Intra & Post Operative Complications Management

Objectives

Students at the end of the lecture will be able to: Learn a common approach to emergency

- 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.

Important - Golden Note - Notes - 436 Note

Anaesthetic emergencies in the operating theatre

- Emergencies are not common but when they do occur they are often life threatening and require immediate action. especially if it was an emergency surgery where the patient can come from the street straight to the OR.
- Factors in the mnemonic COVER ABCD accounts for approximately 95% of critical incidents.
    - Colour – saturation, central cyanosis; Check the color of the patient's lips well saturated > pink .Not well saturated > blue why? due to deoxygenated hemoglobin.
    - Oxygen – ensure adequate and correct delivery
    - Ventilation – e.g. breathing circuit, air entry, CO_2 trace, vaporizer
    - Endotracheal tube – kinks, obstruction, endobronchial; Go from machine to patient or patient to machine to not miss anything.
    - Review monitors – correct site, checked, calibrated; Don't rely 100% on the monitor personally 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 – anaphylaxis (very rare), wrong drug/dose/route
    - Embolism – air/fat/cement/amniotic fluid. very rare.
    - Others – related to CVP line (pneumothorax /cardiac tamponade), awareness, endocrine and metabolic (malignant hyperthermia (MH), pheochromocytoma).

Aspiration

- Definition:- inhalation of gastric contents can occur in patients who do not have fully functional upper airway reflexes. Impaired protective airway reflexes.
- Relaxation of both upper and lower esophageal sphincters when the stomach is full → regurgitation. That's why we ask the patients to fast before surgery.

➔ Signs

- Gastric contents visible within breathing circuit/airway adjunct (e.g. LMA)
- ↓ **Sa02** due to bronchospasm.
- Wheeze/stridor
- Tachycardia
- ↑ Airway pressure due to severe bronchospasm and pneumonitis.

➔ Regurgitation of gastric contents can happen in any patient who does not have fully functioning upper airway protective reflexes. We should tell them to fast.

➔ Those at risk include:

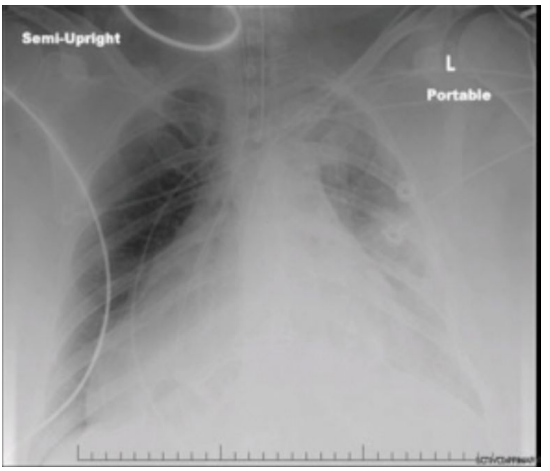
- Inadequate period of preoperative starvation.
- Delayed gastric emptying (e.g. opiates, pain, bowel obstruction, pregnancy at term, DM). they have a full stomach for a long time
- Insufficient/lack of cricoid pressure at induction of anaesthesia early extubation in an at-risk patient in supine position . intubation (double-check).

➔ **Treatment** (no definitive treatment here) :

- 100% oxygen.
- Call for help.
- 30° Head-down position to prevent/limit aspiration.
- Oropharyngeal suction.
- Tracheal intubation if needed, including tracheal suctioning.
- Postoperatively: physiotherapy, oxygen.
- Some advocate antibiotics and steroids (controversial)
- hepatization of the lung (lung resembles hepatic tissue)

Immediately:
Call for help.
100% O2.
Oropharyngeal suction.

The lung is supposed to be black normally.



The whitish area means aspiration. Could be liquids.

Air Embolism

➔ **Definition:-** air embolism results from inadvertent introduction of air into the circulation, usually via the venous system. venous has a better outcome than arterial.

