Editing file

Intraoperative and Postoperative Complications and Management

Objectives:

- Learn a common approach to emergency medical problems encountered in
- intraoperative and postoperative period.
- Study postoperative respiratory and hemodynamic problems and understand how to manage these problems.
- Learn about the predisposing factors, differential diagnosis and management of PONV.
- Understand the causes and treatments of postoperative agitation and delirium.
- Learn about the causes of delayed emergence and know how to deal with this problem.
- Learn about different approaches of postoperative pain management.

Color index:

- Red: important /
- Black: content slides
- Gray: extra
- Green: dr. Notes

IMPORTANT

Anesthesia 438 teamwork

Intraoperative Anesthetic Emergencies

Introduction

Emergencies are not common but when they do occur they are often life threatening and require immediate action.

Factors in the mnemonic COVER ABCD accounts for approximately 95% of critical incidents:	
Colour [1]	saturation, central cyanosis.
Oxygen	ensure adequate and correct delivery by monitoring the inspired gas, expired gas and pulse oximetry
Ventilation [2]	e.g. breathing circuit, air entry, CO2 trace, ETCO2 and vaporizer
Endotracheal tube	kinks, obstruction, endobronchial, secretions
Review monitors	correct site, checked, calibrated; Don't rely 100% on the monitor check the patients color through his lips, conjunctiva or mucous membranes.
Airway	failed intubation, laryngeal spasm, foreign body, aspiration
Breathing	difficult to ventilate, e.g. tube occlusion, bronchospasm, pneumothorax, aspiration, lack of neuromuscular blocking drug (NMBD), pulmonary oedema;
Circulation	hypotension: excess anaesthetic agent, dysrhythmia, myocardial ischaemia/MI, hypovolaemia from any cause (e.g. dehydration, bleeding), sepsis, tension pneumothorax, sympathetic block (e.g. spinal or epidural anaesthetic);
Drugs [3]	anaphylaxis, wrong drug/dose/route
Embolism	air/fat/cement (during total hip arthroplasty) /amniotic fluid. very rare
Others	related to CVP line (pneumothorax /cardiac tamponade), awareness, endocrine and metabolic (malignant hyperthermia (MH), pheochromocytoma).

1- Pink means well saturated, central cyanosis is apparent as a bluish discoloration at the lips, tongue, and sublingual tissues. Peripheral cyanosis, on the other hand (pun intended!), spares the oral mucosa but cause bluish discoloration of the hands and feet; it is the result of vasoconstriction and diminished peripheral blood flow
2- Important because we give the patient NMBD and we are ventilating the patient mechanically.
3- Should be given in small doses in the beginning and wait for some time, if there is no reaction give the rest to avoid anaphylaxis

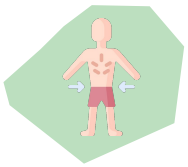
Intraoperative Anesthetic Emergencies

Aspiration

Definition: inhalation of gastric contents can occur in patients who have impaired protective airway reflexes.

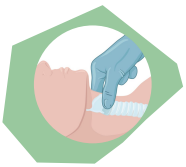
- Regurgitation of gastric contents can happen in any patient who does not have fully functioning upper airway protective reflexes [1].

Those at risk [2]:

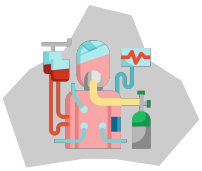


Inadequate period of preoperative starvation.

Delayed gastric emptying (e.g. opiates, pain, bowel obstruction, pregnancy at term, RTA pts should be treated as full stomach; see Figure 6.2)



Insufficient/lack of cricoid pressure at induction of anaesthesia.



Early extubation in an at-risk patient in supine position [3].

Signs:

- Gastric contents visible within breathing circuit/airway adjunct (e.g. LMA)
- ↓ SaO2 due to bronchospasm.
- Wheeze/stridor
- Tachycardia
- ↑ Airway pressure due to severe bronchospasm and pneumonitis.

