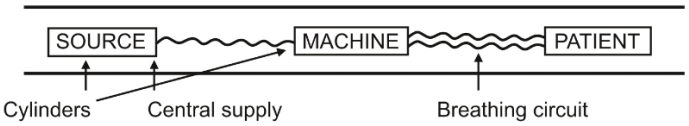
Anaesthesia Delivery Systems

HISTORY 01:01

Active Space

- First public demonstration
  - Given by WTG Monitor
  - On 16th Oct, 1846
  - 16th Oct celebrated as World Anaesthesia Day
  - Done using ether
- First spinal anaesthesia – AUGUST BIER

ANAESTHESIA DELIVERY SYSTEMS 03:04



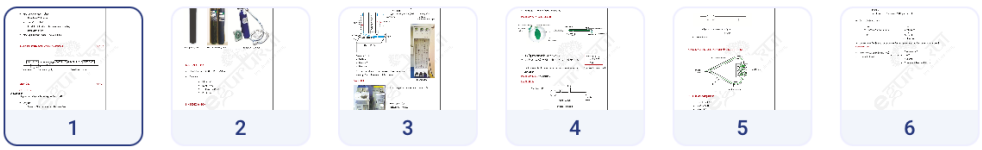
SOURCE 04:18

CYLINDERS

Conversion rate:

1 kg/cm² = 14.5 pounds per square inch (psi)

- Oxygen
  - Colour – Black body with white shoulders
  - Pressure – 2000 psi (139 kg/cm²)
- Nitrous Oxide
  - Colour – Blue
  - Pressure – 760 psi
- Entonox (50% O_2 + 50% N_2O)
  - Colour – Blue body with blue & white shoulders
  - Pressure – 2000 psi
  - Use – Painless labour



Active Space

Oxygen Cylinder

Nitrous Oxide Cylinder

Entonox Cylinder

CENTRAL SUPPLY

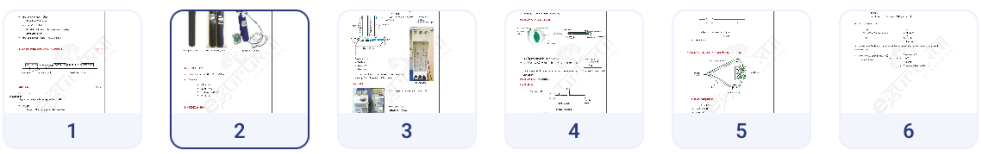
- Pressure – 60 psi (In USA, it is 50 psi)
- Colour –
  - White – O_2
  - BLUE – N_2O
  - YELLOW – Vacuum
  - Black – Air

PIN INDEX SYSTEM

- OXYGEN – 2, 5
- N_2O – 3, 5
- AIR – 1, 5
- ENTONOX – 7
- HELIOX (HE + O_2) – 2, 4

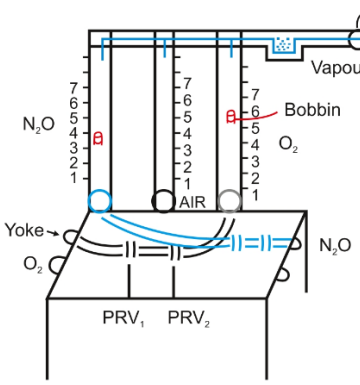
To prevent wrong fitting of cylinders to machine, cylinders are fitted at the yoke.

DIAMETER INDEX SAFETY SYSTEM (DISS)



ANAESTHESIA MACHINE 15:18

ROTAMETER - It is the white unit, called so as it has rotating bobbins



(Rotameter)

Colour of knob:

- White - O
- Black - Air
- Blue - N O

Previously used machine was known as Boyle's machine.
Nowadays Anaesthesia work station is used.

VAPORIZER

Colour of vaporiser act as identification option

Halothane - Red
Isoflurane - Purple
Sevoflurane - Yellow
Desflurane - Blue

BREATHING CIRCUITS 24:18

- Open - Obsolete
- Semi open - FGF ≥ Minute Volume
- Semi closed } Nowadays known as circle system
- Closed } FGF < Minute Volume

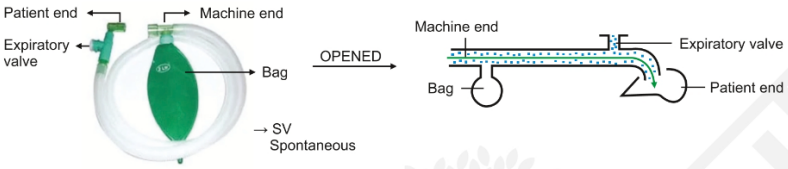
Active Space

Active Space

SEMI OPEN CIRCUIT

- MAPLESON CIRCUIT - described by Mapelson, initially described under semi-closed
- MAPLESON A → F (6 types, from A - F)

MAPLESON A → MAGILL CIRCUIT



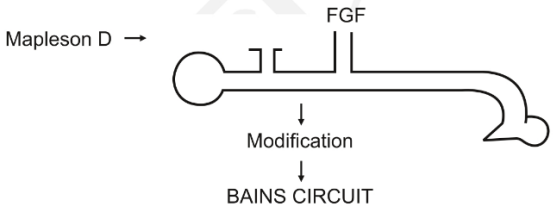
- SV (Spontaneous) → FGF = MV = 6L
- CV (Controlled) → FGF = >3MV = >18L = Not Practical

MV = RR X TV
= 12 X 500
= 6L

∴ Magill circuit is of choice for spontaneous ventilation should not be used for controlled ventilation

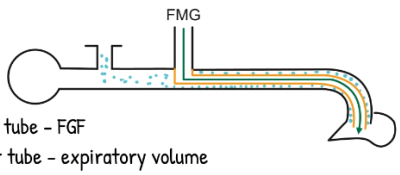
MAPLESON B & C → Obsolete

MAPLESON D →



In Bain's circuit modifcation another tube was inserted to make it co-axial circuit.