➔ **Causes:**

- Neurosurgery (dural sinuses are non-collapsible). surgeries in sitting position so this will cause low arteriovenous pressure in the brain so what happens? when you open a vessel it will immediately get sucked (by negative venous pressure)
- Caesarean section (e.g. if exposed veins are raised above the level of heart).
- Central line insertion/removal. 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)

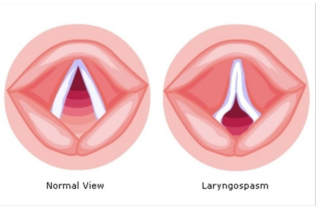
➔ **Signs:**

- ↑ HR
- ↓ BP (stagnation of blood due to air embolism)
- ↓ SaO2
- ↓ ETCO2 (acute due to ventilation–perfusion mismatch). because the pulmonary artery has been blocked > no saturation to the lungs > carbon dioxide is not coming out so it will increase. O2 can not be exchanged with CO2
- Murmur if it was in the heart (millwheel, due to air circulating around the cardiac chambers). if you do an echo you'll see a bubble in the cardiac chamber.

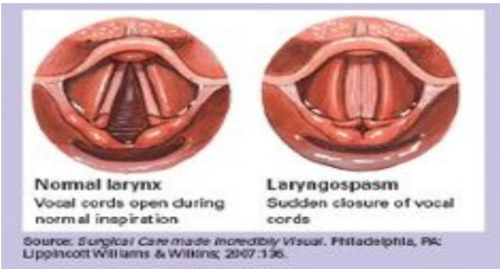
➔ **Treatment:**

- 100% Oxygen. Very imp. 1st thing to do.
- Airway, breathing, circulation and call for help.
- Flood surgical site with saline. if there were any open vessels.
- Position patient in Trendelenburg/left lateral decubitus position.
- Consider inserting a central venous catheter to aspirate gas. When it's in the right atrium
- Consider **hyperbaric chamber** if indicated. for better absorption.

Laryngospasm



- **Definition:-** is the complete or partial adduction of the vocal cords, resulting in a variable degree of airway obstruction.
- Bronchospasm vs laryngospasm
  - In bronchospasm, you can ventilate but the patient cannot exhale (ie cannot remove carbon dioxide) 'air trapping'. While in laryngospasm, the air cannot enter the trachea at all.
- **Causes:**
  - Airway manipulation.
  - Blood/secretions in oropharynx.
  - Patient movement. During surgery
  - Surgical stimulus.
  - Failure to deliver anaesthetic agent.
  - Suctioning the patient while he's awake: 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). The chest goes up and the abdomen goes down, and vice versa.
  - Depression in the jugular notch.(patient is trying to breath)
  - Stridor.
- **Treatment** (Best treatment is Oxygen)
  - Some or all might be needed:
    - Positive pressure ventilation with high flow oxygen (e.g. CPAP[1] or IPPV[2]).
    - If PPV didn't work ⟶ Deepening of anaesthesia (e.g. i.v. propofol)
    - If all the above fails ⟶ Suxamethonium (muscle relaxant) with or without tracheal intubation – causes rapid muscle relaxation and ceases vocal cord opposition.
- **Complications**
  - ↓ SaO2. they get hypoxic very fast.
  - Aspiration.
  - Bradycardia (especially in children). Reflex bradycardia due to hypoxia. So, we don't give Atropine
  - Negative pressure pulmonary oedema. (due to closure of vocal cords ⟶ no air coming inside)

[1] Continuous positive airway pressure
[2] Intermittent positive-pressure ventilation

Failed intubation

- (reproduced from the Difficult Airway Society, with permission).
- Assess the likelihood and clinical impact of basic management problems:
  - Difficulty with patient cooperation or consent. Mental retarded or language barrier.
  - Difficult mask ventilation. Beard, teeth, jaw
  - Difficult supraglottic airway placement. Small mouth opening , jaw fracture.
  - Difficult laryngoscopy. Thick neck
  - Difficult intubation.
  - Difficult surgical airway access.
  - Most important is difficult oxygenation cause lead to severe hypoxia and brain damage.

  Direct Laryngoscopy → Any problems → call for help alway remember oxygenation,
- Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management. To prevent hypoxic brain damage or death.
- Consider the relative merits and feasibility of basic management choices:
  - Awake intubation vs. intubation after induction of general anesthesia.
  - 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. Never give muscle relaxant unless you're sure of intubation. If you're unsure of ventilation, keep spontaneous ventilation.
- **Plan A:** maximum trials 3 times
  - 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) 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 VERY IMPORTANT
  (e.g. **Sp02 < 90%** with **Fi02 1.0**) Always keep it above these levels.
  - ✓ Via ILMATM or LMATM either laryngeal mask airway (LMA) or wake the patient up.

