

Anesthesiologists in an operating room. One is holding a clear oxygen mask over a patient's face. The scene is brightly lit, and the medical staff are wearing blue scrubs and hairnets.

General principles of anaesthesiology

Lecture for 5-year medical students

Lecture plan

- Introduction
- Preoperative History and Physical
- IV's and Premedication
- Commonly Used Medications
- Room Setup and Monitors
- Induction and Intubation
- Maintenance
- Emergence
- PACU Concerns

Induction to anaesthesiology

Definitions

Anesthesia - From the Greek meaning lack of sensation; particularly during surgical intervention.





Induction to anaesthesiology

- On October 16, 1846, in Boston, William T.G. Morton - the first publicized demonstration of general anesthesia using ether.
- The pre-existing word *anesthesia* was suggested by Oliver Wendell Holmes, Sr. in 1846 as a word to use to describe this state.

History of anaesthesia



- William T G Morton

“Inventor and Revealer of Inhalational Anaesthesia: Before Whom, in All Time, Surgery was Agony; By Whom, Pain in Surgery was Averted and Annulled; Since Whom, Science has Control of Pain.”

History of anaesthesia

ETHER



1. Newspaper reporter
2. John Call Dalton
3. William Williamson
Wellington
4. Abel Lawrence Peirson
5. Charles Hosea Hildreth
6. William Thomas
Green Morton
7. Jonathan Mason
Warren
8. Gilbert Abbott
9. John Collins Warren
10. Eben H. Frost
11. Charles
Frederick Heywood
12. Henry Jacob Bigelow
13. Augustus Addison
Gould
14. Solomon Davis
Townsend

- 16th October 1846:
first public
demonstration of
ether anaesthesia in
Boston, Mass.
- *“Gentlemen this is
no humbug. We have
seen something
today that will go
round the world”*



Anesthesia History Timeline



PRE 1846 - THE FOUNDATIONS OF ANAESTHESIA

.....so the Lord God caused him to fall into a deep sleep. While the man was sleeping, the Lord God took out one of his ribs. He closed up the opening that was in his side.....

Genesis 2:21 NIV



THE FOUNDATION OF ANAESTHESIA

○ Drug methods

- Alcohol
- Opium (poppy)
- Hyoscine (Mandrake)
- Cannabis (Hemp)
- Cocaine (New World)

○ Non-drug methods

- Cold
- Concussion
- Carotid compression
- Nerve compression
- Hypnosis
- Blood letting





Anaesthesia

- **Reversible, drug-induced condition**
 - **Amnesia & unconsciousness**
 - **Analgesia**
 - **Muscle relaxation**
 - **Attenuation of autonomic responses to noxious stimulation**
 - **Homeostasis of Vital**
 - **Functions**



A close-up photograph of a patient lying in a hospital bed. The patient is wearing a white medical mask over their nose and mouth, with a clear oxygen tube connected to it. The patient's eyes are closed, and they appear to be resting or asleep. The background is a soft-focus blue and white, suggesting a clinical setting. Overlaid on the image is a large, bold text block.

Anaesthesiology is the science of managing the life functions of the patients organism in time of surgery or aggressive diagnostic procedure.

Induction to anaesthesiology

- **General Anesthesia**
- **Preoperative evaluation**
- **Intraoperative management**
- **Postoperative management**




Preoperative History and Physical

- **Physical Examination**
- **Physical exams of all systems.**
- **Airway assessment to determine the likelihood of difficult intubation**



Preoperative History and Physical

- ▣ **Unlike the standard internal medicine H&P, ours is much more focused, with specific attention being paid to the airway and to organ systems at potential risk for anesthetic complications. The type of operation, and the type of anesthetic will also help to focus the evaluation.**
- 

Classification of operation

- • ***Elective***: operation at a time to suit both patient and surgeon; for example hip replacement, varicose veins.
- ■ ***Scheduled***: an early operation but not immediately life saving; operation usually within 3 weeks; for example surgery for malignancy.

□ .

Classification of operation

- ▣ ■ ***Urgent*: operation as soon as possible after resuscitation and within 24 h; for example intestinal obstruction, major fractures.**
- ▣ ■ ***Emergency*: immediate life-saving operation, resuscitation simultaneous with surgical treatment; operation usually within 1 h; for example major trauma with uncontrolled haemorrhage, extradural haematoma**

Preoperative History and Physical

Of particular interest in the history portion of the evaluation are:

- **Coronary Artery Disease**
- **Hypertension**
- **Asthma**
- **Kidney or Liver disease**
- **Reflux Disease**
- **Smoking**
- **Alcohol Consumption or Drug Abuse?**
- **Diabetes**
- **Medications**
- **Allergies**
- **Family History**
- **Anesthesia history**
- **Last Meal**