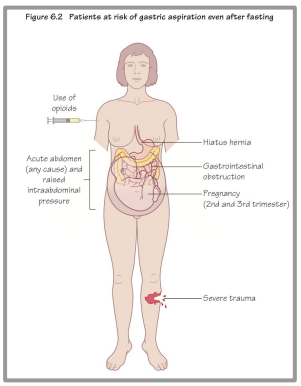
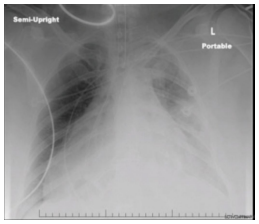


Figure 6.2

Treatment:

1. 100% oxygen
2. Call for help
3. 30% Head-down position to prevent/limit aspiration
4. Oropharyngeal suction
5. Tracheal intubation if needed, including tracheal suctioning [4]
6. Postoperatively: physiotherapy, oxygen
7. Some advocate antibiotics and steroids (not very useful)



1- Why does it happen to anesthetic patients? Because if this happen in normal person he can cough the food particles (protective reflex), but if it happens to patients under anesthesia they will not be able to cough up and therefore increase the incidence of aspiration.
2- Patients with gastric motility problems, recent RTA where the stomach is not emptying probably bc of the anxiousness, diabetic patient with gastroparesis
3-To avoid aspiration the patient should be in left lateral, head-down position to maintains the airway patency by positioning the tongue away from the posterior pharyngeal wall and also protects the airway from aspiration, if patient is obese or anything that make it difficult to position him, semi-upright position will be fine.
4- Don't use any saline to wash the trachea because it will take the food particles down to the lungs

Intraoperative Anesthetic Emergencies

Air Embolism

Definition: air embolism results from inadvertent introduction of air into the circulation, usually via the venous system.

Causes:

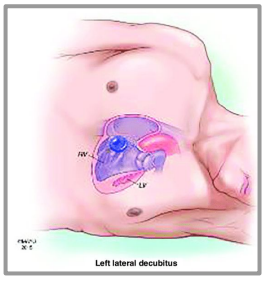
- Neurosurgery (dural sinuses are non-collapsible)
- Caesarean section (e.g. if exposed veins are raised above the level of heart).
- Central line insertion/removal [1]. first complication is pneumothorax then air embolism
- Epidural catheter placement (if loss of resistance to air is used)
- Entrainment through an intravenous line (especially if pressure-assisted).
- Situations where high pressure gas is used (laparoscopy)

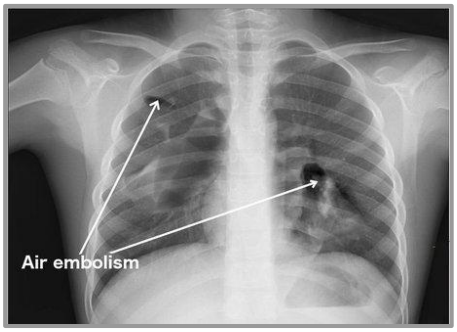
Signs:

- ↑ HR
- ↓ BP
- ↓ SaO2, because there is no proper circulation to bring the O_2
- ↓ ETCO2 (acute due to ventilation- -perfusion mismatch) [2].
- Murmur (millwheel, due to air circulating around the cardiac chambers).

Treatment:

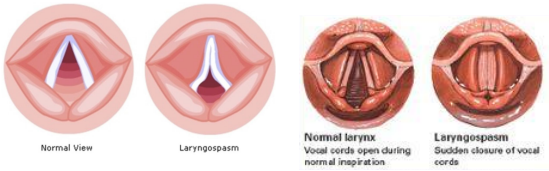
1. 100% oxygen
2. Airway, breathing, circulation and call for help
3. Flood surgical site with saline [3]
4. Position patient in Trendelenburg/left lateral decubitus position
5. Consider inserting a central venous catheter to aspirate gas
6. Consider hyperbaric chamber if indicated





1- Happens especially if you're using pressure bag that's why patient's head should be down 15-20° to avoid air embolism.
2- There is ventilation but no perfusion.
3- To cover the area and prevent further air from getting inside.

Intraoperative Anesthetic Emergencies

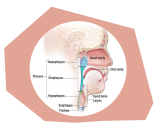


Laryngospasm

Definition: is the complete or partial adduction of the vocal cords, resulting in a variable degree of airway obstruction [1].

Causes:

Airway manipulation

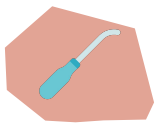


Blood/secretions in oropharynx.

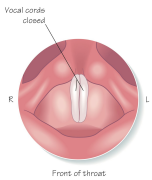
Patient movement

Surgical stimulus [2]

Failure to deliver anaesthetic agent [3]



Suctioning the patient while he's awake .
this will lead to gag reflex and laryngospasm



Signs:

- Partial/complete airway obstruction.
- Paradoxical respiratory effort in a spontaneously breathing patient (abdominal/chest see-saw movements as respiratory effort attempts to overcome the obstruction).