It is a circuit of choice for controlled ventilation



Inner tube - FGF
Outer tube - expiratory volume

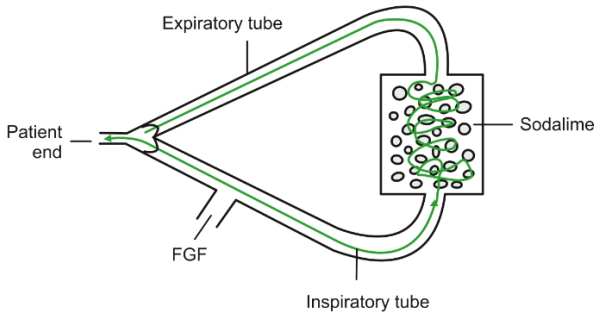
- MC Semi-open circuit
- CV → FGF = 1.6 MV
- SV → FGF = 2.5 MV

Pinch to zoom

MAPLESON E → Ayre's T Circuit
MAPLESON F → Jackson & Rees
} Paediatric Semi-open Circuit

- MC used paediatric circuit in < 6yrs
  < 20kg
- FGF ≈ BAINS

CLOSED / SEMICLOSED CIRCUIT → CIRCLE SYSTEM



- Soda lime Composition
  - $Ca(OH)_2$ – 80%
  - NaOH – 3–5%
  - KOH – 1–2%
  - Water – 15–16%
  - Silica (to prevent dust formation)
  - Color Indicator – Durasorb : Pink (fresh) → White (exhausted)

Advantage

- Economical (Since consumption of gases is very low)
- ↓↓ Pollution (Since there is no venting out of gases)

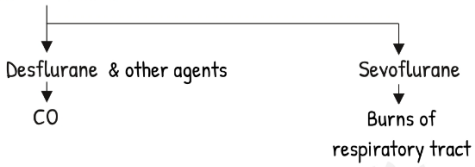
Active Space

Active Space

Disadvantage

- Toxic compounds with inhalation agents
  - Trilene
  - Sevoflurane → Compound A (Nephrotoxic)

- Desiccated soda lime

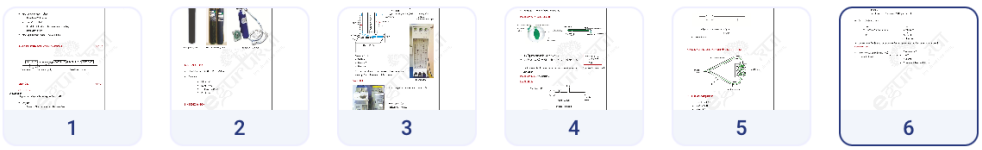


- Desiccation of soda lime was evident with dry state or much evident since water is added

New Absorbents

- Amsorb (Calcium hydroxide lime)
- Lithium hydroxide

→
- No compound A
- No CO
- No burns
- Expensive & less availability



Equipments

EQUIPMENTS

00:10

Active Space

AMBU BAG

Artificial Manual Breathing Unit

- 100% O_2

GUDELS AIRWAY

- To prevent tongue fall

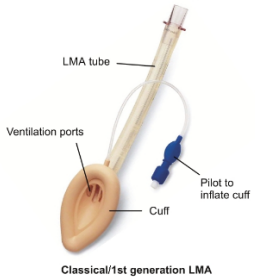
LARYNGEAL MASK AIRWAY (LMA) (Supraglottic airway)

Indications

- Emergency airway for failed/ difficult intubation
- Elective ventilation

Advantages

- Avoid complication of intubation
- Easy to insert
- No laryngoscope
- No muscle relaxant
- Cervical spine fracture



Classical/1st generation LMA

Classical / 1st generation LMA

Disadvantages

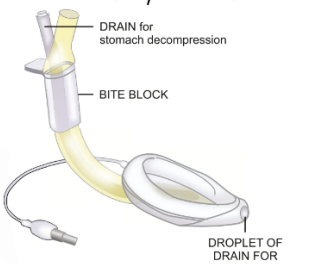
- Increased risk of aspiration

2nd Generation LMA

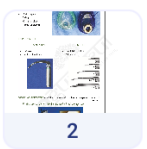
Proseal Prototype

Igel – MC used in India

LMA Supreme (Easy insertion)



Pinch to zoom


1

2

3

4

Active Space

FACE MASKS

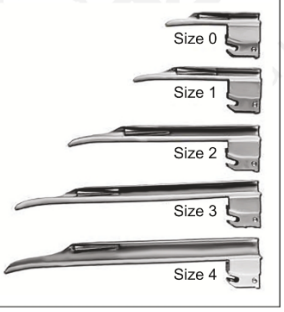
Ventilation for transient period only

Disadvantages

- ↑ dead space
- Tiring
- ↑↑ aspiration
- Increased pollution

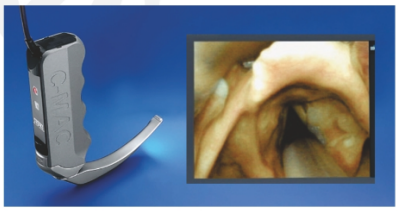
LARYNGOSCOPE

MACINTOSH	MILLER
• MC used • Adult >> Paediatric	• Paediatric >> Adult (all ages)



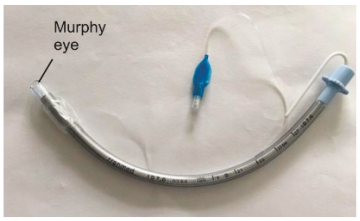
VIDEO LARYNGOSCOPE – contains a camera and structures are displayed on external screen

