Conduct of anesthesia

- Start with prep. evaluation
- Related to surgery - Dehydration, obstruction (investigate about why done and complications of surgery).

- Put a plan - GA and airway management
  - Cavity surgeries - endotracheal + ventilator (controlled).
  - Peripheral surgeries - IHA + spontaneous breathing
    - Limbs, hernias

- Position + monitoring - Basic: ECG, vital, Capnograph
  - O2 sat., airway pressure
  - Neuromuscular stimulation observation by doctor.

- Major surgeries - F. cath. + Temperature monitoring.
- Induction, maintenance, recovery.

**DRUGS:**

- Induction - analgesics, hypnotics, muscle relaxant.
  - **H** - propofol
    - [IV or Inhalational]

- IV: mostly used in adults.
  - Propofol (most commonly used)
  - Sodium thiopental
  - Ketamine
  - Midazolam

- Propofol - rapid onset + recovery
  - Antiemetic

No stimulation to laryngeal reflexes (helps during laryngoscopy to not stimulate the sympathetic system).
Cardiovascular Inhibition - may lead to arrest
1-2 mg/kg → Not given to a dehydrated and
to a patient with Cardiovascular diseases → It might
kill the patient.
Given slowly.
painful on injection
Sodium thiopentone - Not painful , Does not cause CV Inhibi.
stimulates laryngeal reflexes + slow recovery →
Not used as much these days
5 mg/kg
10 minutes (Duration of action) / 4-8 hours (Clearance)
Ketamine - used in hypotensive patients (↑ HR+Bp)
a potent analgesic
Not used commonly due to side effects -
hallucination.

- Cardiovascular stable but causes adrenal
  suppression.

Inhalational hypnotics: follows Induction
Isoflurane - used Commonly
sevoflurane
NO
- sevoflurane + halothane - the only drugs used
in induction
other drugs are
MAC
Blood

- Inhalational Induction - pediatrics + psychiatric (phobia)
  adult patients + Airway obstruction.

  * * * Analgesia: Given before sleep
  rapid onset, and recovery.

  morphine - Delayed action:
  opioids
  - Context sensitive half life - half life depends on
    the duration of drug supply.

  The only drug, no matter how long you give, stops
  action after 11 min. of stopping infusion:
  Remifentanil (sedation + anesthesia).

- The most commonly used - Phentazin -

  📝 Duration of action = 20 min.
  150 mg (the usual dose) → If the dose is (4)
  The half life (4) : highly lipid insoluble

  Redistribution 📝

  🙄 This fact does not apply to Remifentanil →

FIVE APPLE
Muscle relaxant (Type and dose):
Classified as: Neuromuscular blocking agents and others.

Neuromuscular blocking agents: Depolarizing, Non-Depolarizing
- Depolarizing agents:
  - Suxamethonium: Structure like Ach. / lifeth.
  - Side effects: MH, Anaphylaxis, Hyperkalemia, arrhythm.
  - Rapid onset, short duration - stomach
- Non-Depolarizing:
  - Steroids: organ dependent - No release of histamine.

A non-depolarizing agent that is similar in rapid onset to suxamethonium

1) ROCHESTER
2) How to ↑ duration of action of ROCHESTER

- Give a muscle relaxant and leave the patient 3 min. before intubation / BUT ventilate well!
  - Nerve Stimulator - when no stimulation is done then the patient is relaxed (No muscle tone).

- Endotracheal tube:
  1) Indications
  2) CO2 - sustained
  3) Auscultation
Maintenance: IV + Inhalational

Inhalational: Sepoflurane, **Isoflurane**

- Most commonly used.
- Sevo - Better in Induction only and in neurosurgery.
- If maintenance is not adequately done - awareness may occur.

MAC: 2 for Sevoflurane:
1.16 for Isoflurane

Not constant for the same drug.

