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**Local guidelines for students on topic:**

**INDICATIONS AND CONTRAINDICATIONS FOR  
FIBROBRONCHOSCOPY (FBS). PREPARATION  
OF A PATIENT. EQUIPMENT.**

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FBS – is the investigation of the lower air ways with the help of a special instrument – bronchoscope including the examination of the trachea and bronchi as well as the performance of different diagnostic and therapeutic manipulations.

**REMEMBER!!!** FBS must be performed after x-ray investigation.

**The indications for urgent FBS:**

- status asthmaticus is performed with a hard bronchoscope or with a flexible one under narcosis;
- pulmonary hemorrhage /performed with a hard bronchoscope/;
- asynchronicity of the patient's breathing with the apparatus **of artificial pulmonary ventilation (???)**; **искусственной вентиляции лёгких**
- foreign bodies;
- obstruction of the air ways with tumour or sputum;
- hemoptysis;
- trauma of the breast when there is a suspicion for the trauma of the trachea and bronchi;
- asynchronicity with artificial pulmonary ventilation.

*1. What are the indications for planned fibrobronchoscopy?*

**The indications for planned FBS:**

- central and peripheral tumour of the lungs (benign and malignant) revealed in R-grams. For the verification of diagnosis visually and morphologically;
- bronchostenoses and bronchoectases of unclear etiology – the examination of significantly curved bronchi;
- inflammatory processes accompanied by segmental and subsegmental atelectases or infiltrates;
- **???**chronic non-specific diseases of the lungs;
- chronic suppurative disease of the lungs /searching for bronchi draining abscesses of the lung;
- hemoptysis;
- fine foreign bodies uncalculated into subsegmental or more distal bronchi;
- disseminated diseases of the lungs;
- suspicion for tuberculosis;
- tumours of the mediastinum;
- diseases of the pleura;
- assessment of the state of the bronchial stump after operation.

The indication for the performance of FBS is the change of the nature of cough in a smoker+cough over 1 month against the background of intensive therapy.

**In America:**

- cough over a month, incorrigible;
- change of the nature of cough in a smoker;
- hemoptysis;

**2. What are the absolute and relative contraindications for fibrobronchoscopy?**

The contraindications for FBS:

**absolute:**

- acute stage of myocardial infarction;
- acute stage of stroke;
- pre-status asthmaticus;
- extremely severe state of the patient.

Here the doctor is oriented at the patient's feeling, the dynamics of ECG etc. FBS can be performed in 2 months;

- intolerability of anesthetics (to do under narcosis);
- stenosis of the pharynx (is not a contraindication for FBS through the intubation tube, tracheostoma)

**relative:**

- fever not related with the pulmonary process – to postpone for several d;
- the patient's state when FBS doesn't solve anything;
- stenosis of the pharynx is not a contraindication either.

**3. What are the indications for planned and urgent therapeutic investigation?**

**Therapeutic FBS**

The indications for planned therapeutic investigations:

- CSDL (chronic suppurative disease of the lungs);
- foreign bodies;
- hemoptysis and pulmonary bleeding;
- tumours of the trachea and large bronchi;
- bronchial fistula;
- status asthmaticus;
- stenosis of the trachea and large bronchi;
- failure of the bronchial stump

**The indications for urgent therapeutic investigations:**

- changes in the patients undergoing artificial pulmonary ventilation;

- pulmonary bleeding;
- status asthmaticus;
- foreign bodies (needles, nails etc).

## **ENDOSCOPIC ANATOMY AND PHYSIOLOGY of ??? TRACHEOBONCHIAL TREE**

The trachea is a cylindrical tube squeezed from the front backwards. It starts at the level of the VI cervical vertebra and ends at the level of the V thoracic one.

The length is 12 cm.

The diameter is 17-19 mm. Contains 15-20 tracheal rings (maximum up to 26).

In children, the trachea starts at the level of the IV-V cervical vertebrae, bifurcation at the level of 3-4 thoracic vertebra.

From the outside the trachea is covered with:

- a connective tissue compartment – adventitia.

Then by layers:

- the fibrocartilaginous layer;
- the muscular layer;
- the submucous membrane;
- the mucous membrane.
- the frontal and lateral walls of the trachea and large bronchi are represented by cartilaginous rings with ligaments.

The back wall is soft, the membranous part.

The cartilages occupy two thirds of the circumference and represent the framework preserving the lumen. The membranous part is represented by the muscular layer and fibrous tissue.

In the submucous layer there are:

- blood and lymphatic vessels;
- lymphoid follicles;
- alveolar-tubular glands working out protein mucous viscous secret.