Preoperative History and Physical

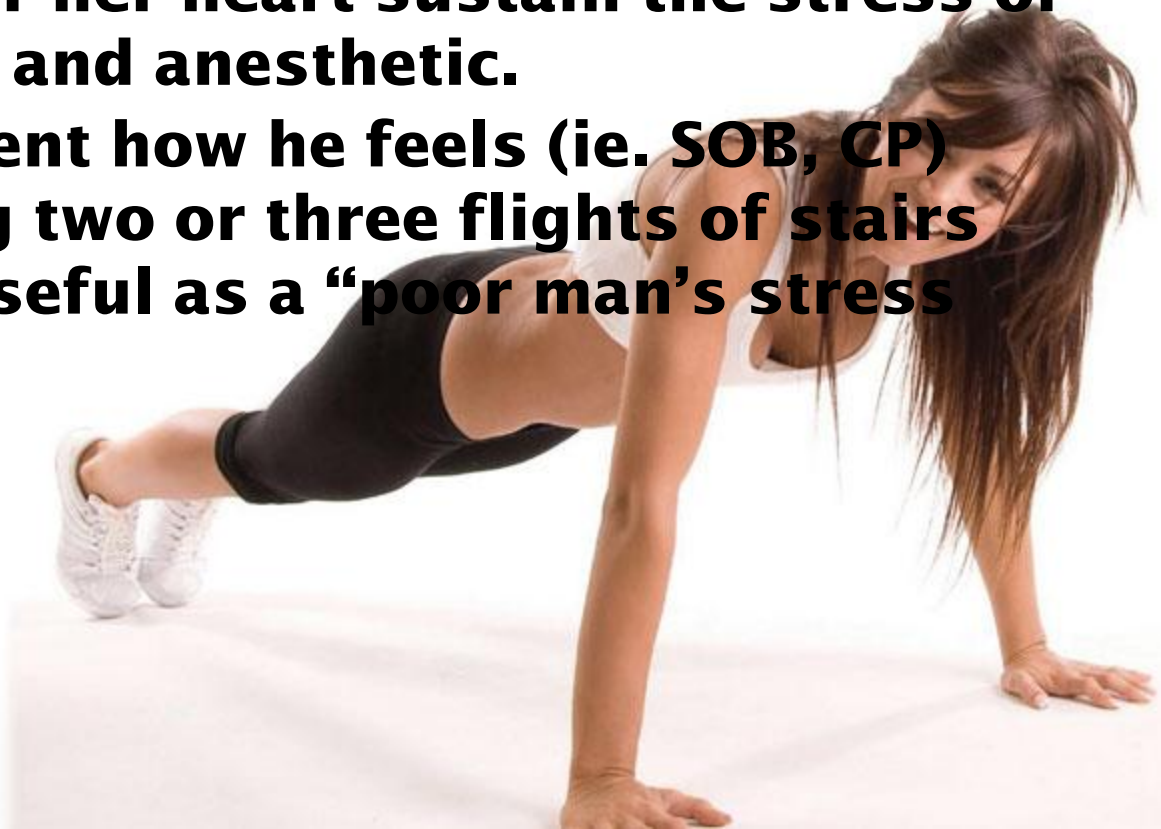
▣ **Coronary Artery Disease**

- **What is the patient's exercise tolerance? How well will his or her heart sustain the stress of the operation and anesthetic.**
- **Asking a patient how he feels (ie. SOB, CP) after climbing two or three flights of stairs can be very useful as a “poor man's stress test”.**

Preoperative History and Physical

▣ **Coronary Artery Disease**

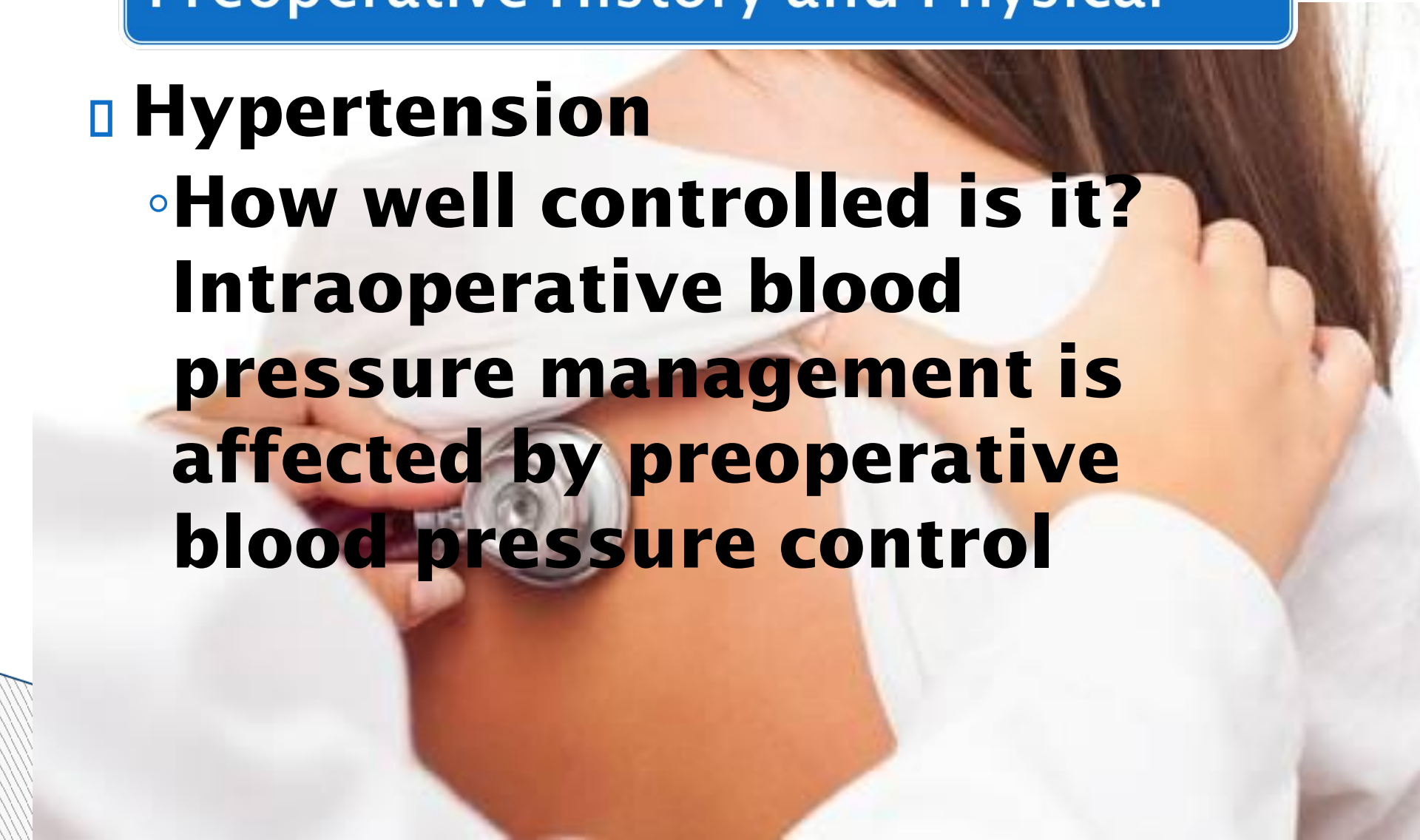
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Preoperative History and Physical

