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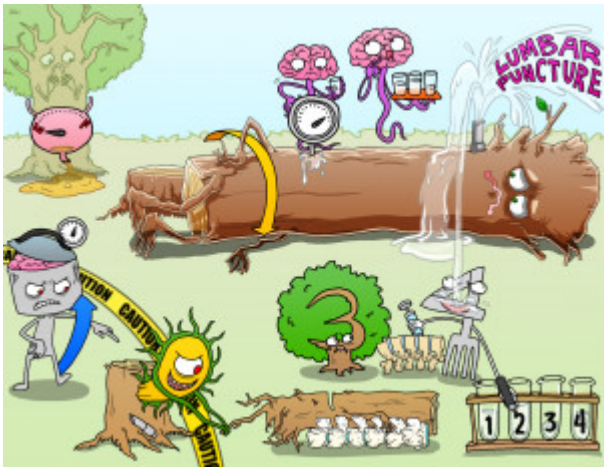
Lumbar Puncture

A lumbar puncture is a commonly used method for obtaining cerebrospinal fluid (CSF) samples and measuring CSF pressure by inserting a needle between the 3rd and 4th lumbar vertebrae. The sample is collected in a series of tubes and must be numbered in the order of collection. Prior to the procedure, ensure that the patient empties their bladder. Although the patient is usually in a side-lying fetal position, a prone position is the alternative used if the lateral decubitus position cannot be used or is unsuccessful. Contraindications to lumbar puncture include increased intracerebral pressure (ICP) and infection at the site of the puncture.



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Indications

CSF Sample

Brain-Spine-Fluid Sampler

A sterile needle is inserted between two lumbar vertebrae to withdraw CSF samples for diagnostic testing. The fluid is collected in a series of tubes and sent for analysis.

CSF Pressure

Brain-Spine-Fluid with Pressure Gauge

A manometer is attached to the hub of the sterile needle used to withdraw CSF samples. The manometer is used to measure CSF pressure. Normal CSF pressure is below 20 mm H2O (refer to the Picmonic on "CSF Lab Values: Normal").

Considerations

Empty Bladder

Empty-gauge Bladder

Prior to beginning the procedure, have the patient empty their bladder. Voiding will help minimize patient discomfort and decrease the risk of accidentally perforating the bladder during the procedure.

Side-lying Position

Side-lying Position

Usually, the patient undergoing a lumbar puncture is placed in a side-lying (lateral decubitus), fetal position with the knees flexed and the back rounded for maximal exposure of the site. To prevent accidentally puncturing the wrong site, ensure the patient remains still during the procedure. If the patient cannot tolerate the side-lying position or if the initial lumbar puncture is unsuccessful, a prone position may be used. A sitting position may also be used if the lumbar puncture is unsuccessful in the side-lying position. The patient should sit on the side of the bed and lean forward with arms on a table in front.

Between 3rd and 4th Lumbar Vertebrae

Punctured Between (3) Tree and (4) Fork Vertebrae

During a lumbar puncture, a sterile needle is inserted in between the 3rd and 4th lumbar vertebrae. Inform the patient that they may feel a temporary pain radiating down the leg.

Number Tubes

Numbering Tubes

The CSF samples are withdrawn in a series of four tubes and must be numbered in the order of collection. Each tube is analyzed separately for components, such as glucose, protein, and bacteria.

Supine Position After Procedure

Supine-spine After Puncture

After a lumbar puncture, the patient should return to a supine position for at least two hours to minimize the risk of developing a spinal headache. Encourage the patient to drink plenty of fluids and monitor for headache and signs of possible infection.

Contraindications

Increased ICP (Intracranial Pressure)

Up-arrow Pressure-cooker Cranium

Lumbar puncture is contraindicated in patients with increased ICP. If the patient has increased CSF, puncturing the lumbar area will cause the fluid to leak and decrease CSF pressure in the spinal column. This will cause the CSF pressure in the brain to shift towards low CSF pressure in the spinal column and cause acute neurological damage.

Infection at Puncture Site

Infectious-bacteria at Puncture Site

Lumbar puncture is contraindicated in patients with an infection at the puncture site. The presence of skin infection may be transferred into the CSF as the needle is inserted into the lumbar area.

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