

## 1 End tidal co2 indication

Done by

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- 1-Validation of proper endotracheal tube placement
- 2-Detection and Monitoring of Respiratory depression
- 3-Hypoventilation
- 4-Obstructive sleep apnea
- 5-Procedural sedation
- 6-Adjustment of parameter settings in mechanically ventilated patients

## 2 O2 therapy definition

❖ **Oxygen therapy** is the administration of oxygen at a concentration of pressure greater than that found in the environmental atmosphere

## 3 Increase risk of morbidity & mortality in anesthesia: **very important**

- Age > 70
- Smoking
- MI < 6 months OR unstable angina within 3 m
- Pulmonary edema < 1 week
- Hb < 10 g/dl
- Urea > 20 mmol/L & dehydration
- Wt. loss > 10% in 1 month
- Severe medical illness, also sepsis, emergency, major operation.

## 4 ASA classification

1. Healthy person.
2. Mild systemic disease.
3. Severe systemic disease.
4. Severe systemic disease that is a constant threat to life.
5. A moribund person who is not expected to survive without the operation.
6. A declared brain-dead person whose organs are being removed for donor purposes.

## 5 Thiopental side effects

- 1- Hypotension
- 2- Respiratory depression
- 3- Laryngeal spasm
- 4- Brochospasm
- 5- Allergic reactions (1 in 14,000)
- 6- Extravasation tissue necrosis
- 7- Intraarterial injection
- 8- Thrombophlebitis

## 6 Succinylcholine contraindications

- CVS effects are found most common in children , bradycardia following administration first dose and 2<sup>nd</sup> in adult
- Fasciculation
- Hyperkalemia
- Muscle pain
- Intra gastric pressure elevation and increase lower esophageal sphincter tone
- Intraocular pressure elevation
- Masster muscle rigidity
- Malignant hyperthermia
- ICP elevation

## 7 Spinal anesthesia contraindications

- Patient refusal.
- Unstable patients (sepsis, hypovolemia)
- Inadequate resuscitative drugs and equipment.
- Uncooperative patients. (Psychiatry, pediatrics).
- Anatomical deformities, spine surgeries
- Neurological disease: Any worsening of the disease postoperatively may be blamed erroneously on the spinal anesthetic.
- Raised intracranial pressure.
- Severe aortic stenosis.
- Clotting disorders.

## 8] Speed of action depends on

- **Agent has to cross the BBB**
- **Speed of action depends upon:**
  - 1- **Lipid solubility**
  - 2- **Protein binding**
  - 3- **Speed of injection**
  - 4- **Cardiac output**

## 9] • Complications of local anesthesia:

- Nerve injury (direct injury)
  1. Pain
  2. Infection
  3. Ischemic necrosis
  4. Bleeding and hematoma
  
- Endotracheal tube pic ( name the parts)
  
- 2 ECG pictures
  1. Ventricular tachycardia
    - Q: what is the management of it?
    - A: Dc shock and amiodarone
  2. Normal ECG

القروب ٢ تخدير وتين

### 1)complete obstruction

#### Symptoms of Complete obstruction

- ✓ Lack of any air movement.
- ✓ Lack of breath sounds with stethoscope.
- ✓ Retraction of the sternum and rib cage.
- ✓ Choking sign (hands clutched throat).
  - ✓ Cyanosis.
  - ✓ Hypoxemia
  - ✓ Hypercarbia

### 2)components of anesthesia machine

#### Component of anaesthesia machine

1. Oxygen source
2. Flowmeter
3. Vaporizer
4. Patient breathing circuit
5. Scavenging system
6. Heads-up display

### 3)factor affect vaporizer

#### Factors affecting vaporiser output

- 1) Flow through the vaporising chamber.
- 2) Efficiency of vaporization.
- 3) Temperature Time.
- 4) Gas flow rate.
- 5) Carrier gas composition.
- 6) Ambient pressure.