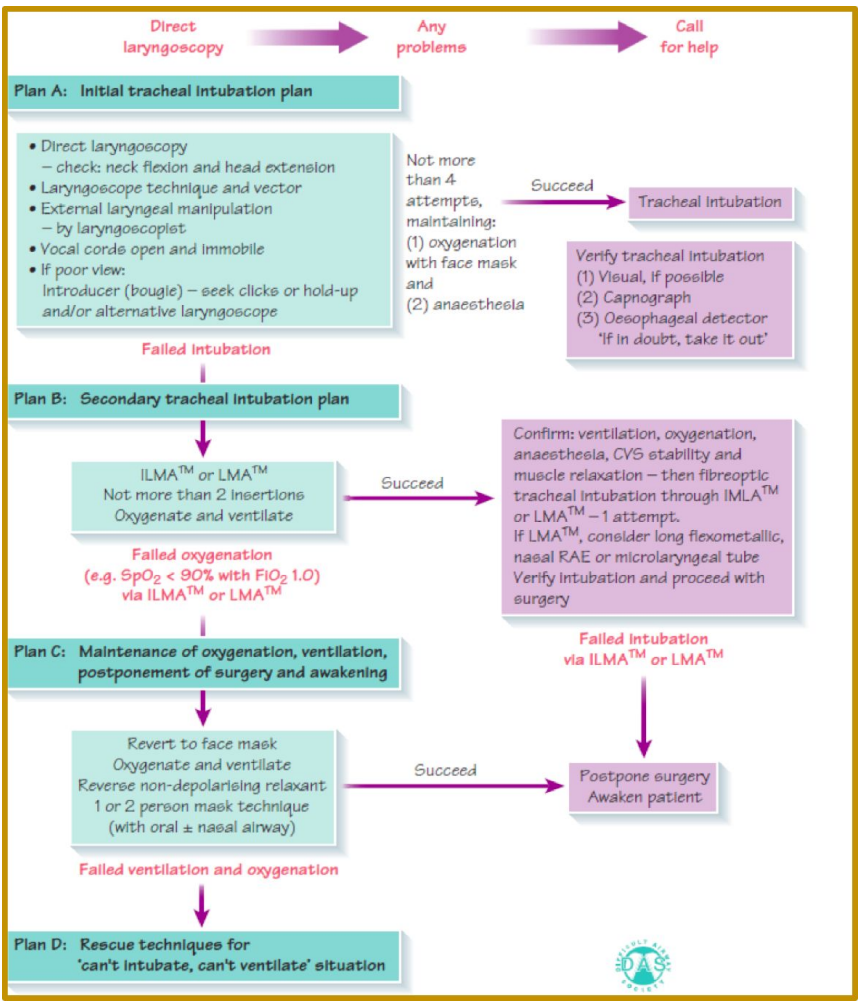
➔ **Plan C**

- 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. 1 person holds the mask 1 person ventilates
- (with oral + nasal airway)

Failed ventilation and oxygenation:

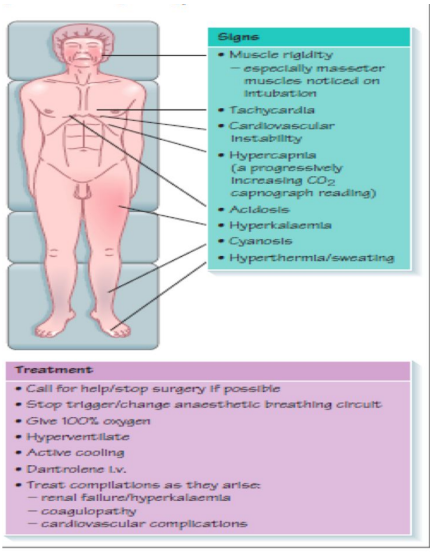
➔ **Plan D:** (worst situation)

- Rescue techniques for can't intubate, can't ventilate' situation.
- Surgical airway is required



Malignant Hyperthermia

Pic is important



- **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. Sudden increase in body temperature and basal metabolic rate so he will produce more carbon dioxide.
- if you have a patient with a previous history of malignant hyperthermia how would you anesthetize him? only use TIVA (Total intravenous anesthesia) use: propofol - fentanyl - rocuronium. the machine should be free of any vaporizer.

