



OneShot 4.0 **Anaesthesia**



ANAESTHESIA

| <i>Sl. No.</i> | <i>CHAPTER</i> | <i>Page No.</i> |
|----------------|-------------------------------------|-----------------|
| 1. | <i>Anaesthesia Delivery Systems</i> | 579 |
| 2. | <i>Equipments</i> | 589 |
| 3. | <i>Preoperative Assesment</i> | 599 |
| 4. | <i>Regional Anaesthesia</i> | 611 |
| 5. | <i>Critical Care and CPR</i> | 617 |

“

Success
is the sum of
small efforts
done every
day.

- Dr. Ajay Yadav

”





ANAESTHESIA DELIVERY SYSTEMS

CYLINDERS

Oxygen Cylinder



- *Color- Black body with white shoulders*
- *Pressure -2000 PSI*

Nitrous Oxide



- *COLOR - Blue*
- *PRESSURE - 760 PSI*

Entonox



- *Blue body with blue and white shoulders*
- *Pressure- 2000 PSI*



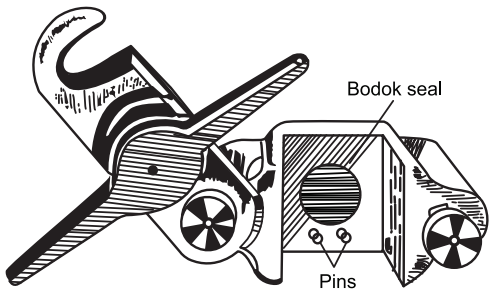
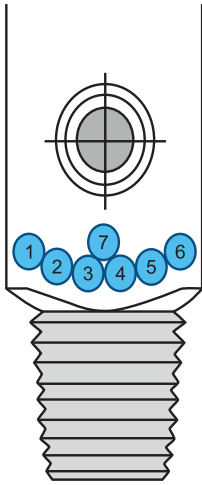
CENTRAL SUPPLY OF GASES



