

Cardiovascular practicals

BLOOD PRESSURE



Objectives

1- To be able to measure arterial blood pressure using a sphygmomanometer

2- To recognize the effects of :

- a) gravity and
- b) muscular exercise on the arterial blood pressure



Equipment



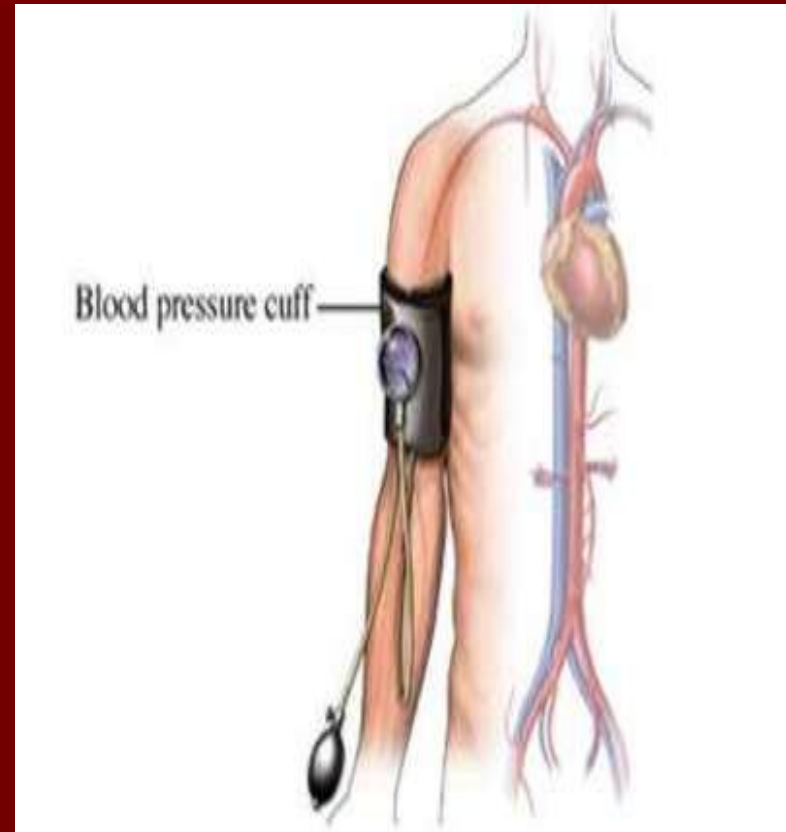
❑ *Stethoscope.*

❑ *Sphygmomanometer.*



Blood pressure is the force of blood pushing against the wall of the arteries

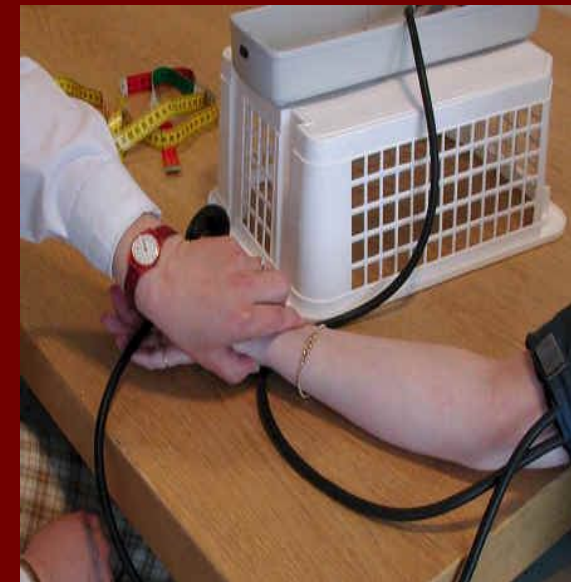
- *The systolic reading: the max pressure exerted on the arterial wall at the peak of left ventricular contraction.*
- *Normal SP ranges from 100 to 140 mm Hg.*
- *The diastolic reading: the min pressure exerted on the arterial wall during left ventricular relaxation.*
- *Normal DP ranges from 60 to 90 mm Hg.*



