

**Міністерство охорони здоров'я України
Харківський національний медичний університет**

Кафедра Внутрішньої медицини №3
Факультет VI по підготовці іноземних студентів

ЗАТВЕРДЖЕНО

на засіданні кафедри внутрішньої медицини №3
«29» серпня 2016 р. протокол № 13
Зав. кафедри _____ д.мед.н., професор Л.В. Журавльова

МЕТОДИЧНІ ВКАЗІВКИ
для студентів англійською мовою

з дисципліни «Внутрішня медицина (в тому числі з ендокринологією)
студенти 4 курсу I, II, III медичних факультетів, V та VI факультетів по підготовці
іноземних студентів

Дихальна недостатність.

Харків 2016

Study subject " respiratory failure. "

Hours – 4

Learning Objectives:

- teach students to recognize the basic signs of pulmonary insufficiency;
- acquaint students with physical methods of investigation pulmonary insufficiency;
- To introduce students to research methods that are used for the diagnosis of pulmonary diseases ;
- teach students to prescribe treatment for lung failure.

➤ **What the student should know?**

- –etiology and pathogenesis of pulmonary disease;
- – clinical manifestations and physical data for pulmonary insufficiency;
- – diagnosis of pulmonary disease;
- – treatment of pulmonary failure.

What the student should be able to do?

- remove the main clinical and physical syndromes of infectious and destructive diseases of bronchopulmonary and pulmonary insufficiency;
- interpret results of additional research;
- prescribe treatment for patients with infectious diseases of bronchopulmonary system and destructive pulmonary disease

The list of practical skills that students must master

- external review of patient
- examination of the chest ;
- percussion ;
- auscultation of the lungs.

CONTENTS THEME :

Respiratory failure (RF) - a syndrome caused by the failure of respiratory system to ensure normal gas composition of arterial blood. RF also occurs when normal maintenance of the gas composition of arterial blood at an adequate level is interrupted by excessive functional tension of the system. Respiratory failure maybe acute (ARF) and chronic. ARF developed in a short time from several hours to several days.

The main reasons for the development of ARF is acute pain caused by trauma or surgery; breach of condition and mobility of the diaphragm; disorders of the central mechanisms of regulation of respiration; injuries and diseases of the brain; breach of tracheobronchial patency; airway obstruction; reduction of surface lung functioning; disorders of blood flow in the pulmonary circulation; bypass surgery, the development of so-called shock lung, thromboembolism of branches of pulmonary artery; acute heart failure leading to pulmonary edema; pulmonary edema caused by overload of infusion, reduced plasma oncotic pressure, increased permeability of the alveolar-capillary membranes.

There are two types of ARF :

- 1) **hypoxia with low or normal PaCO₂ (low PaO₂ at low or normal PaCO₂)**. Developed in patients with respiratory distress syndrome (adults), pneumonia (viral or bacterial origin, aspiration pneumonia), fat embolism of branches of the pulmonary artery, pulmonary edema as a result of severe ventilation-perfusion disorders and intrapulmonary shunt;

2.)**Hypercapnic(low PaO₂ at elevated PaCO₂)**: Includes two types of violations: ventilation-perfusion imbalance and inadequate alveolar ventilation.

Patients with ARF type 2 , in turn , are divided into two categories:

- a) presence of chronic obstructive pulmonary disease with additional influence of infection;
- b) Inadequate ventilation due extrapulmonary reasons:
 - Violation of breath control (drug overdose , CNS disease , trauma , stroke);
 - Neuromuscular disorders (polio, myasthenia syndrome,Guillaine-Barre);
 - Chest injury.

ARF severity assessment is conducted mainly in terms of partial pressure of oxygen and carbon dioxide in arterial blood.

Characteristics of the severity of ARF

<i>Types</i>	<i>PaCO₂mmhg.</i>	<i>PaO₂ mmhg</i>
Norm	36-44	80-96
Mild ARF	46-55	79-65
Moderate ARF	56-65	64-55
Severe ARF	70-85	54-45
Hypercapnic coma	до 130	44-35

Clinical manifestations of ARF

Signs: dyspnea, tachypnea, cyanosis (due to hemorrhage and anemia),tachycardia, psychomotor excitement, then dizziness , loss of consciousness , sweaty skin, nasal flaring, the use of accessory muscles . With the progression of ARF hypertension is converted to hypotension, often with development of bradycardia, arrhythmia and with symptoms of cardiovascular disease . Patients may die

Treatment. ARF Therapy consists of symptomatic and etiotropic components. In this regard, the clinician should use antibiotics for the treatment of pneumonia , diuretics and vasodilators to reduce pulmonary edema and bronchodilators with obstructive lung diseases . Additionally, oxygen therapy can be conducted , correction of blood pressure and electrolyte disorders ,prevention of deep vein thrombosis.