▣ Hypertension

- **How well controlled is it?**
Intraoperative blood pressure management is affected by preoperative blood pressure control



Preoperative History and Physical

▣ Asthma

- **How well controlled is it? What triggers it? Many of the stressors of surgery as well as intubation and ventilation can stimulate bronchospasm.**
- **Is there any history of being hospitalized, intubated, or prescribed steroids for asthma? This can help assess the severity of disease**



Preoperative History and Physical

- ▣ **Kidney or Liver disease**
 - **Different anesthetic drugs have different modes of clearance and organ function can affect our choice of drugs.**

Preoperative History and Physical

▣ **Reflux Disease**

- **Present or not? Anesthetized and relaxed patients are prone to regurgitation and aspiration, particularly if a history of reflux is present**

Preoperative History and Physical

▣ Smoking

- **Currently smoking? Airway and secretion management can become more difficult in smokers.**

Preoperative History and Physical

- ▣ **Alcohol Consumption or Drug Abuse?**
 - **Drinkers have an increased tolerance to many sedative drugs (conversely they have a decreased requirement if drunk), and are at an increased risk of hepatic disease, which can impact the choice of anesthetic agents.**

Preoperative History and Physical

▣ Diabetes

- **Well controlled? The stress response to surgery and anesthesia can markedly increase blood glucose concentrations, especially in diabetics**

Preoperative History and Physical

▣ Medications

- **Many medications interact with anesthetic agents, and some should be taken on the morning of surgery (blood pressure medications) while others should probably not (diuretics, diabetes medications).**

Preoperative History and Physical

▣ Allergies

- **We routinely give narcotics and antibiotics perioperatively, and it is important to know the types of reactions that a patient has had to medications in the past.**

Preoperative History and Physical

▣ Family History

- **There is a rare, but serious disorder known as malignant hyperthermia that affects susceptible patients under anesthesia, and is heritable**

Preoperative History and Physical

▣ Anesthesia history

- **Has the patient ever had anesthesia and surgery before? Did anything go wrong?**

Preoperative History and Physical

▣ Last Meal

- **Whether the patient has an empty stomach or not impacts the choice of induction technique**

Preoperative History and Physical

- ▣ **All patients must have an assessment made of their airway, the aim being to try and predict those patients who may be difficult to intubate.**

▣



Preoperative History and Physical

- ▣ **Finding any of these suggests that intubation may be more difficult.**
- ▣ • limitation of mouth opening;
- ▣ • a receding mandible;
- ▣ • position, number and health of teeth;
- ▣ • size of the tongue;
- ▣ • soft tissue swelling at the front of the neck;
- ▣ • deviation of the larynx or trachea;
- ▣ • limitations in flexion and extension of the cervical spine.

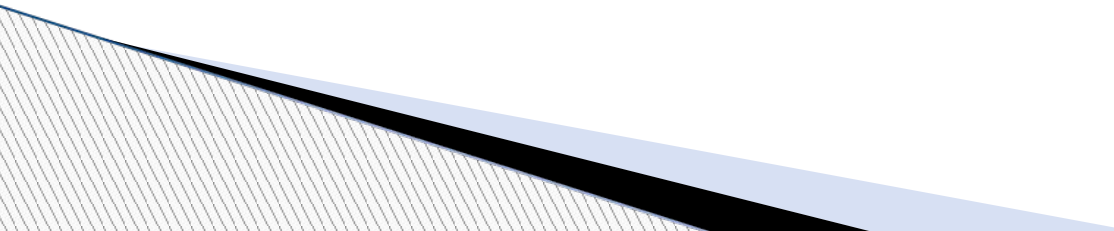
Preoperative History and Physical

- ▣ Also, any loose or missing teeth should be noted, as should cervical range of motion, mouth opening, and thyromental distance, all of which will impact the actual intubation prior to surgery.