- 94-95% success rate for failed intubation by direct laryngoscope



ENDOTRACHEAL TUBE

- PVC (Poly Vinyl Chloride)
- Low pressure & high volume cuff
  ↓
  Tracheal ischemia (less chances)



Active Space

CUFF

- To prevent aspiration, not used for fixation
- Can be used in children at any age

Size	Length
Male → 8/8.5 no. (ID = mm)	Male = 23cms
Female → 7/7.5 no.	Female = 21cms
0-1yr → 3/3.5 no.	Children = $\frac{\text{Age}}{2}$ + 12cms
1-14yrs → $\frac{\text{Age (years)}}{4} + 4.5$	Ex → 4yrs = $\frac{4}{2}$ + 12 = 14cms
Ex → 4yrs = $\frac{4}{4}$ + 4.5 = 5.5	
(ID - Internal Diameter)	

R. A. E PREFORMED TUBE (OXFORD)

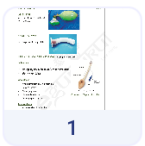
- Oral Sx

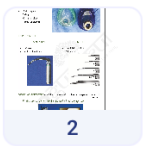
FLEXOMETALLIC

- Non - kinkable
- Neurosurgery (Head and neck)

DOUBLE LUMEN (ROBERTSHAW)

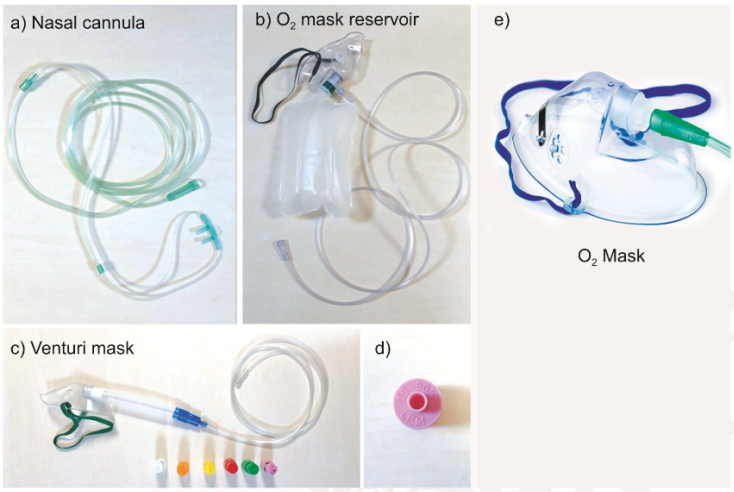
- One lung ventilation





Active Space

OXYGEN DELIVERY DEVICES



Maximum flow and Oxygen

Device	Max flow	Max FIO_2
Nasal cannula	6 L	0.44 (44%)
O_2 mask	10 L	0.6 (60%)
O_2 mask with reservoir	15 L	0.8 (80%)
Venturi mask	15 L	0.6 (60%)

HME (Heat & moisture exchanger)

- Humidification → Also known as artificial nose
- Filter

Pre- Operative Assessment and Monitoring

PREOPERATIVE ASSESSMENT 00:09

- Pre anaesthetic care, including history and examination mainly including respiratory & cardiovascular

AIRWAY ASSESSMENT 00:49

1. Modified Mallampati Score - Assess mouth opening

	Faucial pillar	Faucies	Uvula	Soft palate	Oral Sx
I	✓	✓	✓	✓	} Easy
II	X	✓	✓ (major)	✓	
III	X	X	Tip	✓	Difficult
IV	X	X	X	X	Impossible

2. TM distance ≥ 6.5 cms
3. Neck movements

Investigations

- Guided by associated comorbidity
- No routine investigation

ASA Grading

I → Normal healthy patient
II → Mild with no functional limitation
III → Moderate with functional limitation
IV → Severe - incapacitating
V → Moribund
VI → Brain dead
E → Emergency surgery

example - ASA III(E)

PREMEDICATION 08:20

- Done with aim no routine premedication
- Most common goal → Relieve anxiety

Active Space

Active Space

FASTING

Solid	→	6hrs
Non veg/Fatty	→	8hrs
Clear fluids	→	2hrs
Breast milk	→	4hrs

Management of Pre – Existing Drug Therapy

	TO BE STOPPED	TIME TO STOP
1	Viagra	24hrs
2	Anticoagulants (warfarin)	5 days
3	Antiplatelets – Aspirin	72 hrs except Recent MI Recent Stroke Coronary Stent
	Clopidogrel	5 days
4	Oral contraceptives – high dose estrogen	4 weeks
5	Herbal medication	7 days
6	Smoking	8 weeks
7	ACE inhibitors & ARB	24hrs

Morning Dose to be Ommited

1. Diuretics (if taken as anti-hypertensives then to be continued)
2. Topical creams (can cause local reactions)
3. Oral hypoglycemics

Modifications Required

1. Cholinesterase inhibitor – minimal (reduce storage)
2. Steroids (History of intake of more than 3 weeks in last 1 year, then perioperative steroid to be given)
3. ATT (LFT are normal)

FLUIDS

15:33

Maintenance → 4-2-1
Ringer Lactate – fluid of choice for maintenance

Replacement → Crystalloids > Colloids (for severe shock)
↓
Ringer Lactate – crystalloid of choice for replacement

MONITORING – High monitoring standards, less chances of complications 17:35

Active Space

- CNS
  - Depth of Anaesthesia
    1. Bispectral index (BIS index)