Treatment of ARF includes measures aimed at destroying the causes of violations of ventilation-perfusion , hypoxia and disorders of acid- base balance. For patients with type 1 ARF high concentrations of O₂ in inhaled air can be applied , as there is no risk of delay CO₂. Type 2 ARF is usually an indication for mechanical ventilation.

In sharp pain give local or general anesthesia. In shock conditions and severe violations of hemodynamics anesthesia should precede infusion therapy. Oxygen is given as indicated above, it is necessary to prevent the occurrence of hypoventilation syndrome and closely monitor the depth and frequency of breathing. For injuries of the chest and the formation of a tension pneumothorax used thoracostomy. ARF in violation of the function and mobility diaphragm can be substantially reduced if evacuation of stomach andintestinalcontentisestablished.

To treat disturbance of airway patency (if antitussive drugs and vibrating massage of chest are ineffective) sanationof the tracheobronchial tree is required. The most radical sanation can be done via bronchoscopy , which is made against the background of mechanical ventilation and washing of the bronchial tree. This procedure is used when it is impossible to performsuctioning of bronchial content when the lumen is full of thick mucopurulent mass , such as in severe asthmatic conditions.Cleaning mucopurulent mass from the tracheobronchial tree is carried by suction through a catheter , which is introduced sequentially into the right and left bronchus through a tracheal tube, sometimes through the nose.

With failure of intubation immediate tracheostomy should be done. The artificial lung ventilation (ALV) is used for gross violations of breathing, the clinical picture of severe hypoxia and hypercapnia ($\text{PaO}_2 < 60 \text{ mmHg}$, constant increase of PaCO_2 , increasing acidosis).

Recent developments in the field of respiratory support have led to additional therapies for patients with ARF .

The most commonly used is Ventilation controlled by pressure (PCV – pressurecontrolventilation) Thus, maximum inspiratory pressure and duration; is actively supported without the pressure of the respiratory volume. This type of ventilation improves intrathoracic pressure, leading to an increase in functional residual capacity of the lungs due to increased number of alveoli expansion. High flow rate at the beginning of inhalation additionally contributes to the opening of the collapsed alveoli and a better distribution of the gas mixture in the lungs. New models of machines for mechanical ventilation able to take into account the value of the respiratory volume and perform ventilation considering their patient's respiratory movements.

Ventilation inversion of inhalation and exhalation (ICV – inversecontrolventilation) is a form of mechanical ventilation, in which the ratio of the length of inhalation and exhalation is increased. As a result of the increased inspiratory time it helps to maintain the alveoli in expanded state, and reducing the time of exhalation prevents their collapse.

Separate ventilation: ventilation is provided through one main bronchus, while the other lumen serves as overlap or for another ventilation tube. Thus each lung can be ventilated properly. Separate ventilation can be useful in situations such as massive hemoptysis with the source of bleeding in the lung, large bronchopleural fistula or asymmetrical lung.

There is also non-invasive ventilation with a standard facial or nasal mask, with which tracheal intubation can be postponed for a while or even abandoned.

There are several types of non-invasive methods of ventilation : constant positive airway pressure (CPAP – continuouspositiveairwaypressure), biphasic positive airway pressure (BiPAP – bilevelpositiveairwaypressure), ventilation with support pressure (PSV – pressuresupportventilation), ventilation controlled pressure (PCV – pressurecontrolventilation).

The advantages of non-invasive ventilation methods are: restriction of indications for endotracheal intubation and, consequently, reduced complications of manipulation, convenience for the patient and the ability to talk and eat (when using nasal masks).

Recently greater interest has been shown to use of steroid therapy for ARF, Acute respiratory distress syndrome Patients with fibro - proliferative phase observed higher survival compared with placebo (87 % vs. 37%) , but the group that received steroids had increased frequency of infectious complications. A lot of research centres continue research to solve this problem

Control of initial level of knowledge

" Infectious- destructive lung disease and pulmonary failure."

