

PBL cases answers

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Case 1 answers:

1. What are the goals of preoperative assessment?

- To educate about anesthesia, perioperative care and pain management and to reduce anxiety.
- To obtain patient's medical history and physical examination.
- To determine which lab test or further medical consultation are needed.
- To choose care plan guided by patient's choice and risk factors.

2. What does ASA status 3 mean?

Significant or severe systemic disease that limits normal activity. Significant impact on daily activity. Likely impact on anesthesia and surgery.

3. What is the focus of the anesthesia evaluation of the arthritis, cardiac patients and chronic obstructive lung disease patients?

- Rheumatoid arthritis: CBC, ECG, CXR, C-spine (atlantoaxial subluxation) AP C-spine, AP odontoid view and lateral flexion and extension.
- Cardiac: Creatinine, glucose, ECG, exercise tolerance test, and echo.
- COPD: CBC, ECG, CXR.

4. What is the NPO status required pre-operatively?

- 8 hours after a meal that includes meat, fried or fatty foods
- 6 hours after a light meal (such as toast, crackers and clear fluid) or after ingestion of infant formula or nonhuman milk
- 4 hours after ingestion of breast milk or jello
- 2 hours after clear fluids (water, black coffee, tea, carbonated beverages, juice without pulp)

5. What is the preoperative medications you can use?

- Anxiolysis
- Antisialagogue
- Analgesia
- Antiemesis
- Amnesia
- Antacids, H2 blockers.

Case 2 Answers:

1. Discuss etiologies of Apnea during anesthesia:

Apnea during anesthesia has several etiologies, including:

1. Anesthetic agents themselves (fentanyl), as well as opiates, barbiturates, or benzodiazepines, and hypocarbia-induced respiratory depression.
2. Received an unplanned drug due to a syringe or an ampoule swap. (The case above)
3. The most common drugs that may lead to apnea include muscle relaxants
4. The patient may have a previously unrecognized metabolic disorder such as a neuromuscular disease (ie, myasthenia gravis) or a structural abnormality (ie, stroke or embolism) that needs to be evaluated.

2. Discuss receiving unplanned drug due to a syringe or an ampule swap.

Clinicians should attempt to ascertain whether a wrong drug was administered, and if so, which drug.

3. Discuss treatment and medication-induced respiratory depression varies by cause.

- When respiration is depressed by opiates, as evidenced by miotic, unresponsive pupils, naloxone (Narcan) to reverse the condition.
- In the case of persistent peripheral muscle blockade, typically due to residual muscle relaxants, reversal with neostigmine is initiated.

4. Discuss in case wrong medication administration in the operating room.

It is due to failure to label syringes, incorrect matching of labels on syringes and drug ampoules, failure to read the label on the vial/ampoule, misuse of decimal points and zeroes, and inappropriate abbreviations.

What happened to this patient illustrates an example of faulty drug identity checking, where two drugs were packaged in similar vials, so that one was easily mistaken for the other.

Case 3 answers:

1. Discuss differential diagnosis such as loss of blood at the operation site, anaphylaxis and myocardial depression.

Loss of blood at operation site:

- Usually Surgical Problem. (Unclamped oozing vessel)
- Coagulopathy.
- Drug induced. (Heparin)

Anaphylaxis:

Severe allergic shock may be triggered by substances like: penicillin.

Myocardial depression:

- MI.
- CHF.
- Cardiomyopathy.

2. Discuss the clinical indicators of hypovolemia, monitoring and assessment.

Clinical indicators:

1. Hypotension.
2. Oliguria.
3. Tachycardia.
4. Pallor of skin.
5. Decreased level of consciousness.

Monitoring and assessment:

1. Heart rate.
2. Blood pressure.
3. Urine output.

3. Discuss management of postoperative hypotension.

Initially treat with fluid bolus.

+ Vasopressors.

+ Correction of the cause.

4. Discuss when to give blood and how much blood to be given.

Before administering any blood we check the following:

1. Arterial blood gasses.
2. CBC to check preoperative hemoglobin level to compare with it the hemoglobin level postoperatively.

(I don't know how much blood to be given.)

Case 4 answers.

1. What are the predictors of difficult mask ventilations?

- **Beard**
- **Obese**
- **Old Age**
- **Toothless**
- **Snores**

2. Discuss the risk factors for difficult intubation?

- High Mallampati score.
- Cervical spine arthritis or trauma, burn, radiation, tumor (huge goiter), infection, scleroderma, short and thick neck
- Limited mouth opening.

3. How is the anticipated difficult intubation approach?

Not all difficult airways are detected by the preoperative assessment. Not every previously successful intubated patient means easy airway. Pre oxygenation is very important in these cases to give the patient a good reservoir. Intubation should be done within 30 seconds.

The first step after failed intubation is calling for help.