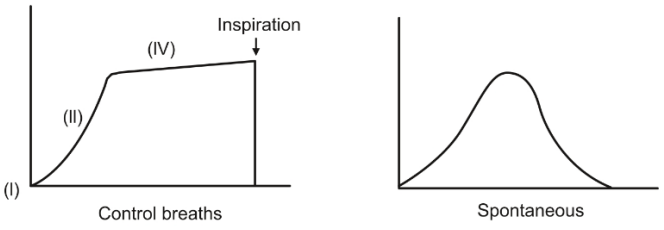
       Brain dead = 0
       Awake = 100
       Adequate depth = 40-60

    2. Entropy
       - to analyse EEG & EMG
- CVS monitoring
  - IBP → Gold standard (Invasive Blood Pressure management)
  - ECG → II – Arrythmia

    $V_3 > V_4 > V_5$ – Ischemia
  - Trans Esophageal Echocardiography (TEE) → Best
  - Trans Thoracic is not possible for monitoring
- Respiratory monitoring
  - Pulse oximeter → SpO_2 ↓
  - Limitations → Can't detect abnormal haemoglobin ↓

    CO- Oximeters – Gold standard (can detect abnormal Hb)
  - Capnography → ET CO_2 along with graphy
  - Uses – Surest confirmation of intubation

    Extubation, Apnea, Cardiac arrest } $EtCO_2 = 0$ / Graph – flat line
    Air embolism ↓
    Malignant hyperthermia ↑↑
  - Capnography graphs



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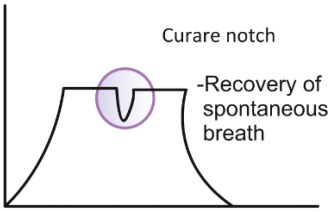
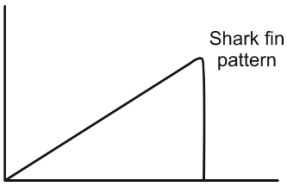
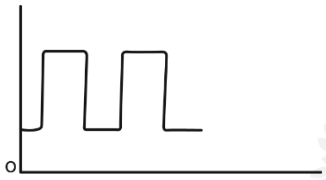


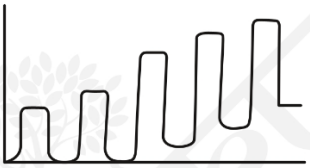
Spontaneous breath during controlled breathing



COPD/Asthma



closed circuit abnormal


Malignant hyperthermia
(CO_2 keeps on increasing to high levels)

Temperature

- Hypothermia - Core temperature < 35°C
- Sites

  Accurate - Pulmonary Artery - Rarely done, and has many complications

  MC used- Lower oesophagus

  (best)

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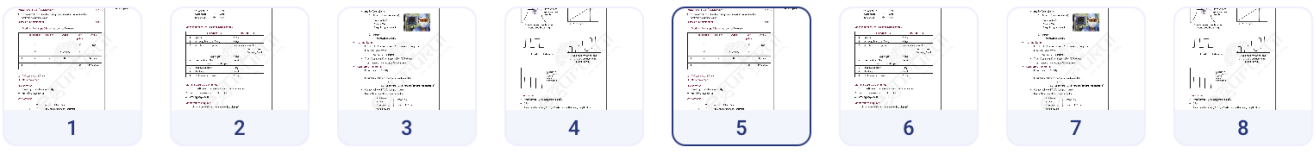

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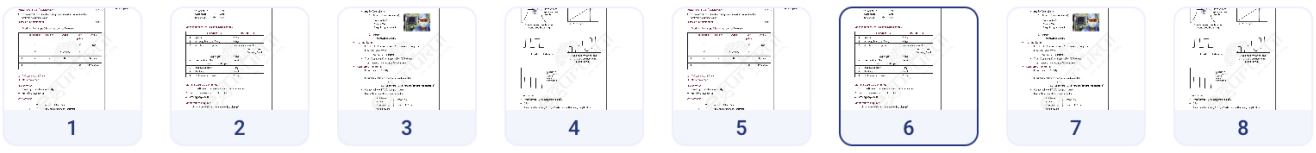

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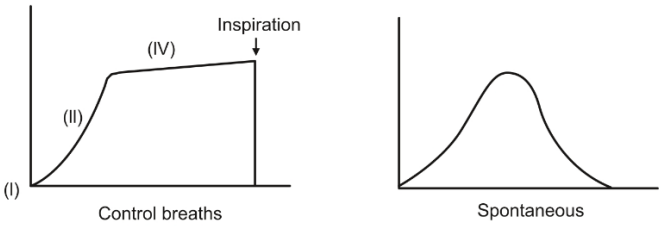

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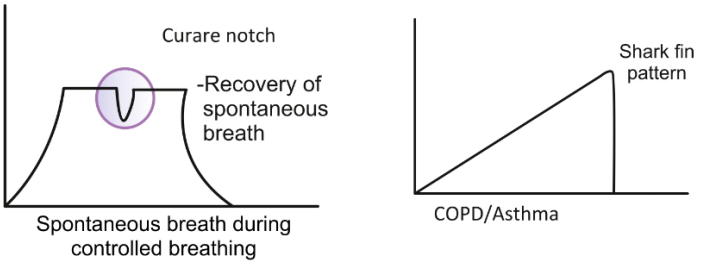

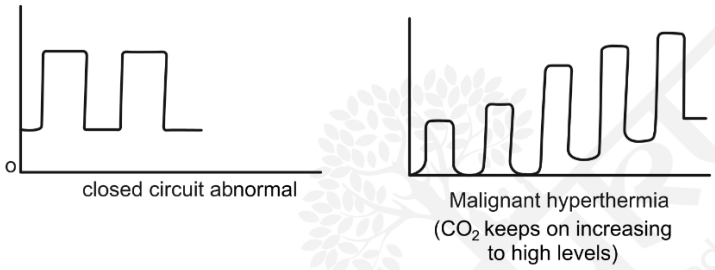

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Introduction to GA and IV Agents