1. The clinical and pathogenetic periods lung abscess include everything except:

- A. Period infiltration.
- B. Period drainage of abscess in the bronchus .
- C. The period of convalescence.
- D. Period mental well-being.

2. Before clinical manifestations of infectious destruction lung include all the features listed below , except:

- A. syndrome intoxication.

- B. pain
- C Respiratory distress syndrome .
- D. Cough with large amount of purulent sputum.
- E. Violation of cardiac rhythm and conduction.

3. The main clinical symptom of lung gangrene are:

- A. The attacks of breathlessness.
- B. Dry cough .
- C. cough with purulent sputum especially in the morning.
- D. Cough with layered sputum.
- E. Intense pain in the chest when breathing .

4. What additional methods most informative with lung abscess:

- A. Clinical (blood, urine, sputum).
- B. The study of lung function (spirometry, spirometry).
- C. X-ray.
- D. bacteriological examination of sputum.
- E. cytological examination of sputum.

5. The characteristic X-ray picture of lung abscess include:

- A. Syndrome of focal consolidation of lung tissue.
- B. Syndrome of accumulation of fluid in the pleural cavity.
- C. syndrome of formation of cavities in the lungs.
- D. None of the above.
- E. All of the above.

6. The most common complication of infectious destruction lung are:

- A. Myocardial infarction.
- B. Hemorrhagic stroke.
- C. Infectious- toxic shock.
- D. asthmatic status.
- E. Spontaneous pneumothorax.

7. Obstructive respiratory failure type is formed by :

- A. Violation of air breathing passage ways.
- B. decreased ability of lung filling and expansion .
- C. Reducing the amount of oxygen in inhaled air.
- D. The presence of anemia.
- E. circulatory disorders.

8. Restrictive type respiratory insufficiency formed by :

- A. Violation of air breathing passage ways.
- B. decreased ability to falling of lung and expansion.
- C. Reducing the amount of oxygen in inhaled air.
- D. The presence of anemia.
- E. Dyscirculatory disorders.

9. Cor pulmonale characterized by :

- A. The right ventricular failure.
- B. left ventricular failure.
- C. total heart failure.
- D. Violation of rhythm and conduction.

E. None of the above.

10. By clinical signs of respiratory distress include all of the above except:

- A. Dyspnea .
- B. Tachycardia .
- C. cyanosis.
- D. Feeling short of breath .
- E. crackling.

Control of final level of knowledge

1. By which diseases should differential diagnosis of lung abscess be conducted with in the first place:

- A. Asthma .
- B. Gangrene lung.
- C Infective endocarditis.
- D. Chronic bronchitis.
- E. emphysema.

2. Treatment of patients with lung abscess should begin with the application of:

- A. Antibacterial and detoxification therapy.
- B. Only antibiotic therapy.
- C. Only detoxification therapy.
- D. antibiotics and sulfonamides .
- E. antibiotics and bronchodilators

3 The main method of diagnosis of lung gangrene are:

- A. X-ray.
- B. Spirography .
- C. Bronchography .
- D. Fluoroscopy OGK .
- E. Analysis of clinical sputum .

4. The changes in the general analysis of sputum characteristic of lung abscess include:

- A. purulent sputum with an unpleasant odor.
- B. When standing separated into two layers.
- C. Spiral Kurshmana .
- D. A + B are correct .
- E. A + C are correct.

5 The changes in the overall analysis of sputum , characteristic for lung gangrene include:

- A. purulent sputum dirty gray.
- B. When standing three layers formed .
- C. The presence of Charcot-Leyden crystals .
- D. Right A + B.
- E. Right A + C.

6. The main areas of treatment of respiratory failure are:

- A. Treatment of the underlying disease that caused the RF .
- B. Provide adequate gas exchange.
- C. Support of lung function .

- D. all of the above is true .
- E. None of the above .

7. A typical clinical syndrome of lung gangrene are all listed below except:

- A. intoxication .
- B. General inflammatory changes.
- C. inflammatory changes in the lung tissue.
- D. hepatolienal syndrome .
- E. Syndrome of respiratory failure.