- *Pressure : 60 PSI*



PIN INDEX SYTEM



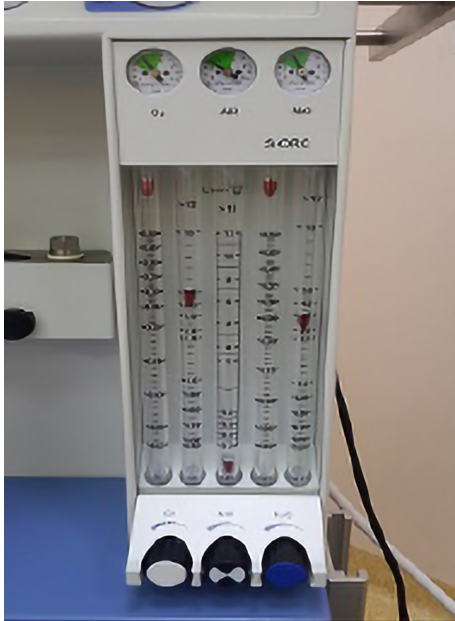


PIN INDEX POSITION

- Oxygen- 2, 5
- Nitrous oxide- 3,5

ANESTHESIA MACHINE

Rotameter

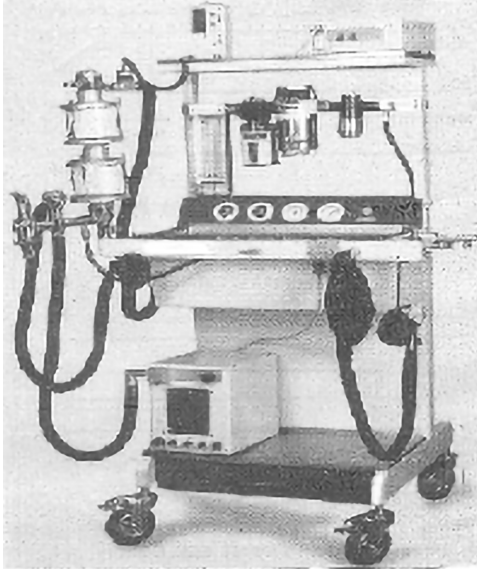


Vaporizer



ANESTHESIA MACHINE

Boyles Machine





ANESTHESIA WORKSTATION



BREATHING CIRCUITS

Magill



Bains



Jackson Rees



Summary of Semiopen Circuits

| Circuit | Semiopen circuit of choice | Fresh gas flow |
|-------------------------|--|-----------------------------------|
| <i>Magill</i> | <i>Spontaneous ventilation</i> | <i>Equal to minute volume</i> |
| <i>Bains</i> | <i>Controlled ventilation</i> | <i>1.6 times of minute volume</i> |
| <i>Jackson and Rees</i> | <i>Pediatric patients less than 6 years or less than 20 kg</i> | <i>Same as of Bains</i> |



Circle System



Soda Lime Composition

$\text{Ca}(\text{OH})_2$ - 80%

NaOH- 3%

KOH- 1%

H_2O - 15%

Color indicator

Toxic Compounds of Inhalational Agents with Sodalime

Trielene- neurotoxic and ARDS

Sevoflurane: Compound A

Desflurane- Carbonmonoxide with desiccated sodalime

Sevoflurane- Burns with desiccated sevoflurane



NOTES



EQUIPMENTS

AMBU BAG



Airway

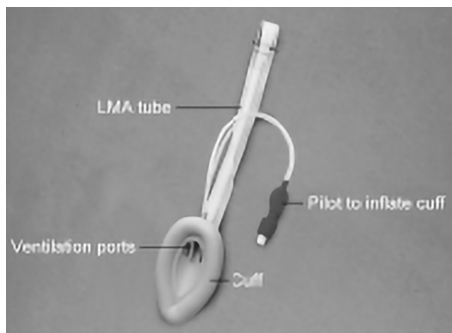
- *Gudels*



Nasal Airways



Laryngeal mask airway



ADVANTAGE:

- *Avoids complications of intubation*
- *Disadvantage : Aspiration*



SECOND GENERATION LMA:

Proseal





Anaesthesia

IGEL





Face Masks



Disadvantage:

Increased risk of aspiration

LARYNGOSCOPE

Macintosh



*Most commonly used
Preferred for adults*

Miller



Preferred for children of all ages



Video laryngoscope



Gidescope



Storz CMAC



Storz DQ Videolaryngoscope

High success rate for failed intubation by direct laryngoscopy

ENDOTRACHEAL TUBES

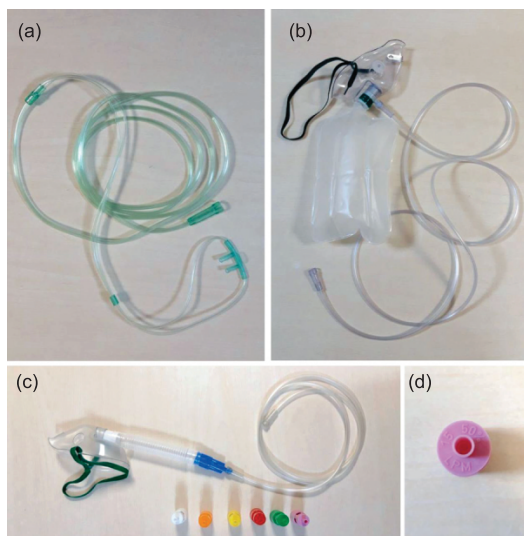


- *Cuff : Low pressure and high volume*
- *Cuff tubes : Can be used at ages*

| | Adult | Children |
|---------------|------------------------------|-----------------|
| <i>Size</i> | <i>Male</i> <i>Female</i> | |
| <i>Length</i> | <i>Male</i> <i>Female</i> | |



