

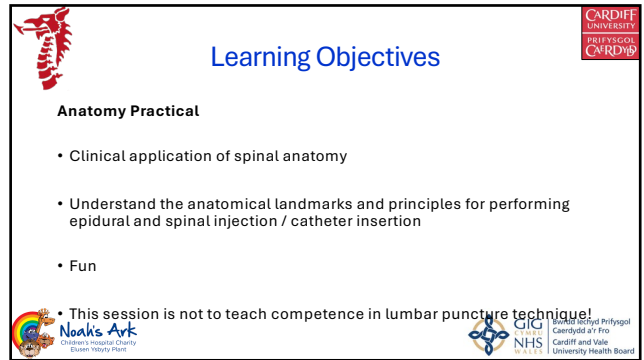
Anatomy Practical
Lumbar puncture

Dr Saraswathy Gowthaman
Consultant Anaesthetist
University Hospital of Wales

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Learning Objectives

Anatomy Practical

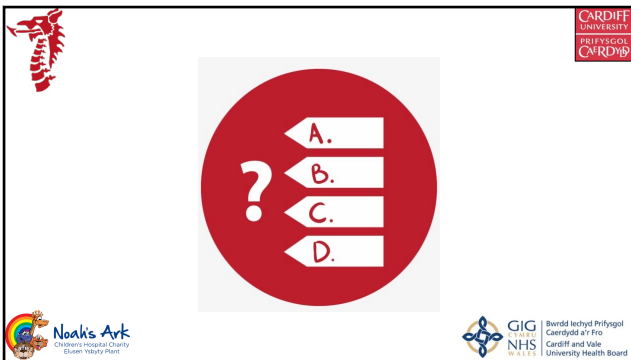
- Clinical application of spinal anatomy
- Understand the anatomical landmarks and principles for performing epidural and spinal injection / catheter insertion
- Fun

• This session is not to teach competence in lumbar puncture technique!

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LP SBAs

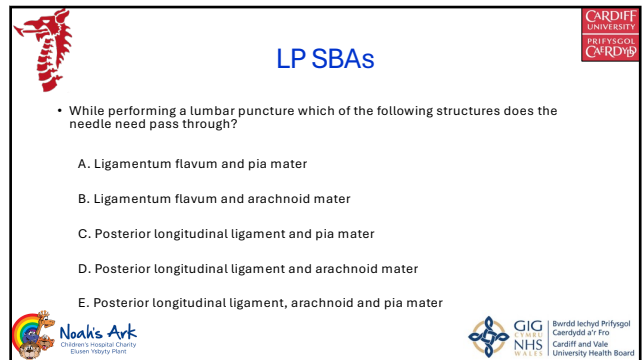
?

A.
B.
C.
D.

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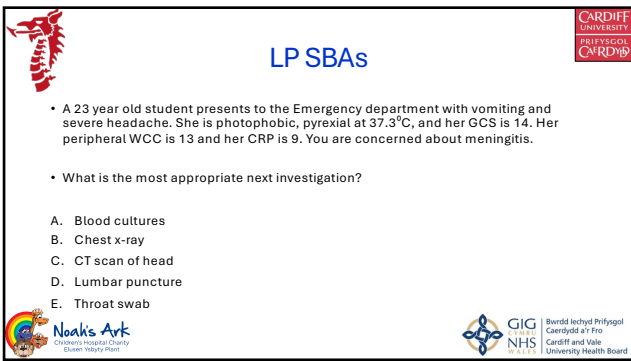
- While performing a lumbar puncture which of the following structures does the needle need pass through?

A. Ligamentum flavum and pia mater
B. Ligamentum flavum and arachnoid mater
C. Posterior longitudinal ligament and pia mater
D. Posterior longitudinal ligament and arachnoid mater
E. Posterior longitudinal ligament, arachnoid and pia mater

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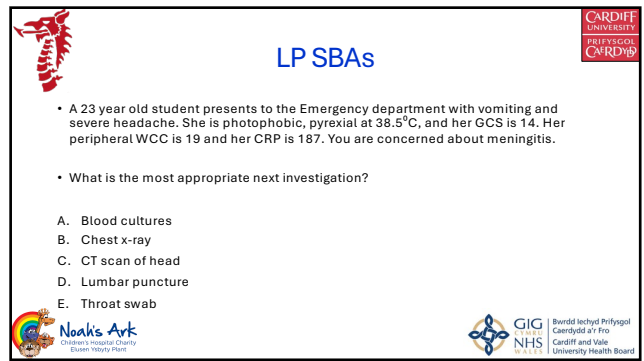
- A 23 year old student presents to the Emergency department with vomiting and severe headache. She is photophobic, pyrexial at 37.3°C, and her GCS is 14. Her peripheral WCC is 13 and her CRP is 9. You are concerned about meningitis.
- What is the most appropriate next investigation?

