

Examination of the child's respiratory system

Diseases of the respiratory system are the most common cause of morbidity in children of all age groups. Their clinical picture changes depending on age – the younger the child, the greater the risk of developing airway obstruction and shortness of breath, and the more likely the overall condition is altered.

Examination of the child's respiratory system :

1. anamnesis
2. physical exam
3. laboratory examination
4. imaging methods
5. functional breathing examination

Physical exam

View

We evaluate the breathing pattern and its changes: dyspnea, tachypnea, apnea, hyperpnea, bradypnea, Cheyne-Stokes respiration, Biot's respiration, Kussmaul's respiration, ...

Dyspnoea (labored, labored breathing)

- subj.: feeling of shortness of breath or lack of air
- obj.: tachypnea, alar flexion, falling in or retraction of the jugular fossa, increased respiratory muscle effort, orthopneic position
- dyspnoea in inspiration → upper respiratory tract disease
- dyspnoea on expiration → lower respiratory tract disease
- dyspnea in inspiration and expiration → trachea disease

Restrictive lung disease (e.g. pulmonary fibrosis)

- the reduced tidal volume is compensated by an increased respiratory rate
- the expirium/inspirium ratio is shortened

Obstructive involvement of the lungs (e.g. bronchial asthma)

- the reduced respiratory rate is compensated by deepening the respiratory volume
- the expirium/inspirium ratio is lengthened We also evaluate the color of the skin (peripheral or central cyanosis – reduced hemoglobin level above 50 g/l), we note the signs of long-term tissue hypoxia (club fingers), the shape of the chest (asthenic, hypersthenic or pyknic, pectus carinatum, pectus excavatum) and facial expression (facies adenoidea).

Feel

- assessment of chest tremor (fremitus pectoralis) and bronchophonia - only in older children and adolescents
- crackling in the subcutaneous tissue - in subcutaneous emphysema (mostly on the neck)
- palpation examination of cervical (axillary, subclavian) lymph nodes

Percussion

- not performed on newborns and infants !!!
- over a healthy lung, the percussion is *full, clear*
- *dark or shortened* percussion is over an airless lung (atelectasis, pneumonia), effusion and muscles
- *muffled or darkened* percussion is over organs (heart, liver) and over fibrotic lung tissue
- *tympanic* percussion is over the intestines, stomach and pneumothorax
- *sonorous, hypersonic or box-like* percussion is above emphysema and pneumothorax

Listening

- **distance phenomena** (sounds audible even at a distance, without stethoscope): stridor, cough, voice assessment
- STRIDOR
 - inspiratory stridor – caused by narrowing of the upper airways (obstructive laryngitis, epiglottitis, retropharyngeal abscess)
 - expiratory stridor – caused by narrowing of the lower airways (foreign body, acute bronchitis, bronchial asthma)
 - inspiratory-expiratory stridor – tracheomalacia (compression of the trachea by an abnormal vessel)
- COUGH

- dry (without expectoration) x wet (with expectoration)
- persistent x paroxysmal
- VOICE ASSESSMENT
 - hoarseness to aphonia (laryngitis)
 - muffled, hoarse voice (epiglottitis)
- GRUNTING _
 - in premature newborns with respiratory distress syndrome
- **listening with a stethoscope**
- RATIO OF INSPIRATION: EXHAUST
 - prolonged inhalation - obstruction of the upper respiratory tract
 - prolonged exhalation - obstruction of the lower airways
- RESPIRATION
 - *physiological* :
 - pure glomerular - in children over 6 years
 - "puerile" - in smaller children
 - *pathological* :
 - sharpened breathing (effusion, adhesions, diffuse bronchial catarrh,...)
 - weakened breathing (pleural effusion, pneumothorax, atelectasis)
 - tubular breathing - exhalation noisier than inhalation (physiol. over trachea, pathol. over infiltrated lung tissue, abscess, bronchiectasis)
 - *secondary respiratory phenomena* :
 - moist phlegm - occurs in the bronchi (bronchitis)
 - crackles and *crepitus* - occur in the alveoli (pneumonia)
 - wheezing and wheezing (lower airway obstruction)

Laboratory examination

- **microbiological examination** - swab from the throat, nose (not for processes in the lungs), coughed up sputum (must be from DCD, young children cannot cough it up), aspirated secretions from the upper respiratory tract, tracheal secretions, bronchial secretions taken during bronchoscopy, abscess puncture and pleural effusion
- **blood count, FW, CRP**
- **biochemical examination** - alpha1-antitrypsin (its deficiency leads to emphysema)
- **ABR, blood gases, transcutaneous pulse oximetry** - respiratory insufficiency partial (hypoxemia) or global (hypoxemia with hypercapnia)
- **immunological examination**
- **determining the level of chloride in sweat** - a concentration of chloride in sweat above 60 mmol/l is present in cystic fibrosis
- **determination of cilia motility** of nasal mucosa cells - Kartagener's syndrome (KO: recurrent bronchitis)
- **serological examination**
- **molecular genetic examination** - cystic fibrosis (F508 mutation), alpha1-antitrypsin deficiency (PiZZ mutation)
- **cytology** from bronchoalveolar lavage
- **biopsy of lung tissue** - rarely

Imaging methods

- **bronchoscopy** - to determine anatomical and functional changes, to extract a foreign body, often + alveolar lavage
- **X-ray, CT, NMR**
- **scintigraphy** - *inhalation* (radionuclide-labeled xenon or argon) to show ventilation and its distribution, *perfusion* (radionuclide-labeled albumin) to show lung perfusion
- **angiography** - vascular anomaly
- **24-hour pH-metry of the esophagus** - to evaluate gastroesophageal reflux
- **mediastinoscopy** + node biopsy

Functional examination of breathing

- standard lung function tests can be performed in cooperative children older than 6 years
- **spirometry** - to measure basic lung volumes and vital capacity, to dynamically measure expiratory rates and to describe obstructive lung disorders (asthma bronchiale)
- **whole-body plethysmography** - to examine ventilation mechanics, to describe restrictive lung disorders (pulmonary fibrosis, emphysema)
- **PEF** (peak expiratory flow) - to monitor asthma

Links

related articles

- Examination of the child : Examination of the child's cardiovascular 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 respiratory system
- Functional examination of the cardiorespiratory system

Reference

1. LEBL, Jan, Kamil PROVAZNÍK and Ludmila HEJCMANOVÁ, et al. *Preclinical pediatrics*. 2nd edition. Prague: Galén, 2007. pp. 105-111. ISBN 978-80-7262-438-6 .

Literature

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Kategorie:Pediatrie Kategorie:Pneumologie