Treatment:

Some or all might be needed:

Deepening of anaesthesia (e.g. i.v. propofol or midazolam)

1. Positive pressure ventilation with high flow oxygen 100% (e.g. CPAP continuous positive airway pressure or IPPV intermittent positive pressure ventilation)
2. Suxamethonium (muscle relaxant) with or without tracheal intubation — causes rapid muscle relaxation and ceases vocal cord opposition

Complications:

- ↓ SaO2. severe hypoxia .
- Aspiration.
- Bradycardia (especially in children). Reflex bradycardia due to hypoxia that is not improved with atropine, so you should give 100% O_2.
- Negative pressure pulmonary oedema, because the patients try to breath against closed vocal cords.

1- We have to take care very quickly because the patient may become hypoxic and cyanosed and result in cardiac arrest especially neonates & pediatric patients because they have high oxygen consumption so they become hypoxic fast
2- If the patient did not receive adequate anesthesia and analgesia
3- Due to problems with vaporizers leads to inadequate anesthesia (below the required MAC level)

Intraoperative Anesthetic Emergencies

Failed intubation [1]

01 Assess the likelihood and clinical impact of basic management problems [2]:

- Difficulty with patient cooperation or consent.
- Difficult mask ventilation.
- Difficult supraglottic airway placement [3].
- Difficult laryngoscopy, positioning
- Difficult intubation.
- Difficult surgical airway access. Most important is difficult oxygenation.

Direct Laryngoscopy → Any problems → call for help

02 Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.

03 Consider the relative merits and feasibility of basic management choices:

- Awake intubation vs. intubation after induction of general anesthesia [4].
- Non-invasive technique vs. invasive techniques for the initial approach to intubation.
- Video-assisted laryngoscopy as an initial approach to intubation.
- Preservation vs. ablation of spontaneous ventilation [4].

Plan A: Initial tracheal intubation plan

- Direct laryngoscopy
  – check: neck flexion and head extension.
- Laryngoscope technique and vector.
- External laryngeal manipulation
  – by laryngoscopist.
- Vocal cords open and immobile.
- If poor view:
  Introducer (bougie) [5] seek clicks or hold-up and/or alternative laryngoscope.

Failed Intubation

Plan B: Secondary tracheal intubation plan

- ILMA or LMA
  - Not more than 2 insertions.
  - Oxygenate and ventilate

Failed oxygenation
(e.g. Sp02 < 90% with FiO2 1.0)
Via ILMATM or LMATM

Failed ventilation and oxygenation

Plan C: Maintenance of oxygenation ventilation, postponement of surgery and awakening.

- Revert to face mask.
- Oxygenate and ventilate.
- Reverse non-depolarizing relaxant.
- 1 or 2 person mask technique.
- (with oral ± nasal airway)