Anaphylaxis

- **Definition:-** this is **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:** These are when the patient is awake
  - Anxiety, feeling of impending doom.
  - Rash, itch.
  - Wheeze, shortness of breath.
  - Abdominal pain, diarrhoea, vomiting.
  - Chest pain
- **Signs:** In anesthesia we usually see these
  - Angioedema, e.g. skin, lips, throat.
  - Rash, flushing, urticaria.
  - Tachycardia, bradycardia, dysrhythmias.
  - **Hypotension.**
  - **Bronchospasm.**

➔ **Treatment:** 1st step is to stop the triggering object for ex: if you're using antibiotic.

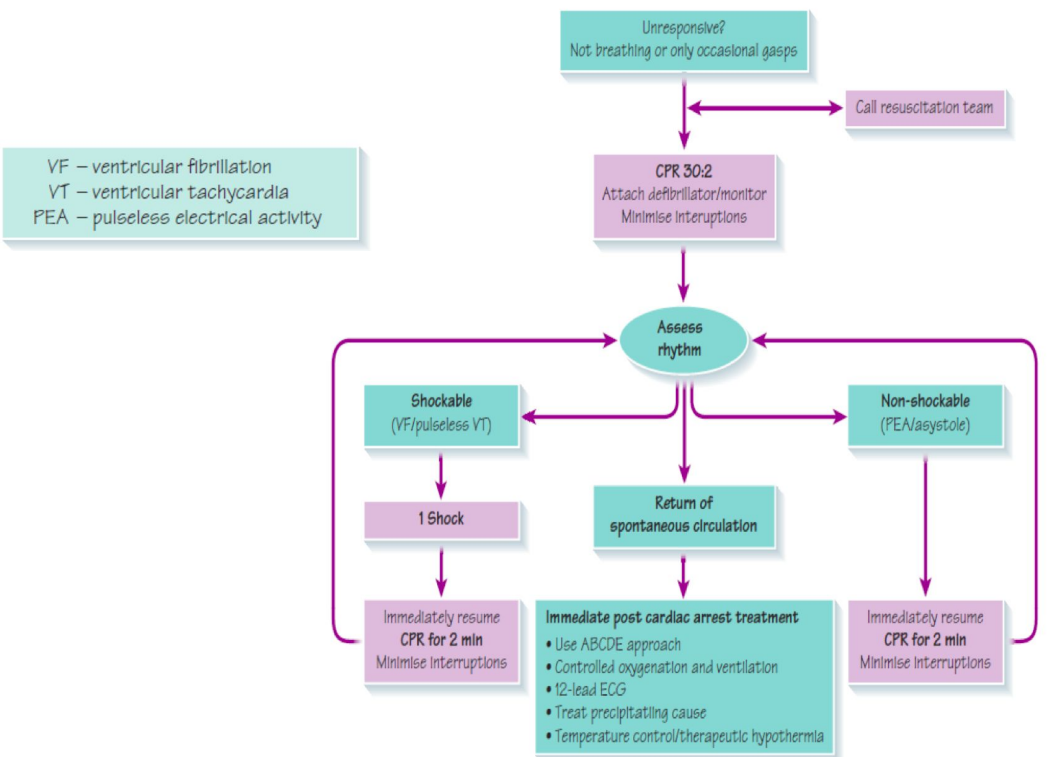
- Basic resuscitation based on Airway Breathing Circulation (**ABC**)
- **Remove suspected cause**
- Call for help.
- Give patient 100% oxygen, tracheal intubation if necessary.
- Elevate legs if hypotension (increases venous return).
- Start cardiopulmonary resuscitation (CPR) if needed.
- **Give epinephrine** 50µg in repeated doses; consider epinephrine infusion. The antidote. (Best thing)
- Give large volumes of fluid, e.g. normal saline or Hartmann's solution. (to maintain intravascular volume)

➔ **Secondary treatment:**

- Chlorpheniramine 10mg (H1 antagonist).
- Hydrocortisone 200mg.
- Consider alternative vasopressor if unresponsive to epinephrine.
- Consider salbutamol i.v. / nebulizer, aminophylline, for persistent bronchospasm.
- High dependency or intensive care transfer.

