI (optic nerve enhancement seen up to 50% of cases). A clearly elevated opening pressure (>25) is a classic finding of IIH and helps to confirm the diagnosis.

A), C), and D) are incorrect. Testing for malignancy (cytology), MS (oligoclonal bands), or fungal meningitis (fungal culture) is unnecessary.

7. **A 59-year-old man is brought in by his family with complaints of headache, confusion, and subjective fever. He complained of mild headache for the past two days and woke up confused the morning of presentation and felt warm to his family. His medical history is notable for osteoarthritis, hypertension, hyperlipidemia, and remote L4/5 discectomy. His physical examination is notable for fever 100.4, disorientation, and mild agitation. Neurologic exam was partly limited by agitation but he was able to sit up and stick out his arms when asked. An LP is planned. In addition to routine studies (cell count, bacterial culture, protein, and glucose) which of the following should be obtained?**
- Head CT
 - Oligoclonal IgG bands
 - HSV 1 & 2 PCR
 - Fungal cultures

Answer: C. HSV 1 & 2 PCRs should be considered for all patients with potential meningoencephalitis. An opening pressure should also be obtained, as it may influence the differential and the decision to send for additional studies.

A) Is incorrect. A head CT is not indicated as the patient doesn't meet criteria for a head CT (see question #1).

B) Is incorrect. Oligoclonal bands are inappropriate for initial evaluation of possible meningoencephalitis.

C) Is incorrect. Fungal cultures are not indicated in the absence of significant immunosuppression, elevated OP or other suggestive clinical signs.