



Lab. (4)

Pressure and Blood pressure



Pressure

Is the force exerted per unit area (F/A)

Standard units of pressure

$N/m^2 = \text{Pascal}$

Blood pressure

Is the force exerted by the blood against any unit area of the vessel wall.

The classical method of measuring pressure is to determine the height of a column of liquid that produces a pressure equal to the pressure being measured

For example

When one says that the pressure in a vessel is 50 mmHg, one means that the force exerted is sufficient to push a column of mercury up to a level of 50 mm high. If the pressure is 100 mmHg, it will push the column of mercury up to 100 millimeters.

Standard unit of blood pressure

Blood pressure is almost always measured in **millimeters of mercury** (mmHg)

Clinical Methods for Measuring Systolic and Diastolic pressures

There are two methods for measurement: -

1. Direct method: - A hollow needle is inserted in the blood vessel, and a catheter (hollow plastic tube) is threaded through the needle. The catheter transmits the blood pressure to the pressure transducer.

2. Indirect method: - The instrument that is commonly used is called a sphygmomanometer.

It is impossible to use the various pressure records that require needle insertion into an artery for making routine pressure measurements in human patients, although they are used on occasion when special studies are necessary. Instead, the clinician determines systolic and diastolic pressures by indirect means, usually by **the auscultator method**.

The auscultator method for determining systolic and diastolic pressures is not entirely accurate, but it usually gives values within 10 percent of those determined by direct measurement from the arteries. Sometimes we can measure the blood pressure without using the stethoscope this method called **palpatory method**. It is also considered indirect method but, in this method, we get the systolic pressure without the diastolic pressure.

Measuring the Blood Pressure by:

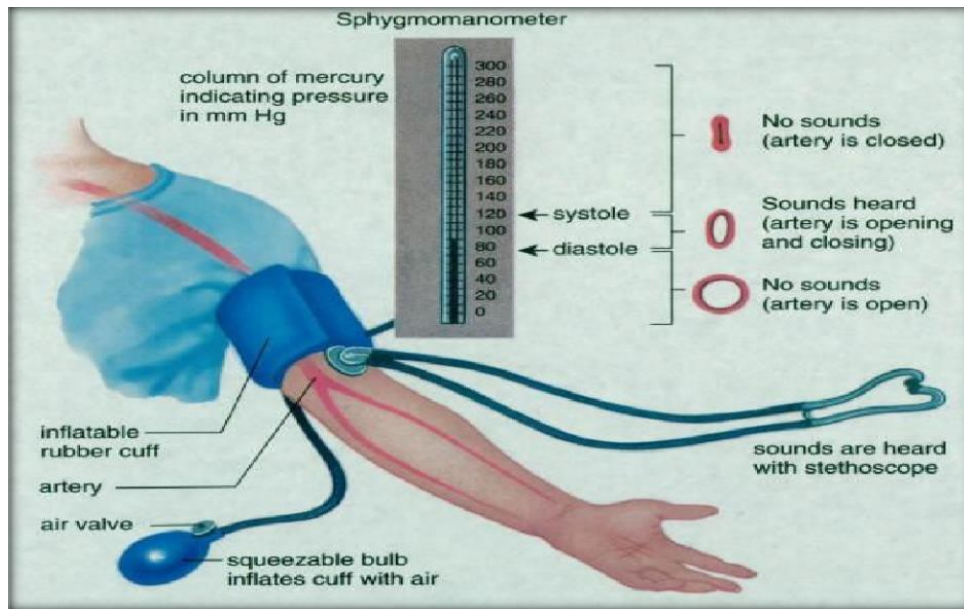
A. Indirect Method (Auscultatory Method)

In determining blood pressure by the auscultatory method, the pressure in the cuff is first elevated well above arterial systolic pressure. As long as this

pressure is higher than systolic pressure, the brachial artery remains collapsed and no blood jets into the lower artery during any part of the pressure cycle.

Therefore, no sounds are heard in the artery. But then the cuff pressure is gradually reduced. Just as soon as the pressure in the cuff falls below systolic pressure, blood slips through the artery beneath the cuff during the peak of systolic pressure, and one begins to hear tapping sounds in the antecubital artery in synchrony with the heartbeat, these sounds called **the korotkoff sounds** {turbulent sounds made by blood flow in this measurements}. As soon as these sounds are heard, the pressure level indicated by the manometer connected to the cuff is about equal to the **systolic pressure**.

As the pressure in the cuff is lowered still more, the korotkoff sounds change in quality, having less of the tapping quality and more of a rhythmical, harsher quality. Then, finally, when the pressure in the cuff falls to equal diastolic pressure, the artery no longer closes during diastolic, which means that the basic factor causing the sounds (the jetting of blood through a squeezed artery) is no longer present. Therefore, the sounds suddenly change to a muffled quality and then usually disappear entirely after 5 to 10 millimeter drop in cuff pressure. One notes the manometer pressure when the korotkoff sounds change to the muffled quality, and this pressure is about equal to the **diastolic pressure**.



B. Indirect Method (Palpatory Method)

In **palpatory** method feel the radial pulse by putting the three middle fingers of the right hand along the course of the radial artery at the wrist with the index finger towards the subject, and then follow the same steps of **auscultatory** method.

A blood pressure cuff is inflated around the upper arm by raising the blood pressure above the normal limit until the palpation from the radial artery cannot be felt then the cuff pressure is reduced slowly until we can feel a pulse under our fingers that we put on the radial artery this pulse will indicate the systolic pressure.

In this method as we mentioned previously we can get the **systolic** pressure without the **diastolic** pressure.

The Needs for Measuring the Blood Pressure by Indirect Method

To measure the blood pressure by indirect method we need:

1. Stethoscope.
2. Sphygmomanometer, it found in two types:
 - A Mercury Type.
 - An Aneroid Type.

➤ **A mercury Type:** In this type the pressure is indicated by height of a column of mercury inside a glass tube. It consists of:

1. Inflated Cuff (rubber bag enclosed in a cloth cuff).
2. Rubber Tubes.
3. Inflated Rubber Bulb with two valves (one and two-way valve).
4. Mercury Reservoir.
5. Graduated Cylinder.

➤ **An Aneroid Type:** In this type the pressure changes the shape of a sealed flexible container, which causes a needle to move on a dial. It consists of:

1. Inflated Cuff (rubber bag enclosed in a cloth cuff).
2. Rubber Tubes.
3. Inflated Rubber Bulb with two valves (one and two way valve).
4. Sealed Flexible Container.
5. Dial with Needle.

Precaution Taken During Measurement of Blood Pressure

1. Before taking your blood pressure, plan to relax and rest for at least 15 minutes. This will reduce the error due to physical activity.
2. Whether sitting or lying, be sure that your arm rests at the same level as your heart to obtain a pressure that is uninfluenced by gravity.
3. Do not let clothes around the arm or the cuff is inflated for some time, the discomfort may cause reflex vasoconstriction, raising the blood pressure.
4. Leaving the cuff partially inflated too long will fill the venous system and make sound difficult to hear.



Mercury Type



Aneroid Type

Questions

1. Define blood pressure, what its unit?
2. When can we hear korotkoff sounds?
3. We can not find diastolic pressure in palpatory method, why?

التقرير:

1. اسم التجربة
1. الغرض منها
3. انواع الاجهزة ومكوناتها
4. طريقة العمل بأختصار
5. حل المناقشة