8. Syndrome of formation of cavities in the lung is characteristic of :

- A. lung abscess .
- B. Pneumonia .
- S. asthma.
- D. bronchiectasis.
- E. pulmonary infarction .

9. For what stage lung abscess is phlegm discharge characteristic:

- A. Stage of forming cavities in the lungs.
- B. Stage of breakthrough drenuvalnyy bronchus .
- C. The stage of convalescence .
- D. For all of the above.
- E. For any of the above.

10. Which elements sputum probably indicates the destruction of lung tissue :

- A. Charcot-Leyden crystals .
- B. leukocytes.
- C. Spiral Kurshmana .
- D. The elastic fibers.
- E. Red blood cells

situational problem.

1. Patient '40years old, complains of paroxysmal cough with sputum yellow-brown, pain in the right side, associated with deep breathing, sweating. Sick 6 days after hypothermia. OBJECTIVE: body temperature - 39.6 0C. BH - 26 per min., Pulse - 110 per min., Blood pressure - 110/70 mmHg Right in the lower lung - wet sounding dribnopusyrychasti wheezing. Radiological findings: right at the bottom of the lungs - a massive infiltration of inhomogeneous areas enlightenment sine differentiated. What complication most likely evolved in the patient?

- A. fibrinous pleurisy
- B. abstsedirovaniya
- C. empyema
- D. Spontaneous pneumothorax
- E. lung atelectasis

2. Woman '42 years old, fell ill two weeks ago, with cough, weakness and fever to 38.0 degrees Celsius. Her condition deteriorated until the end of the 1st week, when there was fever, profuse sweating and towards evening the temperature rose to 39.0 degrees celsius. 2 days before admission, the patient coughed with expectoration of plenty of fetid sputum with blood, after which her condition improved, Pulse - 80 per min, RR - 20 per min, T - 37.6 degrees Celsius. What changes are possible on chest radiograph?

- A. mediastinal shift toward a homogeneous shade
- B. Homogeneous round shadow in the pulmonary field
- C. The presence of cavities with horizontal fluid level

- D. Shadow in the lower section of the oblique upper limit
- E. darkening of a lobe of the lung

3. Patient L., 54 years old, entered the hospital on the 10th day after onset of illness, complaining of fever to 38.5 0C, severe weakness, pain in the right shoulder blade when breathing, dry cough. RR - 28 per min. Pulse - 100 min, signs of intoxication. In the area of the right shoulder blade blunting of percussion note, bronchial breathing, wheezing a few bubbling rales and crackling. After three days of cough attack came with the release of 200 ml purulent sputum, then body temperature decreased. At the level of the blade angle, detected against the background of lung infiltration, was a rounded enlightenment with horizontal fluid level. Your diagnosis?

- A. lung cyst
- B. Acute lung abscess
- C. Cancer of lung collapse
- D. Bronchiectasis
- E. Limited empyema of the pleural cavity

4. Patient D., 34 years old, was diagnosed with pneumonia. Despite treatment, hectic fever appeared, and expectoration of large amopunts of sputum." What disease should be suspected?

- A. Lung abscess
- B. Bronchiectasis
- C. Chronic bronchitis
- D. Pulmonary tuberculosis
- E. staphylococcal pneumonia

5. A. The patient complains of excruciating cough with expectoration of 600 ml per day of purulent sputum chocolate color with a putrid smell. Grave condition, the body temperature - 39 0C, hectic fever .On the radiograph shadow of the cavity in the center, with irregular contours and fluid level. What disease should be suspected?

- A. Pulmonary tuberculosis
- B. Lung abscess
- C. Gangrene of the lung
- D. Bronchiectasis
- E. Cancer of lung collapse

6. Male, 58 years old, alcoholic, suddenly fell ill, the temperature rose to 40 0C, weakness, cough with sputum discharge (dark). OBJECTIVE: T - 39.50 C, RR - 30 per min, heart rate - 100 min, blood pressure - 110/70 mmHg. In the lung moist rales. Heart sounds are muffled, without arrhythmia, mild tachycardia. On radiographs of the lungs shadow in right upper lobe. What is the most likely complication that can develop in the patient?

