

# Examination of the child's cardiovascular system

1. Medical history (congenital heart defects, acquired heart disease in the family, risk factors,...).
2. Patient appearance (height, weight, dysmorphism, skin color,...).
3. Breathing (speed and method of breathing, shape of the chest,...).
4. Abdominal examination (size and structure of the liver,...).
5. Own cardiovascular examination.

## General symptoms of diseases of the heart and blood vessels

- Central cyanosis,
- peripheral cyanosis,
- breathing disorders (tachypnea, dyspnea),
- fatigue,
- weight failure,
- excessive sweating,
- palpitations,
- chest pain,
- hypoxic seizures (in tetralogy of Fallot),
- club fingers,
- peripheral edema (at first periorbital in infant and young children),
- hepatomegaly.

## Physical examination

### Palpation of the pulse

- Frequency and amplitude of pulses (on all four limbs).

### Peripheral blood flow control

- Color and temperature of the acral parts of the limbs.

### Palpation of the precordium

- We look for a heart vortex, evaluate the beating of the apex of the heart and the function of the right ventricle.

### Auscultation of the heart

1. 2nd intercostal space on the right near the sternum (**aortic area**) – determine the pulse rate, identify the sounds and determine the rhythm,
  2. 2nd left intercostal space (**pulmonary region**) – we mainly evaluate the second sound (cleft in inspiration?), pulmonary flow murmur (innocent), the first sound (early systolic pulmonary click?),
  3. lower left edge of the sternum (**tricuspid region**) – we are looking for split first sound, systolic and diastolic murmur,
  4. tip area (**mitral area**) – early systolic aortic click?, mesosystolic click?, third sound?,
  5. the area above the great vessels in the neck.
- **First sound** – arises from the closure of the atrioventricular valves (1. mitral, 2. tricuspid).
    - In children it takes 0.07-0.1 seconds,<sup>[1]</sup>
    - pathological split of the first sound (we differentiate between mitral and tricuspid valve closure) – e.g. in tricuspid valve stenosis.
    - noisy first sound to reverse cleft - in mitral stenosis (the valve closes with a delay).
  - **The second sound** – arises from the closure of the semilunar valves (1. aortic, 2. pulmonary).
    - In children it takes 0.06 seconds,<sup>[2]</sup>
    - the split of the second sound is physiological if it disappears during exhalation (due to the reduction of venous return and the subsequent shortening of the time when a smaller volume is expelled into the lung),
    - pathological split of the second sound (fixed) – e.g. in the case of left-right shunt (atrial septal defect), or right ventricular failure.
  - **The third sound** – is produced by the oscillation of the relaxed myocardium of the ventricle at the beginning of diastole, during its rapid filling.
    - Darker and deeper than the first two sounds, therefore it is difficult to hear under physiological conditions,
    - best heard at the apex of the heart,
    - in children and adolescents it has a greater amplitude than in adults, therefore it can be heard in up to 80% of healthy children,<sup>[2]</sup>

- it is pathological in newborns and infants,
- accentuation in abnormal dilatation of the ventricles in heart failure.
- **The fourth sound** – arises during a powerful atrial systole, which leads to a rapid increase in pressure in the ventricle and causes vibration of the ventricular muscle.
  - It is not audible in healthy children or adults (ventricles are compliant),
  - audible in heart defects with atrial hypertrophy.

### Additional sounds

- Early systolic click (ejection click),
- atrioventricular opening tone (snap),
- heart murmurs – created either by blood turbulence or tissue vibration,
  - physiological heart murmurs:
    - systolic functional murmurs: vibration murmur (Still's), pulmonary ejection murmur, supraclavicular murmur,
    - continuous functional murmurs: swirling venous murmur,
    - pericardial friction murmur.

### Palpation of femoral pulses

- To detect coarctation of the aorta.

### Blood pressure measurement

- The measured value is assessed according to the gender, age and height of the child.
- Watch out for white coat syndrome!
- Hypertension is blood pressure equal to or greater than the 95th percentile for a child's sex, age, and height, measured at three different measurements.<sup>[3]</sup>

### Special investigative methods

- EKG
- X-ray examination of the heart and lungs
- Echocardiography
- Cardiac catheterization
- Angiocardiology

## Links

### Related Articles

- **Examination of the child:** Examination of the child's respiratory system ■ Examination of the child's gastrointestinal system ■ Examination of the child's uropoietic system ■ Examination of the child's endocrine system ■ Examination of the child's movement system ■ Examination of the child's skin and skin adnexa ■ Examination of the child's vision and hearing
- Congenital defects of the circulatory system

### References

1. LEBL, Jan – PROVAZNÍK, Kamil – HEJCMANOVÁ, Ludmila. *Preklinická pediatrie*. 2. edition. Galén, 2007. pp. 115. ISBN 978-80-7262-438-6.
2. LEBL, Jan – PROVAZNÍK, Kamil – HEJCMANOVÁ, Ludmila. *Preklinická pediatrie*. 2. edition. Galén, 2007. pp. 116. ISBN 978-80-7262-438-6.
3. LEBL, Jan – PROVAZNÍK, Kamil – HEJCMANOVÁ, Ludmila. *Preklinická pediatrie*. 2. edition. Galén, 2007. pp. 122. ISBN 978-80-7262-438-6.

### Literature

- LEBL, Jan – PROVAZNÍK, Kamil – HEJCMANOVÁ, Ludmila. *Preklinická pediatrie*. 2. edition. Galén, 2007. pp. 113-129. ISBN 978-80-7262-438-6.

### External links

Internal propaedeutics (2nd Faculty of Medicine, UK) – examination of the heart UK) examination of the heart ([http://int-prop.lf2.cuni.cz/zof/vysetreni/srdce\\_n.htm#se](http://int-prop.lf2.cuni.cz/zof/vysetreni/srdce_n.htm#se))