The largest glands are above bifurcation and in the main bronchi. The excretory ducts of the lungs open in the lumen of the bronchial tree by flask-like dilatations (in their involvement in the inflammatory process, the diseases last very long).

The blood supply of the trachea – the inferior thyroid arteries and bronchial arteries.

Innervation – vagus and recurrent laryngeal nerves.

The angle of bifurcation – 70 degrees (at the level of the fifth thoracic vertebra).

The right primary bronchus – the length 1-4 cm, the diameter 12-16 mm.

The left primary bronchus – the length 5-7 cm, the diameter 10-14 mm, leaves the trachea

at an almost right angle .

#### **4. Describe the segmental structure of the lungs?**

A segment of the lung - an area of the lung being ventilated by a segmental bronchi with its artery and vein.

**On the right** – 10 segments and 3 lobes (superior, median, inferior).

**On the left** – 8 segment and 2 lobes – superior (superior and inferior)

**Upper lobular bronchus on the right is divided into 3 segmental bronchi:**

- apical B1.
- posterior B2
- Frontal B3

**Median lobular bronchus on the right is divided into 2 segmental bronchi:**

- lateral B4;
- - medial B5.

**Lower lobular bronchus on the right is divided into 5 segmental bronchi:**

- apical B6 (Nelson's bronchus, Fowler's apex);
- mediobasal B7 (cardiac);
- frontobasal B8;
- laterobasal B9;
- posterio basal B10.

**Upper lobular bronchus on the left is divided into 2 branches:**

- upper, which, in its turn, is divided into 2 segmental bronchi;
- apicoposterior B1-2 (common);
- frontal B3;

Lower which, in its turn, is divided into 2 segmental bronchi:

- upper uvular B4;
- lower uvular B5.

**Lower lobular bronchus on the left is divided into 4 segments (as a rule, no B7):**

- apical B6;
- frontobasal B8;
- laterobasal B9;
- posterio basal B10.

**On the right 4 areas are singled out:**

1. upper lobe – upper area, bronchus upper areal.
2. middle lobe – frontal area, bronchus – **frontoareal**.
3. B6 – posterior area, bronchus – **posterioareal**.

4. 4 basal segments on the right – lower area, bronchus – **lower areal**.

**On the left – also 4 areas:**

1. upper branch of the upper lobular bronchus – upper area.

2. bronchus – upper areal, lower branch of the upper lobular bronchus – frontal area, bronchus **frontoareal**.

3. B6 – posterior area of bronchi – **posterioareal**.

4. # basal segments on the left – lower area, bronchus – **lower areal**.

Preparation of the patient

1. It is necessary to explain to the patient the necessity of the forthcoming procedure characterize its basic stages.

2. To specify the mental state of the patient, the degree of his anxiety. In case of need, prescribe a tranquilizer for night (diazepam, tazepam, redanium, pax).

3. Heavy patients should be examined by the doctor which is supposed perform FBS.

4. The anamnesis. should include:

- general blood test;
- general urine test;
- blood group and r-factor;
- time of coagulation;
- ECG .

-Roentgenograms : direct and lateral tomograms.

5. The stomach should be empty, consequently, the patient is going to investigation fasting. If the patient has got the concomitant stenosis of the pylorus, it is necessary to lavage the stomach.

***5 .How is the premedications and anesthesia of the patients before FBS performed?***

#### **PREMEDICATION AND ANESTHESIA**

30 minutes before the beginning to perform local anesthesia, the patient is injected 1 ml of 0.1 solution of atropine subcutaneously to eliminate vagus influence.

In patients with glaucoma investigation is performed without preliminary atropinization.

The patients who tend to bronchospasm 15 before investigation are injected intravenously 10 ml of 2.4% solution of euphilline per 10 ml of physiological solution, and immediately before the beginning of local anesthesia they are given 1-2 doses of aerosol of asthmopent, ,salbutamol, atrovent or alupent.

For the anesthesia of the upper air ways and pharynx they use:

-1% solution of **licaine**;

-2% solution of lidocaine;

-4 solution of xylocaine.

Imposing them on the mucosa with the help of a spray.

In transnasal introduction of the endoscop , the anesthesia of the nasal meatus is performed in the application way. The anesthesia of the vocal cords is performed through the catheter introduced through the channel of the bronchoscope. The anesthesia of the mucous trachea and bronchi is performed with the 4% solution of trimecaine – **b-1- ml** or the 0.5% solution of dicaine – 3-5 ml.

**The primary reflexogenic zones are thoroughly anesthetized:**

- bifurcation of the trachea;
- spurs of lobular and segmental bronchi.