During the physical examination, particular attention is paid to the airway by asking the patient to “open your mouth as wide as you can and stick out your tongue” The classification scale of **Mallampati is commonly used.**

Preoperative History and Physical

Mallampati Classification

- ▣ **Class I: Entire uvula and tonsillar pillars visible**
 - ▣ **Class II: Tip of uvula and pillars hidden by tongue**
 - ▣ **Class III: Only soft palate visible**
 - ▣ **Class IV: Only hard palate visible**
- 

Mallampati Classification

A



Grade 1



Grade 2



Grade 3



Grade 4

B



Class 1



Class 2



Class 3



Class 4

Preoperative History and Physical

- ▣ Finally, a physical status classification is assigned, based on the criteria of **the American Society of Anesthesiologists (ASA 1-5)**, with ASA-1 being assigned to a healthy person without medical problems other than the current surgical concern, and ASA-5 being a moribund patient, not expected to survive for more than twenty-four hours without surgical intervention. **An “E” is added** if the case is emergent. The full details of the classification scale can be found below.

Preoperative History and Physical

ASA Physical Status Classification

- ▣ **ASA-I: Healthy patient with no systemic disease**
- ▣ **ASA-II: Mild systemic disease , no functional limitations**
- ▣ **ASA-III: Moderate to severe systemic disease, some functional limitations**
- ▣ **ASA-IV: Severe systemic disease, incapacitating, and a constant threat to life**
- ▣ **ASA-V: Moribund patient, not expected to survive > 24 hours without surgery**
- ▣ **ASA-VI: Brain-dead patient undergoing organ harvest**

Classification of anaesthesia

- general anaesthesia
- **Simple (one-component) anaesthesia**
 - Inhalation**
 - **mask**
 - **endotracheal**
 - Noninhalation**
 - **intravenous**
- **Combined (multi-component anaesthesia)**
 - Inhalation + Inhalation**
 - Noninhalation + Noninhalation**
 - Noninhalation + Inhalation**
 - Combined with miorelaxanthams**

Clasification of anaesthesia

▣ local anaesthesia

Terminal anaesthesia

Infiltration anaesthesia

Nerve block anaesthesia

trunk

plexus

▣ regional anaesthesia

Spinal anaesthesia

Epidural anaesthesia

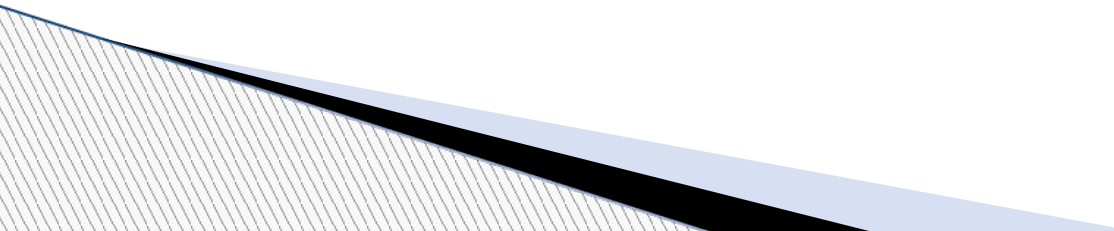


Anesthesia Selection

Factors that affect selection of the type of anesthesia:

- Planned procedure and estimated duration
- Patient position
- Age, size, and weight of the patient
- Patient status (emotional, mental, and physical)
- General health of the patient (comorbid conditions)

IV's and Premedication

- Every patient (with the exception of some children that can have their IV's inserted following inhalation induction) will require IV access prior to being brought to the operating room.
 - Normal saline, Lactated Ringer's solution, or other balanced electrolyte solutions (Plasmalyte, Isolyte) are all commonly used solutions intraoperatively.
- 

Premedication

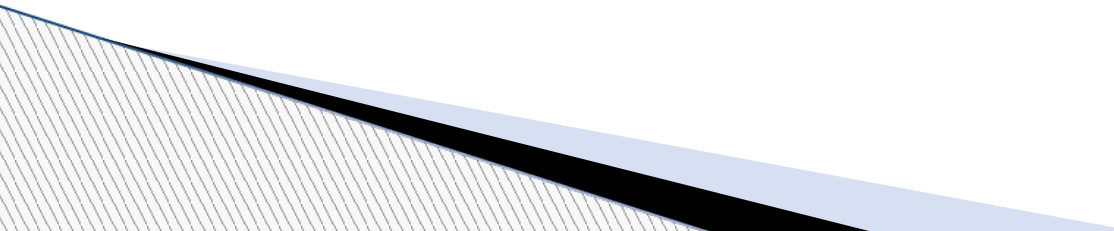
- **Premedication refers to the administration of any drugs in the period before induction of anaesthesia.**
- a wide variety of drugs are used with a variety of aims
- **The 6 As of premedication**
 - ■ **Anxiolysis**
 - ■ **Amnesia**
 - ■ **Antiemetic**
 - ■ **Antacid**
 - ■ **Antiautonomic**
 - ■ **Analgesia**



IV's and Premedication

- ▣ Many patients are understandably nervous preoperatively, and we often premedicate them, usually with a rapid acting **benzodiazepine** such as intravenous **midazolam** (which is also fabulously effective in children orally or rectally).
- ▣ **Metoclopramide** and an H2 blocker are also often used if there is a concern that the patient has a full stomach,
- ▣ and anticholinergics such as **glycopyrrolate** or **atropin** can be used to

Room Setup and Monitors

- ▣ **Before bringing the patient to the room, the anesthesia machine, ventilator, monitors, and cart must be checked and set up.**
 - ▣ **The anesthesia machine must be tested to ensure that the gauges and monitors are functioning properly, that there are no leaks in the gas delivery system, and that the backup systems and fail-safes are functioning properly.**
- 