OXYGEN DELIVERY DEVICES



Oxygen delivery devices

| Device | Maximum flow (liter/ minute) | Maximum FIO_2 |
|----------------------------|--------------------------------------|-----------------------------------|
| <i>Nasal cannula</i> | <i>6</i> | <i>0.45</i> |
| <i>Simple oxygen mask</i> | <i>10</i> | <i>0.6</i> |
| <i>Mask with reservoir</i> | <i>15</i> | <i>0.8</i> |
| <i>Venturi mask</i> | <i>15</i> | <i>0.6</i> |



NOTES



PREOPERATIVE ASSESMENT

MODIFIED MALLAMPATI CLASSIFICATION



I



II



III



IV

Preoperative drugs modifications

| Drug | Modification required |
|--|------------------------------|
| Viagra | Stop 24 hours before surgery |
| ACE inhibitors | Stop 24 hours before surgery |
| ARB | Stop 24 hours before surgery |
| High dose estrogen oral contraceptives | Stop 4 weeks before surgery |
| Herbal medications | Stop 7 days before surgery |
| Warfarin | Stop 5 days before surgery |
| Directly acting oral anticoagulants | Stop 48 hours before surgery |
| Aspirin | Stop 72 hours before surgery |
| Clopidogrel | Stop 5 days before surgery |
| Oral hypoglycemics | Omit on the day of surgery |
| NSAIDS | Omit on the day of surgery |
| Diuretics | Omit on the day of surgery |

Fasting guidelines

| Type of food | Fasting hours |
|---------------------|----------------------|
| Solid | 6 hours |
| Fatty/non-veg | 8 hours |
| Clear fluids | 2 hours |
| Breast milk | 4 hours |

MONITORING

Bispectral index monitor



- To see the depth of anaesthesia



PULSE OXIMETER



Limitation:

