

LUMBAR PUNCTURE

procedure in which a needle is passed into the subarachnoid space at the level of the lumbar spine

INDICATIONS:

- diagnosis of meningitis, encephalitis, subarachnoid hemorrhage, and autoimmune
- administration of anesthetic drugs, abx, and cytotoxic drugs

CONTRAINDICATIONS:

- evidence of intracranial space-occupying lesion or ↑ICP
- evidence of spinal cord compression
- prolonged clotting time and/or bleeding disorder
- local infection at site of needle insertion

Risks: herniation, infection, epidural hematoma, neurotoxicity, CSF leak causing headache, back pain

Procedure:

- ① patient in lateral decubitus or seated leaning forward
- ② administration of local anesthetic
- ③ spinal needle inserted into subarachnoid space between L4 and L5 (US-guided)
- ④ obturator removed to: assess opening/closing pressure, withdrawal fluid (3-4 tubes)
- ⑤ needle withdrawn, occlusive dressing applied, patient left prone/supine w/ pressure applied

CT done prior IF:

- space occupying lesion suspected (abscess, subdural hematoma, subdural empyema)
- significantly immunocompromised OR impairment due to level of consciousness

CSF ANALYSIS

Normal: clear color, no cells, 15-45g/dL protein, glucose 60% of serum, lactate 1.1-2.4 mmol/L

Appearance:

Cloudy/turbid → infection (>1000 WBC/microl)

Xanthochromia → breakdown of hgb, ↑ protein (>150), or systemic hyperbilirubinemia (>10)

Bloody → traumatic tap

Increased WBCs: ↑ gamma globulin → MS

↑ neutrophils → bacterial infections

↑ lymphocytes/monocytes → viral meningitis

↑ eosinophils → helminth infections

Protein: most proteins are excluded by the blood-brain barrier

↑ protein → demyelinating polyneuropathies or infection

↓ protein → trauma

Glucose:

↑ glucose → hyperglycemia

↓ glucose → bacterial meningitis (if very low → tb, mycoplasma, treponema meningitis)

Lactate:

↑ lactate → seizures, meningitis, encephalitis, ischemia, malignancy, metabolic disorders

↓ lactate → viral or aseptic meningitis

	WBCs	GLUCOSE	Protein	Opening P	Appearance
Normal	<5	60% serum	15-45	10-20 mmHg	Clear
Bacterial	↑↑ (>100)	↓ (<40%)	↑	↑	Cloudy
Viral	↑ (<100)	normal	↔ ↑ (>50)	↔ ↑	Most clear
Fungal	↑ (10-500)	↓	↑	↑	Normal (slightly turbid)