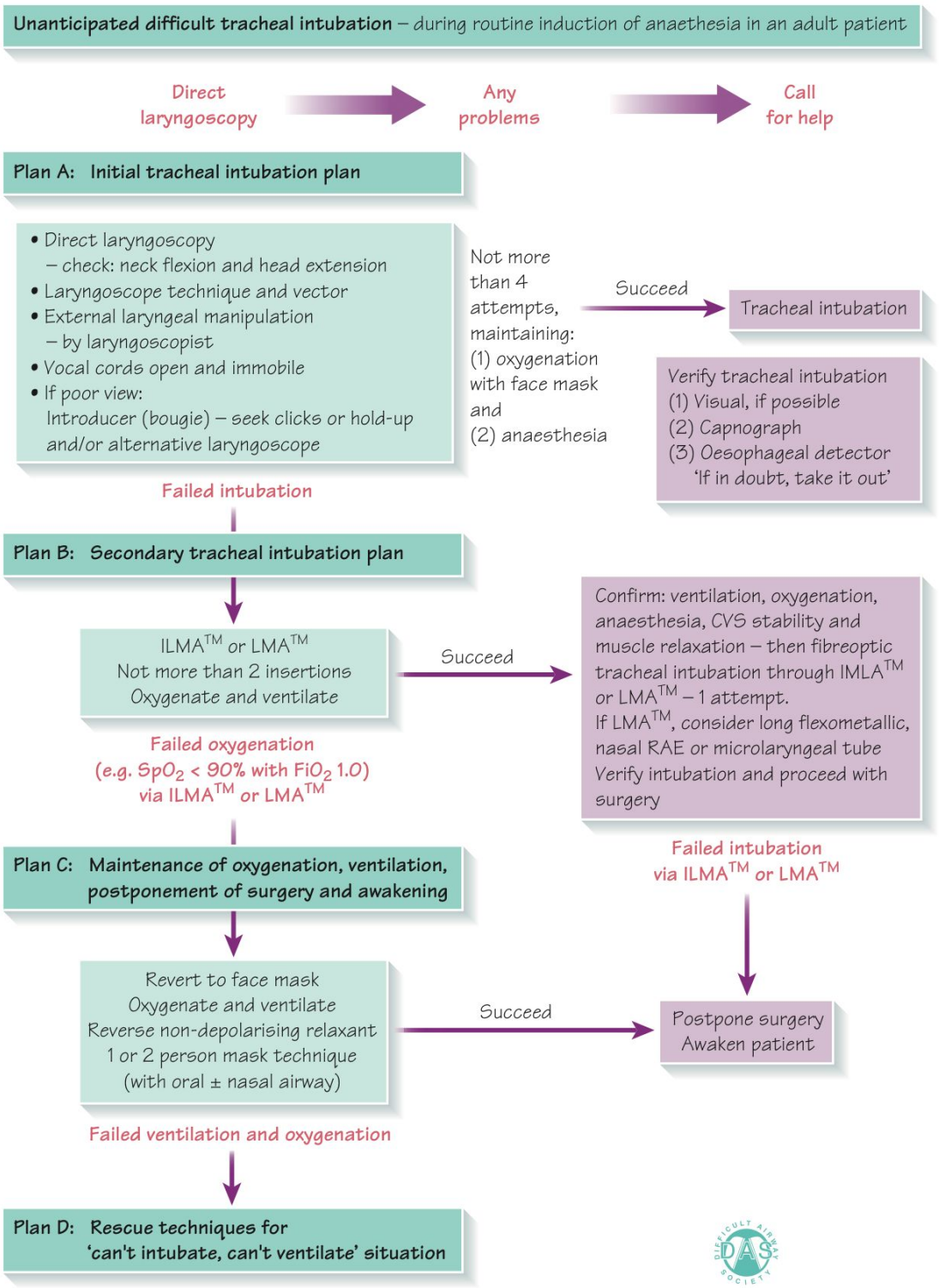
Plan D: Rescue techniques for 'can't intubate, can't ventilate' situation.

- surgical airway to save the pt's life

1- Before intubation if you did not ventilate the patient probably you may loss the patient by causing brain damage because of hypoxia.
2- All of these should be assessed by the anesthesiologist during the preoperative visit.
3- Pitney will not have adequate mouth opening (1-2 fingers) which means LMA cannot be used. If LMA cannot be used, you will be in trouble.
4- If you're going to incubate the patient after GA make sure you can ventilate the patient before giving muscle relaxant (by doing a trial)
5- The bougie, also called 'introducer', 'gum-elastic bougie' or 'GEB', is a device which allows a Seldinger-like technique of intubating a patient's airway. This means the device is inserted into the airway first, then an endotracheal tube is railroaded over the bougie into the airway, after which the device is removed.

Failed intubation (reproduced from the Difficult Airway Society, with permission)

Figure 23.4 Failed intubation *(reproduced from the Difficult Airway Society, with permission)*

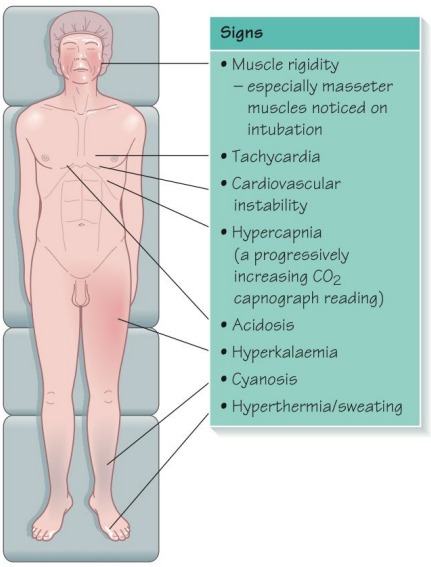


Waking up the patient is much safer than attempting something that you're not very sure about it.

Intraoperative Anesthetic Emergencies

Malignant Hyperthermia

Definition: this occurs after exposure to a triggering agent (volatile anaesthetics or suxamethonium "succinylcholine") and results in loss of normal calcium homeostasis within skeletal muscle cells leads to muscle rigidity and contract severely leading to MH.