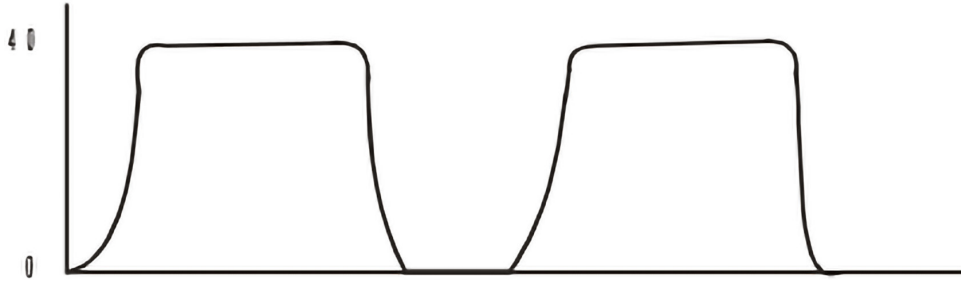
CAPNOMETER



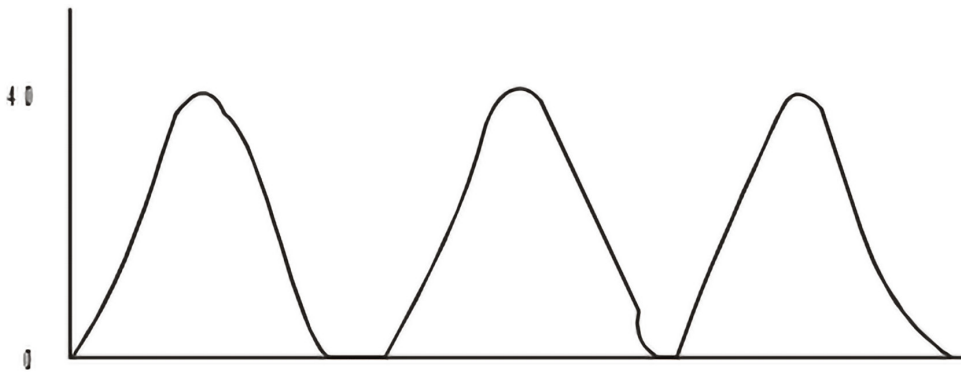


CAPNOGRAPHY GRAPHS

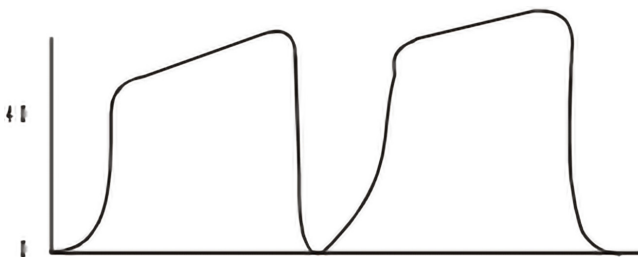
i. Normal graph for mechanical ventilated patient



ii. Spontaneous breath

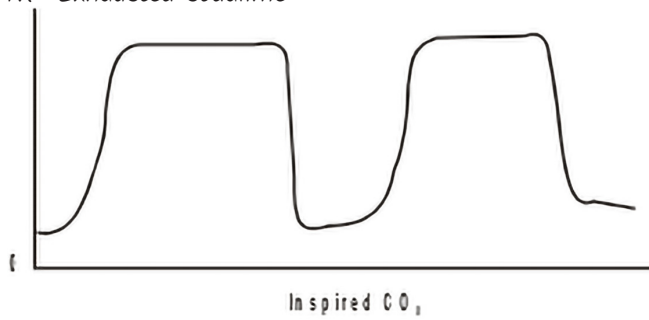


iii. COPD/ASTHMA (SHARK FIN PATTERN)

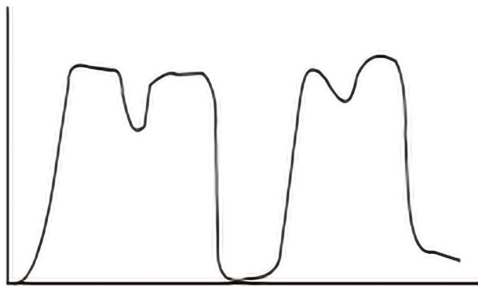




iv. Exhausted sodalime

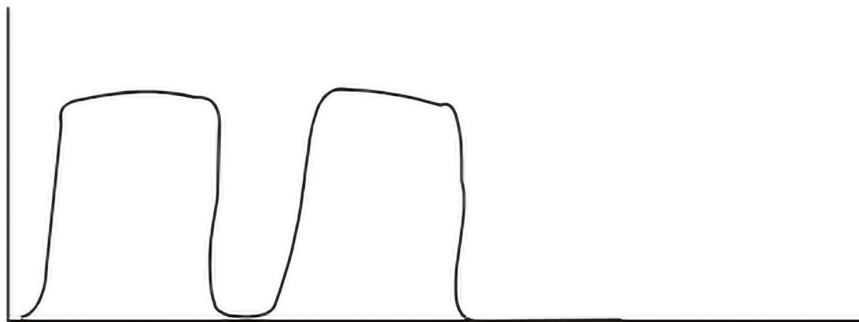


v. Recovery of spontaneous breath (Curae notch)



