

Specificity of UPV in patients with Asthma bronchiale/High School (nurse)

Template:High School

Epidemiology

- 3-6% of the population (1993 - 6.4%) generally a permanent increase !
- Asthmatic condition – mortality 12% in intubated patients and 1-2% in non-intubated patients.
- 80% of patients who died with status asthmaticus have bronchial asthma for more than 5 years.
- The so-called refractory asthma only about 5% of all patients.

Basic characteristics

- Bronchoconstriction.
- Airway edema
- Hyperreactivity of DCs to various stimuli.
- Airway remodeling.
- An asthma attack is triggered by SMOKING, dust, pollen, dust mites, drugs (THP, beta blockers, ANP,...), cold, physical exertion.

Pathophysiology from the point of view of UPV

- Increased resistance in DC.
- Air trapping.
- Hyperinflation.
- An increase in the negativity of pleural pressures.
- Increase in functional residual capacity, residual volume and total lung capacity.
- An increase in the ventilation-perfusion ratio.
- Increase in dead space and alveolar ventilation (until exhaustion, then decrease).

Treatment of acute exacerbation

- Higher FiO₂ and high flow oxygen.
- Inhaled β -mimetic until signs of overdose (aerosol, spacer).
- Systemic or inhaled steroids (120–180 mg Methylprednisone/24 hours in 3–4 doses after 48 hours → 60–80 mg until the patient's condition improves).
- Aminophyllins in **infusion**.
- Mucolytics.
- ATB only in case of infection.

Non-standard methods of bronchodilation

- Ketamine 10-40 μ g/kg/min ?
- Magnesium up to 10 g/24 hours.
- NO.
- Helium (the earlier and in more seriously ill patients, the greater the benefit).

UPV in Asthmatics

- UPV complicated and risky.

Indication

- Impairment of consciousness.
- Respiratory rate above 40 D/min.
- Rising/falling pulsus paradoxus.

= Heart rate whose waves are smaller during inhalation than during exhalation systolic pressure decreases during inspiration. As a result of the increase in the volume of blood in the chest during inspiration, this difference is to a certain extent physiological.

- PDrop in pO₂ below 7.5 kPa.
- Rise of pCO₂ above 7 kPa → acidosis.
- Persistent lactic acidosis.
- Barotrauma.

- Silent chest despite patient's inspiratory efforts.
- Inability to communicate, muscle fatigue, exhaustion.

Use of ventilation mode

The goal of UPV is ventilation and oxygenation support and prevention of extreme pH changes and severe hypoxia.

- The basis is controlled hypoventilation and permissive hypercapnia.
- Volume-controlled ventilation with constant inspiratory flow is more suitable.
- Respiratory rate less than 10 D/min. with a 1:3 to 1:4 ratio of inspira to expira.
- Low PEEP 2-4 cmH₂O → distance therapy (keeping the lung open).
- The patient is semi-sitting.
- If there are no complications, the time for UPV in a critical condition is 3-5 days.
- Extubation when bronchospasm resolves, decreased secretion production, good muscle strength.

Complications of UPV

- Hypotension.
- PNO.
- Arrhythmia.
- ETI dislocation.
- Pneumonia.
- Circulation failure.
- Kbleeding into the GIT.
- Pulmonary embolization.
- Pneumomediastinum.
- Subcutaneous emphysema.

Asthma bronchiale in children

- More heterogeneous character and time course different from adults.
- 10% of children.

A predisposed individual.

- Repeatedly in contact with adverse environmental influences (polluted air, smoking, unhealthy lifestyle and nutrition, etc.) → contact with the so-called trigger (allergen, exertion, smoke, viral infection, etc.) → airway obstruction (contraction of the smooth muscles in the bronchi, mucosal swelling and increased mucus secretion) with symptoms of expiratory dyspnea and cough.
- The most common cause of exacerbation in childhood is viral infections.