Cardiac Arrest

Figure 24.2 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. Intubation
- 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:** 5(T) and 5 (H)
    - ✓ Hypoxia.
    - ✓ Hypo-/hyperkalemia/metabolic
    - ✓ Thrombosis coronary or pulmonary.
    - ✓ Toxins.
    - ✓ Hypovolaemia
    - ✓ Hypothermia
    - ✓ Cardiac Tamponade
    - ✓ Tension pneumothorax

Status Asthmaticus

This is a severe acute exacerbation of asthma refractory to conventional β2 agonist therapy and is a medical emergency.

➔ **Signs:**

- Tachypnoea.
- Use of accessory respiratory muscles (e.g. abdominal, sternocleidomastoid), and intercostal and subcostal recession.
- Wheeze might be minimal or absent. In severe asthma
- Tachycardia.
- Pulsus paradoxus >10 mmHg (a reduction in blood pressure on inspiration).
- Sweating.
- Tiring. → These are the signs of hypoxia
- Confusion.

➔ **Treatment:** in asthma + COPD patients they're depending on hypoxia when they breathe so we don't give 100% O2 they will end up stop breathing. There is special mask for them that suits their level or O2

- Give supplemental oxygen to maintain SaO2 94-98%.
- β2 agonist (either salbutamol or terbutaline) via O2 driven nebulizer.
- Continuous nebulization can be used if there is a poor initial response.
- Intravenous β2 agonists should only be used when the inhaled route is unreliable.
- Steroids – either oral prednisolone or i.v. hydrocortisone.
- Nebulized ipratropium (anticholinergic).
- Consider i.v. magnesium sulphate when life-threatening or poor initial response to treatment.
- Aminophylline might also be considered in this situation.

Post Anesthesia Care Unit

Sometimes 24 hours post anesthesia

The role of the anaesthetist is not limited to theatres. There may be a number of postoperative responsibilities to undertake, both in the recovery room and on the surgical ward.

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

- ➔ The PACU is a critical care unit where the patient's vital signs are closely observed ,pain management begins , and fluids are given . The nursing staff is skilled in recognizing and managing problems in patients after receiving anesthesia.
- ➔ The PACU is under the direction of the Department of Anesthesiology.
- ➔ Design should match function
- ➔ Location:
  - Close to the OR.
  - Access to x-ray, blood bank & clinical labs.
- ➔ Monitoring equipment. same the one in ICU one nurse to one or two patient (1:1) , (1:2)
- ➔ Emergency equipment/
- ➔ Good trained personnel.

Admission to PACU:

Steps:

- ➔ Coordinate prior to arrival.
- ➔ Assess airway.
- ➔ Administer oxygen. don't wait for the monitors to see if the patient needs oxygen administer anyway.
- ➔ **Apply monitors.**
- ➔ Obtain vital signs.
- ➔ Receive report from anesthesia personnel.

PACU ASA Standards:

- Standard I ⟶ All patients should receive appropriate care.
- Standard II ⟶ All patients will be accompanied by one of the anesthesia team. not only a technician or a nurse.
- Standard III ⟶ The patient will be reevaluated & report given to the nurse.
- Standard IV ⟶ The patient shall be continually monitored in the PACU. every 5-10 minutes.
- Standard V ⟶ A physician will signing for the patient out of the PACU.

Patient Care in the PACU

- ➔ Admission
  - ◆ Apply **oxygen** and monitor. vitals
  - ◆ Receive report. Events that happened in the OR
- ➔ Monitor & Observe & Manage see changes. Wait for 15-20 minutes.
  - ◆ To Achieve:
    - Cardiovascular stability.
    - Respiratory stability.
    - Pain control.
- ➔ Discharge from PACU. **if oxygen saturation is good**

Monitoring in the PACU

- ➔ Baseline vital signs. All events that happened in OR + anesthesia + meds been given should be
- ➔ Respiration told to the PACU team to keep good monitoring
  - ◆ RR/min, Rhythm.
  - ◆ Pulse oximetry.
- ➔ Circulation
  - ◆ PR/min & Blood pressure.
  - ◆ ECG.
- ➔ Level of consciousness.
- ➔ Pain scores.