Treatment:

1. Call for help/ stop surgery if possible
2. Stop trigger/change anesthetic breathing circuit [1]
3. Give 100% oxygen
4. Hyperventilation
5. Active cooling [2], IV dantrolene 3- 2 mg/kg rapid IV bolus, repeat as needed
6. Treat complications as they arise:
   - Renal failure/hyperkalemia
   - Coagulopathy
   - Cardiovascular complications

Anaphylaxis

Definition: an acute severe type 1 hypersensitivity reaction when an antigen (trigger) reacts with immunoglobulin IgE bound to histamine rich mast cells and basophils. first exposure they build the antibodies and anaphylaxis will occur at the second exposure but sometimes it happens at the first due to cross-reaction.

Symptoms	Signs [3]
Anxiety, feeling of impending doom	Angioedema, e.g. skin, lips, throat.
Rash, itch	Rash, flushing, urticaria
Wheeze, shortness of breath	Tachycardia, bradycardia, dysrhythmias
Abdominal pain, diarrhoea, vomiting	Hypotension
Chest pain	Bronchospasm

Treatment:

1. Basic resuscitation based on Airway Breathing Circulation (ABC)
2. Remove suspected cause, Call for help
3. Give patient 100% oxygen, tracheal intubation if necessary
4. Elevate legs if hypotension (increases venous return)
5. Start cardiopulmonary resuscitation (CPR) if needed
6. Give epinephrine 50μg in repeated doses; consider epinephrine infusion
7. Give large volumes of fluid, e.g. normal saline or Hartmann's solution

Secondary treatment

- Chlorpheniramine 10mg (H1 antagonist)
- Hydrocortisone 200 mg
- Consider alternative vasopressor if unresponsive to epinephrine
- Consider salbutamol i.v./nebulizer, aminophylline, for persistent bronchospasm
- High dependency (for observation, if the patient is breathing spontaneously and has recovered) or intensive care transfer (if the patient is intubated, ventilated and hypotensive)

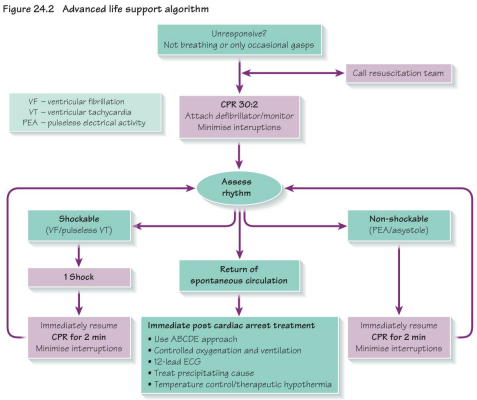
1- Change the whole machine because even trace of that inhalational anesthetic will trigger the MH again
2- e.g. a hypothermia blanket(s) (over and under the patient) and a refrigerator containing cold isotonic saline for IV infusion. Ice is much more effective at cooling, though core cooling using iced saline intravenously may be effective
3- Dependant on the histamine release

Intraoperative Anesthetic Emergencies

Cardiac arrest Advanced life support algorithm

During CPR:

- Ensure high-quality CPR rate, depth, recoil. Measured by End tidal CO2.
- Plan actions before interrupting CPR.
- Give oxygen.
- Consider advanced airway and capnography.
- Continuous chest compressions when advanced airway in place.
- Vascular access (intravenous, intraosseous).
- Give adrenaline every 3-5 min.
- Correct reversible causes.



Reversible causes:

Hypoxia, Hypovolaemia, Hypo-/hyperkalemia/metaboli, Hypothermia, Thrombosis coronary or pulmonary, Cardiac tamponade, Toxins, Tension pneumothorax.

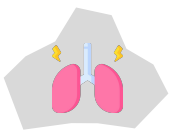
Status asthmaticus

Definition: is a severe acute exacerbation of asthma refractory to conventional β 2 agonist therapy and is a medical emergency.

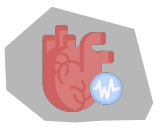
Signs:

Tachypnoea

Use of accessory respiratory muscles (e.g. abdominal, sternocleidomastoid), & intercostal & subcostal recession.



Wheeze might be minimal or absent.



Tachycardia & Sweating.

Pulsus paradoxus >10 mmHg (a reduction in blood pressure on inspiration).

Tiring & Confusion.

Treatment [1]:

1. Give supplemental oxygen to maintain SaO2 94-98% [2].
2. β 2 agonist (either salbutamol or terbutaline) via O2 driven nebulizer.
3. Continuous nebulization can be used if there is a poor initial response.
4. Intravenous β 2 agonists should only be used when the inhaled route is unreliable.
5. Steroids — either oral prednisolone or i.v. hydrocortisone [3].
6. Nebulized ipratropium (anticholinergic).
7. Consider i.v. magnesium sulphate when life-threatening or poor initial response to treatment [4].
8. Aminophylline might also be considered in this situation.