Precautions when taking BP

- *No eating, drinking, smoking, or exercising within 1 hour.*
- *Quiet room, comfortable T°.*
- *Lying down or sitting quietly for about 5 min.*
- *Arm bare up to shoulder (no clothing constricting the arm).*
- *Position the patient with his upper arm at heart level and his palm turned up.*

- *Select the correct cuff for the arm circumference.*
- *Lower end of cuff above the brachial pulse: 4cm above the antecubital fossa.*
- *The middle of the bag over the brachial artery.*
- *The manometer at the same level as the heart (vertical)*



Palpatory method

- *Palpate the radial pulse.*
- *Inflate the cuff to 30 mm Hg above the point where the pulse disappears: (by compressing the brachial artery the pulse or pressure wave can no longer be transmitted to the radial artery).*
- *Release the valve gradually.*
- *Note the reading when the radial pulse just reappears.*
- *This is the **SYSTOLIC** pressure .*

- *Pressures obtained by palpatory method are 2.5 mmHg lower than those measured by the ausc method.*
- *The disadvantage of this method is that the diastolic pressure cannot be determined.*
- *Employed before recording the pressure with the auscultatory method.*

Auscultatory method

- The cuff is inflated until the pressure in it is well above the expected systolic pressure in the brachial artery.
- Place the bell of the stethoscope over the brachial pulse.
- The pressure in the cuff is then lowered slowly: 2 mm Hg/sec.
- A series of Korotkov sounds are heard



The korotkov sounds

• *These are produced by turbulent flow in the constricted brachial artery.*

■ *Phase 1:*

The 1st sounds are clear, sharp, and tapping.

The appearance of the 1st sound marks the systolic pressure.

■ *Phase 2:*

Softened sounds with a murmurish character.

■ *Phase 3:*

Sounds become clear and banging.