A. Blood cultures
B. Chest x-ray
C. CT scan of head
D. Lumbar puncture
E. Throat swab

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LP SBAs

- A 23 year old student presents to the Emergency department with vomiting and severe headache. She is photophobic, pyrexial at 38.5°C, and her GCS is 14. Her peripheral WCC is 19 and her CRP is 187. You are concerned about meningitis.
- What is the most appropriate next investigation?

A. Blood cultures
B. Chest x-ray
C. CT scan of head
D. Lumbar puncture
E. Throat swab

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Introduction

- Lumbar puncture
 - Needle is passed through the dura in the lumbar spine in order to obtain CSF
 - For diagnosis
 - Relieve pressure
 - Injection of drugs

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Clinical case 1

There seems to be a bit of a commotion around the staff toilet. You investigate and find that one of the senior nurses has collapsed on the floor.

She is conscious, vomiting and complains of a severe headache. A CT is promptly arranged..

What is the diagnosis?

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Case 2

In the aftermath you are discussing the case with some of the ward doctors who said a few weeks ago they had heard of a similar story which happened to one of the visiting relatives and apparently they had a nor:

What is the next most appropriate investigation?

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Clinical uses

- Diagnosis
 - Meningitis
 - Subarachnoid haemorrhage
 - inflammatory CNS disorders
- Relieve pressure
 - Hydrocephalus
- Administration drugs

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On the ward..

CSF result phoned

What's the likely differential?

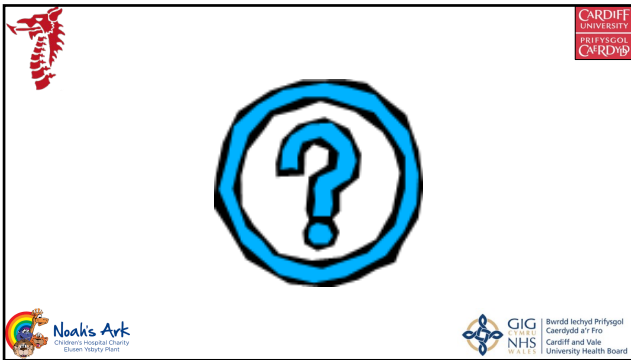
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On the ward..

CSF result phoned

What's the most likely differential?

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Anatomy

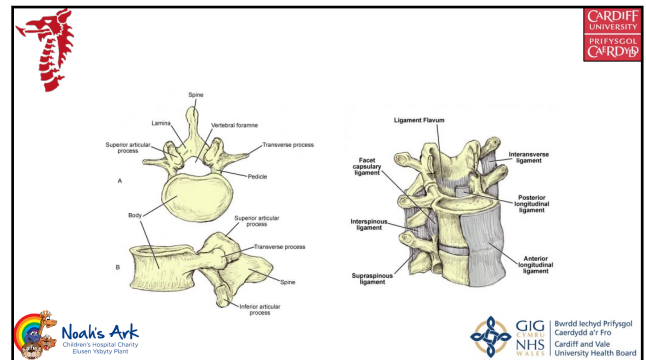
- In adults spinal cord ends at L1/2
- LP occurs below this level
- Usually at L3/4 or L4/5
- Usually use the midline technique

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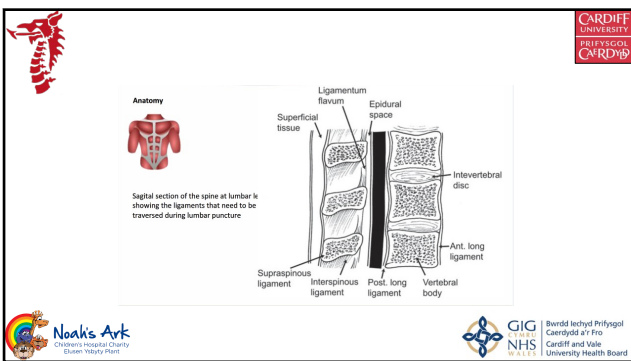
Anatomy

- 3 main ligaments
 - Tough suprapinous ligament
 - Interspinous ligament
 - Ligamentum flavum (yellow ligament)
- Below ligamentum flavum – potential space that surrounds the spinal canal; drugs may be introduced into the is space (**epidural space**) to perform an epidural block
- Beyond the epidural space is the dural sac (**sub-arachnoid space**) that contains CSF