### 4)table type of hypovolemic shock

	<b>Class I</b>	<b>Class II</b>	<b>Class III</b>	<b>Class IV</b>
Blood Loss	< 750	750-1500	1500-2000	> 2000
% Blood Vol.	< 15%	15 – 30%	30 – 40%	> 40%
Blood Pressure	Normal	Normal	<b>Decreased</b>	<b>Decreased</b>

## 5)table medical gases

### Characteristics of Medical Gas Cylinders

**TABLE 2-1** Characteristics of medical gas cylinders.

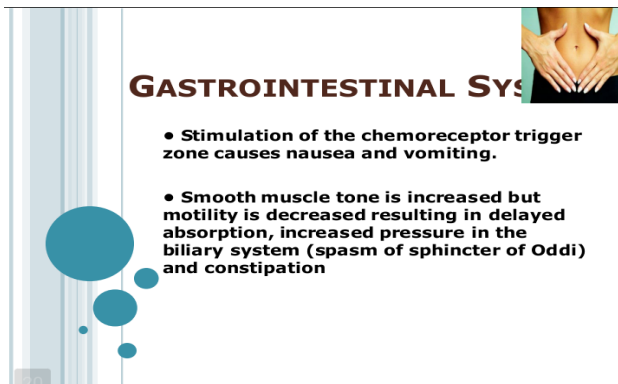
Gas	E-Cylinder Capacity <sup>1</sup> (L)	H-Cylinder Capacity <sup>1</sup> (L)	Pressure <sup>1</sup> (psig at 20°C)	Color (USA)	Color (International)	Form
O <sub>2</sub>	625-700	6000-8000	1800-2200	Green	White	Gas
Air	625-700	6000-8000	1800-2200	Yellow	White and black	Gas
N <sub>2</sub> O	1590	15,900	745	Blue	Blue	Liquid

## 6) components of lactate ringer

### 2-LACTATED RINGER:

\* SODIUM, CHLORIDE, POTASSIUM, CALICIUM, LACTATE

## 7)effect opioid on GI system



**GASTROINTESTINAL SYS**

- Stimulation of the chemoreceptor trigger zone causes nausea and vomiting.
- Smooth muscle tone is increased but motility is decreased resulting in delayed absorption, increased pressure in the biliary system (spasm of sphincter of Oddi) and constipation

## 8)GCS

**TABLE 38-2****Glasgow Coma Scale**

BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	<i>Best response</i>	15
	<i>Comatose client</i>	8 or less
	<i>Totally unresponsive</i>	3

9) ECG + manegment

10) normal ECG

1) Mention 5 factors increase MAC

**TABLE 8-4 Factors affecting MAC.<sup>1</sup>**

Variable	Effect on MAC	Comments	Variable	Effect on MAC	Comments
Temperature			Electrolytes		
Hypothermia	↓		Hypercalcemia	↓	
Hyperthermia	↓	↑ if > 42°C	Hypernatremia	↑	Caused by altered CSF <sup>2</sup>
			Hyponatremia	↓	Caused by altered CSF
Age			Pregnancy	↓	MAC decreased by one-third at 8 weeks' gestation; normal by 72 h postpartum
Young	↑				
Elderly	↓				
Alcohol			Drugs		
Acute intoxication	↓		Local anesthetics	↓	Except cocaine
Chronic abuse	↑		Opioids	↓	
			Ketamine	↓	
Anemia			Barbiturates	↓	
Hematocrit < 10%	↓		Benzodiazepines	↓	
			Verapamil	↓	
PaO <sub>2</sub>			Lithium	↓	
<40 mm Hg	↓		Sympatholytics		
			Methyldopa	↓	
Paco <sub>2</sub>			Clonidine	↓	
>95 mm Hg	↓	Caused by < pH in CSF	Dexmedetomidine	↓	
			Sympathomimetics		
Thyroid			Amphetamine		
Hyperthyroid	No change		Chronic	↓	
Hypothyroid	No change		Acute	↑	
			Cocaine	↑	
Blood pressure			Ephedrine	↑	
Mean arterial pressure	↓				
<40 mm Hg					

2) Mention 5 surgeries in which using nitrous oxide is contraindicated:

-Examples of conditions in which nitrous oxide might be hazardous include venous or arterial air embolism, pneumothorax, acute intestinal obstruction with bowel distention, intracranial air (pneumocephalus following dural closure or pneumoencephalography), pulmonary air cysts, intraocular air bubbles, and tympanic membrane grafting.