Then we can do either:

- Awake intubation

- Intubation with Lighted stylet (trachlight), fiberoptic laryngoscope, or Glidscope.

4. Describe the management options for a patient who, after induction of anesthesia, unexpectedly cannot be intubated with a Macintosh blade. This patient has a good mask airway.

You cannot use LMA because Laparoscopic surgeries require abdominal insufflation which will increase intra abdominal pressure and then eventually aspiration.

I would use another blade to intubate. (Not sure of this answer).

5. Following induction of anesthesia, ventilation by facemask and intubation are impossible. What maneuvers may help?

Do sniffing position maneuver.

6. How is successful tracheal intubation verified?

- Direct
 1. Visualization of ETT passing through cords
 2. Bronchoscopic visualization of ETT in trachea
- Indirect
 1. End-tidal co2 in exhaled gas measured by capnograph
 2. Auscultate for equal breath sounds bilaterally and absent breath sounds over epigastrium
 3. Chest movement and no abdominal distention
 4. Auscultation of the left, right lung, and epigastric area.
 5. Feel the normal compliance of lungs when ventilating patient
 6. Condensation of water vapor in ETT visible during exhalation
 7. Refilling of reservoir bag during exhalation
 8. Ap or lateral cxr: ETT tip at midpoint of thoracic inlet and carina (lateral cxr more sensitive and specific)

7. Following a difficult intubation, how is the postoperative extubation managed?

- Airway must be patent
- Patient no longer need intubation
- Patient airway reflexes are present
- Patient is oxygenating and ventilating spontaneously

Laryngospasm most commonly occur when extubating a semi conscious patient.

Case 5 answers.

1. Discuss hypoxia and possible causes after anesthesia.

Hypoxia: Oxygen saturation is less than 95%.

Causes:

Atelectasis

- Metabolic acidosis.
- Hyperthermia.
- Muscle relaxants residuals.
- Blood loss.
- Drugs (Morphine).
- Obstructed upper airway due to tongue fall, large uvula, laryngeal spasm, vocal cord palsy, and tracheal collapse.
- Smoking. (Cilia movement decreased in smokers)

2. Was the patient hypoxemic?

Yes.

3. Discuss hemoglobin oxygen dissociation curve.

(See picture)

4. Discuss clinical assessment and management of postoperative hypoxia.

Clinical Assessment:

- Pulse oximeter.
- Arterial blood gases.
- Chest x-ray.
- Oxygen analyzer.

Management:

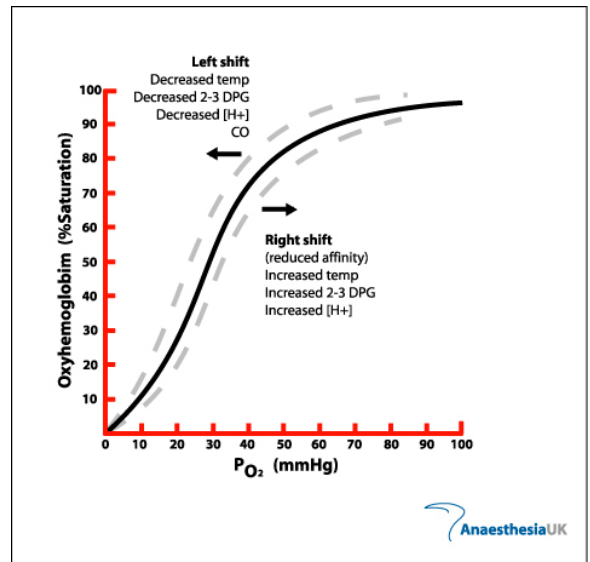
- Patients with airway obstruction should receive supplemental oxygen while corrective measures are undertaken.
- A combined jaw-thrust and head-tilt maneuver pulls the tongue forward and opens the airway.
- Insertion of an oral or nasal airway.

5. Discuss effect of smoking on respiratory system.

- Cilia movement decreases.
- Bronchospasm.
- Laryngospasm.

6. Does the patient's history of smoking may be the cause respiratory insufficiency?

Yes.



Case 6 answers

1. What are the benefits of local anesthetic infiltration?

- Non-systemic effects concerning anesthetic.
- No risk for hypoventilation
- No pain
- Low risk on respiration

2. What attributes are you looking for in a local anesthetic in this case?

- Rapid onset.
- Long duration.
- Potent.

3. Which agent would you choose and what is the maximum dose?

Lidocaine, Marcaine.

3.5 ml/kg.

4. What are the complications might be expected form overdose?

- Numbness.
- Metallic taste.
- Convulsions.
- Respiratory arrest.
- CNS effects.
- Hypotension.

Case 7 answers.

1. How can the patient be protected and the surgery allowed to proceed?

- For induction we do not use any IV agents that could raise intracranial pressure like ketamine. However we use thiopental, etomidate or propofol that has no significant effect on CSF.
- As for maintenance we use fentanyl and its derivatives.
- Then as neuromuscular blockers we use vecruonium or rocruonium to avoid any complications.