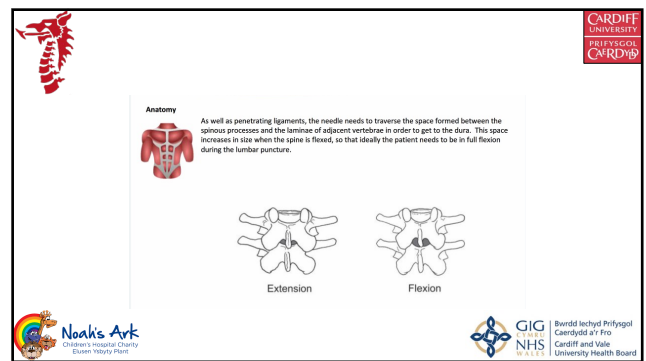
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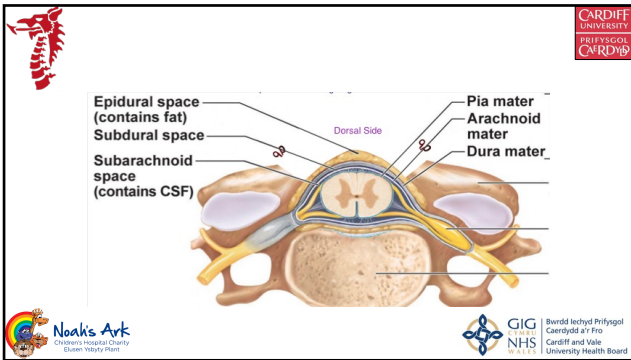
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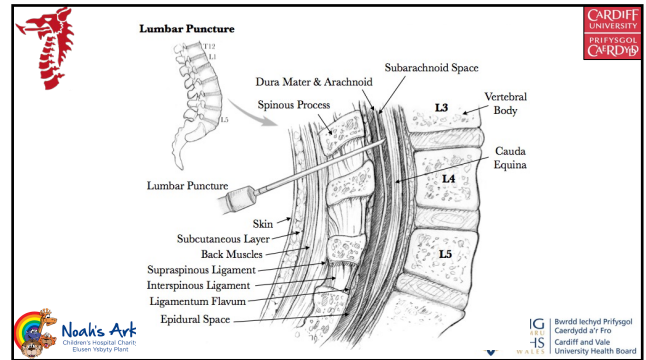
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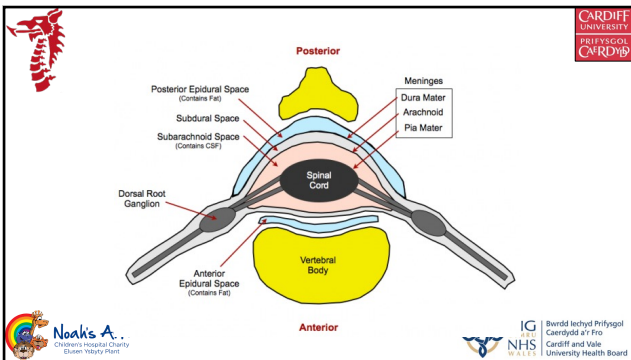
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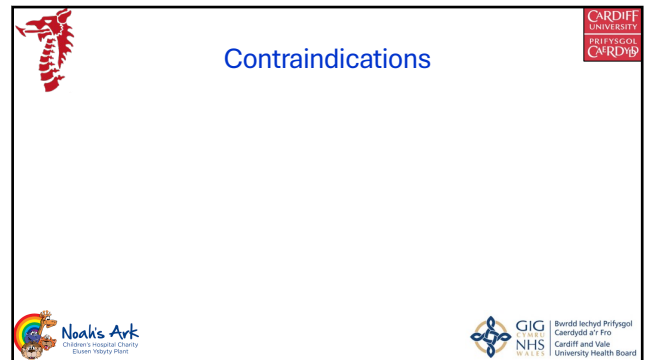
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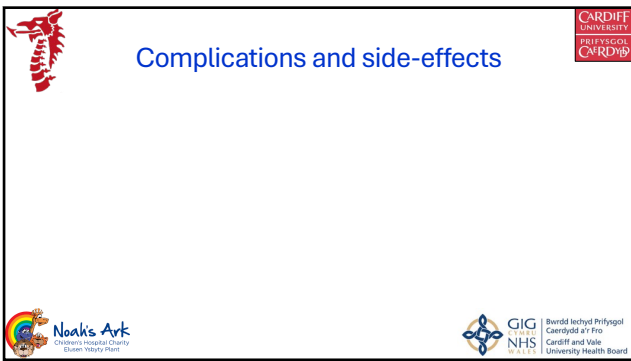
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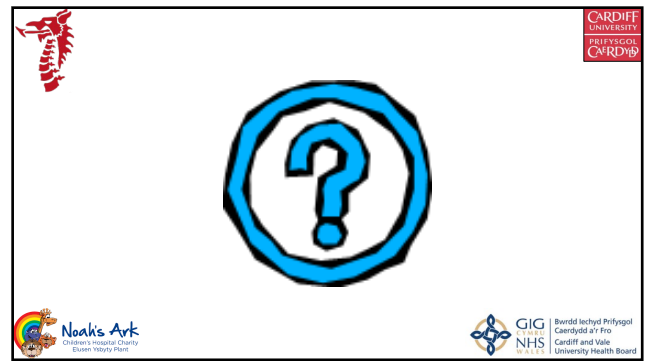
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Equipment and procedure