Factors affecting MAC:
1. Age: $\frac{6 \text{ year}}{100}$

*** Analgesia: phentanil - For short surgeries
Ketamine -given for long surgeries

- Phentanil: give every 30 min.
  - Short duration is preferred
- Epidural analgesia
- Multimodal analgesia: Senergetic action
  - Opioids + Non steroidal + Ketamine

*** Muscle relaxant:
1. A second dose is given when changes on Capnograph are seen.
2. Duration
3. According to the nerve stimulator ((The most proper one))
4. Surgeon's notes
5. (1)

* Maintenance of safety!
Recovery:
- Hipnotics: Stop dosing 5-10 minutes of recovery time. MAC awake → 0.3 MAC, monitor

2 Analgesia: ↑ the dose before recovery
Routine: morphine given 15 min. before reco.

① 3 m. relaxant: Reversal Neostigmine

- Invasive Blood Pressure monitoring - at the level of the mid axillary line (at the
  Invasive Bp monitoring - long duration + delicate surgeries.
  - Nerve Stimulator - Tof (Train of four)
    1 twitch - 25% cleared

- Brain oximetry - O2 saturation in the brain hypotensive
- Preop evaluation - 3 months.

② Neostigmine & Atropine
  8 min. → 2 min.
Reverse is given in the 2nd and 3rd twitches → wait for spontaneous breathing to be back → remove the tube and awake the patient.
CPR

Airway management

Shock + fluid man.

Conduct of anaesthisa.

- American heart association.

- Airway man.
  * Open airway
  * CPR, obvious obstruction, trauma.
  * Obstructed airway:
    - Uncon. not responsive
    - Anatomical changes; laryngeal muscles get weaker
    - and obstruct the airway
    - First try to talk to the patient - if unable
    - Airway obstruction
    - Weak chest movement
    - Abdominal breathing
    - Cyanosis
    - Look, listen and feel

* Airway opening:
  (1) Open mouth and sweep (by finger) trying to remove
    F. bodies
  (2) Head tilts chin left. (H.T.: not done in trauma
    patients).
  (3) Jaw thrust
  (4) Breathing: mask, fit and secured

Chest expander: → No: oropharyngeal airway
Airway - size - mouth to ear lobe distance

- easy, smooth

- even so aspiration can occur. If the patient is not fasting

- Transient, not done for long period.

- Definitive airway (endotracheal tube or laryngeal mask) has to be put as soon as possible.

* Supraglottic airway - Not as gas, as the endotracheal tube.

1. LMA -

- 3: Female, or small male
- 4: Average male
- 5: big male

- Chest movement - To make sure the

- No leak sound - LMA is secure and

- Vapor on tube - Fit

- Capnography: end tidal CO2

- Sustained CO2 is the target: From the lung.

- Indicating the cardiac output

* Endotracheal tube -

- Suctioning is very important

- Laryngoscope in the left → left tongue from the right side
Difficult ventilation - Tongue is relaxed
  Tumours in neck and oral Cav.
  m. score 3

emergency surgery \(\rightarrow\) Not fasting; Infection (Aspiration of Chemical pneumonia),
  emergency vs elective cases(1)

Scoline (sevoflurane)(1)
  - the Fastest muscle relaxant
  - 60 Seconds
  - used in emergency; Full stomach
  - Delayed stomach emptying like pain

  a patient NOT that haven't eaten since for 6 hours
  put in pain
  pregnancy; \(\uparrow\) intraabdominal pressure; \(\uparrow\) acidity

  \(\downarrow\) time; not to ventilate the patient.

Dif
  - Fast onset of action and Fast metabolism
  Full stomach
  emergency
  Difficult Intubation

  - Not used in Scoline apnea; Choline esterase
def. Hadad \(\rightarrow\) \(\uparrow\) Duration of action.
  patient is left on a ventilator until awake

- Never give a muscle relaxant when the
  patient is awake
Endotracheal tube -

Flexometallic - head and neck surgeries
Adult tubes - 22 mm

Long-time intubation → cuff is not inflated for more than two weeks → or else the patient is sheathed to a tracheostomy.

Length of the trachea

Wrong intubation → to the right lung:

1. Unilateral chest expansion
2. Breathing sound / Auscultation
3. CO₂ from the lungs and in stomach
4. See tube going through the vocal cords while laryngoscopy.

