ANATOMO-PHYSIOLOGICAL PECULIARITIES,
METHODS OF EVALUATION OF THE CARDIOVASCULAR
SYSTEM IN CHILDREN
Academic discipline «Pediatric Propedeutics»
*Self-study guide for the 3rd year*
*English medium students*

АНАТОМО-ФІЗІОЛОГІЧНІ ОСОБЛИВОСТІ, МЕТОДИ
ОБСТЕЖЕННЯ СЕРЦЕВО-СУДИННОЇ СИСТЕМИ У
ДІТЕЙ
З дісципліни «Пропедевтика педіатрії»
*Методичні вказівки*
до самостійної роботи студентів 3-го курсу
медичного факультету
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Методичні вказівки
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медичного факультету

Затверджено
Вченою радою ХНМУ
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Number of class periods: independent work – 4; practical trainings – 4.

Contents


The main regularity of morpho-functional development of cardiovascular system on tissue, organ and organism levels. Morpho-functional development and structure of the cardiovascular system in prenatal period, placental type of hemodynamic, its characteristics. Functional changes of the cardiovascular system in postnatal period. Growth and development of the cardiovascular system in postnatal period. Hemodynamic in different age periods, pulse rate, arterial pressure in age aspect.

The main clinical methods of investigation of the cardiovascular system: interrogation, observation, palpation, percussion, auscultation, palpation of pulse, determining of blood pressure. The main paraclinical methods of investigation of the cardiovascular system: electrocardiography, phonocardiography, echocardiography, roentgenography, determining of arterial and venous pressure, function tests with physical exercises, angiocardiography, measuring of cardiac output, measuring of circulating blood volume, measuring of blood flow speed, capillaroscopy.

Specific goals:
- to collect anamnesis of a patient with diseases of the cardiovascular system.
- to conduct an objective examination of the cardiovascular taking into account the child's age characteristics.
- to interpret the results of investigation.
To know:
- the embryogenesis of cardiovascular system
- the congenital anomalies of the heart and blood vessels.
- the peculiarities of blood circulation in fetus.
- anatomo-physiological peculiarities of the heart and blood vessels in childhood.
- method of physical examination, palpation of the cardiovascular system in children.
- percussion of absolute and relative boundaries of the heart in children.
- auscultation of the heart in children.

Be able to:
- to collect anamnesis of a patient with diseases of the cardiovascular system.
- to conduct an objective examination of the cardiovascular taking into account the child's age characteristics.
- to interpret the results of investigation.

**Basic knowledge, practices and skills necessary for the topic (interdisciplinary integration).**

<table>
<thead>
<tr>
<th>Names of previous branches of learning</th>
<th>Acquired skills</th>
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<tbody>
<tr>
<td>2. General physiology.</td>
<td>Knowledge of characteristics of organs and body systems functioning.</td>
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</tbody>
</table>
Control questions to the lesson:
1. What do you know about embryogenesis of the cardiovascular system?
2. Tell about peculiarities of morphological structure of child’s cardiovascular system.
3. What is the cardiovascular system function?
4. What do you know about the intrauterus and postnatal type of child’s hemodynamic?
5. Tell about physiological features of children cardiovascular system.
6. State the main clinical methods of examination of the cardiovascular system.
7. State the main paraclinical methods of examination of the cardiovascular system.
8. What is the role of the cardiovascular system examination in pediatric practice?
9. Describe the semeiology of the cardiovascular system affections.

Graphical structures of individual issues of the topic.
1. Fetal blood circulation.
2. Newborn blood circulation.

Tests for self-control:
1. What is the main function of the cardiovascular system?
   A. transport
   B. protective
   C. respiratory
D. tactile
E. All answers are correct

2. Fetal four-chambered heart is formed?
A. 4-3 weeks of gestation
B. 6-5 weeks of gestation
C. 7-8 weeks of gestation
D. 9-10 weeks of gestation
E. 14-17 weeks of gestation

3. At what week of gestational age may formed intrauterine abnormalities of the cardiovascular system?
A. 3-8
B. 12-15
C. 17-20
D. 21-22
E. 24-27

4. What are the basic structures of the fetal circulation cease to function after birth?
A. Two umbilical veins, umbilical artery, Arantsev duct, Botllov duct, foramen ovale
B. Two umbilical arteries, Arantsev duct, Botllov duct, foramen ovale
C. Two umbilical arteries, umbilical vein, Arantsev duct, Botllov duct, foramen ovale
D. Two umbilical arteries, umbilical vein, Arantsev duct, Botllov duct, foramen ovale
E. umbilical artery, umbilical viena, Arantsev duct, Botllov duct, foramen ovale

5. Location of the apical impulse on the vertical line in a child older than 12 years is:
A. 0.5 cm outwards from the left sternocleidomastoideus line
B. 1 cm outwards from the left sternocleidomastoideus line
C. on sternocleidomastoideus line
D. 1-2 cm outwards from the left sternocleidomastoideus line
E. 0.5 cm medially from the left sternocleidomastoideus line
6. Bulging of the chest in the heart, region is determined as:
   A. "Carotid shudder"
   B. cardiac hump
   C. apical beat
   D. cardiac impulse
   E. symptom Myusi

7. The tip of the heart after birth consists of:
   A. the right atrium and right ventricle
   B. left atrium and left ventricle
   C. right atrium and left atrium
   D. right ventricular and left ventricular
   E. right ventricle and left atrium

8. What methods of clinical examination of the cardiovascular system do you know?
   A. survey, external inspection
   B. palpation, percussion
   C. auscultation
   D. assessment of the heart rate, blood pressure
   E. all answers are correct

