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Essential Quick Review

With Free Companion FAQs on Oral Surgery

Oral Surgery



HIGHLIGHTS

- Supplementary FAQ book containing Definitions, Classifications and Viva-voce
- Diagrams with supporting answers
- Recent question bank of all India universities
- Covers entire undergraduate DCI syllabus

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CHAPTER 4

General Anaesthesia

LONG ESSAYS

Question 1

Explain pre-anaesthetic evaluation. What are its advantages and disadvantages? What are the various drugs used for the same? Also explain assessment of physical status of the patient.

Answer

Pre-anaesthetic evaluation is important for all patients undergoing surgical procedures under general anaesthesia.

If the patient has to undergo surgery under general anesthesia, then he or she should be assessed thoroughly by the anaesthetist prior to the surgery.

- Proper medical history evaluation should be done
- Any previous history of exposure to anaesthesia should be recorded
- Present physical status, medications in use, if any should be found out
- Presence of mobility, dentures, bridges, and crowns on anterior teeth should be checked
- The patient should be informed about the endotracheal tube, masks, IV lines, etc.
- Patient should also be told that these may be present when he recovers from anaesthesia
- An informed consent should be signed by the patient or by the caretaker
- Any query or doubt regarding the procedure should be clarified to the patient
- Appropriate laboratory findings should be checked and also the availability of cross matched blood, if required
- A patient is co-operative if he or she is well-prepared.

Advantages

- Reduced stress
- Smoother induction and recovery
- Decreased amount of induction
- Reduced secretions
- Reduced autonomic responses.

Disadvantages

- Cost is a common concern
- Time factor: Premedication given subcutaneously usually takes 20 minutes to reach peak effect but can last up to 2 hours.
- Procedure may take longer due to inclusion of recovery phase.

Various Drugs Used

- Anticholinergics
- Phenothiazines
- Benzodiazepines
- α2-agonists
- Opioids.

Anticholinergics (Parasympatholytics)

- Examples: Atropine, Glycopyrrolate (Robinul-V)
- Exerts effect by blocking the actions of the parasympathetic neurotransmitter acetylcholine at the muscarinic receptors
- Reverses the parasympathetic effects.

Indications

- To prevent or treat bradycardia by suppressing stimulation of the vagal nerve
- In combination with opioids
- To reduce salivary and tear secretions
- Promotes bronchodilation
- Blocks the stimulation of the vagus nerve preventing bradycardia and reduced cardiac output.

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Effects

- Dilate pupils (mydriatic)
- Thicker mucus secretions in the airway may occur
- Reduces gastrointestinal activity by inhibiting peristalsis.

Contraindications

- Tachycardiac patients
- Possibly with geriatrics or with other conditions, such as, congestive heart failure that could not handle a potential tachycardia
- Conditions, such as constipation and ileus, which would further reduce peristaltic action of the intestine (i.e., endoscopic procedures)
- Glycopyrrolate and atropine produce basically the same effect
- Glycopyrrolate has a slower onset of action and generally has less potential for producing a tachycardia or cardiac arrhythmia
- Atropine is more potent and faster acting
- Salivation is more effectively suppressed with glycopyrrolate.

Phenothiazines (Tranquilizers)

Indications

- Good sedation for healthy patients undergoing elective procedures
- Anti-emetic.

Contraindications

- Convulsing/epileptic patients, seizure history or head trauma
- Shock (hypovolemia) and hypothermia because of peripheral vasodilation that can lead to hypotension
- Depressed patients
- Liver or kidney disease
- Allergy testing because of antihistamine effect.

Other Effects

- Antiarrhythmic effect
- May cause excitement rather than sedation
- Personality changes that usually subside within 48 hours.

Benzodiazepines (Tranquilizers)

Examples

- Diazepam (Valium)
- Midazolam (Versed)
- Lorazepam (Ativan).

Indications

- Convulsing/epileptic patients
- Patients with a history of seizure
- Minimal cardiovascular or respiratory depression
- Ideal for older, depressed or anxious patients.

Contraindications

- May cause excitement
- Neonate with poor hepatic function
- Valium is in a propylene glycol solution is insoluble in water
  - May precipitate with other drugs
  - Propylene glycol is irritating and may sting at the injection site
  - Does not work well when given via routes other than IV.

α2-agonists

- They are derivatives of thiazine.
- Examples:
  - Xylazine (Rompun, Anased)
  - Romifidine
  - Detomidine (Dormosedan)
  - Medetomidine (Domitor).
- Stimulates the α_2-adrenoreceptors causing a decrease effect in norepinephrine
- Have some short-lived (16-20 minutes) analgesic effects
- Will cause vomiting in up to 50% of patients.

Contraindications

- Considerable potential for side effects, especially if administered intravenously
- Profound cardiovascular effects include bradycardia, profound hypotension, decreased contractility, stroke volume and second degree heart block
- Reduces pancreatic secretions causing transient hyperglycemia (exacerbates dehydration).

Opioids

- Act by reversible combination with one or more specific receptors in the brain and spinal column.
- Commonly used:
  - Morphine
  - Oxymorphone (Numorphan)
  - Butorphanol (Torbugesic, Torbutrol)
  - Hydromorphone
  - Meperidine (Demerol, pethidine)
  - Fentanyl.