vi. ETCO_2 becoming zero

- Extubation
- Apnea
- Disconnection
- Complete obstruction



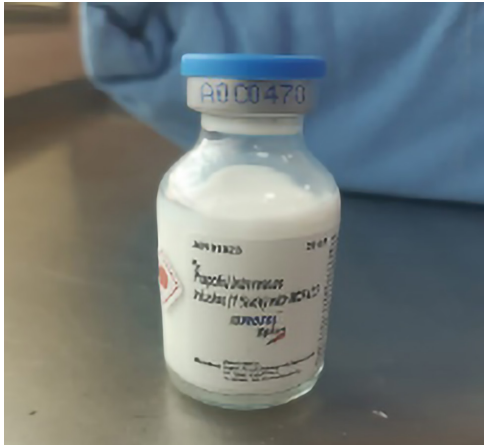
INTRAVENOUS ANESTHETICS

Thiopentone





Propofol



Summary of IV agents

| Agent | Comments |
|-----------------|---|
| Thiopentone | Cerebroprotective Induction agent of choice for neurosurgery Alkaline Ph Intraarterial injection causes vasospasm |
| Propofol | Painful injection Bacterial contamination due to egg lecithin IV Agent of choice for induction and day care surgery |
| Etomidate | Most cardiac stable Can cause adrenocortical depression |
| Ketamine | IV agent of choice for Shock Low cardiac output states Uncontrolled asthma Major side effects- Vivid reactions (Hallucinations) |
| Opioids | Used for analgesia Can cause respiratory depression Maximum muscle rigidity- alfentanil |
| Dexmedetomidine | Alpha 2 agonist Used for sedation |

INHALATIONAL AGENTS

Halothane bottle





Isoflurane



Sevoflurane



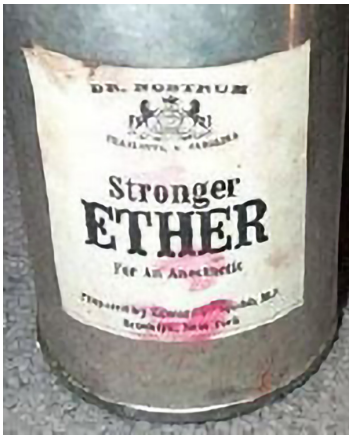


Anaesthesia

Desflurane



Ether



Summary of inhalational agents

| Agent | Comments |
|----------------------|--|
| <i>Halothane</i> | <i>Causes hepatitis Sensitizes myocardium to catecholamines</i> |
| <i>Isoflurane</i> | <i>Agent of choice cardiac patients Does not cause coronary steal</i> |
| <i>Sevoflurane</i> | <i>-Inhalational agent of choice for Pediatric induction Neurosurgery Day care surgery</i> |
| <i>Desflurane</i> | <i>Does not produce fluoride Agent of choice for renal patients</i> |
| <i>Nitrous oxide</i> | <i>C/I Pneumothorax/pneumopericardium/pneumocephalus Ozone depletion</i> |
| <i>Xenon</i> | <i>Ideal agent Expensive</i> |

MUSCLE RELAXANTS**Suxamethonium****Rocuronium**

Neostigmine



| Agent | |
|----------------------------|---|
| Suxamethonium | <ul style="list-style-type: none"> • Ideal muscle relaxant for intubation • Causes Hyperkalemia • C/I for muscular dystrophies • Most commonly implicate for malignant hyperthermia |
| Vecuronium | <ul style="list-style-type: none"> • Most cardiac stable |
| Rocuronium | <ul style="list-style-type: none"> • Non- depolarizer of choice for intubation |
| Cis-atracurium /Atracurium | <ul style="list-style-type: none"> • Metabolized by Hoffman degradation • Muscle relaxant of choice for renal and hepatic failure |
| Suggamadex | <ul style="list-style-type: none"> • New reversal agent of steroidal muscle relaxants |