Initial assessment

Color, respiration, circulation, consciousness, activity.

This assessment is useful to check on the patient if he needs help or not.

Aldrete score: A scoring system to see if the patient is fit for discharge. (>9 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 the 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-anesthesia Discharge Scoring System:
  - Modification of the Aldrete score which also includes an assessment of pain, N/V, and surgical bleeding, in addition to vital signs and activity.
  - Also, a score of 9 or 10 shows readiness for discharge.

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Discharge criteria from PACU

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

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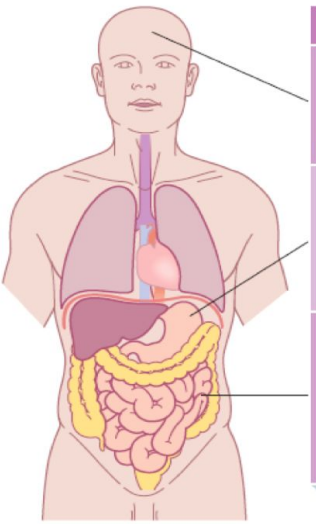
9 is good.

Post-operative management :

Figure 34.1 Side effects of opioids



Side effect	Potential problems
Respiratory depression, sedation and cough suppression	• Apnoea, • Gastric aspiration • Respiratory infection
Nausea and vomiting	• Electrolyte imbalance • Dehydration and malnutrition • Wound dehiscence • Delayed discharge
Reduction in peristalsis	• Constipation • Ileus and urinary retention • Slow return to GI function after bowel surgery

Common PACU Problems :

Common PACU Problems	
Airway obstruction	Bleeding
Hypoxemia	Agitation
Hypoventilation	Delayed recovery
Hypotension	PONV
Hypertension	Pain
Cardiac dysrhythmias	Oliguria
Hypothermia	

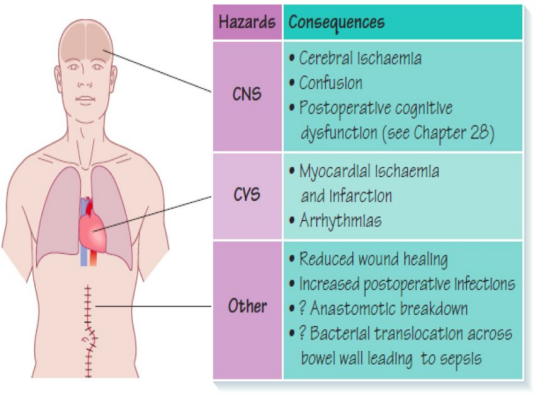
Airway Obstruction

- **Most common: tongue fall back posterior pharynx.**
- May be foreign body.
- Inadequate relaxant reversal. Important not to be missed out when the patient leaves the OR
- Residual anesthesia room the he can't breathe well
- Management of Airway Obstruction:
  - Patient's stimulation. 1st wake the patient 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
    - Tracheal intubation.
    - Cricothyroidotomy.
    - Tracheotomy.

Hypoventilation

- Residual anesthesia:
  - Narcotics.
  - Inhalation agent.
  - Muscle Relaxant
- Post-op Analgesia
    - Intravenous.
    - Epidural.
- Hypoxia causes agitation so you need to be careful.
- Venturi Effect: Is used for patients with COPD.
  You don't want to give too much oxygen because if you give 100% oxygen they will stop breathing and the drive for breathing in such cases is the hypoxia.

