General Surgery - Topic 11 - Anaesthesia and pain management

Assessment and Choice of Anaesthesia

Preoperative Anaesthetic Assessment

History and Examination

Operation, History and Medicines

- Identify the operation, urgency, expected duration, position and likely physiological disturbance.
- Ask about previous anaesthesia, difficult airway, drug reactions, postoperative nausea and relevant family anaesthetic problems.
- Review cardiopulmonary disease, sleep apnoea, renal or liver dysfunction, diabetes, reflux and aspiration risk.
- Record medicines, anticoagulants, allergies, alcohol, smoking and the timing of the last food and drink.

Functional Reserve and Airway Examination

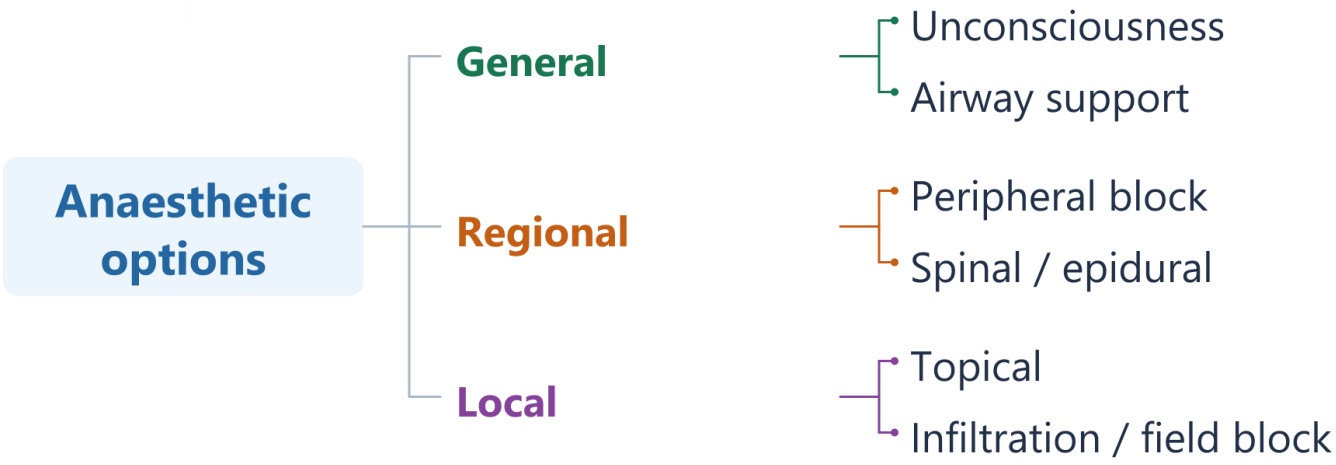
- Assess functional capacity, frailty, nutritional state and the likely need for postoperative support.
- Examine the airway, teeth, mouth opening, neck movement and relevant heart and lung findings.
- No single airway test reliably excludes all difficulties, so preparation must include a rescue plan.

Planning and Consent

- Choose investigations according to clinical findings and the proposed operation.
- Explain the anaesthetic options, benefits, important risks, expected recovery and pain-control plan.
- Plan fasting, medication changes, aspiration precautions, vascular access and monitoring individually.
- For suitable healthy elective adults, clear fluids are commonly allowed until two hours and a light meal until six hours before anaesthesia.
- Emergency surgery and conditions that delay gastric emptying require a separate risk-based plan.
- Confirm availability of trained staff, oxygen, suction, monitoring, airway equipment and emergency medicines.

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Main Techniques



Technique	Main effect	Important requirement
General anaesthesia	It produces unconsciousness with suitable analgesia and control of surgical responses.	Airway, ventilation and physiological monitoring must be managed.
Regional anaesthesia	It blocks sensation in a larger nerve distribution or neuraxial region.	Check the block, contraindications, monitoring and rescue plan.
Local anaesthesia	It blocks sensation at or near the operative site.	Calculate the total dose and prepare for toxicity or inadequate anaesthesia.