REGIONAL ANAESTHESIA

LOCAL ANESTHETICS

Xylocard



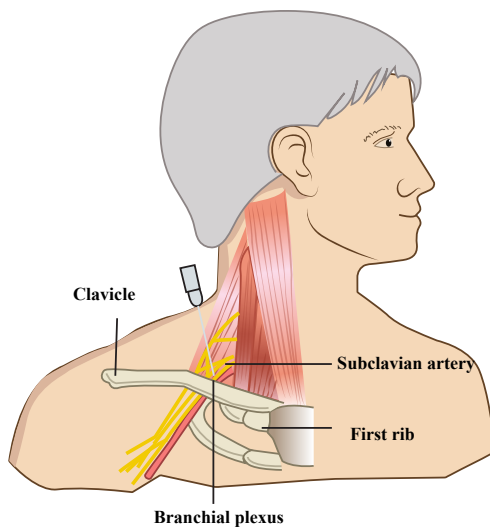
Ropivacaine



| Agent | Comments |
|-------------------------------------|---|
| <i>Lignocaine</i> | <ul style="list-style-type: none"> • Max safe dose Without adrenaline – 4.5 mg/kg With adrenaline – 7 mg/kg • Duration Without adrenaline – 45-60 minutes With adrenaline – 2-3 hours |
| <i>Bupivacaine</i> | <ul style="list-style-type: none"> • Preferred for painless labour and post-op analgesia • Highly cardiotoxic • C/I- Bier's block |
| <i>Ropivacaine /levobupivacaine</i> | Less cardiotoxicity |
| <i>Prilocaine</i> | Causes methemoglobinemia |

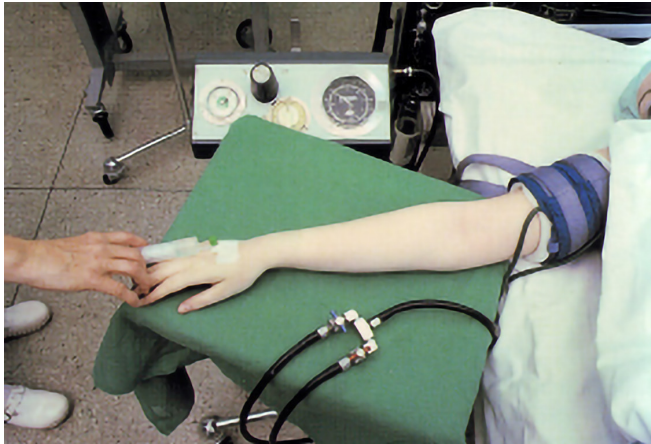
REGIONAL BLOCKS

Supraclavicular brachial plexus block

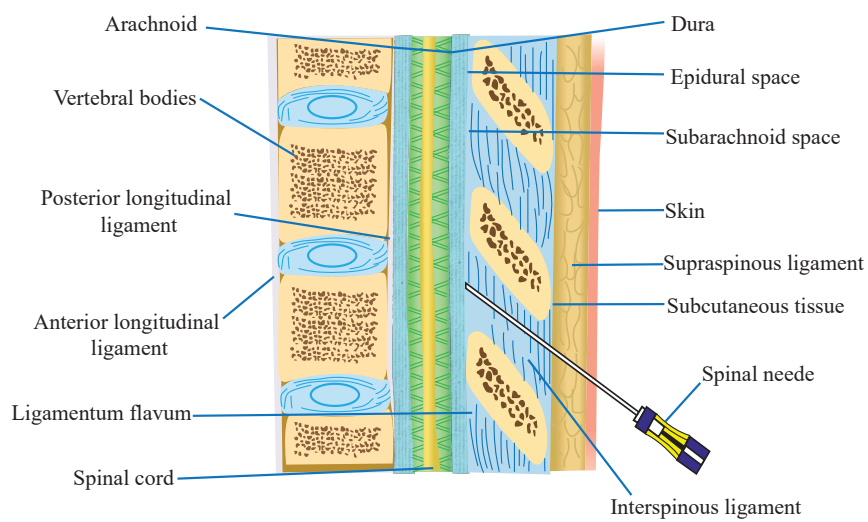




Biers block



Structure encountered during spinal



| Block | Comments |
|--|--|
| <i>Supraclavicular brachial plexus block</i> | <i>Bothersome complication- pneumothorax</i> |
| <i>Beirs block</i> | <i>Bupivacaine- absolutely C/I</i> |
| <i>Spinal</i> | <p>Structures encountered</p> <ul style="list-style-type: none"> • <i>Skin</i> • <i>S/C tissue</i> • <i>Supraspinous</i> • <i>Interspinous</i> • <i>Ligamentum flavum</i> • <i>Dura</i> • <i>Arachnoid</i> <p>Absolute C/I</p> <ul style="list-style-type: none"> • <i>Raised ICT</i> • <i>Coagulopathy/ anticoagulants</i> • <i>Patient refusal</i> • <i>Infection at local site</i> • <i>Severe fixed cardiac output lesions</i> |
| <i>Epidural</i> | <p><i>Needle used – Tuohy</i></p> <p><i>Used for painless labour/post-op analgesia</i></p> |