ID: Internal diameter of the tube

Two = to put the vocal cords in. btw: you have to auscultate after words, and change position.

Size: depending on age / (Age / 4) + 1: Adults only

Length = (Age / 112) + 1: Pediatrics.
- No cuff in paediatric tubes: mucosa of trachea
- Difficulties in intubation in babies: small mouth, big tongue, high epiglottis (harder, U-shape, vocal cords opening is bigger than the subglottic area big head.

- Physiology of the lung:
  - Volumes
  - Morphine: active metabolites / not given / or given carefully in renal failure patients.

- Tidal volume $\rightarrow$ 7-10 ml/kg
  10 kg $\rightarrow$ 70-100 ml

  Incase a good volume is not given atelectasis may occur $\rightarrow$ appears as a complication of anesthesia on the first day after surgery when shifted to spontaneous breathing. No cough, no normal breathing.

- Capnography: $\uparrow$ end-tidal CO2 $\uparrow$ RR
- Normal HR in a paediatric: 160-120
Muscles are involved in respiration.

In case of obstructive disease → obstruct

Factors affecting the C³
Heart rate:

↑ Diastolic time: more blood reaching the Coronaries
Tachycardia + ↑ Diastolic time → ↓ myocardial perfusion
myocardial Ischaemia

Bradycardia with normal blood pressure is better than
Tachycardia with high blood pressure.

 Bradycardia in theatre → Do not reach For atropine
at first → Drugs are left for last.
CPR
- The most common cause is V. fibrillation

- CAB
Cardiac Compression, btw
Rate: 100 - 120/minute
5cm downward
30 times atime (16 seconds).
* Don't put pressure on the xiphoid process nor ribs.
In btw the nipples.
* Quality:
  color of the patient
  Capnograph - CO2 > 10
  Normal 35 - 45

- Sequence:
  1. Arrest:
     Timing is very Critical; starting is better as soon as possible.
  2. Safe approach
  3. Confirmation of arrest
     No response / If θ → Not arrested
     θ → Need help
     Check for breathing → θ → pulse on the carotid
     10 sec.
     Obvious pulse → Not arrested
- Not responsive
  - No breathing

  Ask for help.

  Start with chest compression - High quality
  - Don't interrupt compression /
  - Don't check for pulse unless you feel effort from the pat.
  - Ventilation - two times for
    and go back to compression
  - Attach ECG for monitoring without interruption
  - IV line
  - Airway management equipment

  Monitoring - look at the rhythm (shockable, non-
  - shockable)

  Shockable - responsive to electrical shock
  - Ventricular Fibrillation → considered arrest
  - No CO.
  - Ventricular Tachycardia → sustained
    - If no pulse - Not treated as arrest.

  Non-shockable - No pulse
  - To continue CPR
  - IV access - Epinephrine (adrenaline) - 1mg / every 3-5 minutes.
  - Lidocaine is not given (antiarrhythmic -
    - No pulse)
Airway management (LMA)
Check Rhythm after 2 minutes (monitoring)

In Case of ventricular fibrillation:
EC Shock - two types: DC shock;
   1. Monophasic - one single direction
      Start with 360 Joule
   2. Biphasic
      Start with 150 - 200 Joule
      Only one time - If the rhythm is not complete CPR
      After 2 min. → DC shock

Drugs:
- After the second shock -
  Epinephrine
- amiodarone - Class III anti-arrhythmic
  300 mg slowly then
  150 mg
given after the 3rd shock
- Lidocaine

Non-shockable: (No pulse)
Ventilation + Compression
epinephrine
5(H5) and 4(T5)

- Hypoxia (patient connected to a very high 
  \( \text{SO}_2 \text{O}_2 \))
- Hypotension - mostly caused by hypovolemia.
- Hyperkalemia
- Hypothermia / Don't start CPK before warming the pat.
- Hydrogen ion abn (acid)

severe hypothermia (below 16)
- Oxygen demand
- Arrested but alive.

Fentanyl, propofol, muscle relaxant

150