

1- Discuss radial artery sampling (10 marks)

Radial artery sampling

- Perform a modified Allen test to ensure adequate collateral circulation from ulnar artery:
 - If the colour returns to the hand within 5sec→+ve test (good collateral)
 - If the colour returns to the hand within 5-10sec→equivocal test
 - If the colour returns to the hand within >10sec→-ve test (poor collateral)
 - Position the patient's hand as shown in the figure with the wrist extended 20- 30 ° .
 - Identify the radial artery by palpating the pulse; choose a site where the pulse is prominent.
 - Clean the sampling site with an alcohol wipe.
 - Expel the heparin from syringe.
 - Steady your hand on the patient's hand then insert the needle at 45°, bevel facing up.

- Be sure to insert the needle slowly to minimize the risk of arterial spasm.
- When the needle is in the artery a flash of blood will appear in the barrel of the needle. most ABG syringes will then fill under arterial pressure.
- Obtain at least 3mL of blood before withdrawing.

After sampling

- Once adequate blood has been obtained, remove the needle and apply firm, direct pressure to the sample site for at least 5 minutes.
- Dispose all sharp and contaminated materials appropriately.
- Ensure that no air bubbles are present in the sample ,as they may compromise results. Any sample with more than very fine bubbles should be discarded.
- The sample should be analyzed promptly: if the transit time is likely to exceed 10 minutes, then the syringe should be stored on crushed ice.

- If sampling is unsuccessful it is often advisable to repeat the test on the opposite wrist as even slight irritation of the artery on the first attempt may have provoked arterial spasm , thwarting further attempts at puncture.

2- Indication and care of patient on mechanical ventilation (10 marks)

Indications:

1. respiratory gas tension:

a. Direct indices:

- $\text{PaO}_2 < 50 \text{ mm Hg}$ on room air.
- $\text{PaO}_2 > 50 \text{ mm Hg}$ in absence of metabolic alkalosis.

b. Derived indices:

- $\text{PaO}_2 / \text{FiO}_2 \text{ ratio} < 250 \text{ mm Hg}$.
- $\text{Pa} - \text{a O}_2 \text{ gradient} > 350 \text{ mm Hg}$.
- $\text{V}_a / \text{V}_t > 0.6$.

2. Clinical indices:

- Respiratory rate $> 35 \text{ breath / min}$.

3. Mechanical indices

- Tidal volume $< 5 \text{ ml/Kg}$.
- Vital capacity $< 15 \text{ ml/Kg}$.

1. Maximum inspiratory force > -25 CmH₂O

3- Colloid solutions-----definition, uses, types (10 marks)

B- Colloid solutions:

Definition: they are solutions contain high molecular weight substances with intravascular half life longer than crystalloids (4-6 hs).

Uses:

- Fluid resuscitation e.g., hemorrhagic shock.
- Severe hypo-albuminaemia e.g., Albumin.

Types:

a- Blood derived colloids.

- 1- Human albumin(5% & 25%): it contain albumin only.
- 2- Plasma protein fraction(5%): contain albumin + α & β globulins.

b- Synthetic colloids:

- 1- Dextrose starches (Max. dose 1.5 L)

Disadvantages:

- Allergy.
- Renal failure.
- Interfere with blood typing.
- ↑↑ Bleeding time.

2- Gelatins: (Max. dose 1.5 L)

Disadvantages: Allergy.

3- Heta starch:

Advantages:

- Not affect coagulation.
- Not affect bleeding time.
- No allergy.
- Very effective.
- Less expensive than albumin.

4-Estimate the daily caloric and protein requirements for 70kg wt female patient admitted in ICU (10 marks)

5-Estimation of blood loss and determination of transfusion point (10 marks)

- **Estimation of blood loss:**

- Blood in suction container.
- Visually estimating the blood on surgical sponges & pads.
 - *Fully soaked sponge (4 x 4 cm) holds 10 ml of blood.
 - *Fully soaked pads holds 100 – 150ml blood.

Better by weighting sponges & pads before & after use.

-Calorimetry.

- **Determination of transfusion point:**

- 1- Blood loss > 10 – 20% of their blood volume.
- 2- Hemoglobin reaches 7 – 10 gm/dl according to patient condition.
- 3- Haematocrit: 20 – 30%.

N.B.: Normal blood volume.

- Adult 75ml/kg -neonates 90ml/kg
- Pediatric 80 ml/kg.

6-How to recognize a critically ill patients (10 marks)

7-Types and uses of blood components (10 marks)

Blood components:

- 1- **Whole blood** (450 – 510 ml):
 - Acute blood loss.
 - Surgical procedures.
- 2- **Packed R.B.Cs** (350 – 400 ml).

- For patient requiring R.B.Cs e.g., anemic pt.
- Surgical procedures.

3- **Fresh frozen plasma** (unit = 200 ml).

- Coagulation factors deficiency.
- Reversal of anticoagulant.
- Liver diseases.
- Massive blood transfusion.

4- **Platelets:** (unit 50 – 70ml).

- Each unit increases platelets by 5000 – 10000.
- Stored at 20 – 24 °C for 5 days.
- Used in: * ↓↓ platelets (thrombocytopenia)

* Platelets dysfunction.

5- **Granulocyte** transfusion:

Used in bacterial infections not responding to antibiotics.

6- **Cryoprecipitate:** contain factor VIII

Used in hemophilia.