ANESTHETIC MANAGEMENT OF CO-EXISTING DISEASES

GA agents for systemic diseases

| System | IV agent | Maintenance agent | Muscle relaxants |
|-----------------------------|--|--------------------------|--------------------------------------|
| <i>CVS</i> | <i>Etomidate</i> | <i>Isoflurane</i> | <i>Vecuronium</i> |
| <i>Hypotension</i> | <i>Ketamine</i> | <i>Desflurane >6%</i> | <i>Vecuronium</i> |
| <i>Respiratory (asthma)</i> | <i>Controlled – Propofol</i> <i>Uncontrolled – ketamine</i> | <i>Sevoflurane</i> | <i>Steroidal</i> |
| <i>Hepatic</i> | <i>Propofol</i> | <i>Sevoflurane</i> | <i>Cisatracurium > atracurium</i> |
| <i>Renal</i> | <i>Propofol</i> | <i>Desflurane</i> | <i>Cisatracurium > atracurium</i> |

SPECIALITY MANAGEMENT

Day care surgery

| IV | Propofol |
|------------------------|---------------------|
| <i>Inhalational</i> | <i>Sevoflurane</i> |
| <i>Muscle relaxant</i> | <i>Mivacurium</i> |
| <i>Opioid</i> | <i>Remifentanyl</i> |
| <i>Benzodiazepine</i> | <i>Midazolam</i> |



NOTES



CRITICAL CARE AND CPR

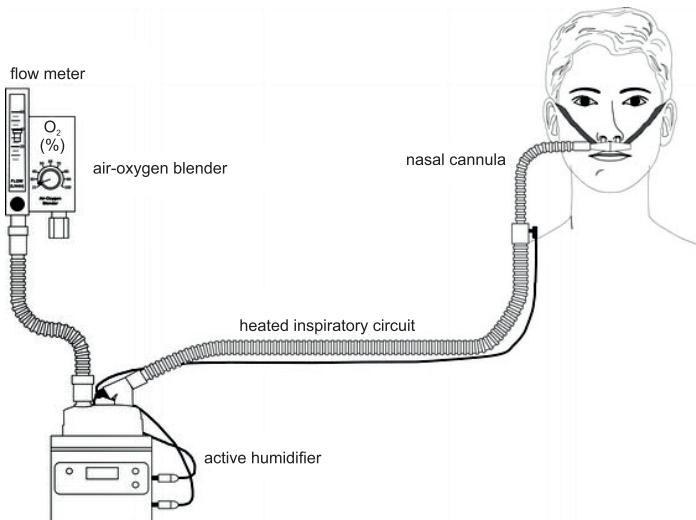
CRITICAL CARE

Non-invasive ventilation



Type II respiratory failure

High flow nasal cannula



Lung protective strategy

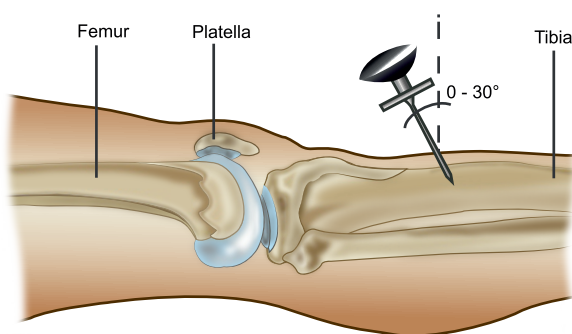
| Parameter | |
|------------------|---------------------------------|
| Tidal volume | 4-6 ml/kg |
| Plateau pressure | <30 cmH2O |
| PEEP | Start with 5 cm H2O and titrate |
| FIO2 | <0.6 |