Active Space

GENERAL PROTOCOL 00:21

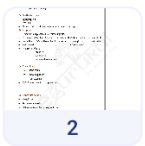
1) Preoxygenation (Denitrogenate/Increase O_2 reserve)
↓
2) Induction → IV (propofol)
↓
3) Suxamethonium
↓
4) Intubation
↓
5) Maintenance → 75% N_2O/ Air + 25% O_2 + Inhalational agent + Non – depolarising muscle relaxant
↓
6) Reverse (Neostigmine)
↓
7) Extubation

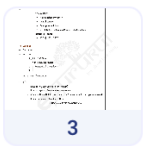
IV AGENTS 04:50

IV Agents
- Barbiturates
- Non – barbiturates

1) Thiopentone

- Alkaline pH (10.5)
- Redistribution (conscious within 15–20 min, redistribution is for all IV agents)
- Anticonvulsant
- Cerebroprotective – ↓ CMR by 30–40%
- Complication: Intra-arterial injection – Vasospasm (alkaline pH leads to endothelial injury)
- Prevention – 2.5%, Inject slowly
- Rx
  - Don't remove needle/cannula (future Thiopentone at same rate)
  - Vasodilators
    - Papaverine
    - α blockers
    - Lignocaine





Active Space

- Stellate ganglion block (Sympathetic block – ↓ Vasospasm)
- Heparin
- Warfarin 7–14 days

2) Methohexitone

- Epileptogenic
- I/V → ECT
- Absolute C/I for Thiopentone & methohexitone is "porphyrias"

3) Propofol

- Prepared in soyabean oil → Painful injection
- Contains egg lecithin → Discard after 6 hours (High chances of bacterial contamination may be fatal)
- Half – life → 2–3hrs (lesser half life is reason for it being better than Thiopentone)
- Anti – emetic
- IV agent of choice
  - Induction
  - Day care Sx
  - Controlled asthmatics

4) Entomidate

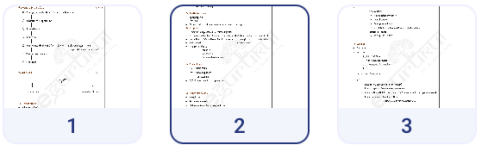
- CV → Most stable
- I/V → Cardiac patient
  Vascular Sx
- S/E → Adrenocortical suppression

5) Benzodiazepines

- Anxiolytics
- Retrograde amnesia
- Midazolam (only Benzodiazepine in use)
  - $t_{1/2}$ → 2 hours
  - Painless (due to water based preparations)

6) Ketamine

- Dissociative anaesthesia
- NMDA receptor
- Advantages
  - I/V of choice for
    - Shock patients → (+) Sympathetic
    - Full stomach → Pressure airway reflexes
    - Active asthmatics → Rx – Refractory status asthmatics



Active Space

- Low cardiac output (CHF) – (+) Sympathetic → ↑C.O
- RT – LT shunts (TOF) – (+) sympathetic → ↑ SVR → ↓ Shunt

- S/E
  - Vivid reactions
    - Hallucination (40-50%)
    - Vivid dreaming
    - Emergence delirium
    - Rx → BZDs (midazolam) (prevent vivid reactions)
  - Increased pressures
    - IOP, ↑ IGP, ↑ ICP

7) Opioids

- Analgesia
- Receptors

$\mu \rightarrow \mu_1$ - Analgesic
$\mu \rightarrow \mu_2$ – Resp. depression
K, δ } Analgesic at spinal level

Nociception – Endogenous

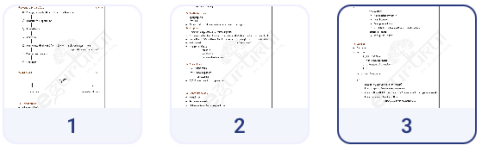
- S/E –
  - Respiratory depression (most common)
  - Muscle rigidity – Wooden chest syndrome
  - Constipation – Opioid bowel syndrome (No tolerance to constipation is seen)
  - Construction of Sphincter of Oddi
    - Biliary colic is not an absolute C/I

8) Peripheral antagonists (Constipation)

- Methylnaltrexone and Naloxegol

9) α_2 Agonist

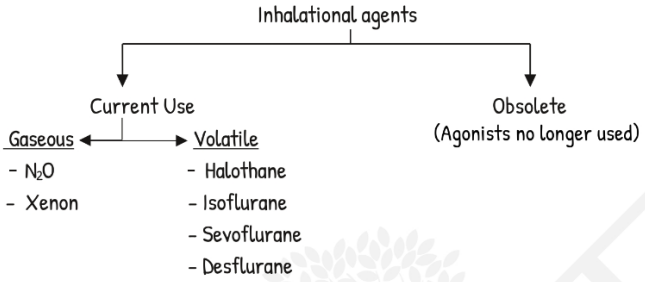
- Adjuvant and sedation (recommended for outside OT sedation also)
- Clonidine (obsolete)
- Dexmedetomidine – less S/E



GA – Inhalational Agents

Active Space

CLASSIFICATION



Potency ∝ 1 / MAC

- MAC (Min alveolar conc.) (minimum alveolar concentration required to produce effects in 50% of subjects)
- Most potent – Halothane
- Least potent – Overall – N_2O
  Volatile – Desflurane