1- Most important thing is to avoid the trigger.
2- Do not try to give COPD patients 100% O_2 because these patients depend on the hypoxic drive to breath, without hypoxia they cannot breath.
3- To reduce the inflammation in the bronchi
4- Also, ketamine can be used as it is a good bronchodilator.

Post Anesthesia Care Unit (PACU)

The role of the anaesthetist is not limited to theatres.

After receiving anesthesia for a surgery or procedure a patient is sent to the PACU to recover and wake up .

The nursing staff is skilled in recognizing and managing problems in patients after receiving anesthesia.

Design should match function

There may be a number of postoperative responsibilities to undertake, both in the recovery room and on the surgical ward.

The PACU is similar to a critical care unit where the patient's vital signs are closely observed, pain management begins , and fluids are given

The PACU is under the direction of the Department of Anesthesiology.

- Location: Close to the OR, Access to x-ray, blood bank & clinical labs.
- Monitoring equipment.
- Emergency equipment: ETT, laryngoscope
- Well trained personnel.

Admission to PACU :

1. Coordinate prior to arrival [1]
2. Assess Airway
3. Administer oxygen
4. Apply monitors [2]
5. Obtain vital signs
6. Receive report from anesthesia personnel

PACU ASA Standards:

01 All patients should receive appropriate care.

02 All patients will be accompanied by one of the anesthesia team [3]

03 The patient will be reevaluated & report given to the nurse.

04 The patient shall be continually [4] monitored in the PACU

05 A physician will signing for the patient out of the PACU.

1- Ensure empty space.
2- Connect O2 first then apply the monitors to keep good oxygenation.
3- Till the patient is discharged from the OR
4- Every 3-5 minutes

Post Anesthesia Care Unit (PACU)

Patient Care in the PACU	
Admission	• Apply oxygen and monitor. • Receive report
Monitor & Observe & Manage	To Achieve: • Cardiovascular stability. • Respiratory stability. • Pain control.
Discharge from PACU	if oxygen saturation is good

Monitoring in the PACU

- Baseline vital signs.
- Respiration: RR/min, Rhythm, Pulse oximetry
- Circulation: PR/min & Blood pressure, ECG
- Level of consciousness.
- Pain scores.

Initial assessment

- Color
- Respiration
- Circulation
- Consciousness
- Activity

Aldrete score: A scoring system to see if the patient is fit for discharge. (>8 you can discharge).

Score	Activity	Respiration	Circulation	Consciousness	Oxygen Saturation
2	Moves all extremities	Breathes deeply and coughs freely.	BP ±20 mm of pre anesth. level	Fully awake	Spo2 > 92% on room air
1	Moves 2 extremities	Dyspneic, or shallow breathing	BP ± 20-50 mm of pre anesth. level	Arousable on calling	Spo2 >90% With suppl. O2
0	Unable to move	Apneic	BP ± 50 mm of pre anesth. level	Not responding	Spo2 <92% With suppl. O2

Discharge from Post Anesthesia Care Unit (PACU)

- **Standard Aldrete score:**
  - Simple sum of numerical values assigned to activity, respiration, circulation, consciousness and oxygen saturation.
  - A score of 9 out of 10 shows readiness for discharge.

- **Post-anesthetic Discharge Scoring system:**
  - Modification of the Aldrete score which also include an assessment of pain, N/V and surgical bleeding, in addition to vital signs and activity.
  - Also, a score of 9 out of 10 shows readiness for discharge

Discharge criteria from PACU

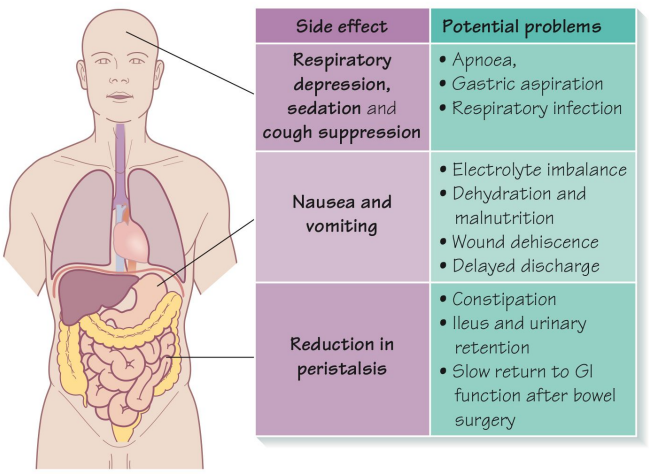
- Easy arousability
- Full orientation
- Ability to maintain & protect airway as well as he can cough
- Stable vital signs for at least 15 - 30 minutes
- The ability to call for help if necessary
- No obvious surgical complication (active bleeding)