Anesthesia Machine

Room Setup and Monitors

- ▣ **The monitors that we use on most patients include the pulse oximeter, blood pressure monitor, and electrocardiogram, all of which are ASA requirements for patient safety.**
- ▣ **Each are checked and prepared to allow for easy placement when the patient enters the room.**
- ▣ **You may see some more complicated cases that require more invasive monitoring such as arterial or central lines**

Room Setup and Monitors

- ▣ **The anesthesia cart is set up to allow easy access to intubation equipment including endotracheal tubes, laryngoscopes, stylets, oral/nasal airways and the myriad of drugs that we use daily.**
- ▣ **A properly functioning suction system is also vital during any type of anesthetic**

Room Setup and Monitors

- ▣ **Other preparations that can be done before the case focus on patient **positioning and comfort**, since anesthesiologists ultimately are responsible for intraoperative positioning and resultant neurologic or skin injuries. Heel and ulnar protectors should be available, as should axillary rolls and other pads depending on the position of the patient.**

General Anesthesia

Four Phases

- ▣ **Induction**
 - ▣ **Maintenance**
 - ▣ **Emergence**
 - ▣ **Recovery**
- 

A person wearing blue scrubs and white gloves is holding a white cloth. The background is a plain, light-colored wall.

General Anesthesia

Four Phases

- ▣ **Induction**
- ▣ **Maintenance**
- ▣ **Emergence**
- ▣ **Recovery**

Induction and Intubation

You now have your sedated patient in the room with his IV and he's comfortably lying on the operating table with all of the aforementioned monitors in place and functioning. It is now time to start **induction of anesthesia.**

- ▣ **Induction** is the process that produces a state of surgical anaesthesia in a patient.

Guedel's stages of anaesthesia

- ▣ **Stage I – Amnesia**
- ▣ **Stage II – Excitement**
- ▣ **Stage III – Surgical Intervention (4 planes)**
- ▣ **Stage IV – Overdose**



Guedel's stages of anaesthesia

- ▣ **Stage I (stage of analgesia or disorientation):** from beginning of induction of general anaesthesia to loss of consciousness.
- ▣ **Stage II (stage of excitement or delirium):** from loss of consciousness to onset of automatic breathing. Eyelash reflex disappear but other reflexes remain intact and coughing, vomiting and struggling may occur; respiration can be irregular with breath-holding.

Guedel's stages of anaesthesia

- ▣ **Stage III (stage of surgical anaesthesia):** from onset of automatic respiration to respiratory paralysis.
- ▣ It is divided into four planes:
- ▣ **Plane I** - from onset of automatic respiration to cessation of eyeball movements. Eyelid reflex is lost, swallowing reflex disappears, marked eyeball movement may occur but conjunctival reflex is lost at the bottom of the plane

Guedel's stages of anaesthesia

Plane II - from cessation of eyeball movements to beginning of paralysis of intercostal muscles. Laryngeal reflex is lost although inflammation of the upper respiratory tract increases reflex irritability, corneal reflex disappears, secretion of tears increases (a useful sign of light anaesthesia), respiration is automatic and regular, movement and deep breathing as a response to skin stimulation disappears.

Guedel's stages of anaesthesia

- ▣ ***Plane III*** - from beginning to completion of intercostal muscle paralysis. Diaphragmatic respiration persists but there is progressive intercostal paralysis, pupils dilated and light reflex is abolished. The laryngeal reflex lost in plane II can still be initiated by painful stimuli arising from the dilatation of anus or cervix. This was the desired plane for surgery when muscle relaxants were not used.

Guedel's stages of anaesthesia

- ▣ **Plane IV** - from complete intercostal paralysis to diaphragmatic paralysis (apnea).
- ▣ **Stage IV:** from stoppage of respiration till death. Anesthetic overdose cause medullary paralysis with respiratory arrest and vasomotor collapse.

Induction and Intubation

- ▣ **The first part of induction of anesthesia should be preoxygenation with 100% oxygen delivered via a facemask.**
- ▣ **Again, using the example of a normal smooth induction in a healthy patient with an empty stomach, the next step is to administer an IV anesthetic until the patient is unconscious. A useful guide to anesthetic induction is the loss of the lash reflex, which can be elicited by gently brushing the eyelashes and looking for eyelid motion.**

Induction and Intubation

- ▣ **Patients frequently become apneic after induction and you may have to assist ventilation.**
- ▣ **The most common choices used for IV induction are Propofol, Thiopental, and Ketamine.**

Intravenous Agents

- Permit rapid pleasant transition from consciousness to unconsciousness
- Produce marked sedation and amnesia
- Produce hypotension and respiratory depression
- Some induction agents may also be used for maintenance

IV Anesthetics

□ • Propofol

□ Typical adult induction dose 1.5–2.5 mg/kg

□ Popular and widely used drug associated with rapid and 'clear-headed' recovery. Rapid metabolism and lack

Pro: Prevents nausea/vomiting, Quick recovery if used as solo anesthetic agent

Con: Pain on injection, Expensive, Supports bacterial growth, Myocardial depression), Vasodilation

Propofol

- Sedative hypnotic
- Soy oil in water emulsion (inhibits microbial growth)
- Induction or conscious sedation
- Alkaline – irritating to the vein
- Causes increased ICP and hypotension



IV Anesthetics

▣ ■ **Thiopental Sodium**

- ▣ **Typical adult induction dose 3–5 mg/kg (2.5% solution)**
- ▣ **The ‘gold-standard’ against which all other drugs are judged. Smooth induction in one arm–brain circulation time**

Pro: Excellent brain protection, Stops convulsion , Cheap

Con: Myocardial depression, Vasodilation, Histamine release.