2. What are the clinical pharmacology of the neuromuscular blockers?

- Depolarizing (Suxamethonium, Succinylcholine): Acts as acetyl choline.
- Nondepolarizing: Block neuromuscular junction plate. They compete with acetyl choline.

3. Maintenance of blockade: How much is enough?

(See picture)

4. Discuss reversal of the neuromuscular blockade and emergence.

Steps of emergence:

- Turn off the agent (inhalation or IV agents)
- Reverse the muscle relaxants.
- Return to spontaneous ventilation with adequate ventilation and oxygenation
- Suction upper airway
- Wait for pts to wake up and follow command
- Hemodynamically stable

Reversal: Is used for non-depolarizing

muscle relaxants and they are neostigmine, glycopyrolate or atropine.

<u>TOF Response</u>	<u>Approximate Percentage of Receptors Blocked by Agent</u>	<u>Clinical Significance</u>
Four Twitches	0 to 75	May be able to move although may experience weakness. Amenable to reversal of blockade with antagonist
Three Twitches	75	May need to administer additional drug to prolong relaxation. Short or intermediate acting agents may be reversible
Two Twitches	80	Suitable for short term relaxation as well as long term mechanical ventilation.
One Twitch	90	Usually gives conditions suitable for short term procedures including intubation and long term mechanical ventilation.
Twitches Absent	100	Conditions for intubation. Long term saturation may lead to prolonged effects.

Case 8 answers.

1. Does the patient special monitoring for this procedure?

Yes, he does.

2. What this patient's monitoring must adhere to the standards for basic monitoring published by the ASA?

- **STANDARD I**

Qualified anesthesia personnel shall be present in the room throughout the conduct of all general anesthetics, regional anesthetics and monitored anesthesia care.

- **STANDARD II**

During all anesthetics, the patient's oxygenation, ventilation, circulation and temperature shall be continually evaluated.

1. Oxygenation: Pulse oximeter.

2. Ventilation: Capnogram.

3. Circulation: Non invasive blood pressure.

4. Temperature: Temperature probe.

5. Urin output: Catheter.

6. Invasive monitoring: No, but if it needs to be done we use intraarterial blood pressure.

7. Monitoring of neurological function: EEG.

8. Monitoring of neuromuscular function: Peripheral nerve stimulation.

Case 9 answers.

1. What are the components that must be considered when calculating the volume of fluid that should be replaced?

- Weight.
- NPO status.
- Type of surgery.
- Duration of surgery.
- Any other deficits.
- Blood losses.
- Type of fluid replacement (Crystalloid or colloid)

2. What are the signs of preoperative hypovolemia?

- Increased heart rate.
- Decreased blood pressure.
- Dry skin.
- Pale.
- Decreased urine output.

3. How to calculate the fluid replacement in the intraoperative period all which take into consideration the preoperative fluid deficits, intraoperative blood loss and urine output?

- **Fluid deficit (NPO):** $1.5 \times \text{weight} \times \text{Hours of NPO}$.
- **Bowel prep:** 1000 ml.
- **Maintenance:** $1.5 \times \text{weight} \times \text{Hours of surgery}$.
- **Third Space Losses:**
 - Superficial surgical trauma: 1-2 ml/kg/hr
 - Minimal Surgical Trauma: 3-4 ml/kg/hr
 - Moderate Surgical Trauma: 5-6 ml/kg/hr
 - Severe surgical trauma: 8-10 ml/kg/hr (or more)
- **Blood Loss:** 3ml crystalloid per 1ml of blood loss. Colloids. 1ml per 1ml of blood loss.

4. Which fluids: crystalloid, colloid, you can use and when to use?

- **Colloids:**
 - Fluids containing molecules sufficiently large enough to prevent transfer across capillary membranes.
 - Replace volume per volume.
 - Used in emergency situation when we need rapid volume replacement.
- **Crystalloid:**
 - Combination of water and electrolytes.
 - Replace 3 times the volume lost.
 - Used to correct blood loss and for maintenance.

Case 10 was answered by the doctor in a PowerPoint presentation. (Attached)

Case 11 answers.

1. What would you include in your preoperative evaluation of this patient?

History including:

- Age
- Present illness
- Drugs
- Allergies
- Past history (operations and anaesthetics, GERD)
- Anaesthetic family history
- Social (smoking, alcohol)
- Last meal.

Examination:

- Airway
- Teeth

2. What medication will you use for induction and maintenance of anesthesia?

Fentanyl for induction and maintenance.

3. How will you manage postoperative pain in this patient?

I will follow the WHO pain ladder.

4. What considerations are warranted in this healthy, young woman scheduled for an emergency surgical procedure if she has a full stomach?

Rapid sequence induction with cricoid pressure.