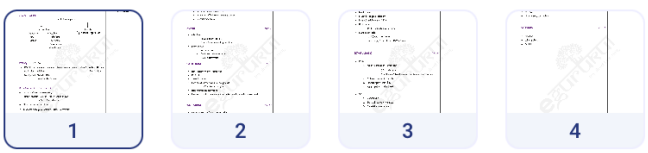
Blood Gas Coefficient / BG solubility

- Indicator of induction & recovery
- Fastest induction – Overall – Xenon (still in trials)
  – Current – Desflurane
- Slowest induction – Halothane
- Lower the blood gas coefficient, faster is extraction

Individual Agents

NITROUS OXIDE 06:40

- 35 times more soluble than nitrogen
- Least potent
- Side effects –
  1. Expansion of air spaces: Absolutely C/I in Pneumothorax, Pneumopericardium, Pneumoencephalus (Pneumopericardium)



Active Space

2. Bone marrow aplasia
3. Sub-acute degeneration of spinal cord } Prolonged use (seen more in industrial workers)
4. Megaloblastic anemia (>8-12hrs)
5. Teratogenic effects (seen in animal studies)
6. Destructive to ozone

XENON 10:57

- Advantages
  - No S/E like nitrous oxide
  - Supersedes in anesthetic properties
- Disadvantages
  - Very expensive
  - Can increase airway resistance
  - Avoid in asthmatics

HALOTHANE 12:16

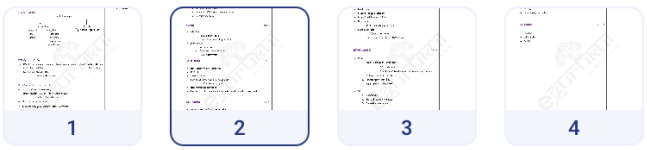
- Non - irritant → Smooth induction
- Most potent
- Slowest recovery
- Sensitizes heart to adrenaline (exogenous)
  C/I - pheochromocytoma
- Not preferred for asthmatics
- Halothane hepatitis (Immunologic basis due to antigen-antibody reaction)

ISOFLURANE 15:00

- Irritating induction (most cardiac stable)
- IAOC - Cardiac patients including MI
  Min ↓ CO
  Isoflurane doesn't cause coronary steal

DESFLURANE 16:50

- Isomer of Isoflurane
- Irritating induction
- High vapor pressure



Active Space

- Low boiling point (Tech 6 vaporiser is used)
- Can produce CO
- Least potent
- Lowest blood gas coefficient
- Minimal metabolism (<0.1%)
- No fluoride

  IAOC – Renal Failure patients
- Systemic effects

  < 6% (IMAC) ~ Isoflurane

  > 6% → (+) Sympathetic : IAOC –Shock

SEVOFLURANE 19:41

- IAOC
  1. Pediatric induction – smoothest

     2nd – halothane

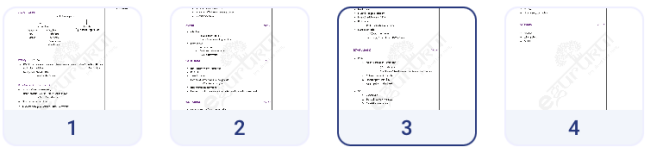
     * Isoflurane & Desflurane – can't be used for induction
  2. Asthma – Max bronchodilation
  3. Neurosurgery – Min ↑ ICT
  4. Hepatic patient – Min ↓ HBF

- S/E
  1. Compound A
  2. Burns of respiratory mucosa
  3. Convulsions – very rare

ETHER 23:19

Advantages
- Cheapest
- Safest
- Compete

Disadvantages
- Irritating Induction
- Nausea & Vomiting
- Inflammable & Explosive



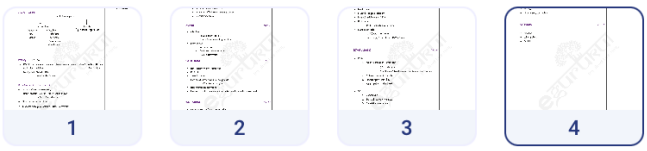
HELIOX *24:50*

- Low density
- He + O_2
- Upper airway obstruction

ENTONOX *25:34*

- N_2O + O_2
- Labor analgesic
- Dental

Active Space



GA – Muscle Relaxants

Active Space

SEQUENCE OF MUSCLE BLOCKADE 00:13

- Central muscles → limbs
  Head & neck > Respiratory, trunk, abdominal > limb (due to preferential blood supply)
- The sequence at reversal is same

NM MONITORING 01:42

MUSCLES

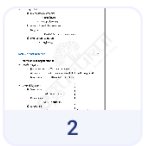
- Ideal muscles → Corrugators supercilli > Orbicularis oculi
- Most commonly used → Adductor pollicis (Ulnar N.)
- Modality → Train of four

CLASSIFICATION 03:05

- Depolarizers → Depolarization → Refractory Membrane
- Non - Depolarizers → Complete antagonist

SUXAMETHONIUM 04:47

- Succinylcholine – behaves like Acetylcholine
- Ideal for intubation
  - Onset = 20-30 sec
  - Duration < 10 min
  - Metabolized by pseudocholinesterase
- Systemic effects
  - Hyperkalemia
  - Increase IGP, IOP & ICT
  - Muscle pains (40-50%)
  - Malignant hyperthermia
- C/I
  - Hyperkalemia
  - Upto (due to extra junctional receptors)
    - 3 months after trauma
    - 6 months after stroke
    - 1 year after burns



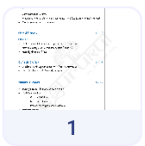
- Muscular dystrophies (Serum K^+ can increase by 3-4 mEq. which can be fatal)

- Prolonged block
  1) Low pseudocholinesterase
     - Hepatic failure
     - Hypoproteinemia
  2) Abnormal pseudocholinesterase (Atypical)
     - Dibucaine no. (can tell genetic makeup)
  3) Phase 2 block (Dual block)
     - High doses