Figure 34.2 Hazards of postoperative hypoxaemia



- Treatment of Hypoventilation
  - Close observation.
  - Assess the problem.
  - Treatment of the cause:
    - Reverse (or Antidote):
    - Muscle relaxant ⟶ Neostigmine
    - Opioids ⟶ Naloxone
    - Midazolam ⟶ Anexate

Become fast but with less pressure O2 now is less than 100% it's become diluted O2

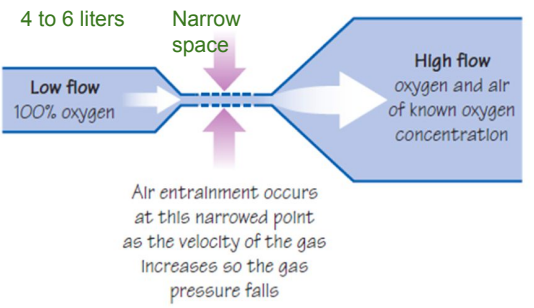


Figure 34.3 Venturi effect

Hypertension

- ○ Common causes:
  - Pain.
  - Full Bladder.
- Hypertensive patients. Did not take the tablet before surgery (NPO)
- Fluid overload.
- Excessive use of vasopressors.
- **Treatment of Hypertension:**
  - Effective pain control.
  - Sedation
  - Anti-hypertensives:
    - Beta blockers.
    - Alpha blockers.
    - Hydralazine (Apresoline).
    - Calcium channel blockers

Hypotension

- Decreased venous return from drugs (vasodilation) and anesthesia and what causes hypotension
  - Hypovolemia. From the start from NPO
    - ↓ fluid intake.
    - ↑ losses.
    - Bleeding.
- Sympathectomy. Spinal + epidural anesthesia can cause hypotension and vasodilation.
- 3rd space loss. Major surgery
- Left ventricular dysfunction.
- If not corrected with fluids the patient will need inotropes.

Fluids

- Patients will require I.V. fluids until they are able to drink normally.
- Maintenance and interoperative fluid losses. in maintenance use the 4-2-1 rule but in bleeding use the 3-1 rule where 3 is the crystalloid and 1 colloid.
- Replacement of **pre-existing** losses (e.g. dehydration preoperatively).
- Replacement of **postoperative** losses (e.g. nasogastric losses, bleeding).
- If the bleeding was more than 20% or Hb dropped to 7-8 g/dl then drop to drop meaning blood should be replaced with every drop.
- The types of fluid are:
  - Isotonic crystalloid (most often used).
  - Colloids (for maintaining intravascular volume, early bleeding).
  - Blood and blood products (for significant haemorrhage, coagulopathy).

Dysrhythmias

- ➔ Very common in PACU **(the worst are VTAC or 3rd- degree heart block)**
- ➔ Secondary to:
  - Hypoxemia.
  - Hypercarbia.
  - Hypothermia.
  - Acidosis.
  - Catecholamines. Using it in OR by mistake. Mistaken with fluids.
  - Electrolyte abnormalities.
- ➔ Treatment of Dysrhythmia know the cause and treat accordingly
  - Identify and treat the cause.
  - Assure oxygenation. 100%
  - Pharmacological

Urine output

- ➔ Normal urine output is a good indicator of patient hydration status. specially in long surgeries
- ➔ Oliguria:
  - Hypovolemia.
  - Surgical trauma.
  - Impaired renal function.
  - Mechanical blocking of catheter.
- ➔ Treatment:
  - Assess catheter patency
  - Fluid bolus.
  - Diuretics e.g. Lasix if the patient is not responding.

Post-op Bleeding

- ➔ the patient will have hypotension > know the source > check hemoglobin
- ➔ Causes:
  - Usually Surgical Problem. Thyroidectomy is important because it's obstructing the breathing treatment: is to open stiches and release the blood
  - Coagulopathy.
  - Drug induced

➔ Treatment of Post op Bleeding

- ◆ Start I.V. lines → push fluids.
- ◆ Blood sample:
  - ○ CBC.
  - ○ Cross matching.
  - ○ Coagulopathy.
- ◆ Notify the surgeon.
- ◆ Correction of the cause.

Hypothermia

➔ Most patients will arrive cold. OR is very cold, and patient does not have warm clothes.

➔ Treatment

- Try to prevent it before occurring.
- Get baseline temperature.
- Actively rewarm.

-provide heater medications + blankets .