9. What is a vessel come out from the right ventricle:
   A. superior and inferior vena cava
   B. trunkus pulmonary
   C. right pulmonary artery
   D. left pulmonary artery
   E. aorta

10. Place of auscultation of the tricuspid valve (fourth point):
    A. the apex
    B. point of attachment III - IV on the left edge to the edge of the sternum
    C. second intercostals interval to the right of the sternum
    D. second intercostals space to the left of the sternum
    E. place of attachment of the xiphoid process to the sternum, slightly to the right
11. The pulse rate of a newborn is:
A. 120-140 beats per minute
B. 100 beat per minute
C. 80-90 beats per minute
D. 70-80 beats per minute
E. less than 70 beats per minute

12. Place of the auscultation of the mitral and aortic valves (fifth point) is:
A. the apex
B. point of attachment III - IV on the left edge to the edge of the sternum
C. second intercostal space to the right of the sternum
D. second intercostal space to the left of the sternum
E. place of attachment of the xiphoid process to the sternum, slightly to the right

13. What is a vessel coming out of the left ventricle:
A. aorta
B. pulmonary arteries
C. pulmonary trunk
D. aorta
E. superior and inferior vena cava

14. How is called heart valve, which is located between the left atrium and left ventricle:
A. semilunar
B. mitral
C. tricuspid
D. univalve
E. All answers are correct

15. The pulse rate for a teenager of 15 years is:
A. 140 beats per minute
B. 100 beats per minute
C. 80-90 beats per minute
D. 70-80 beats per minute
E. less than 70 beats per minute
16. Criteria for the apical impulse is, except for:
A. localization
B. distribution
C. edema
D. quantity
E. resistance

17. Place of auscultation the mitral valve (first point):
A. the apex
B. point of attachment III - IV on the left edge to the edge of the sternum
C. second intercostal space to the right of the sternum
D. second intercostal space to the left of the sternum
E. place of attachment of the xiphoid process to the sternum, slightly to the right

18. The place of the auscultation of aortic valve (second point)?
A. the apex
B. point of attachment III - IV on the left edge to the edge of the sternum
C. second intercostal space to the right of the sternum
D. second intercostal space to the left of the sternum
E. place of attachment of the xiphoid process to the sternum, slightly to the right

19. The murmur listen in the heart can be in character and causes:
A. organic
B. organo-functional
C. functional
D. physiological
E. All answers are correct

20. What vessels drain into the right atrium:
A. upper and lower hollow vein
B. pulmonary trunk
C. right pulmonary artery
21. The pulse rate in a child older than 5-6 years is:
A. 140 beats per minute
B. 100 beats per minute
C. 80-90 beats per minute
D. 70-80 beats per minute
E. less than 70 beats per minute

22. The localization of point of auscultation the pulmonary artery valve (third point)?
A. the apex
B. point of attachment III - IV on the left edge to the edge of the sternum
C. second intercostal space to the right of the sternum
D. second intercostal space to the left of the sternum
E. place of attachment of the xiphoid process to the sternum, slightly to the right

The list of study materials:

Main:

Additional:
Figure 6  Fetal circulation
Figure 7 Transitional circulation in the newborn.

**Embryogenesis**
- Critical period of formation – 8 weeks
- Influence of teratogenic factors
- Placental type of hemodynamic

**Morphofunctional peculiarities**
- Ovale shape of the heart
- Ratio size arteries and veins 1:1 in early childhood
- Horizontal position of the heart

**Pulse rate in different age level (per minute)**
- 120-140 (by 160) – newborn
- 120 – infant
- 100 – 5 years
- 85 – 10 years
- 80 – 12 years
- 70-75 – 15 years
Clinical methods of investigation

Interrogation
- complains (dyspnea, cyanosis), anamnesis morbi (pregnancy, diseases somatic and infectious, bad habits), anamnesis vitae (virus and streptococcal infections)

Observation
- general condition, forced posture, cyanosis or pallor of the skin, vessels pulsation, heart hump, oedema, systolicus tremling, “drumsticks”

Palpation
- oedema, localization of the cardiac impulse, the strength of cardiac shock

Percussion
- relative and absolute heart dulness, boardes of the heart depends of the age, enlargment of the heart (fibroelastosis, myocarditis, pericarditis, sport’s heart)

Auscultatio
- points of auscultation (I, II, III, IV, V), heart sounds (I, II, increase or decrease, split heart sounds), heart murmurs: systolic, diastolic, functional, organic, pericard friction rub

Examination of the pulse rate
- Newborn infants - 140 per minute, 5-6 years - 100 per minute, older than 5-6 years - 80-90 per minute

Examination of arterial blood pressure
- using the age-cuffs, formula BP: systolic $80 + 2n$ (n – age in yrs), diastolic $-2/3$ from systolic
Appendix 2.


Site of borders of relative cardiac dullness

- **before 2 years**
  - Left border: 1-2 cm lateral of left mamillary line.
  - Right border: Right parasternal line
  - Upper border: II rib

- **2-7 years**
  - Left border: 1-2 cm lateral of left mamillary line.
  - Right border: Slightly medial of right parasternal line

- **7-12 years**
  - Left border: left mamillary line.
  - Right border: Midway between right parasternal line and right sternal margin
  - Upper border: III rib

- **12-18 years**
  - Left border: 0.5 cm medial of left mamillary line.
  - Right border: Slightly closer to sternal margin
  - Upper border: III rib or third intercostal space
Для нотатків
Для нотатків
Навчальне видання

Анатомо-фізіологічні особливості, методи обстеження серцево-судинної системи у дітей

Упорядники: Клименко Вікторія Анатоліївна
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Комп’ютерна верстка

Ум. друк. арк.___. Тираж____ прим. Зам. №____.

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