

Lecture one: Blood collection, blood sampling , phlebotomy

- Blood collection is necessary to diagnose the disease and assess the condition
- Blood is collected from the vein for various hematological investigations.

Types of blood vessels to collect blood from:

1. **Capillaries** : they can be used , but they give small amount which can't be collected in tubes with anti-coagulant. So we use the blood immediately in case of measuring one thing only such as blood sugar test.
2. **Arteries** : carries oxygenated blood , so it is used in blood gases measurement but they are not used in all the other testes because they are deep and have thick wall.
3. **veins** : most commonly used , gives whole blood or serum
 - **-serum** : not used in physiology lab , but in the biochemistry labs
 - **-whole blood** : the one we use . It contains anti-coagulant, which has many types, but the anti-coagulant we use is EDTA

Preparation for blood collection:

1. Read the request of the patient.
2. prepare equipment for blood sampling (Tourniquet, Alcohol, Cotton, Adhesive strip, Sterile Disposable syringes, suitable tubes for each test)

1.Capillary or peripheral blood:

This method used to draw a small amount of blood in special micro tubes usually from the end of a finger (capillary tubes), only a few test can be performed. Material: 1. Lancet 2. Capillary tubes 3. Alcohol (ethanol 70%) 4. Cotton

Procedure:

1. Sterilize the area by alcohol and allow to dry.
2. Deep quick stab the area by disposable blood lancet, the puncture should be about 3 mm
3. Wipe off the first drop of Blood and a little pressure is applied
4. Never press out Blood
5. Take the Blood
6. Apply slight pressure over the area (Do not use excessive pressure because the blood may become diluted with tissue fluid).



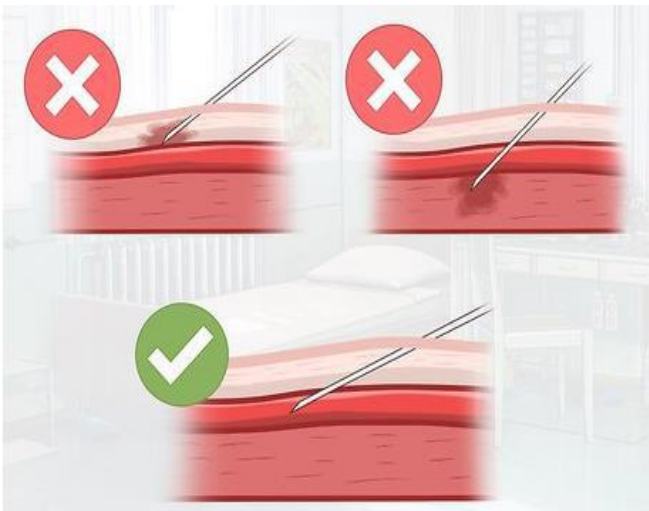
Sites for capillary puncture- :

1.Finger pulp 2. Heel pulp or great toe (in infant) 3. Ear lobe

2.Venipuncture blood sampling:

A venous sample of blood must be obtained when you need a large volume of blood for laboratory analysis

Best site for blood collection : in the cubital fossa from the Median , Cephalic and Basilic veins , the Median is usually the best but not always. So remember to collect always from the most clear and the most prominent which is determined by feeling the vein not seeing it.



Positioning the patient and choosing the vein:

- 1- The patient should sit comfortable in a chair or sit up in bed.**
- 2- In order to avoid problems with hemconcentration and hemodilution, the patient should be seated for 15 to 20 minutes before the blood is drawn.**

- 3- Avoid arm with burn area, hematoma, scarring, recently injected or withdrawn syringe (tissue fluid accumulation alters test results).
- 4- Apply tourniquet to distend the vein (tourniquet obstructs the venous return so it helps to distend the vein).

Note/ as a rule, the tourniquet should not be placed too tightly or left on the patient for more than 2 min.

What are the effects if the tourniquet left for more than 2 min?