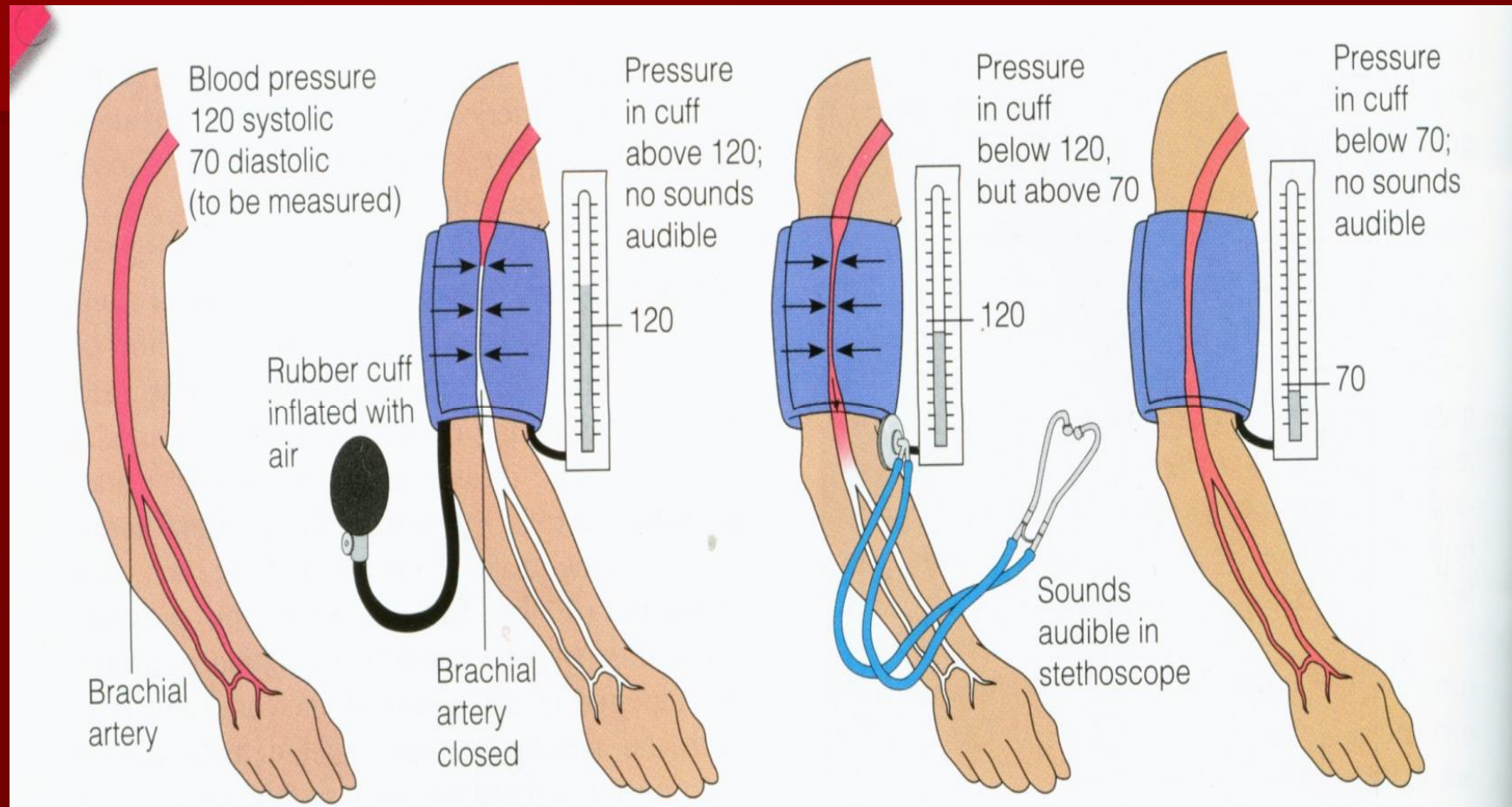
■ *Phase 4:*

An abrupt muffling of sound(↓intensity).

■ *Phase 5:*

All sounds disappear.

The last korotkov sound is the DP.



- *After noting the DP, deflate the bag quickly to zero pressure.*
- *2 or more measurements should be taken one minute apart.*

**The ABP is conventionally expressed as:
ABP=120/80 mm Hg equivalent to 16/10 KPa.**

- **The pulse pressure** = *the difference between the systolic & diastolic pressures is about 40 mm Hg.*

This is the rise of pressure produced by the ventricular systole.

- **Mean arterial pressure:** *The average pressure throughout the cardiac cycle.*

$$\text{MAP} = \text{D} + 1/3 \text{ pulse pressure.}$$

Blood pressure in the lower limbs

- **The femoral arteries are the direct extensions of Aorta.**
- **The subject lies face downwards.**
- **The thigh cuff is applied to the thigh.**
- **The post tibial artery is palpated behind the medial malleolus.**
- **The stethoscope is placed over the center of the popliteal fossa at the back of the knee.**
- **An identical method to that employed in the arm is used.**

Gravity

- Pressure in vessel below heart level is ↑
- Pressure in vessel above is ↓

**The magnitude of the gravitational effect is
0.77 mmHg/cm.**

If at heart level BP=100mmHg.

In the head (50 cm above heart):

$$\text{BP}=100-(0.77 \times 50)=62 \text{ mmHg.}$$

In the foot (105 cm below heart):

$$\text{BP}=100+(0.77 \times 105)=180 \text{ mmHg}$$

Posture:

- *In erect posture: the systolic falls a little but soon returns to normal by the compensatory mechanisms.*

Age:

- *BP with ↑age.*
- *At birth: 50/30.*
- *Adult: 120/80.*
- *Old age: 170/90.*

Sex:

- *BP lowest in females until menopause.*

Body build:

- *Obese ↑BP.*

Diurnal variation:

- *BP lowest in the morning.*

Digestion:

- *SBP rises by 6-8 mmHg after meals(1 hour).*

Exercise:

- *↑SBP Unchanged DBP.*

Temperature:

- *Cold: Vasoconstriction: ↑peripheral resistance: ↑BP.*

Emotions:

- *↑BP.*

It drops during sleep and excessive hemorrhage.

THANK YOU