Anxiety

- Probably the most frequent etiologic factor in the generation of a medical emergency
- In combination with a labile medically compromised patient, contributes to medical crisis and possible fatality
- Can be effectively managed in many ways, including the use of sedation and anesthesia

Anxiety and Pain Control

- General Anesthesia=unconsciousness
- Sedation=diminished consciousness
- Nitrous oxide=sedation
Behavioral Manifestations of Anesthesia (Guedel)

- Stage I - Analgesia
- Stage II - Delirium
- Stage III - Surgical Anesthesia
  - Plane 1
  - Plane 2
  - Plane 3
  - Plane 4
- Stage IV - Medullary Paralysis

Anxiety and Pain Control

- General Anesthesia
  - Intravenous
  - Inhalational
- Parenteral Sedation (Conscious Sedation)
  - Intravenous
  - Intramuscular
  - Submucosal
- Enteral Sedation (Oral Sedation)
- Nitrous Oxide Sedation

Conscious Sedation

- CNS depression: not unconscious
  - amnesia
  - diminished ability to respond to command
  - diminished ability to remain unobstructed

Big Risks

- Obesity
- Asthma/Pulmonary disease
- Hypomobility of the mandible: “locked jaw”
- Extremes of age

Respiratory Difficulty

- Airway obstruction
- Respiratory arrest
- Cardiac failure/acute pulmonary edema
- Laryngospasm
- Bronchospasm
  - asthma
  - allergic reaction
Mortality Statistics

• Death/serious disability in the office practice of OMS is 1:800,000 anesthetics

Anesthetic Agents Commonly Used with a GA in the OMS Environment

• Benzodiazepine
  – Midazolam
  – Diazepam
• Opioid
  – Meperidine
  – Fentanyl
• Barbiturate
  – Sodium methohexitol
• Propofol
• Ketamine
• Inhalational agent
  – Isoflurane, Sevoflurane, Halothane

Point to Remember

• Any anesthetic/sedative/opioid regardless of route of administration can be a general anesthetic (can cause unconsciousness)

Routes for Delivery of General Anesthetics

• Intravenous (IV)
• Inhalational

Types of General Anesthetics

• Induction agents
  – Induction agents usually administered IV
  – can be inhalational for those who do not tolerate IV access
• Maintenance agents
  – Maintenance agents usually administered inhalationally or IV with bolus or continuous infusion technique

FIGURE 19-1 Structural formulas of anesthetic drugs.
General Anesthetics-Intravenous Agents

- Primary role as induction agents
- Maintenance with total intravenous anesthesia
  - Rapid redistribution
  - Shorter half lives
  - Environmental risk of inhalational agents
- Rapid distribution to vessel rich tissues

General Anesthetics-Intravenous Agents

- High lipid solubility allows for rapid induction
- When redistributed out of the brain, effect decreases
- Advantages
  - Rapid and complete induction
  - Less CV depression

General Anesthetics-Intravenous Agents

- Benzodiazepines
  - Rarely used alone for general anesthesia
  - Cannot easily induce and maintain general anesthesia
  - Lack analgesic properties
  - Used for sedative and amnestic effects
- Opioids
  - Decrease MAC of inhalation agents
  - Primarily used as adjuncts
  - Respiratory depression

General Anesthetics-Intravenous Agents

- Ketamine
  - Duration of anesthesia 5-20 minutes
  - Metabolized in the liver
  - Increase in HR, BP, and CO due to sympathomimetic effects
  - Do not use in patients that will not tolerate above
  - Stimulates salivary secretions
  - Emergence phenomenon 5-30%

General Anesthetics-Intravenous Agents

- Ketamine
  - “Dissociative anesthesia”
  - Amnesia
  - Analgesia
  - Catalepsy
  - Thalamoneocortical and limbic systems
  - Protective reflexes maintained
  - NMDA antagonist
General Anesthetics-Intravenous Agents

- Ketamine (cont.)
  - Affects mu opioid receptors
  - Onset and peak plasma concentrations
    - 1 minute after IV
    - 5-15 minutes after IM
    - 30 minutes after oral
  - Distributional half life 11-16 minutes
  - Elimination half life 2-3 hours

- Methohexital
  - 2.5 times more potent than thiopental
  - Shorter duration of action
  - Sleep time 5-7 minutes
  - Mean elimination half life 3.9 hours
  - Biotransformed in the liver
  - Excitatory phenomena
  - Most often used GA in OMS

- Propofol
  - Unrelated to other general anesthetics
  - Oil in water emulsion
  - Rapid onset
  - Distributional half life 1-8 minutes
  - Terminal elimination half life 4-24 hours
  - Extensive plasma and tissue protein binding