3) Mention 4 reasons of inaccuracy in flowmeters:

**Inaccuracy in flowmeters** are due to:

- The tube not being vertical.
- Back-pressure, from for example, a ventilator.
- Static electricity causing the float to stick to the tube.
- Dirt causing the float to stick to the tube

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4}give 5 adverse effects of opioids:

Pages 13-25 contain many adverse effects ☺ like

Constipation, muscle rigidity, neonatal respiratory depression, histamine release, respiratory depression, tolerance and dependency, hallucinations

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5} write the ligand and the effect on receptor Mu stimulation:

RECEPTOR	ENDOGENOUS LIGAND	EFFECT ON RECEPTOR STIMULATION
Mu( $\mu$ )	Endorphin	Supraspinal analgesia ( $\mu_1$ ) Dependance ( $\mu_2$ ) Respiratory depression ( $\mu_2$ ) Constipation ( $\mu_2$ ), miosis ( $\mu_2$ )

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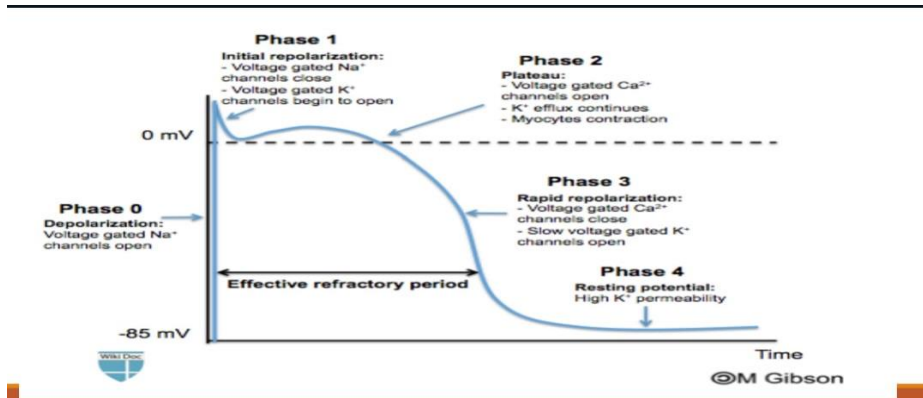
6}



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7}write the five phases of action potential and electrolytes affecting each phase:





2 Ecgs

1.SVT

Treatment (carotid massage, Valsalva maneuver, adenosine dose 6,6,12

2.Inferior MI (treatment is aspirin or morphine)

8)Mention 9 indications of O2 therapy:

- INDICATIONS:**
- ACUTE RESPIRATORY FAILURE
  - ACUTE MYOCARDIAL INFARCTION
  - CARDIAC FAILURE
  - SHOCK
  - HYPERMETABOLIC STATE INDUCED BY TRAUMA, BURNS OR SEPSIS
  - ANAEMIA
  - CYANIDE POISONING
  - DURING CPR
  - DURING ANAESTHESIA FOR SURGERY

# Anesthesia group B

- sugammadex dose and effect for Which muscle relaxant?  
واجب دكتور اشرف
- Factors affecting the vaporiser output ? (Mention 5)

## Factors affecting vaporiser output

- Flow through the vaporising chamber
- Efficiency of vaporization
- Temperature Time
- Gas flow rate
- Carrier gas composition
- Ambient pressure

- Signs and symptoms of subdural hematoma

### Signs & Symptoms

1. Altered mental status
  2. LOC
  3. Focal neurological signs  
(ipsilateral mydriasis - Failure of the ipsilateral pupil to react to light)
  4. Contralateral hemiparesis
  5. Headache - Nausea - Vomiting
- Usually associated with severe diffuse injury, immediate deep coma from moment of impact
  - Extreme neurosurgical emergency.
  - 30% mortality, 30% good outcome.