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- Fentanyl patches:
  - Takes 8–12 hours to reach effectiveness but will last for several days
  - Very few cardiovascular side effects
  - Does not significantly contribute to vasodilation or hypotension.
- Other effects in addition to analgesia:
  - Cardiopulmonary effects
  - Bradycardia
  - Possible hypotension
  - Increased muscle contraction in low doses
  - Respiratory depression
  - Gastrointestinal effects
  - Addiction
  - Body temperature decreases
  - Increased responsiveness to noise
  - Cough suppression
  - Excessive salivation
  - Sweating.
- Phencyclidines (cyclohexylamine)
- Ketamine (Ketaset, Ketalean, Vetalar)
- Tiletamine hydrochloride
- Telazol, in combination with zolazepam:
  - Produces cardiovascular stimulation
  - Increases muscular rigidity
  - Causes salivation.

Indications

- Immobilization of patient
- Mucous membrane application via the mouth is effective.

Contraindications

- Never use alone
- Avoid in person with seizure history
- Produces poor visceral analgesia
- Increases cranial pressure
- Increases ocular pressure
- Prolonged unreliable recoveries
- Convulsion effect can be ameliorated by combining with a tranquilizer
- Do not use in cases with possibility of brain herniation
- Do not use where perforation of the eye chamber is suspected.

Neuroleptanalgesics

Drugs with any combination of an analgesic and a tranquilizer (eg oxymorphone and acepromazine).

Indications

- Heavier sedation (depending on dose) for short procedures (i.e. wound suturing, porcupine quill removal)
- Cardiac or shock cases.

Examples of injectable anaesthetics are:

- Brabiturates
- Propofol
- Cyclohexamines
- Etomidate
- Guaifenesin
- Fentanyl.

Assessment of the Physical Status of the Patient

- The American Society of Anaesthesiologists (ASA) adopted the ASA physical status classification. It is useful in determining the surgical and anaesthetic risk prior to the procedure.
- ASA I:
  - The patient has no organic, physiological and biochemical or psychiatric disturbance
  - The pathologic process for which the operation is being conducted is localized and does not entail any systemic disturbance.
- ASA II:
  - Mild to moderate systemic disturbances caused either by the condition to be treated surgically or by other pathophysiological process
  - Mild organic heart disease, diabetes, hypertension, anaemia, old age, etc.
- ASA III:
  - Limitation of lifestyle due to disease
  - Severe systemic disturbances or diseases, e.g., angina, history of myocardial infarction (MI), diabetes, etc.
- ASA IV:
  - Life-threatening severe systemic disorder.
- ASA V:
  - A morbid end-patient not expected to survive more than 24 hours or without operation.
- ASA VI:
  - Emergency operation of any variety.

Question 2

Discuss general anaesthesia in detail.

Answer

General anaesthetics are the drugs that brings about a reversible loss of consciousness. These drugs are generally used to facilitate surgery.

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Anaesthetics are classified into two classes:

- Inhalation anaesthetics
  - Vapours or gases
  - Generally halogen gases.
- Intravenous anaesthetics
  - Injections
  - Anaesthetics or induction agents.

Inhaled Anaesthetics

- Halothane
- Enflurane
- Isoflurane
- Desflurane.

Physical and Chemical Properties of Inhaled Anaesthetics

- Addition of halogens to hydrocarbons and ethers increase anaesthetic potency, but it also increases the potential for inducing cardiac arrhythmias in the following order: F < Cl < Br
- Ethers having an asymmetric halogenated carbon are potent anaesthetics such as, enflurane
- Halogenated methyl ethyl ethers (enflurane and isoflurane) are more stable, more potent and have better clinical profile than halogenated diethyl ethers
- Fluorination decrease inflammability and increases the stability of adjacent halogenated carbons
- Complete halogenations of alkane and ethers or full halogenations of end methyl groups decrease potency and enhances convulsant activity.

Intravenous Anaesthetics

Used in combination with inhaled anaesthetics to:

- Maintain general anaesthesia
- Supplement general anaesthesia
- Provide sedation
- Control blood pressure.

Essential Properties of Anaesthesia

- Hypnosis: Unconsciousness
- Analgesia: Perception of pain eliminated
- Muscle relaxation
- Depression of spinal motor reflexes.

Theories of General Anaesthesia Function

- Lipid theory: The higher the solubility of anaesthetics is in oil, the greater is the anaesthetic potency. It is a rejected concept
- Protein (receptor) theory: It states that anaesthetic potency of an anaesthetic is related with the ability of anaesthetics to inhibit enzymes activity of a pure, soluble protein
- Binding theory: This theory states that the anaesthetics bind to hydrophobic portion of the ion channel, thus producing the anaesthetic action.

Mechanism of Action

- Most recent studies suggest:
  - General anaesthetics act on the central nervous system by modifying the ion channels at molecular level of neurons, thus modifying the neuronal electrical activity
  - This occurs either by the binding of the anaesthetic molecules to the ion channels or they disrupt the function of the molecules which maintain the ion channels.
- Receptors that maintain the neuronal excitability are:
  - Voltage-gated ion channels, such as, sodium, potassium and calcium channels
  - Ligand-gated ion channel superfamily
  - G protein-coupled receptors superfamily.

General Actions of Inhaled Anaesthetics

- Depreses respiration and response to carbon dioxide (CO_2)
- Depreses the urine output and renal blood flow
- Relaxation of skeletal muscles in higher concentrations
- Reduction of peripheral vascular resistance and arterial pressure. Isoflurane is the best anaesthetic which is able to maintain coronary function as compared to other agents
- Increase blood flow to cerebrum and decreases cerebral metabolism.

Toxicity and Side Effects

- Decreased CO_2 drive (medullary chemoreceptors), i.e., it takes higher concentration of CO_2 to stimulate respiration
- Depressed cardiovascular drive
- Methoxyflurane leads to fluoride ion toxicity as it is metabolized in liver and leads to release of fluoride ions in the body
- Due to decrease in the renal function, the fluoride is not excreted out and accumulates causing nephrotoxicity.

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Oral Surgery

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