NON – DEPOLARIZERS 11:53

- Maintenance of surgical resection
- Obsolete agents
  - D – tubocurare – First muscle relaxant
  - Gallamine – Cross placenta (contraindicated in pregnancy)
  - Doxacurrium – 99% excreted unchanged (not desired for muscle relaxant)
- Current day agents
  1) Vecuronium
     - Most cardiac stable
  2) Pancuronium
     - NA → Hypotension
  3) Atracurium
     - Hoffman degradation (Spontaneous degradation)
     - MR → Renal failure
       Liver failure
     - S/E → Release histamine
       Laudosine → convulsions
  4) Cisatracurium > Atracurium
     - No histamine released
     - 1/5th laudosine
  5) Rocuronium (Derivative of vecuronium)
     - Fast onset = < 90 sec
     - Non dep → Intubation

Active Space



Active Space

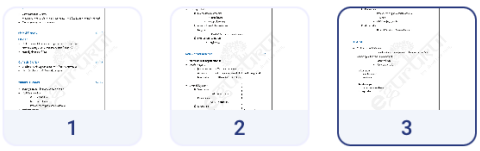
6) Rapacuronium
   - Bronchospasm (9-10%) – hence was banned
7) Mivacurium
   - Metabolized by pseudocholinesterase
   - ~ 10 min
   - MROC → Day care Sx
8) Gantacurium
   - Onset & Duration ~ Suxamethonium

REVERSAL

- Cholinesterase inhibitors
  - Neostigmine + Glycopyrrolate (Block muscarinic S/E)
- Gamma cyclodextrins (sugammadex)
  - Directly binds
  - Reverse steroids

Advantages:
- Immediate onset
- Deep block

Disadvantages:
- can only reverse steroids
- expensive



GA - Complications

Active Space

COMPLICATIONS OF GENERAL ANAESTHESIA 00:09

- Aspiration
  - Preventable
  - Nil orally
  - Anaesthetic management for high risk

A.O.C → Regional

GA → Rapid Sequence Induction (RSI)

Premedication: Meta loperamide + ranitidine

Preoxygenation

Induction → Ketamine → SCh

Bag & Mask (C/I)

Cricoid Pressure (pressure over oesophagus prevents aspiration) (Sellick Manoeuvre)

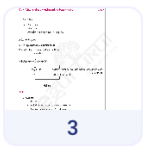
Intubate

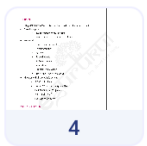
CNS

- Convulsions
  - Hypoxia
  - Methohexitone (propofol, etomidate) ⟶ I.V.
  - Sevoflurane (Enflurane) ⟶ Inhalational
  - Atracurium/Cisatracurium (Laudanosine) ⟶ Muscle relaxants
  - LA toxicity
- Pain
  - 2nd MC post-op

ANAPHYLAXIS

- Except inhalational agents
- MC - Antibiotics





Active Space

GIT

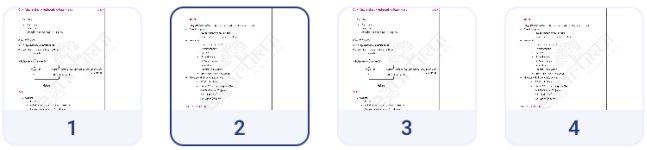
- Nausea and vomiting → Most common post-op complication

THERMAL

- Malignant hyperthermia ⟶ Genetic disease with high temperature levels
- Causative agents
  - Suxamethonium → MC implicated
  - Volatile agents → Maximum - Halothane
- Treatment
  - Stop triggering agent
  - Hyperventilation
  - Rx ↑ K^+
  - Rx Arrhythmia
  - Rx hyperthermia
  - Rx acidosis
  - Maintain urine output
  - Specific Rx - Dantrotene sodium
- Management of susceptible patient
  - A.O.C → Regional
  - GA → I/V → Propofol (protective)
    Maintainence → IV Opioids
  - MR → SCh → C/I
    Non-dep → Delay MH

POSITION RELATED

- Peripheral Neuropathy
  - MC - Ulnar Nerve
- Venous Air Embolism
  - Sitting
  - 100 ml
  - Transesophageal Echocardiography (0.2 mL) ⟶ (most sensitive test)



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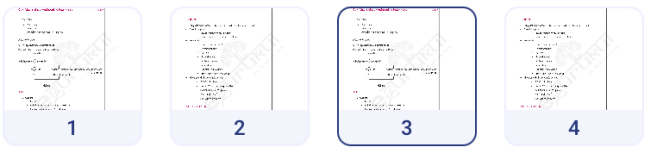

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Regional Anaesthesia - Local Anaesthetics

Active Space

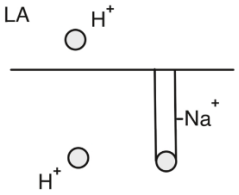
SEQUENCE OF NERVE BLOCKADE 00:18

- Nerve fibres
  - Peripheral nerve block (PNB): Aγ > Aδ > Aα = β > B > C
    A > B > C
  - Central nerve block CNB: B > A > C

- Functional
  - PNB : Motor > Sensory > Autonomic
  - CNB : Autonomic > Sensory > Motor

- Recovery
  - Reverse
  - PNB : Autonomic > Sensory > Motor
  - CNB : Motor > Sensory > Autonomic

MECHANISM OF ACTION 04:09



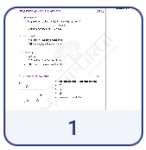
- Activated channels > inactivated channels
- K^+
- Ca^{2+}
- Cl^-
- Mainly Na^+ channel block