CARDIOPULMONARY AND CEREBRAL RESUSCITATION

Mechanical CPR device



Intraosseous



Recommended for:
 All ages
 Anything can be given
 Preferred over endotracheal tube



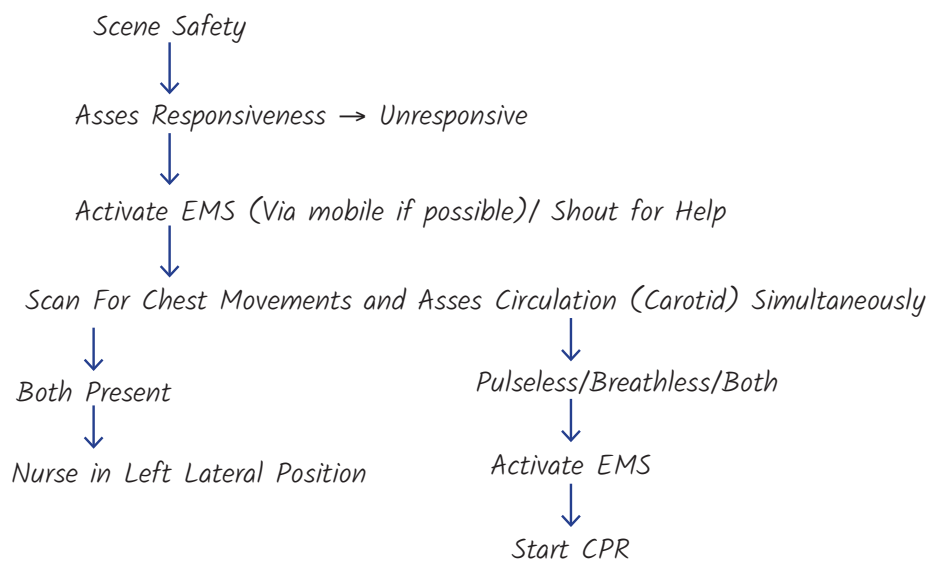
| | Basic Life Support | Advanced Cardiac Life Support |
|----------------|--|--------------------------------------|
| Airway | Manually | Equipments |
| Breathing | Mouth to mouth/ bag and mask | ETT/LMA/Tracheostomy |
| Circulation | Cardiac massage | Cardiac massage |
| Defibrillation | Automatic external defibrillators/public assess defibrillators | Manual defibrillators |
| Drugs | - | + |

Cardiac massage

| | Infants (0 – 1 Year) Excluding newborns | Children (1- 14) | Adults |
|-------------------------|--|--------------------------------------|--------------------------------------|
| Pulse check | Brachial | Carotid | Carotid |
| Compression area | Mid sternum | Mid Sternum | Lower one third |
| Compression with | 2 – 3 fingers | Heel of one hand | Both hands (one over the other) |
| Depth | 1 ½ inch | 2 inch | 2 inch (not more than 2.4 inches) |
| Rate | 100 / minute {but not more than 120} | 100 / minute {but not more than 120} | 100 / minute {but not more than 120} |
| Ratio | | | |
| Without advanced airway | 15:2 (Two rescuers) 30:2 (one) | 15:2 (Two rescuers) 30:2 (one) | 30:2 |
| With advanced airway | 100 compressions with 20-30 breaths | 100 compressions with 20-30 breaths | 100 compressions with 10 breaths |

ALGORITHM FOR CPR

For Adults :





For Children :

- 5 Cycles of CPR (15:2) and Then Call for Ems

SHOCKABLE RHYTHM

Ventricular fibrillation

Pulseless ventricular tachycardia

Polymorphic ventricular tachycardia

Shock energy :

Monophasic : 360 J

Biphasic : 160-200 J

SUMMARY OF AHA 2020 CHANGES

1. RECOVERY – 4th chain of survival
2. RESPIRATORY RATE for children: 20-30/minute



NOTES



NOTES