Thiopental Sodium

- Potent barbiturate
- Short acting
- Alkaline – irritating to the vein
- Less expensive than propofol



IV Anesthetics

□ Ketamine

- **Typical adult induction dose 0.5-2 mg/kg**
- **Useful for sedation with profound analgesia. Increases pulse rate and blood pressure and useful for the induction of patients suffering from acute trauma**

Pro: Works IV, PO, PR, IM – good choice in uncooperative patient without IV, Stimulation of SNS, often preserves airway reflexes

Con: Dissociative anesthesia with postop. dysphoria and hallucinations, bad for patients with compromised cardiac function, increases airway secretions

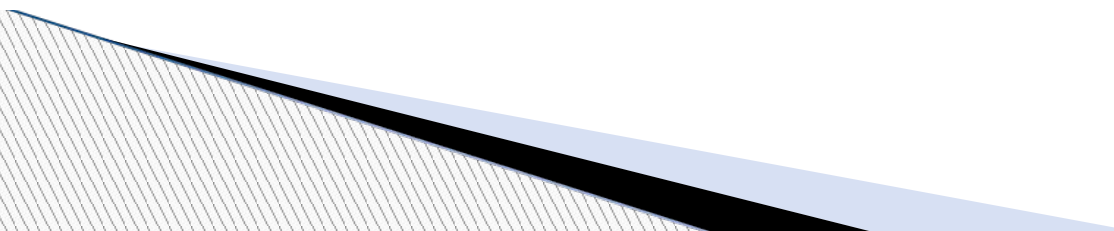
Dissociative Agents

- Interrupt the associative pathways of the brain (patient appears awake, but is unaware of surroundings)
- Produce amnesia and profound analgesia

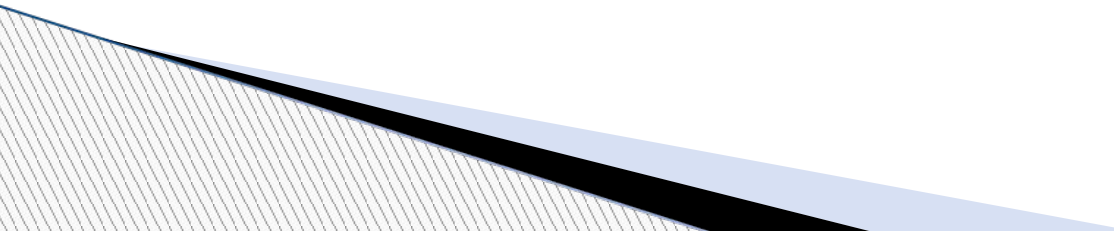
Ketamine



Opiate/Opioids

- Morphine sulfate
 - Meperidine (Demerol)
 - Fentanyl citrate (Sublimaze)
 - Sufentanil citrate (Sufenta)
 - Alfentanil hydrochloride (Alfenta)
 - Remifentanil hydrochloride (Ultiva)
- 

Benzodiazepines

- Sedative tranquilizers
 - Reduce anxiety/apprehension
 - Adjunct to general anesthesia (reduce amount and concentration of other agents)
 - Do not produce analgesia
- 

Benzodiazepines

- Diazepam (Valium)
- Midazolam (Versed)
- Droperidol (Inapsine)

Induction and Intubation

- Assuming that you are now able to mask ventilate the patient, the next step is usually to administer a **neuromuscular blocking agent** such as **succinylcholine** (a depolarizing relaxer).
- Once the patient is adequately anesthetized and relaxed, it's time **to intubate**, assuming you have all necessary supplies at the ready.

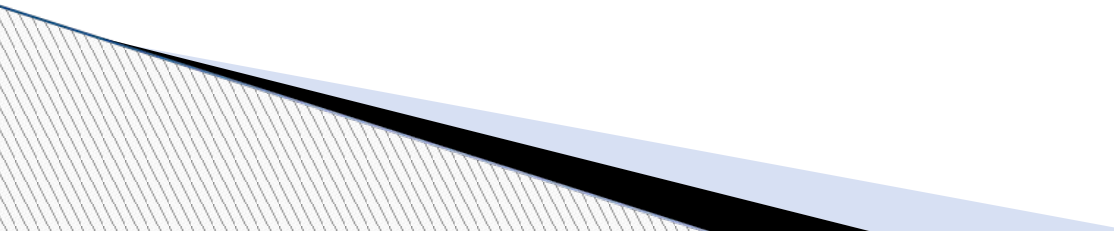
Induction and Intubation

- ▣ . **Hold the laryngoscope in your left hand (whether you're right or left handed) then open the patient's mouth with your right hand, either with a head tilt, using your fingers in a scissors motion, or both. Insert the laryngoscope carefully and advance it until you can see the epiglottis, sweeping the tongue to the left. Advance the laryngoscope further into the vallecula (assuming you're using a curved Macintosh blade), then using your upper arm and NOT your wrist, lift the laryngoscope toward the juncture of the opposite wall and ceiling. There should be no rotational movement with your wrist, as this can cause dental damage. When properly done, the blade should never contact the upper teeth. Once you see the vocal cords, insert the endotracheal tube until the balloon is no longer visible, then remove the laryngoscope, hold the tube tightly, remove the stylet, inflate the cuff balloon, attach the tube to your circuit and listen for bilateral breath. If you have chest rise with ventilation, misting of the endotracheal tube, bilateral breath sounds and end tidal CO₂, you're in the right place and all is well! Tape the tube securely in place, place the patient on the ventilator, and set your gas flows appropriately.**