- The best technique depends on the operation, patient preference, comorbidities, anticoagulation, skills and facilities.
- Regional or local anaesthesia can sometimes be combined with general anaesthesia for improved pain relief.
- Sedation is not the same as local anaesthesia and can still impair breathing, airway reflexes and decision-making.

General Anaesthesia

- General anaesthesia produces a controlled reversible state of unconsciousness with appropriate analgesia and suppression of responses to surgery.

Components and Sequence

- Muscle relaxation is added when required, but a paralysed patient still needs adequate hypnosis and analgesia.

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Preparation and Anaesthetic Sequence

- Preparation includes equipment checks, monitoring, intravenous access and preoxygenation.
- Induction is followed by maintenance of anaesthesia, ventilation and physiological stability.
- At the end, anaesthetic drugs are adjusted or stopped, neuromuscular block is managed and airway removal is planned safely.
- Recovery requires continued monitoring because airway obstruction, residual weakness and drug effects can persist.

Important Risks

General Adverse Effects

- Risks include nausea, dental injury, aspiration, hypoxaemia, hypotension, awareness and drug reactions.

Malignant Hyperthermia

- Malignant hyperthermia is a rare inherited susceptibility triggered by certain anaesthetic agents and requires immediate specialist treatment.
- A rising carbon dioxide level, rigidity and rapidly developing physiological disturbance may be more useful early clues than fever alone.

Difficult-Airway Planning

- A documented difficult-airway plan and careful communication reduce avoidable harm.