- Effect of opioid on GIT

### GASTROINTESTINAL SYSTEM



- Stimulation of the chemoreceptor trigger zone causes nausea and vomiting.

- Smooth muscle tone is increased but motility is decreased resulting in delayed absorption, increased pressure in the biliary system (spasm of sphincter of Oddi) and constipation



Handwritten notes in Arabic: "nausea & vomiting" with an arrow pointing to the first bullet point, and "تشنج" (spasm) with an arrow pointing to "sphincter of Oddi" in the second bullet point.

- Absolute and relative contraindications of arterial line

Arterial line Contraindications	
Absolute Contraindications	Relative Contraindications
Absent Pulse	Hemorrhage
Thromboangitis obliterans	Angiopathy
Full thickness burns over the cannulation site	Coagulopathy
Raynaud syndrome Infection on site	Atherosclerosis

- Atracurium dose ,metabolism , metabolites and side effects

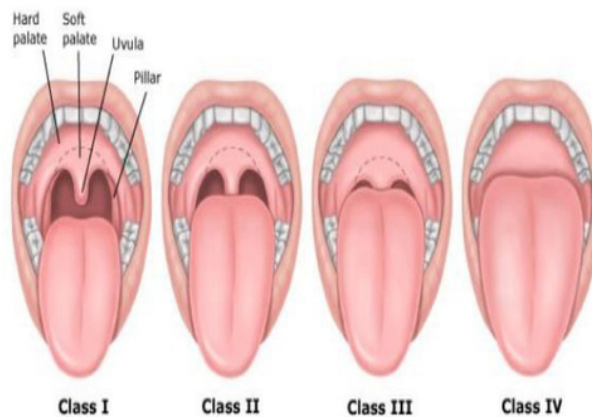
**Atracurium :**

- Benzylisoquinoline structure
- Metabolism by **nonspecific esterase** , or by **hofman elimination** (nonenzymatic chemical breakdown into laudanosine)
- Laudanosine >> its accumulation leads to renal failure & seizures
- Dose 0.5 mg/kg ,onset of action 1-2mins for intubation .
- Stored at room temp

**Side effect :** B tend to release histamine, so:

- 1- Hypotension and tachycardia
- 2- Bronchospasm
- 3- laudanosine toxicity
- 4- Allergic reaction

- Mallampoti classes



- Class I : Uvula, fauces, soft palate, pillars visible.
- Class II : Uvula, Soft palate, fauces visible.
- Class III : Base of uvula visible, Soft palate, .
- Class IV : Only hard palate visible

**2 ECG :**

**Atrial fibrillation**

**AV block 2nd degree**

• when we use fresh frozen plasma ?

• Indications:

- Non-life-threatening warfarin-induced bleeding
- Vitamin K deficiency
- DIC
- in patient with liver disease ,major hepatic resection and sever liver injuries
- TTP

# الفصل الثاني

2.

1-ephedrine

Dose

mechanism of action

Indecation

2.

What the best inhalation anesthetic agent for asthma patient and enhance bronchodilation

3.

Local anesthetic agent

1- mechanism of action

2- how drug affect nerve block

3- sensitivy of block

4.

Etomidate

1- dose

2- indecation

3- contraindeication

Advers effect

5.

Indecation of criopricipetate

6.

## ASA score

7.

ECG

1 - first degree AV block

2- ventricular tachycardia

8.