- A. Endocarditis
- B. Bronchiectasis
- C. Pericarditis
- D. Lung abscess
- E. Pulmonary haemorrhage

7. During the flu epidemic in patient Z., 60 years, after reduction of fever appeared chest pain, cough with sputum yellow-green 100 ml per day, sometimes mixed with blood. OBJECTIVE: RR - up to 36 min., Under the shoulder blade on the lungs right blunting of percussion sound, dyspnea, medium and coarse bubbling rales. Blood: WBC - $18,6 \cdot 10^9 / l$, ESR - 64 mm / h. sputum: WBC - 80-100 in FOV, RBC- 40-50 in FOV, elastic fibers, cocci. Radiological findings: dilated roots, bottom right non-uniform shadow of two segments. Indicate the most likely diagnosis?

- A. Peripheral Cancer lower lobe of the right lung
- B. lung infiltrative tuberculosis in a phase of disintegration
- C. pleural effusion
- D. Right sided pneumonia with abscess formation
- E. infarction, pneumonia

8. Patient A., 32 years old, is at the dispensary with chronic lung abscess with frequent exacerbations for 5 years. Guided inpatient survey is made to determine the most effective treatment. In the hospital diagnosed: abscess upper lobe of the right lung with moderate course in remission. What treatment is most effective?

- A. Operational
- B. antibiotics
- C. bronchodilators
- D. Physiotherapy
- E. Spa treatment

9. The patient B., 26 years, has an increase in temperature to 38.0 C, cough with purulent sputum, severe weakness, shortness of breath, chest pain when breathing. Shortening percussion sound in the lower left lung, dry and moist rales are heard. What diagnostic method is the most important for diagnosis?

- A. The analysis of sputum microflora
- B. Spirography
- C. Pneumotachymetry
- D. Bronchography
- E. X-ray examination

10. In patient M., 34, who abused alcohol, a massive pneumonia developed, with grave condition, increased body temperature to 39-40 0C, bad breath, increased the amount of purulent sputum; increased erythrocyte sedimentation rate and number of stab leukocytes. On radiographs in the lower lobe of the right lung massive infiltration of enlightenment (з просвітленням) in the center. What kind of complications can be suspected?

- A. Bronchiectasis
- B. acute lung abscess
- C. pneumonia, heart attack
- D. Lung gangrene
- E. empyema

Control questions.

1. respiratory failure.
2. Type and severity of acute respiratory failure.
3. Clinical manifestations and diagnosis of respiratory failure.
4. Treatment of respiratory failure.

Practical tasks.

1. To provide curation of patients with respiratory failure.
2. Assess the patient's condition and results of physical examination.
3. Fill minutes Supervision patient with respiratory failure.
4. Writing or interpreting received laboratory studies.
5. Give or interpreting received instrumental methods.
6. treatment.

ANSWERS TO TESTS RELATED TO THE TOPIC

«Infectious-destructive diseases of the lungs and pulmonary failure»

Basic level of knowledge

- | | | | |
|----|---|----|---|
| 1. | D | 6. | C |
| 2. | E | 7. | A |
| 3. | D | 8. | B |
| 4. | C | 9. | A |
| 5. | C | 10 | E |

Final level of knowledge

- | | | | |
|----|---|----|---|
| 1. | B | 6. | D |
| 2. | A | 7. | D |
| 3. | E | 8. | A |
| 4. | D | 9. | B |
| 5. | D | 10 | D |

Situational Tasks

- | | | | |
|----|---|----|---|
| 1. | B | 6. | D |
| 2. | C | 7. | D |
| 3. | B | 8. | A |
| 4. | A | 9. | E |
| 5. | C | 10 | B |

RECOMMENDED BOOKS:

1. Clinical Pulmonology - 2016 (The Clinical Medicine Series Book 19).-343h.
- 2 .Pulmonary Disorders [Sect. 5, Merck manual] 2010.-123p.
3. Pulmonary Pathophysiology : The Essentials by (author) John B. West 2012 .-200p.
4. Davidson's Principles and Practice of Medicine 22nd Edition .-Walker, Brian R., FRSE.-2014.-1312p.

Website of the departament: <http://www.vnmed3.kharkiv.ua/>,

Методичні вказівки склав: доц.. Федоров В.О.

Методичні вказівки переглянуто і затверджено на засіданні кафедри: 31 серпня 2016р.
протокол №13.

З доповненнями (змiнами).

Завiдувач кафедри
внутрiшньої медицини №3
д.м.н. проф..

Журавльова Л.В.