Causes of asthma problems in children

- The etiology varies in different periods.
- **Respiratory viruses:**
 - Infants/toddlers - temperatures are often present → very good prognosis even with recurrences; usually disappear by school age.
 - the exception is especially human rhinoviruses, which damage the mucous membrane of the bronchi and thus can contribute to the later development of persistent asthma.
- **Allergies.**
 - Atopic predisposition → worse prognosis, often progression to persistent asthma.
 - The later obstructive bronchitis manifests itself in childhood, the more likely the allergic etiology and progression to persistent asthma.
- **Other.**
 - Physical stress, stress, cigarette smoke, etc. → less often in children, schoolchildren/adolescents.
- Around the age of 3, 3 basic groups of children are symptomatically intertwined:
 - The so-called transient wheezers → children who "grow out" of the problem on their own.
 - Non-atopic wheezers → děti s poškozenými dýchacími cestami v důsledku infekceNon-atopic wheezers → children with damaged airways due to infection, this defect is reversible in case of non-allergenic terrain.
 - Real asthmatics.

Investigation

- Medical history - family history, especially atopy, smoking, pets,...
- Laboratory height - inflammatory markers, ...

- Immunological examination including total IgE and ECP, possibly. specific IgE.
- Spirometry (approx. from 3-4 years).
- Whole-body body plethysmography → an airtight chamber allowing pressure and volume changes that take place inside to be measured (also possible in non-cooperative children).

Asthma predictive index

- **Major criteria** – asthma in the parents, atopic eczema in the child, sensitivity to airborne allergens.
 - **Small criteria** – wheezing outside the cold season, eosinophils in the blood count >4%, food sensitivity
- presence of one major or 2 minor criteria → probability of asthma.

Therapy

Acute bronchial obstruction

- The 1st choice is short-acting inhaled bronchodilators → β 2 -mimetic (salbutamol), anticholinergic (ipratropium bromide) newly questionable meaning.
- In the case of insufficient effect or severe p.os course; and corticosteroids.
- Hospitalization if the clinical condition does not improve after 3 repeated inhalations of bronchodilators.

Long-term treatment

- Indicated if the frequency or severity of exacerbations significantly impairs quality of life and asthma is not under control (control criteria same as for adults).
- 1st choice of inhaled corticosteroids (treatment effectiveness is evaluated after at least 3 months),
 - after control is achieved, the dose is reduced to the lowest level,
 - if there is insufficient control,
 - → necessary control of correct use, compliance with measures → if in order,
 - increase the dose of inhaled corticosteroids (ICS) or add a leukotriene receptor antagonist (montelukast = Singulair).
- Long-acting β 2 mimetics (=LABA) – they are not recommended in monotherapy, in combination only if ICS alone are not enough.
- Measures to eliminate causative agents.

Inhaler attachments

- Significant simplification of inhalation, coordination of inhalation and squeezing is eliminated.
- Wash the spacer and let it dry, do not wipe!!!! → formation of static electricity trapping particles.
- 1 injection from the dispenser = 5-10x calm inhalation and exhalation without removing the dispenser and spacer.

Determining the fullness of the aerosol dispenser

- Immerse the dispenser in the water and determine the fullness of the dispenser according to the drop towards the bottom (see picture).

Adverse effects of ICS

File:Bombicky.jpg
Aerosol dispenser

- LOCAL:
 - Common: oropharyngeal candidiasis, throat, tongue, pharynx, esophagus irritation, cough.
 - More rarely: early and delayed hypersensitivity reactions in the face, lips, eyes, pharynx, redness, rash, urticaria, eczema, swelling, angioedema, bronchospasm.
- SYSTEMS:
 - To varying extents with all ICS, they are dose-dependent, but long-term negative effects on children's development have not been proven.
 - Adrenal effects - cortisol synthesis.
 - Induction of osteoporosis, slowing of growth rate.
 - Psychological changes.
 - At high doses, deterioration of healing, atrophy of the skin.
 - Disorders of glucose tolerance.
 - Increased incidence of glaucoma and cataracts.

Links

- Asthma

Source of information

- VOJTÍŠEK, Petr. *Bronchial asthma in children and adults* [lecture for subject Modul UPV, specialization Intensive care nurse - postgraduate study, Higher vocational school medical school Secondary and higher medical school Ústí nad Labem]. Ústí nad Labem. 18.12. 2011.
- DOSTÁL, Pavel, et al. *Fundamentals of artificial pulmonary ventilation*. 2. edition. prague : Maxdorf, 2005. ISBN 80-7345-059-3.