Intubation



Maintenance

- ▣ **Careful and continues vigilance of vital sings and depth of anesthesia is the integral part of the maintenance phase.**
 - ▣ **Pulse oximetry, End-tidal carbon dioxide tension, patient's temperature, ECG and blood pressure are continuously monitored during the maintenance phase. End-tidal concentration of nitrous oxide and inhalation agents (isoflurane, halothane etc) is continuously monitored for the proper depth of anesthesia (analgesia, amnesia, sedation and muscle relaxation).**
- 

Maintenance

- ▣ It is important to keep track of the **blood loss** during the case and should be replaced hourly with crystalloid. Fluid therapy should be guided by monitoring hourly urine output (0.5 cc/Kg/Hr).

Maintenance

▣ **It is also vital to pay attention to the case itself, since blood loss can occur very rapidly, and certain parts of the procedure can threaten the patient's airway, especially during oral surgery or ENT cases. It is also important to keep track of the progress of the case.**

▣ **Vigilance is key to a good anesthesia.**

Maintenance

- ▣ **One can also prepare for potential post-operative problems during the case, by treating the patient intraoperatively with long-acting anti-emetics and pain medications.**

Common Anesthetic Agents

Volatile Agents

- Liquids with potent evaporative vapors
- CNS depression produces general anesthesia
- Myocardial and respiratory depression
- Decrease muscle tone

Volatile Agents

- Halothane (Fluothane)
- Enflurane (Ethrane)
- Isoflurane (Forane)
- Desflurane (Suprane)
- Sevoflurane (Ultane)

Commonly Used Medications

Volatile Anesthetics

□ Halothane

- Pro: Cheap, Nonirritating so can be used for inhalation induction
- Con: Long time to onset/offset, Significant Myocardial Depression, Sensitizes myocardium to catecholamines, Association with Hepatitis

Halothane



- Rapid acting
- Sweet odor
- Nonirritating to the respiratory tree
- Used for induction and maintenance

Commonly Used Medications

Volatile Anesthetics

▣ Sevoflurane

- Pro: Nonirritating so can be used for inhalation induction, Extremely rapid onset/offset
- Con: Expensive, Due to risk of “Compound A” exposure must be used at flows >2 liters/minute, Theoretical potential for renal toxicity from inorganic fluoride metabolites

Sevoflurane



- Odorless
- No irritation to respiratory tree
- Causes bradycardia, hypotension, dysrhythmias, decreases cardiac output

Enflurane



- Halogenated
- Sweet odor
- Rapid induction
- Rapid recovery
- Hypotension (when not surgically stimulated)
- Potentiates nondepolarizing NMB

Desflurane



- Halogenated
- Requires heated vaporizer
- Pungent aroma
- Not biotransformed in the liver

Isoflurane



- Rapid induction and recovery
- Musty smelling
- Profound respiratory depression and hypotension
- Markedly potentiates NMB
- Increases ICP

Common Anesthetic Agents

Nitrous Oxide



- Produces analgesia and amnesia
- Produces little muscle relaxation
- Decreases myocardial contractility and respiratory function