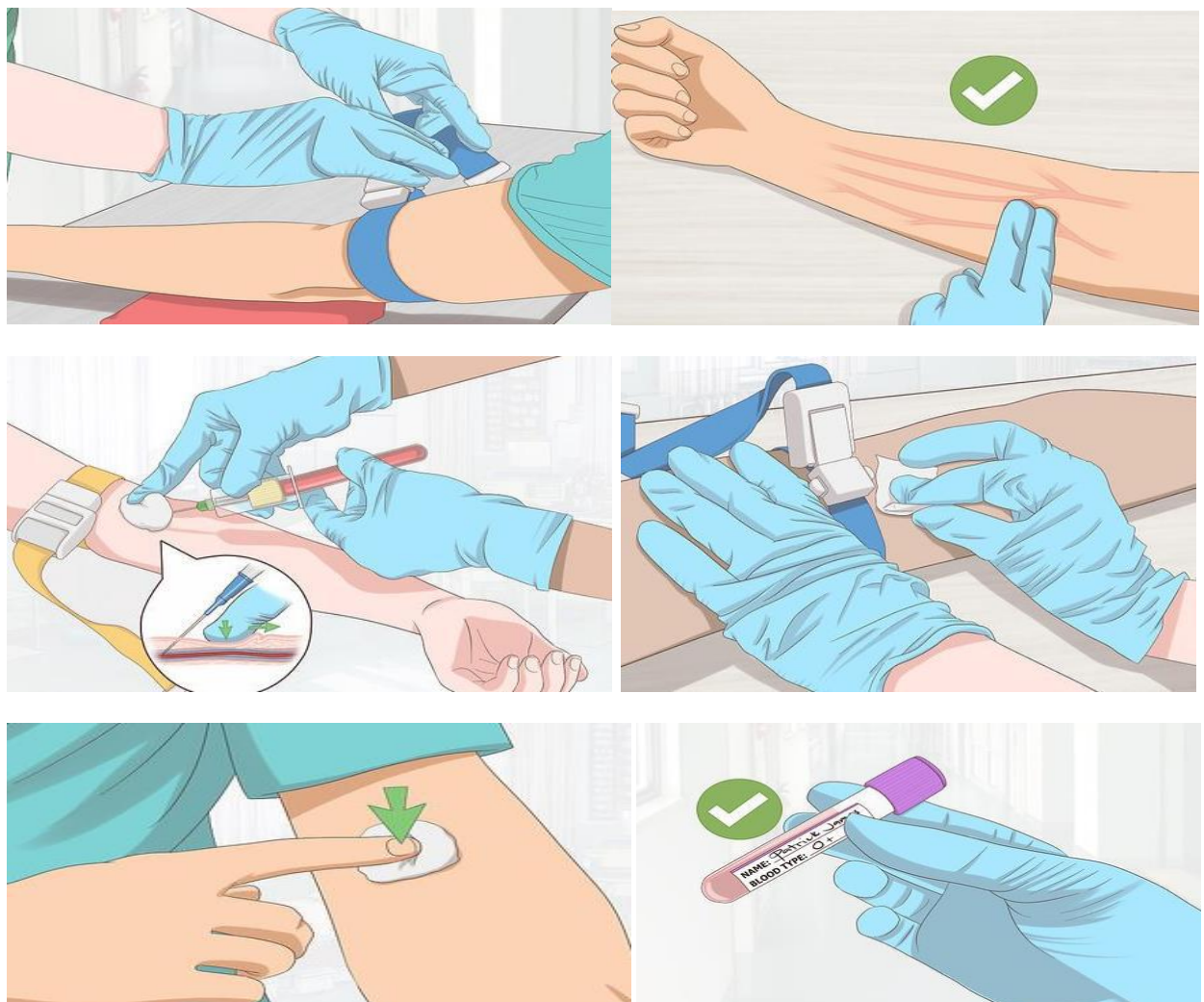
Prolonged application of the tourniquet results in partial stasis of blood which leads to hemoconcentration that increase concentration of serum enzymes, potassium, proteins, and protein bound substances as calcium.

Vein-puncture:

- a. Check the syringe
- b. The plunger must be pushed firmly to the bottom of the cylinder to prevent injection of air into the vein, this can be fatal.
- c. Use 70% alcohol as disinfectant the site in concentric circle and let it to dry for 30–60 sec to avoid hemolysis and burning sensation.
- d. Enter by the needle at 45-degree angle (under the skin and then into the vein), When the needle enters the vein there is sudden loss of resistance and blood come in the head of needle.
- e. Remove the tourniquet once the needle has been inserted.