Gas	E-Cylinder Capacity <sup>1</sup> (L)	H-Cylinder Capacity <sup>1</sup> (L)	Pressure <sup>1</sup> (psig at 20 °C)	Color (USA)	Color (international)	Form
O <sub>2</sub>	625-700	6000-8000	1800-2200	Green	White	Gas
Air	625-700	6000-8000	1800-2200	Yellow	White and black	Gas
N <sub>2</sub> O	1590	15,900	745	Blue	Blue	Liquid

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Clinical feature of neurogenic shock

# Anesthesia

Group B

## Important complications of local anesthesia

- **Block of the peripheral nerve**
- Complications of local anesthesia:
- Nerve injury (direct injury)
  1. Pain
  2. Infection
  3. Ischemic necrosis
  4. Bleeding and hematoma

# Sign of complete obstruction

## 2) Complete:

- ✓ Lack of any air movement.
- ✓ Lack of breath sounds with stethoscope.
- ✓ Retraction of the sternum and rib cage.
- ✓ Choking sign (hands clutched throat).
- ✓ Cyanosis.
- ✓ Hypoxemia
- ✓ Hypercarbia



## Normal ABG values

- PO<sub>2</sub>            80 – 100 mmHg
- PCO<sub>2</sub>           35 – 45 mmHg
- pH                7.35 – 7.45
- HCO<sub>3</sub>           22 – 26 mmol/L
- SaO<sub>2</sub>            >95%

## 2) Surgical management

Criteria for immediate surgical intervention is **asymptomatic EDH** with:

- 1) **Volume greater than 30 ml.**
- 2) **Thickness of 10 mm (children 5 mm).**
- 3) **A midline shifts beyond 5 mm.**

	<u>Class I</u>	<u>Class II</u>	<u>Class III</u>	<u>Class IV</u>
Blood Loss	< 750	750-1500	1500-2000	> 2000
% Blood Vol.	< 15%	15 – 30%	30 – 40%	> 40%
Pulse	< 100	> <b>100</b>	> 120	> 140
Blood Pressure	Normal	Normal	<b>Decreased</b>	<b>Decreased</b>
Pulse Pressure	Normal	<b>Decreased</b>	<b>Decreased</b>	<b>Decreased</b>
Resp. Rate	14 – 20	<b>20 – 30</b>	<b>30 – 40</b>	<b>&gt; 40</b>
UOP	> 30	<b>20 – 30</b>	<b>5 – 15</b>	<b>negligible</b>
Mental Status	sl. Anxious	mildly anx	<b>confused</b>	<b>lethargic</b>
Fluid	crystalloid	crystalloid	<b>blood</b>	<b>blood</b>



### Sinus Tachycardia

- Results from increased SA node discharge.



**Rate:** Fast ( $>100$  bpm)

**Rhythm:** Regular

**P Waves:** Normal (upright and uniform)

**PR Interval:** Normal (0.12–0.20 sec)

**QRS:** Normal (0.06–0.10 sec)

▼ **Clinical Tip:** Sinus tachycardia may be caused by exercise, anxiety, fever, hypoxemia, hypovolemia, or cardiac failure.

### Third-Degree AV Block

- Conduction between atria and ventricles is absent because of electrical block at or below the AV node.
- "Complete heart block" is another name for this rhythm.



**Rate:** Atrial: 60–100 bpm; ventricular: 40–60 bpm if escape focus is junctional,  $<40$  bpm if escape focus is ventricular

**Rhythm:** Usually regular, but atria and ventricles act independently

**P Waves:** Normal (upright and uniform); may be superimposed on QRS complexes or T waves

**PR Interval:** Varies greatly

**QRS:** Normal if ventricles are activated by junctional escape focus; wide if escape focus is ventricular

## ASA Physical Status Classification System

- |      |   |
|------|---|
| I.   | A normal healthy patient  |
| II.  | A patient with mild systemic disease  |
| III. | A patient with severe systemic disease  |
| IV.  | A patient with severe systemic disease that is a constant threat to life        |
| V.   | A moribund patient who is not expected to survive without surgical procedure    |
| VI.  | A declared brain-dead patient whose organs are being removed for donor purposes |
- The addition of 'E' indicates emergency surgery.