- Administer oxygen if shivering.
- Take care for: **(age extremes)**
  - ○ Pediatric.
  - ○ Geriatric. Have to be careful they become hypothermic very fast

Altered Mental Status

- ○ Reaction to drugs:
  - ■ Drugs e.g. sedatives, anticholinergics.
  - ■ Intoxication / Drug abusers.
- ○ Pain.
- ○ Full bladder.
- ○ Hypoventilation.
- ○ Low COP.
- ○ CVA. rare
- ○ Treatment of altered mental status:
  - ✓ Reassurances.
  - ✓ Always protect the patient. Can be agitated and hurt themselves or others.
  - ✓ Evaluate the cause. Most imp
  - ✓ Treatment of symptoms.
  - ✓ Sedatives/Opioids if necessary. If the patient in pain or to relax her/him

Delayed Recovery

➔ Systematic evaluation

- Pre-op status.The medical+surgical HX
- Intraoperative events.
- Ventilation.extubate the patient early
- Response to Stimulation.
- Cardiovascular status

➔ The most common cause:

- Residual anesthesia ⟶ Consider reversal.
- Hypothermia.
- Metabolic e.g. diabetic coma. DKA may mimic anesthesia
- Underlying psychiatric problem.
- CVA.

Postoperative Nausea & vomiting (PONV)

The most common in post operative.

➔ **Risk factors:**

- Type & duration of surgery.
- Type of anesthesia.general anesthesia is more than regional
- Drugs.
- Hormone levels. Females are more prone.
- Medical problems.
- Autonomic involvement.

➔ **Prevention of PONV:**

- NPO status.
- Dexamethasone. we give it intra op to prevent PONV
- Droperidol.
- Metoclopramide.
- H2 blockers.
- Ondansetron.
- Acupuncture

Table 34.1 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

Post Operative Pain

Skipped by the doctor already has been discussed in pain management lecture

➔ 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. particularly chest tube
  - Surgical: complication of surgery
  - Others: cast, dressing too tight, urinary retention.

Table 34.2 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

➔ **Referral to high dependency unit/intensive care unit:**

Table 34.3 Levels of postoperative care

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

Questions:

1.42 years old male underwent a surgery for a large bowel obstruction, in the post anesthesia care unit the patient is awake and moves all of his extremities, breathes deeply and coughs. The patient's BP increases 25 mm of the pre anesth. Level. The Spo2 is 97%. What is the patient's score in the Aldrete score system?
A 10
B 8
C 6
D 4

2.Hyperthermia results in loss of normal homeostasis within skeletal muscle cells of which one of the Following minerals?
A potassium
B sodium
C Calcium
D phosphorus

3.In patients with status asthmaticus beta 2 agonist is administered in which way?
A Oral
B Intravenous
C Nebulizer
D Intramuscular

4.In the PACU ASA Standards, All patients will be accompanied by one of the anaesthesia team is the?
A Standard I
B Standard II
C Standard III
D Standard IV

5.What will be the aldrete score at which the patient will be ready for discharge from PACU?
A 9 out of 10
B 8 out of 10
C 3 out of 10
D 1 out of 10

6.Which one of the following is the most common cause of airway obstruction in the PACU?
A Tongue fall back
B foreign body
C inadequate relaxant reversal
D residual anaesthesia

7.Which one of the following does not cause dysthymia in PACU?
A Hypoxemia
B Hypercarbia
C Hyperthermia
D Acidosis

8.The first level of postoperative care described as?
A Patient's needs met on normal ward
B Patients at risk of their condition deteriorating, or who require advice from the ICU team
C Patience with a single falling organ system or requiring detailed observation/intervention
D Patients requiring ventilation (alone), advanced respiratory support alone or support of at least two organ systems

9.A lady had laparoscopic cholecystectomy under general anaesthesia. She is now in the post anesthesia care unit (PACU) and had vomited three times. Which one of the following drugs is the most effective for controlling her vomiting intravenously?
A Pethidine
B Metoclopramide
C Morphine sulphate
D Navidoxin

10.A young male patient post had PNS excision was transferred to PACU, what is the first thing to check?
A BP
B oxygenation
C pulse rate
D temperature

1.A 2.C 3.C 4.B 5.A 6.A 7.C 8.B 9.B 10.B