Post-operative management

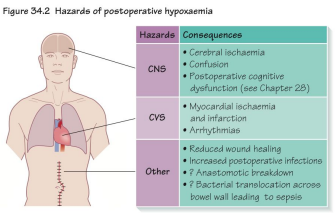
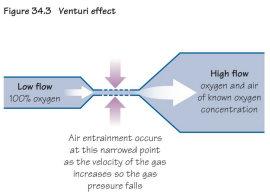
Common PACU Problems:

1. Airway obstruction
2. Hypoxemia
3. Hypoventilation
4. Hypotension
5. Hypertension
6. Cardiac dysrhythmias
7. Hypothermia
8. Bleeding
9. Agitation
10. Delayed recovery
11. "PONV"
12. Pain
13. Oliguria

Figure 34.1 Side effects of opioids



Common PACU problems

	Causes	Treatment
Airway Obstruction 	• Most common: tongue fall back to posterior pharynx. • foreign body. • Inadequate relaxant reversal. • Residual anesthesia	• Patient's stimulation wake him up. • Suction. • Oral Airway. if he is completely unconscious because if he was conscious he will gag • Nasal Airway. if he's awake Others: If saturation is not improving go for invasive: • Tracheal intubation. • Cricothyroidotomy • Tracheotomy
Hypoventilation 	Residual anesthesia: • Narcotics. • Inhalation agent. • Muscle Relaxant Post-op Analgesia : • Intravenous • Epidural.	• Close observation. • Assess the problem. Treatment of the cause: Reverse (or Antidote): • Muscle relaxant → Neostigmine [1] • Opioids → Naloxone [2] • Midazolam → Anexate
	Figure 34.2 Hazards of postoperative hypoxaemia 	Figure 34.3 Venturi effect 
Hypertension 	• Common causes: Pain [3], Full Bladder. • Hypertensive patients. • Fluid overload. • Excessive use of vasopressors.	• Effective pain control. • Sedation • Anti-hypertensives: Beta blockers, Alpha blockers, Hydralazine (Apresoline), Calcium channel blockers.
Hypotension 	• Decreased venous return • Hypovolemia : ↓ fluid intake / ↑ losses / Bleeding. • Sympathectomy. • 3rd space loss [4]. • Left ventricular dysfunction.	**Patients will require i.v. fluids until they are able to drink normally** - maintenance and intraoperative fluid losses; - replacement of pre-existing losses (e.g. dehydration preoperatively); - replacement of postoperative losses (e.g. nasogastric losses, bleeding). **types of fluid:** - isotonic crystalloid (most often used); - colloids (for maintaining intravascular volume, early bleeding); - blood and blood products (for significant haemorrhage, coagulopathy).
Dysrhythmia 	Secondary to: Hypoxemia., Hypercarbia ,Hypothermia, Acidosis, Catecholamines, Electrolyte abnormalities (K+, Ca++)	• Identify and treat the cause. • Assure oxygenation. • Pharmacological (stable) • Electrical cardioversion (unstable)

1- Nowadays we have sugammadex for rocuronium .
2- You have to remember that when you reverse the opioid the pain will come back, so you have to take care.
3- If you relive the pain, the BP will be normal
4- In major laparotomy surgery

Common PACU problems

	Causes	Treatment
Oliguria 	• Hypovolemia. • Surgical trauma. • Impaired renal function. • Mechanical blocking of catheter. • Stress will result in increase release of ADH	• Assess catheter patency • Fluid bolus. • Diuretics e.g. Lasix
Post op Bleeding 	• Usually Surgical Problem • Coagulopathy • Drug induced	• Start i.v. lines push fluids • Blood sample: CBC, Cross matching, Coagulopathy • Notify the surgeon • Correction of the cause
Hypothermia 	Most of patients will arrive cold	• Get baseline temperature • Actively rewarm • Administer oxygen if shivering [1] • Take care for: Pediatric, Geriatric.
Altered Mental Status 	• Reaction to drugs: (Drugs e.g. sedatives, anticholinergics) Intoxication / Drug abusers • Pain • Full bladder • Hypoventilation • Low COP • CVA	• Reassurances, • Always protect the patient [2] • Evaluate the cause • Treatment of symptoms • Sedatives / Opioids if necessary.
Delayed Recovery 	• The most common cause: Residual anesthesia, Consider reversal • Hypothermia • Metabolic e.g. diabetic coma, • Underlying psychiatric problem • CVA	Systematic evaluation • Pre-op status • Intraoperative events • Ventilation • Response to Stimulation • Cardiovascular status

