Anatomy.
Skin.
Subcutaneous fats.
Supraspinous ligament.
Interspinous ligament.
Ligamentum flavum.
Epidural space.
Dura.
Subarachnoid space.
The spinal cord usually ends at the level of L1 in adults and L3 in children.

Dural puncture above these levels is associated with a slight risk of damaging the spinal cord and is best avoided.

An important landmark to remember is that a line joining the top of the iliac crests is at L4 to L4/5.
Mechanism of action

- Local anaesthetic solution injected into the subarachnoid space blocks conduction of impulses along all nerves with which it comes in contact, although some nerves are more easily blocked than others. There are three classes of nerve: motor, sensory and autonomic. Stimulation of the motor nerves causes muscles to contract and when they are blocked, muscle paralysis results. Sensory nerves transmit sensations such as touch and pain to the spinal cord and from there to the brain, whilst autonomic nerves control the calibre of blood vessels, heart rate, gut contraction.

- Generally, autonomic and sensory fibres are blocked before motor fibres. This has several important consequences. For example, vasodilation and a drop in blood pressure may occur when the autonomic fibres are blocked.

- **Practical implications of physiological changes.** The patient should be well hydrated before the local anaesthetic is injected and should have an intravenous infusion in place so that further fluids or vasoconstrictors can be given if hypotension occurs.
The Advantages of Spinal Anaesthesia

1. cost
2. Respiratory disease.
4. Diabetic patients.
5. Muscle relaxation.
Indications for Spinal Anaesthesia.

Spinal anaesthesia is best reserved for operations below the umbilicus e.g. hernia repairs, gynaecological and urological operations and any operation on the perineum or genitalia.

All operations on the leg are possible.
**Older patients** and those with systemic disease such as chronic respiratory disease, hepatic, renal and endocrine disorders such as diabetes.

In **obstetrics**.
Contra-indications to Spinal Anaesthesia.

Absolute

1. Coagulopathy or other bleeding disorders.
2. Severe hypovolaemia. (Shock)
3. Patient refusal.
4. Increased Intracranial Pressure.
5. Severe aortic stenosis.
6. Severe Mitral stenosis.
7. Skin infection at the site.
Relative contraindication
1. Sepsis
2. Uncooperative patients.
3. Pre-existing neurological deficit.
5. Severe spinal deformities.
Local Anaesthetics for Spinal Anaesthesia.

Local anaesthetic agents are either heavier (hyperbaric), lighter (hypobaric), or have the same specific gravity (isobaric) as the CSF.

Hyperbaric solutions tend to spread below the level of the injection, while isobaric solutions are not influenced in this way. It is easier to predict the spread of spinal anaesthesia when using a hyperbaric agent. Isobaric preparations may be made hyperbaric by the addition of dextrose.

Hypobaric agents are not generally Used.
**Bupivacaine (Marcaine).** 0.5% hyperbaric (heavy) bupivacaine is the best agent to use if it is available. **0.5% plain bupivacaine is also popular.** Bupivacaine lasts longer than most other spinal anaesthetics: usually 2-3 hours.

**Lignocaine (Lidocaine/Xylocaine).** Best results are obtained with 5% hyperbaric (heavy) lignocaine which lasts 45-90 minutes.
Pre-operative Visit.

Patients should be told about their anaesthetic during the pre-operative visit. It is important to explain that although spinal anaesthesia abolishes pain, they may be aware of some sensation in the relevant area, but it will not be uncomfortable and is quite normal.

They must be reassured that, if they feel pain they will be given a general anaesthetic.
Premedication is not always necessary, but if a patient is apprehensive,
A benzodiazepine such as midazolam can be given to the patient in anxiolytic dose.
**Pre-loading**

All patients having spinal anaesthesia must have a large intravenous cannula inserted and be given intravenous fluids immediately **before the spinal**.

The volume of fluid given will **vary with the age of the patient and the extent of the proposed block**. A young, fit man having a hernia repair may only need 500 mls. Older patients are not able to compensate as efficiently as the young for spinal-induced vasodilation and hypotension and may need 1000mls for a similar procedure.
The fluid should preferably be normal saline or ringer lactate. 5% dextrose is readily metabolised and so is not effective in maintaining the blood pressure.
Position

1. Lateral (Lt lateral)
2. Sitting
Males tend to have wider shoulders than hips and so are in a slight "head up" position when lying on their sides, whilst for females with their wider hips, the opposite is true.
LEFT LATERAL POSITION
SITTING POSITION
The sitting position is preferable in the obese whereas the lateral is better for uncooperative or sedated patients.
Factors Affecting the level of Spinal anesthesia

- The baricity of the local anaesthetic solution.
- Dosage, concentration and volume injected.
- Site of injection.
- Position of the patient.
  - During Injection.
  - Immediately after injection.
- Patient Height.
complication

1. Immediate complication
   - Total spinal block leading to respiratory arrest.
   - Urinary retention.
   - Epidural hematoma, Bleeding.

2. Late complication
   - Post dural puncture headache (PDPH)
   - Backache
   - Focal neurological deficit
   - Bacterial meningitis
Treatment of Hypotension.

Hypotension is due to vasodilation and a functional decrease in the effective circulating volume.

1. vasoconstrictor drugs

2. All hypotensive patients should be given OXYGEN by mask until the blood pressure is restored.

3. Raising their legs thus increasing the return of venous blood to the heart.

4. Increase the speed of the intravenous infusion to maximum until the blood pressure is restored to acceptable levels.

5. pulse is slow, give glycopyrolate.
It is widely considered that pencil-point needles (Whiteacre or Sprotte) make a smaller hole in the dura and are associated with a lower incidence of headache (1%) than conventional cutting-edged needles (Quincke).
Treatment of spinal headache.

1. Remain **lying flat in bed** as this relieves the pain.

2. They should be encouraged to **drink** freely or, if necessary, be given **intravenous fluids to maintain adequate hydration**.

3. **Simple analgesics** such as paracetamol, aspirin or codeine may be helpful,
5. **Caffeine containing drinks** such as tea, coffee or Coca-Cola are often helpful.

6. **Prolonged or severe headaches** may be treated with **epidural blood patch** performed by aseptically injecting 15-20ml of the patient's own blood into the epidural space. This then **clots and seals the hole and prevents further leakage of CSF**.

It used to be thought that bedrest for 24 hours following a spinal anaesthetic would help reduce the incidence of headache.
END

THANK YOU