- Propofol (cont.)
  - Disappears from bloodstream more rapidly than thiopental
  - Decreases MAP 20-30%
  - Apnea 22-45% after induction dose
  - Pain on injection
  - Less N & V
  - Discard unused portion after 6 hours

Inhalational Anesthetics Uptake and Distribution

- Blood solubility- low, intermediate and high
- Muscle has an affinity for anesthetic agents similar to that of blood
- Lipids have a high affinity for anesthetic agents
MAC-Minimum Alveolar Concentration

- The amount of anesthetic gas that will provide surgical anesthesia so that 50% of the subjects will not respond to the surgical incision

Elimination and Metabolism of Anesthetic Gases

- Same factors apply as uptake regarding gas principles
- Most agents are biotransformed in the liver to some degree

Pharmacologic Effects of Inhalation Agents

- CV
  - Depression of myocardial contractility
  - Sensitivity to catecholamines
  - Concerns regarding bradycardia
- Depression of peripheral vascular resistance
  - Effect is hypotension
- Respiration
  - Depression of medullary responses and respiration

General Anesthetics-Inhalational Agents

- Nitrous Oxide
  - MAC is 105%
  - Blood/gas partition coefficient 0.47
  - With other Gas, concentration is 50-70%
  - Little effect on respiration
  - Eliminated unchanged
  - Dysphoria and nausea with increased concentrations
  - Diffusion hypoxia
  - Can induce changed in folate and amino acid
General Anesthetics-Inhalational Agents

• Sevoflurane
  – MAC 2.05%
  – Mild airway irritant
  – Suitable for mask induction
  – Rare hepatotoxicity

Inhalational Agents

• Desflurane
  – Blood gas partition coefficient 0.42
  – Irritating to airway
  – MAC 6%
  – Required heated vaporizer
  – Expensive compared to other anesthetic gases
  – Reduces SVR and MAP, but increase in heart rate causing stable CO
  – Low risk of hepatotoxicity
  – Rapid depth and recovery

Inhalational Agents

• Isoflurane (Forane)
  – Anesthesia of choice
  – Blood/gas partition coefficient 1.4 MAC 1.15%
  – "Pungent" odor
  – Can provide muscle relaxation (high concentrations)
  – Dose dependent depression of myocardial contractility
  – Coronary vasodilation
  – CO maintained
  – Can use catecholamines
  – Respiratory depression
  – Neither nephrotoxic or hepatotoxic
  – Coronary vasodilation
  – CO maintained
  – Can use catecholamines
  – Respiratory depression
  – Neither nephrotoxic or hepatotoxic

Inhalational Agents

• Halothane
  – Halogenated hydrocarbon
  – MAC is 0.75%
  – Blood/gas partition coefficient 2.3
  – Poor analgesic properties
  – Incomplete muscle relaxation
  – Decreased MAP
  – Depressant effect on myocardial contractility
  – Vasodilator
  – Depressant effect on respiration
  – Elimination-alveolar excretion and hepatic metabolism
  – Sensitizes heart to catecholamines
  – Associated with hepatotoxicity
  – Malignant hyperthermia

Inhalational Agents

• Halothane (cont.)
  – Vasodilator
  – Depressant effect on respiration
  – Elimination-alveolar excretion and hepatic metabolism
  – Sensitizes heart to catecholamines
  – Associated with hepatotoxicity
  – Malignant hyperthermia
General Anesthesia in a Hospital Operating Room or Outpatient Surgical Center

- NPO
- Intravenous access
- Preanesthetic sedative
- Induction agent (general anesthetic)
- Muscle relaxant
- Intubation
- Maintenance of the anesthetic (general anesthetic)
- Emergence
- Recovery
- Average time > 30 minutes-several hours
- Patient supine (prone)
General Anesthetic in an Oral and Maxillofacial Surgery Office

- NPO
- IV access
- Preanesthetic sedative and analgesic
- Induction agent/maintenance agent
- Emergence

Recovery
- Average time 20-30 minutes
- No intubation
- Patient in semi recumbent position
Differences between a Hospital GA and an Office GA

- **Hospital GA**
  - Patient intubated
  - Skeletal muscle relaxant administered (at least for intubation)
  - Patient is supine
  - Inhalational agents used frequently
  - Longer anesthesia period

- **Office GA**
  - No endotracheal tube
  - Patient is semi supine
  - No muscle relaxant
  - IV agents most frequently used
  - Anesthesia duration is less than 30 minutes