

Title : Physiology of the cardiovascular system. /Clinical aspects/

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I. Physical examination of the cardiovascular system

1. Inspection
2. Palpation
 - a. Palpation- the apex beat (cardiac impulse)- produced by left ventricular contraction is the lowest and the most lateral point on the chest at which the cardiac impulse can be appreciated. Normally it is medial and superior to the intersection of the left midclavicular line and the fifth intercostal space.
arterial pulse- it is the pressure wave that expands the arterial walls during systole- is palpable as the pulse. We measure the frequency, regularity and the shape of the pulse
3. Cardiac auscultation
 - a. Auscultation- heart sounds and heart murmurs. Murmurs are abnormal sounds heard in various part of the vascular system. Luminal flow is silent, but turbulent flow creates sounds. Blood flow speeds up when an artery or heart valve is narrowed.
4. Murmurs and other adventitious sounds
 - a. The systolic murmurs of the heart we divide into ejection (associated with stenosis of the semilunar valves) and regurgitant (associated with insufficiency of a-v valves).
The diastolic murmurs of the heart are associated with stenosis of the a-v valves and insufficiency of semilunar valves.

II. Examination of the blood pressure and peripheral arterial puls

1. Sphygmomanometer – types of instruments
2. Examination technique, the orthostatic test
3. The normal arterial pulse, characters of pulse
4. Spats of peripheral arterial puls examination
5. Physiologic parameters of blood pressure
 - a. The pressure in the aorta and large arteries rises to peak value (systolic pressure) of about 120 mm Hg and falls to a minimum value(diastolic pressure) of about 70 mm Hg.
 - b. The pulse pressure it is the difference between the systolic and diastolic pressures and is normally 50 mm Hg.
 - c. The mean pressure is the average pressure throughout the cardiac cycle and equals the diastolic pressure plus one-third of the pulse pressure.

III. Electrocardiography

1. Electrical bases and theory
2. Electrophysiological bases and theory
3. Lead system
4. The normal electrocardiogram:
 - a. The electrical currents generated in the heart can be detected by recording electrodes on the skin. An electrocardiograph amplifies these signals and produces an electrocardiogram. It consists of deflections, segments and intervals. To the most important deflections belong
 - b. The P wave- corresponds with depolarization of the atria
 - c. The QRS complex- marks ventricular depolarization
 - d. The T wave is generated by ventricular repolarization. Atrial repolarization occurs during the QRS wave and is hidden in it.

e. The twelfth ECG leads are as follow:

- Bipolar leads

Lead I- records the potential difference between the left arm and right arm

Lead II - records the potential difference between the right arm and left leg

Lead III- records the potential difference between the left arm and left leg

- Unipolar leads

aVR - electrode is located on the right arm

aVL - electrode is located on the left arm

aVF - electrode is located on the left leg

V1- electrode is located in the fourth intercostal space at the right sternal border

V2- electrode is located in the fourth intercostal space at the left sternal border

V3- electrode is located in the midway between V2 and V4

V4- electrode is located in the fifth intercostal space in the left midclavicular line

V5- electrode is located at the left anterior axillary line at the level of V4

V6- electrode is located at the left midaxillary line at the level of V4

The standard limb leads – I, II, III record the differences in potential between 2 limbs.

Unipolar leads record the potential differences between an exploring electrode and an indifferent electrode - there are 6 unipolar chest leads (precordial leads) – V1-V6 and 3 unipolar limb leads aVR, aVL, aVF.