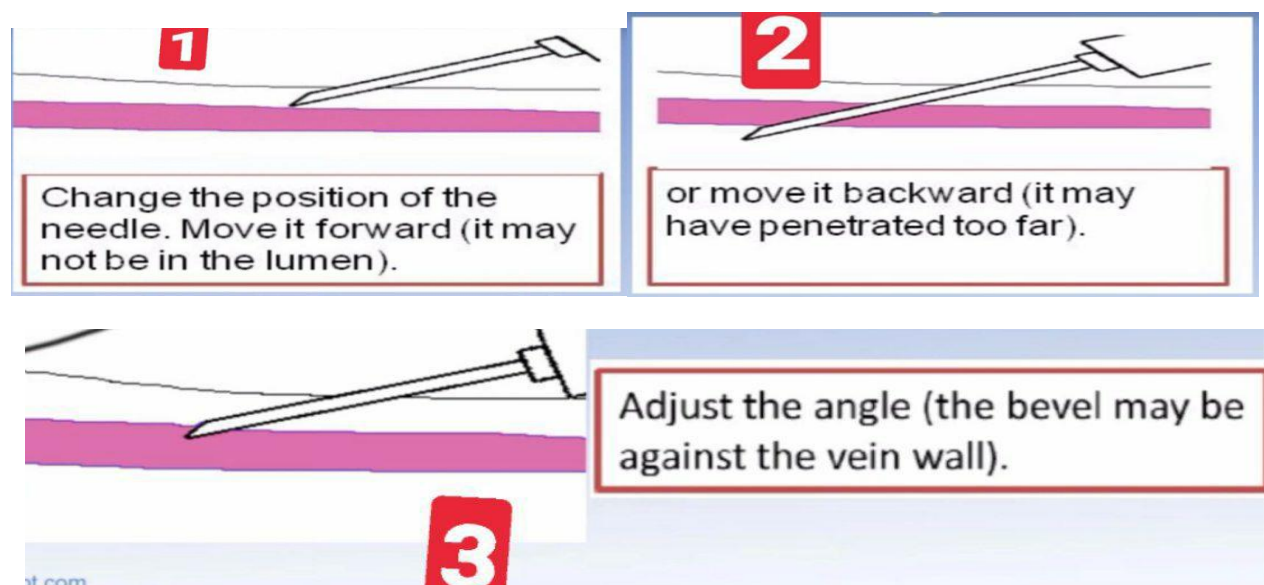
Note If the needle were removed prior to the Tourniquet being removed, blood would be forced out of the venipuncture site, resulting in hematoma.

- f. Withdraw blood gradually by gently pulling upon the syringe plunger.
- g. Place a sterile cotton piece over the point where the needle entered the skin.
- h. Remove the syringe quickly
- i. Dispose of contaminated materials and needles in special disposal containers.



Venous blood collection steps

Some mistakes during venous blood collection:



3.Heelstick Procedure (infants):

The recommended location for blood collection on a newborn baby or infant is the heel.

1.Prewarming the infant's heel (42° C for 3 to 5 minutes) is important to increase the flow of blood for collection.

2. Hold the baby's foot firmly to avoid sudden movement.

3.Make the cut across the heel print lines so that a drop of blood can well up and not run down along the lines.

4. Wipe away the first drop of blood with a piece of clean, dry cotton gauze. Since newborns do not often bleed immediately. Do not use excessive pressure because the blood may become diluted with tissue fluid.



4.Arterial Blood Collection:

Collection of blood from arteries its usefulness in determination of blood gases measurements :

References:

1. Mei, J. (2014). Dried blood spot sample collection, storage, and transportation. Dried blood spots: Applications and techniques, 21-31.
2. World Health Organization. (2010). WHO guidelines on drawing blood: best practices in phlebotomy. World Health Organization.
3. Duś-Ilnicka, I., Szczygierska, A., Kuźniarski, A., Szymczak, A., Pawlik-Sobecka, L., & Radwan-Oczko, M. (2022). SARS-CoV-2 IgG Amongst Dental Workers During the COVID-19 Pandemic. International Dental Journal, 72(3), 353-359.