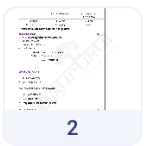
TOXICITY 05:18

- CNS → Earlier
- CVS CNS CVS
  Lignocaine 1 : 7
  Bupivacaine 1 : 3

PRILOCAINE 05:40

- Extrahepatic metabolism
- High doses – Methemoglobinemia





Active Space

LIGNOCAINE 06:32

- MC used

	Without adrenaline	With adrenaline (1 in 2,00,000)
Duration	45-60 min	2-3 hrs
Max safe doses	4.5mg/kg	7mg/kg

Adrenaline reduces systemic absorption of lignocaine

BUPIVACAINE 08:58

- No commercial preparation with Adrenaline
- Duration → 2-3 hrs
- Max safe dose → 2 mg/kg
- Cardiotoxicity
  - Bradyarrhythmia → Tachyarrhythmia
  - Ventricular Tachycardia

    DOC - Amiodarone

LEVOBUPIVACAINE

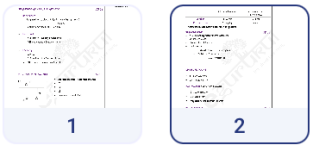
- S - BUPIVACAINE
- Less cardiotoxicity

ROPIVACAINE > LEVO / BUPIVACAINE

- ↓↓ cardiotoxicity
- 1/3rd less potent
- Prognosis to cardiac arrest is better

EMLA CREAM 12:44

- 2.5% lignocaine + prilocaine
- Enteric mixture of local anaesthetics



Speciality Management

Active Space

SPECIALITY MANAGEMENT 00:08

CVS

RA / GA
↓
- Induction (I) – Etomidate
- Maintenance (M) – Isoflurane
- Muscle Relaxant (MR) – Vecuronium

Respiratory System (Asthma/COPD)

- A.O.C – RA
  GA
- I – Controlled – Propofol
- Uncontrolled – Ketamine
- M – Sevoflurane
- MR – Steroids

Hepatic

- A.O.C – GA
- I – Propofol
- M – Sevoflurane
- MR – Cisatracurium > Atracurium

Renal

- A.O.C – GA
- I – Propofol
- M – Desflurane
- MR – Cisatracurium > Atracurium

Neuromuscular disease (like Myasthenia Gravis)

- A.O.C – RA
  GA
- I – Propofol
- M – Desflurane (Max MR)
- MR – Mivacurium / Cisatracurium > Atracurium

Active Space

Anaesthesia for Covid

- A.O.C – RA
  GA
  - Rapid sequence
  - Video laryngoscope

Neurosurgical Anaesthesia

- I – Thiopentone
- M – Sevoflurane (Max MR)
- MR – SCh -C/I
  Non dep – safe

Obstetric Anaesthesia

LSCS

- A.O.C – Spinal

In case of GA

- Rapid sequence

Painless labour – Lumbar epidural

Paediatric Anaesthesia

GA

- I – 1st – Propofol
  2nd – Inh – Sevoflurane
- M – Desflurane
- MR – Cisatracurium > Atracurium
- Cuffed tubes
- RA is not C/I

Anaesthesia for Day care

RA / GA

- Avoid supraclavicular (due to risk of pneumothorax)

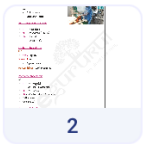
GA

- LMA > ETT
- IV – Propofol
- Inh – Sevoflurane > Desflurane
- MR – Mivacurium
- BZD – Midazolam
- Opioid – Remifentanil

Active Space

Anaesthesia for laryngoscopy

- Ideal gas – Argon (expensive)
- MC gas – CO_2 (highly diffusibility)



Critical Care and CPCR

Active Space

CRITICAL CARE 00:09

VENTILATORS

Ventilators

	Volume controlled/ Volume Preset	Pressure controlled/ Pressure Preset
Advantage	↓ risk of hypoventilation	↓ barotrauma
Disadvantage	↑ risk of barotrauma	↑ hypoventilation

LUNG PROTECTIVE STRATEGY

1) Low TV → 4-6 mL/kg of TBW
2) Plateau pressure < 30mm H_2O
3) PEEP = Start with 5 cm H_2O & titrate
4) FIO_2 = < 0.6 (<0.5%)

} Prevent Barotrauma

CPCR 05:43

- RHYTHMS
  - VF
  - PEA
  - Asystole
- SEQUENCE
  C → A → B
  ↓
  30/18-20 sec
- CRP

	BLS	ACLS
AIRWAY	Manual	Equipments
BREATHING	M-M, B & M	LMA/ETT/TT
CIRCULATION	- Cardiac Massage -	
DEFIBRILLATION	AED/PAD	Manual
DRUGS	-	+

Active Space

- CARDIAC MASSAGE

	INFANTS	CHILDREN	ADULTS
Pulse Check	Brachial	Brachial/Carotid	Carotid
Compression Area	-	Lower 1/3rd sternum	-
Compression Done With	2-3 times	1 hand	2 hand
Compression Rate	-	100-120mt	-
Compression Depth	1'	1 ½'	2-2.4'
Ratio (C:V)			
Without Advanced Airway Single Two	30:2 15:2	30:2 30:2	30:2 30:2
With Advanced Airway Ventilation	-	C = 100-120/min 20 – 30 breath / min (AHA 2020)	- 10 Breath/min

ARRYTHMIA MANAGEMENT

- Shockable Rhythm
  - VF
  - Pulseless VT
  - Polymorphic VT

  360 J – Monophasic
  150 – 200 J – Biphasic
- Non – Shockable Rhythm
  - PEA
  - Asystole
  - Adrenaline
- Drugs
  - Adrenaline →I/V > I/O > ET
  - Concentration – 1 :10000