- Health person with alcohol consumption ?
- ASA 2
- Health person with aortic aneurysm
- ASA 5
- Patient with DM, HTN complain of bowel obstruction
- ASA E4

- What is capnography, normal value of  $ETCO_2$ , what cause the difference between  $pCO_2$  and  $ETCO_2$ ?
- 1- **capnography** refers to the non-invasive measurement of the partial pressure of carbon dioxide ( $CO_2$ ) in exhaled breath expressed as the  $CO_2$  concentration over time
- 2- The normal values are 5% to 6%  $CO_2$ , which is equivalent to 35-45 mmHg
- 3- The difference between  $EtCO_2$  and  $PaCO_2$  represents the pulmonary dead space. Acute increase in dead space, such as in pulmonary embolism, widens this gap

- (3 ) Contraindication of nitrous oxide??

## Contraindications

Although nitrous oxide is relatively insoluble in comparison with other inhalation agents, it is 35 times more soluble than nitrogen in blood. Thus, it tends to diffuse into air-containing cavities more rapidly than nitrogen is absorbed by the bloodstream. For instance, if a patient with a 100-mL pneumothorax inhales 50% nitrous oxide, the gas content of the pneumothorax will tend to approach that of the bloodstream. Because nitrous oxide will diffuse into the cavity more rapidly than the air (principally nitrogen) diffuses out, the pneumothorax expands until it contains roughly 100 mL of air and 100 mL of nitrous oxide. If the walls surrounding the cavity are rigid, pressure rises instead of volume. **Examples of conditions in which nitrous oxide might be hazardous include venous or arterial air embolism, pneumothorax, acute intestinal obstruction with bowel distention, intracranial air (pneumocephalus following dural closure or pneumoencephalography), pulmonary air cysts, intraocular air bubbles, and tympanic membrane grafting.** Nitrous oxide will even diffuse into tracheal tube cuffs, increasing the pressure against the tracheal mucosa. Obviously, nitrous oxide is of limited value in patients requiring increased inspired oxygen concentrations.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

ارشيف التخذير Group c

Done by : Eiman Alrfou & Afnan bassam

Q1. Write the signs and symptoms of subdural hematoma :

1. Altered level of consciousness
2. A dilated pupil ipsilateral to the hematoma
3. Failure of the ipsilateral pupil to react to light
4. Hemiparesis contralateral to the hematoma

Q2. Write the component of lactate ring :

1. Sodium
2. Potassium
3. Calcium
4. Lactate
5. Chloride

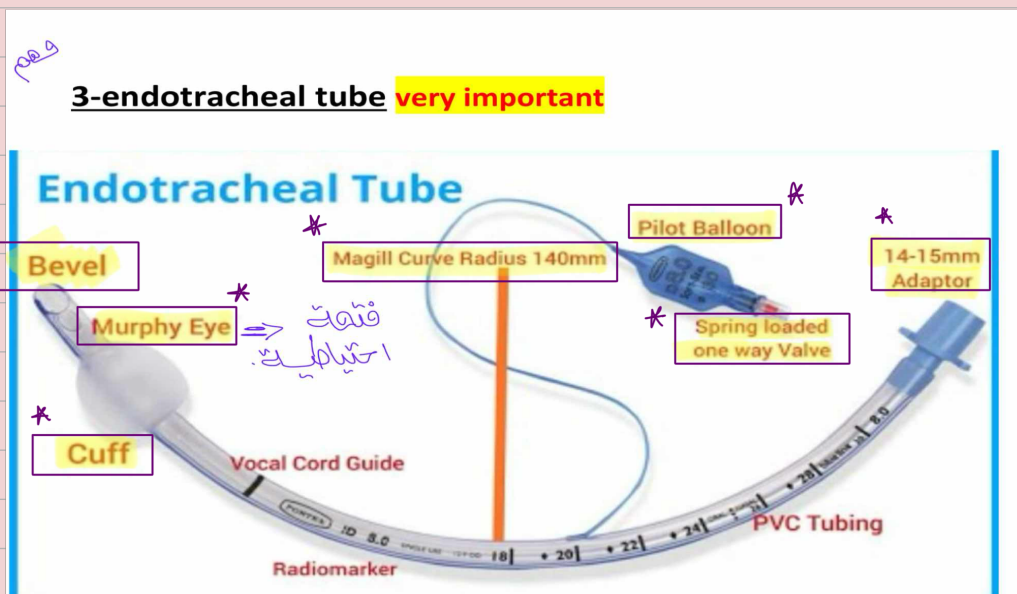
Q3. Write the indications of platelet transfusion :