- Informed consent
 - Benefits, risks and complications
- Left lateral position

Equipment

- sterile towel
- cleaning solutions
- some swabs
- a manometer
- a spinal needle
- local anesthetic solution (double wrapped), needles for infiltration
- syringes
- Sterile bottles for culture and cell and biochemical analysis.

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Basic equipment for lumbar puncture.

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Procedure

Spinal needle is inserted between 3rd and 4th lumbar vertebrae.

Cerebrospinal fluid

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Lumbar Puncture

Lying Position

Sitting Position

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Procedure

✓ Identify the posterior superior iliac spines

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Site of needle entry


L4 Spinous Process

L3/4

L4/5

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Procedure



- ✓ Identify an interspace, at the level of the posterior superior iliac spines or one space below.

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Procedure



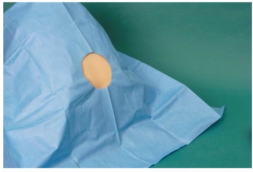
- ✓ Clean the back with a sterile solution over an area about 20cm square, with the anticipated injection point at the centre.

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Procedure



- ✓ Place a sterile drape around the clean area. Confirm the injection point, and ask the patient to fully flex the back (with the aid of an assistant).

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Procedure




- ✓ Infiltrate 1% lidocaine at the level of puncture with a small needle (orange or grey, 22-24 SWG). Wait 3 minutes for it to work.
- ✓ This time can be used to assemble the manometer for use.
- ✓ Change to a longer needle (green or blue, 18-20 SWG). Infiltrate the deeper tissues, aspirating before each injection of local anaesthetic. Wait another 3 minutes for the local anaesthetic to work.

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Procedure




- ✓ Push the introducer needle through the skin at 90 degrees. This needle will pass through the supraspinous ligament and the tip should lie in the spongy interspinous ligament.

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Procedure





- ✓ Insert the spinal needle (with the trocar in position) through the spinal needle. Gradually push it through the remainder of the interspinous ligament. Increased resistance will be felt as it enters the ligamentum flavum.

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Procedure



✓ Continue to push the needle through the ligamentum flavum. A loss of resistance will be felt as it passes into the epidural space. A few millimeters more and it will pass through the dura. At this stage a small 'pop' may be experienced.

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Procedure

✓ When the trocar is withdrawn, the correct position is confirmed by leakage of CSF.
✓ In this position the needle has usually been inserted to a depth of 5-6 cm in the adult.

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Procedure




✓ For all diagnostic lumbar punctures, the CSF pressure should be measured with a manometer.
✓ A 3-way tap at the bottom of the manometer is used to control the flow into the manometer.
✓ Once the CSF column has stopped rising up the tube (it will oscillate gently with respiration) the measurement (in cm of CSF) should be:

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Procedure





✓ Collect specimens of CSF in sterile containers. Usually at least 3 containers are required, with a few ml of CSF in each.

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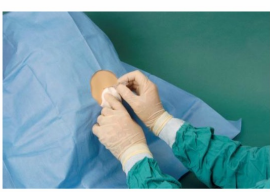


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Procedure

✓ Once all the samples have been collected and the CSF pressure has been measured, the needle and introducer needle may be completely withdrawn, and pressure applied to the puncture site with a sterile gauze swab for at least 2 minutes.


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Procedure

Apply a sterile plaster or dressing to the puncture site.



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Post-procedure

- Check the patient
- Lie flat for 30 minutes
- Safely dispose sharps
- Label specimens
- Microscopy and culture (microbiology)
- Protein and glucose (biochemistry)

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Summary

- Overview of the anatomy
 - brain meninges
 - spinal cord
- Clinical uses of lumbar puncture
- Overview of the procedure

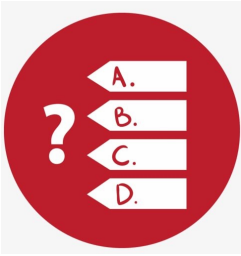
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