1- Because O2 consumption will increase and the patient will become hypoxic
2- From injuring himself

Common PACU problems

Postoperative Nausea & Vomiting "PONV"

Risk factors

- Type & duration of surgery
- Type of anesthesia
- Drugs
- Hormone levels
- Medical problems
- Autonomic involvement

Prevention

- NPO status
- Dexamethasone
- Droperidol
- Metoclopramide
- H2 blockers
- Ondansetron
- Acupuncture

Postoperative Pain

Causes

- Incisional: Skin and subcutaneous tissue
- Laparoscopy: Insufflation of Co2
- Others:
  - Deep: cutting, coagulation, trauma
  - Positional: nerve compression, traction & bed sore.
  - IV site: needle trauma, extravasation, venous irritation
  - Tubes: drains, nasogastric tube, ETT
  - Surgical: complication of surgery
  - Others: cast, dressing too tight, urinary retention

Common methods of administering analgesics

Analgesic	Method
Opioids	i.m., i.v. (PCA), epidural/spinal, oral, intra-articular
Paracetamol	i.v. and oral (rarely p.r.)
NSAIDs	Oral, p.r., i.v.
Local anaesthetic	Wound, epidural/spinal, various nerve blocks. Intra-articular

Drugs used for multimodal analgesia

Drug	Side effects
Opioids	See Figure 34.1
NSAIDs	• Bleeding, especially gastrointestinal • Gastrointestinal perforation • Asthma, renal failure • Myocardial and cerebral thrombosis
Paracetamol	• Liver dysfunction in overdose
Local anaesthetics	• Cardiac and CNS toxicity

Referral to high dependency unit/intensive care unit

Level of care	
0 (ward)	Patients needs met on normal ward
1 (HDU)	Patients at risk of their condition deteriorating, or who require advice from the ICU team
2 (ICU)	Patients with a single failing organ system or requiring detailed observation/intervention
3 (ICU)	Patients requiring ventilation (alone), advanced respiratory support alone or support of at least two organ systems

Lecture Quiz

answers: 1(B) 2(D) 3(E) 4(D)

Question 1: A young ASA1 patient underwent an elective abdominal hysterectomy under general anaesthesia with endotracheal intubation. She had no history of acid reflux. Soon after extubation, the patient developed severe laryngospasm which responded to intravenous propofol and CPAP via a face mask. Despite having a clear upper airway, she remained breathless with an oxygen saturation of 90% whilst breathing 100% oxygen via a face mask. The oxygenation improved over a period of 2 hours following the use of CPAP and diuretic treatment. The most likely diagnosis in this patient is:

A. Aspiration pneumonia.
B. Negative pressure pulmonary oedema.
C. Bronchial asthma.
D. Fluid overload.
E. Congestive cardiac failure.

Question 2: A 2-year-old child is brought to the emergency department with acute onset of respiratory distress, cough and stridor. The chest appears hyperinflated on the right side with reduced movements and breath sounds. The child is irritable with an oxygen saturation of 90% on air and a heart rate of 120/minute. What is the most likely diagnosis?

A. Acute severe asthma.
B. Acute epiglottitis.
C. Aspiration pneumonia.
D. Foreign body aspiration.
E. Anaphylaxis.

Question 3: An anaesthetist administers 10 ml of 0.5% bupivacaine as part of an epidural top-up for a Caesarean section. One minute after completing the injection, the patient complains of dizziness, difficulty in breathing and then starts to convulse. She then suffers a VF cardiac arrest. The most appropriate management in the first 4 minutes would be:

A. Defibrillation, CPR, adrenaline, amiodarone.
B. Defibrillation, CPR, adrenaline, Caesarean section.
C. CPR, adrenaline, 20% Intralipid, Caesarean section.
D. CPR, defibrillation, 20% Intralipid, Caesarean section.
E. CPR, defibrillation, adrenaline, 20% Intralipid.

Question 4: A 67-year-old patient has had a total knee replacement. He is on morphine PCA for the management of postoperative pain. He has received a total of 40 mg morphine in the recovery area and you are worried that he may develop an opioid overdose. Which of the following is the earliest sign of opioid overdose?

A. Respiratory rate less than 8 per minute.
B. A fall in oxygen saturation.
C. Rapid shallow breathing.
D. Progressive rise in sedation level.
E. Uncontrolled vomiting.

Explanation File

Good Luck

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