1. chemotherapy ,radiotherapy for leukemia and multiple myeloma
2. Aplastic anemia
3. ITP
4. AIDS
5. Hypersplensm

Q4. What is the evaluation of hypovolemic shock :

1. CBC
2. ABG
3. Electrolytes
4. Coagulation studies
5. Type and cross-match
6. As indicated: CXR, Pelvic x-ray, CT, GI endoscopy, Vascular radiology

Q5. Fill the following blanks :

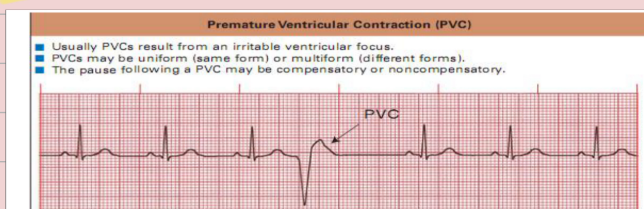


Q6. طلب بس الاشياء المظلل عليها

FACTOR	ACTION AFFECTED	DESCRIPTION
* pKa	Onset	Lower pKa = more rapid onset of action, more RN molecules present to diffuse through nerve sheath, thus onset time is decreased
* Lipid solubility	Anesthetic potency	Increased lipid solubility = increased potency
* Protein binding	Duration	Increased protein binding allows anesthetic cations (RNH <sup>+</sup> ) to be more firmly attached to protein located at receptor sites, thus duration of action is increased
Tissue diffusibility	Onset	Increased diffusibility = decreased time of onset
Vasodilator activity	Anesthetic potency and duration	Greater vasodilator activity = increased blood flow to region = rapid removal of anesthetic molecules from injection site, thus decreased anesthetic potency and decreased duration

Handbook of Local Anesthetics, Stanley F. Malamed

Q7. Case and ECG طلب التشخيص والعلاج



Treatment : usually stable give atropin



Q8. Normal ECG

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Q9. Give one example for each of the following :

1. Dose of neostigmine →→ 0.04 mg /kg
  2. Cox 2 inhibitor →→ Aspirin
  3. Inhalation agent cause PONV →→ Nitrous oxide
  4. Competitive muscarinic receptor antagonist : →→ Atropin
  5. Not liquid inhalation agent : Nitrous oxide
  6. Non depolarizing muscle relaxant used for rapid sequence induction : Rocuronium
  7. Muscle relaxant metabolized by pseudocholinesterase : →→ Mivacurium
-

## Archive group D 2nd sem

Q1. ECG.

Diagnosis..V. Tack

Management

Q2.ECG

Diagnosis... third block

Management

Q3. 7. Complications of anaesthesia on respiratory system

Q4. Indication (uses) for packed RBCs

Q5. Prevention and treatment of erythroblastosis fetalis

Q6. organ blood supply

(mention the components of rich vessels group)

Q7. Apnea test (in details)

شرح كل اشي وشو الخطوات

Q8. cormack lehane classification

(laryngoscopy)

Q9. 5 uses of central line catheter

Q10. All of thing about ketamine

Dose

Uses

Author name

Effect

Mechanism

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