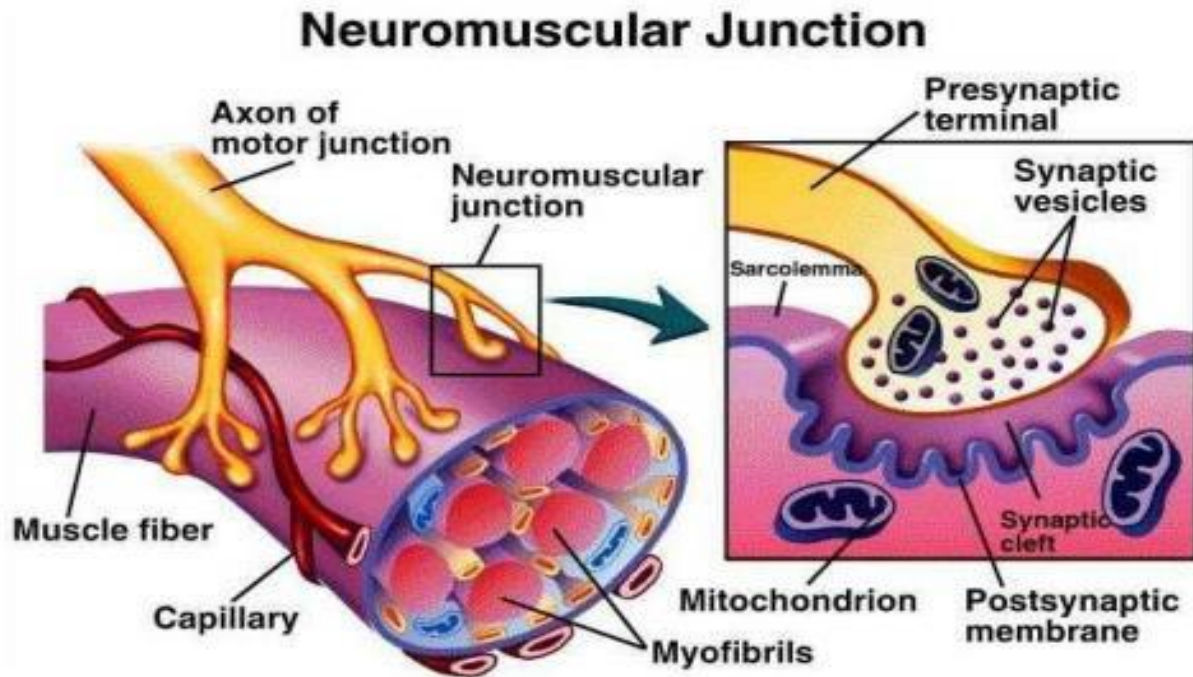
Common Anesthetic Agents

Oxygen



- Inhalation agent
- Not anesthetic agent
- Necessary for life

Neuromuscular Junction



Commonly Used Medications

Muscle Relaxants

▣ Depolarizing

Succinylcholine inhibits the postjunctional receptor and passively diffuses off the membrane, while circulating drug is metabolized by plasma esterases.

Associated with increased ICP/IOP, muscle fasciculations and postop muscle aches, triggers MH, increases serum potassium especially in patients with burns, crush injury, spinal cord injury, muscular dystrophy or disuse syndromes.

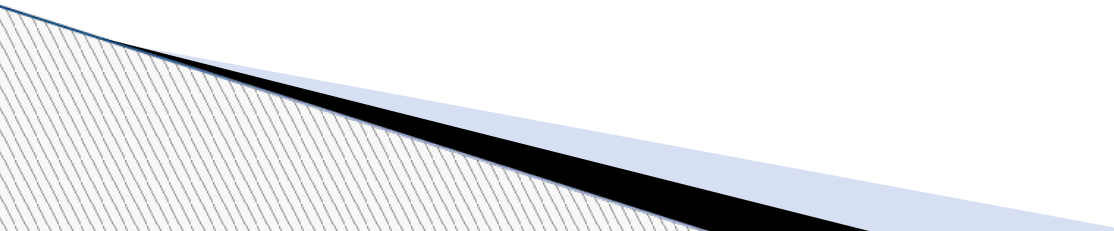
Rapid and short acting.

▣ **Nondepolarizing**

Many different kinds, all ending in “onium” or “urium”. Each has different site of metabolism, onset, and duration making choice depend on specific patient and case. Some examples: **Pancuronium** - Slow onset, long duration, tachycardia due to vagolytic effect. **Cisatracurium** - Slow onset, intermediate duration, Hoffman (nonenzymatic) elimination so attractive choice in liver/renal disease. **Rocuronium** - Fastest onset of nondepolarizers making it useful for rapid sequence induction, intermediate duration.

Emergence

▣ EMERGENCE FROM GENERAL ANESTHESIA

- ▣ **1. Reversal of muscle relaxation.**
 - ▣ **2. Turning off the inhalation agents and nitrous oxide**
 - ▣ **3. Meeting the extubation criteria**
 - ▣ **4. Extubation of trachea**
 - ▣ **5. Transfer of the patient to post anesthesia care unit.**
- 

Emergence

- ▣ **First, the patient's neuromuscular blockade must be re-assessed, and if necessary reversed and then rechecked with a twitch monitor.**
- ▣ **Next, the patient has to be able to breathe on his own, and ideally follow commands, demonstrating purposeful movement and the ability to protect his airway following extubation. Suction must always be close at hand, since many patients can become nauseous after extubation, or simply have copious oropharyngeal secretions**

Emergence

- ▣ . **Once the patient is reversed, awake, suctioned, and extubated, care must be taken in transferring him to the gurney and oxygen must be readily available for transportation to the recovery room/Post-Anesthesia Care Unit (PACU). Finally, remember that whenever extubating a patient, you must be fully prepared to reintubate if necessary, which means having drugs and equipment handy.**

PACU Concerns

- ▣ **The anesthesiologist's job isn't over once the patient leaves the operating room. Concerns that are directly the responsibility of the anesthesiologist in the immediate postoperative period include nausea/vomiting, hemodynamic stability, and pain.**

PACU Concerns

- ▣ **Other concerns include continuing awareness of the patient's airway and level of consciousness, as well as follow-up of intraoperative procedures such as central line placement and postoperative X-rays to rule out pneumothorax. A resident and staff member are usually assigned to the PACU specifically to follow up on these concerns, since we frequently have to return to the OR for subsequent cases, and may not be available if problems should arise.**

Commonly Used

Medications

Opioids

- ▣ **Morphine** – long acting, histamine release, renally excreted active metabolite with opiate properties therefore beware in renal failure
- ▣ **Dilaudid** – long acting, no active metabolites or histamine release, same onset/duration as morphine
- ▣ **Demerol** – euphoria, stimulates catecholamine release, so beware in patients using MAOI's, renally excreted active metabolite associated with seizure activity, renally excreted metabolite with seizure potential therefore beware in renal failure
- ▣ **Fentanyl/Alfentanil/Sufentanil** – low doses produce brief effect, but larger doses are long acting, increased incidence of chest wall rigidity vs. other opiates, no active metabolites
- ▣ **Remifentanyl** – almost instantaneous onset/offset of action due to metabolism by plasma esterases, must be given as continuous infusion significant

Questions?

Thank you for listening.

