PROCEDURES FOR THE COLLECTION OF BLOOD FOR HEMATOLOGICAL INVESTIGATIONS

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COLLECTION OF BLOOD

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Skin Puncture

This method is most common and mostly used in infants and small children and if the small amount of blood is required. This method is suitable for the estimation of hemoglobin, cell counts, determination of hematocrit (HCT) or packed cell volume (PCV) by micro method and preparation of blood films. Blood obtained by this method is also called as capillary blood. However, it is the mixture of blood from arterioles, venules, and capillaries. It also contains small amount of tissue fluid. In infants, blood is collected from the heel (the medial or lateral aspect of plantar surface or great toe). In adults, it is collected from the side of a middle or ring finger (distal digit) or from the ear lobe. (see Figure 1)

The puncture site is cleansed with the 70% ethanol or another suitable disinfectant. After drying, a puncture is made with a sterile, dry, disposable lancet, in deep to allow free flow of blood. The first drop of blood is wiped away with the dry and sterile cotton as it contains tissue fluid. After wiping the first drop of blood, next few drops of blood are collected. Excessive pressing should be avoided, as it may dilute the blood with the tissue fluid. After collection of blood, a piece of dry and sterile cotton is pressed over the puncture site till the bleeding ends. Hemoglobin, red cell count and hematocrit (HCT) or packed cell volume (PCV) are moderately higher in the blood collected from skin puncture, as compared to the venous blood. The reason behind this scenario is that platelets adhere to the puncture site and cause the lower count of platelet, and due to small sample size, instant repeat testing is not possible if the result is abnormal or unusual. Avoid collecting blood from cold, cyanosed skin since the false elevation of values of red blood cells, white blood cells and hemoglobin will be obtained.

Venous Blood Collection

Venous blood is obtained when the larger quantity of blood is needed to perform multiple tests. Different test tubes are filled with blood as per requirement of anticoagulant and blood ratio for the test. Anticoagulant is not required for the test performed by the serum.

Method:

1. The best site for obtaining blood is the veins of antecubital fossa. A rubber
tourniquet is applied to the upper arm (see Figure 2; Common sites of venepuncture in antecubital fossa). It should not be too much tight and should not remain in a place for more than 120 seconds. To get veins more palpable and prominent, the patient is asked to make a fist.

2. The puncture site is cleansed with the 70% ethanol or other suitable disinfectant and allowed to dry.

3. The preferred vein is anchored by squeezing and pulling the soft tissues below the prick site with the left hand.

4. Sterile, dry, disposable needles and syringes should be used for the collection of blood. Needle size should be 23-gauge in children and 19- to 21-gauge in adults. Venepuncture is made along with the direction of the vein and with the bevel of the needle up. Blood is withdrawn slowly. Pulling the piston quickly can cause hemolysis and collapse the vein. The tourniquet should be released as soon as the blood begins to flow into the syringe.

5. When the required blood is collected, the patient is asked to open his/her fist. The needle is removed from the vein. A sterile alcohol swab is pressed over the puncture site. The patient is asked to press the alcohol swab over the site till the bleeding ends.

6. The needle is removed from the syringe and the required amount of blood is carefully transferred into the test tube containing anticoagulant as per requirement of the laboratory test. If the blood is forced through the syringe without removing the needle, hemolysis can occur. Containers may be glass bottles or disposable plastic tubes with corks and flat bottom.

7. Blood is mixed with the anticoagulant in the container thoroughly by gently inverting the container several times. The container should not be shaken strenuously as it can cause hemolysis and fizzing.

8. Check whether the patient is dizzy and bleeding has stopped. Cover the site of
puncture with a sticky bandage strip. Recapping the needle by hand can cause needle-prick injury. After the usage of disposable syringe, needles are crashed by the syringe needle destroyer and the syringe is disposed into the biohazard box. The blood container is labeled properly with the patient’s name, age, gender and the time of collection. The sample should be sent without delay to the laboratory with accompanying properly filled laboratory requisition form.

**Precautions**

1. The tourniquet should not be too tight and should not be applied for more than 120 seconds as it will cause hemoconcentration and variation of test results.

2. The tourniquet should be released before removing the needle from the vein to prevent the formation of a hematoma.

3. Blood is never collected from the arm being used for the intravenous line since it will dilute the blood sample.

4. Blood is never collected from an area with hematoma and from a sclerosed vein.

5. A small bore needle should not be used, blood is withdrawn gradually and the needle is removed from the syringe before transferring blood into the container to avoid hemolysis.

6. Proper precautions should be noticed while collecting blood either from a skin or a vein puncture since all blood samples are considered as infectious.

7. The anticoagulated blood sample should be tested within 1-2 hours of collection. If this is not possible, the sample can be stored for 24 hours in a refrigerator at 4-6° C. After the sample is taken out of the refrigerator, it should be allowed to return to room temperature, mixed properly, and then laboratory test is performed.

**Complication**

1. **Failure to obtain blood:** This is very common and usually painful for the patient. This happens if the vein is missed, or excessive pull is applied to the piston causing collapse of the vein.

2. Formation of hematoma, abscess, thrombosis, thrombophlebitis, or bleeding.

3. Transmission of infection like human immunodeficiency virus (HIV) or hepatitis B virus (HBV) if reusable syringes and needles, which are not properly sterilized, are used.