Regional Anaesthesia

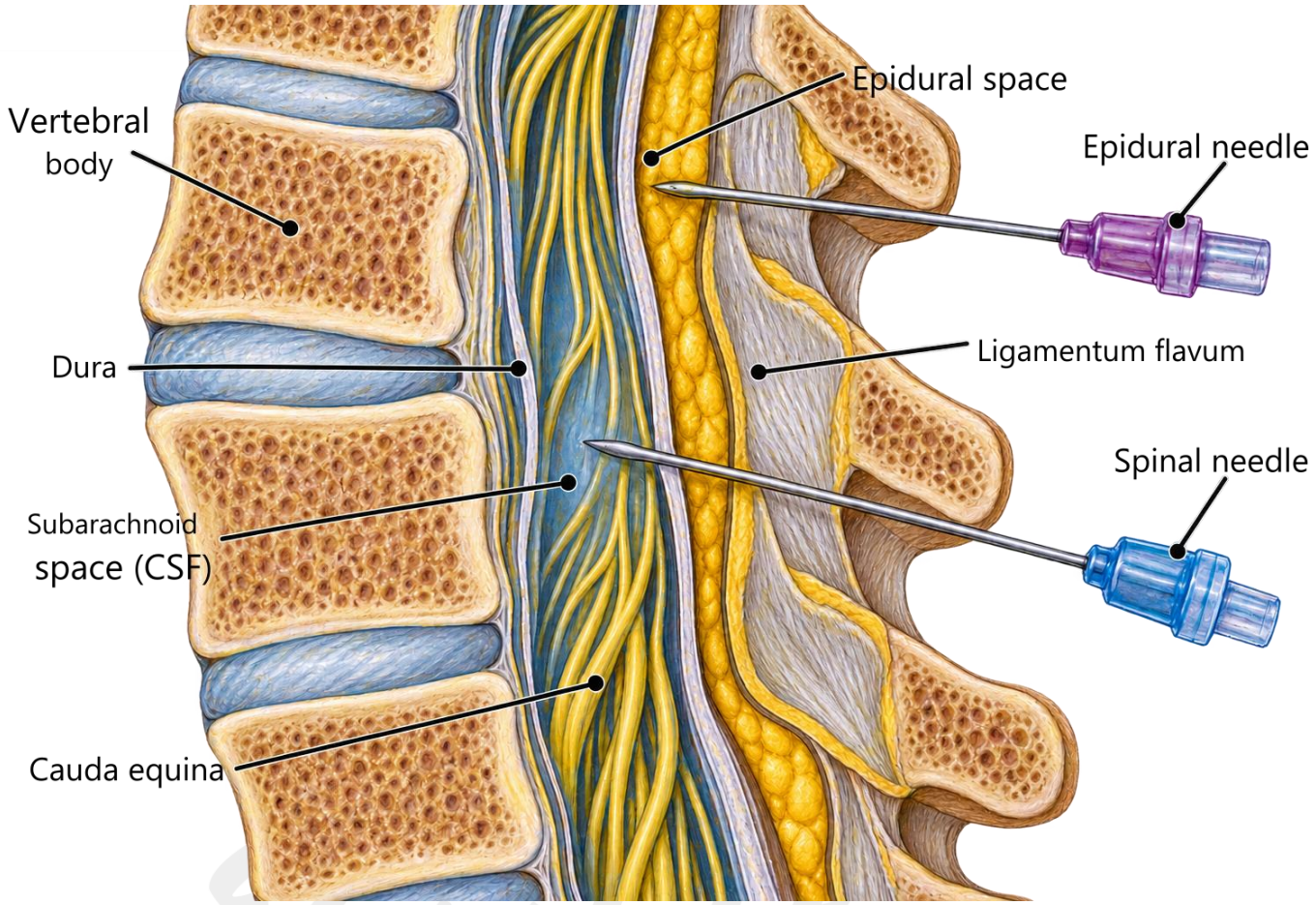
Peripheral and Neuraxial Techniques

1. Peripheral Nerve Blocks

- Local anaesthetic placed near a nerve or plexus blocks sensation in its distribution.
- Ultrasound and other localisation methods help guide selected blocks, but do not remove the need for anatomical knowledge and safety checks.
- Potential complications include incomplete block, nerve injury, bleeding, infection and systemic local-anaesthetic toxicity.
- Protect the numb limb from pressure, heat and unrecognised injury until sensation and strength recover.

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2. Spinal and Epidural Techniques



Epidural injection is outside the dura, while spinal injection enters the subarachnoid space containing cerebrospinal fluid

A. Spinal Anaesthesia

- Spinal anaesthesia places local anaesthetic in the cerebrospinal fluid within the subarachnoid space.
- The small intrathecal dose acts directly on nerve roots and generally produces a relatively rapid, dense block.

B. Epidural Anaesthesia

- An epidural technique places medicine outside the dura and may use a catheter for repeated dosing or infusion.
- An epidural catheter allows titration and prolonged analgesia, but its position and effect require careful repeated assessment.

Clinical Uses, Contraindications and Complications

Clinical Uses and Block Effects

- Neuraxial blockade can provide surgical anaesthesia and postoperative analgesia for suitable procedures.
- Sympathetic blockade can cause hypotension, and an excessively high block can impair breathing and circulation.

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Complications and Contraindications

- Other risks include headache after dural puncture, urinary retention, infection, bleeding and rare neurological injury.
- Patient refusal, important uncorrected coagulation problems and infection at the insertion site are major reasons not to proceed.
- Anticoagulant timing and other contraindications need specialist assessment under the relevant neuraxial guidelines.

Urgent Neurological Warning Signs

- New severe back pain, progressive weakness or bladder dysfunction after neuraxial treatment requires urgent assessment.

Local Anaesthesia

Mechanism and Uses

- Local anaesthetics block voltage-gated sodium channels and prevent propagation of nerve impulses.
- Topical anaesthesia, local infiltration and field blocks are useful for suitable minor procedures.
- Lidocaine has a relatively rapid onset, while agents such as bupivacaine can provide longer action.
- An inflamed or acidic tissue environment may reduce the effectiveness of local infiltration.

Dose and Injection Safety

Dose Calculation and Maximum Exposure

- Calculate the total dose from the concentration and volume before injection and include every source of local anaesthetic used.
- A 1% solution contains 10 mg/mL, so 10 mL contains 100 mg.
- Use the agent-specific maximum dose and reduce exposure when patient factors increase toxicity risk.
- The effects of different local anaesthetics are additive, so combining agents does not give a separate full maximum allowance for each.

Injection and Resuscitation Safety

- Inject incrementally with appropriate checks and monitoring, using the lowest effective dose.
- Resuscitation equipment and a local-anaesthetic toxicity protocol must be immediately available.

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