Anesthesia is performed per 0.5 ml with the interval of 30 sec.

The minimum time for performing anesthesia – 10 mm.

The sufficiency of anesthesia – when the vocal cords are touched, they do not close up+no cough..

-lidocaine for the whole anesthesia – 10 ml.

- the best combination: dicaine\_trimecaine, dicaine - up to 5 ml.

- anesthesia with xylocaine only for the nasopharynx, afterwards continue with trimecaine.

**REMEMBER !!!** Anesthetics should be warm.

And only in the presence of hemorrhage – cold.

**6. What apparatuses and instruments are needed for FBS?**

**THE APPARATUSES AND INSTRUMENTS FOR FBS**

For performing FBS, it is necessary to have:

- a comfortable armchair with the elbow-rest, it is OK when it is like prosthodontic;
- fibrobronchoscope;
- a source of the light;
- appliances for diagnostic and therapeutic manipulations;
- **a stand from under a dropper.**

The modern fibrobronchoscope has the general length of 760 mm, the working length – 550 mm. The external diameter of the tube being introduced is 6 mm. The range of the angle of the curve of the distal end is **180o** upwards and **130o** downwards. Such a big range ensures a smooth introduction of the apparatus in not easily accessible areas (for example, the upper right and left lobe), a deepened examination of subsegmental bronchi.

The diameter of the biopsy channel is 2.8 mm/ which enables **to take aspirates** freely, perform biopsy and cytology.

There exists a therapeutic fibrobronchoscope XT-20 with the external diameter of 6.3 cm, while the internal diameter of the biopsy channel is 3.2 mm, which allows to use instruments of large sizes for:

- large scale biopsy;
- taking large foreign bodies out of the tracheobronchial tree;
- arresting hemorrhages.

The source of the light CLE-10 in which they use for observation a halogen lamp with the capacity of **159 Wt** and a flash lamp for taking photos with the capacity of 500 Wt.

### **The appliances for diagnostics and treatment:**

-cytological brushes

-biopsy forceps;

- catching forceps;

- fork laws;

- 'alligator';

- 'rat teeth';

- 'tripod' claw;

-basket;

- magnetic extractor;

- lavage tubes;

- injector;

- surgical scissors;

- anti-shock set.

### **METHODS OF INVESTIGATION**

The patient's position – sitting or lying. Preferable is the performance of investigation in the patient's sitting position.

The endoscope is introduced transnasally.

Perorally – only in the sharp narrowing and deformation of the inferior nasal meatuses.

### **Anatomical clues:**

The 1<sup>st</sup> anatomical clue – **the epiglottis anatomical.**

They single out the parts of the larynx:

- upper – as far as the false vocal folds;
- middle – as far as the vocal fissure which is formed by the true vocal folds;
- lower – as far as the lower edge of the cricoid cartilage.

The 2<sup>nd</sup> anatomical clue – the true vocal folds;

- located under the false one, these are whitish bands, stripes. At their back edge there are arytenoid cartilages. The space between the inner surface of the true vocal ligaments and arytenoid cartilages – the vocal fissure.

- The 3<sup>rd</sup> anatomical clue – the carina of bifurcation.

In breathing, it is shifted downwards and forwards by 2-3 cm. In the carina they single out:

- crescent;
- anterior and posterior triangles.

Endoscopically: the mucosa of the anterior triangle is lighter than the posterior one, and its size is bigger.

The carina can be:

- sharp;
- flattened;
- saddle-likely curved;
- S-like.

### ***7. What should one remember in the examination of the bronchi in the process of FBS?***

#### **Remember!!!**

The examination starts with that side of the bronchial tree where the changes are less expressed (which is preliminarily determined after roentgenograms).

If the changes are expressed on both sides equally, the examination starts with any half of the bronchial tree (usually on the right).

On the right, they primarily examine the upper lobular bronchus which leaves outwards and upwards at right angles. Its diameter is 8-10 mm.

From the lower border of the mouth of the upper lobular bronchus there starts the intermediate bronchus which ends at the level of the mouth of the middle lobular bronchi. Its length is 2-3 cm, diameter 10-11 mm.

The middle lobular bronchus leaves the frontal service of the intermediate bronchus. It is narrow, long, leaves at acute angles – a frequent localization of pathology. The length 10-12 cm, diameter – 7 mm.

After leaving the middle lobular bronchus, the lower lobular bronchus starts. It is short, hard to determine. Its back surface – downwards, backwards and laterally – is left by Bb-diameter up to 10 mm; it is divided into 3 subsegmental bronchi. Further, the lower lobular bronchus is divided into 4 basal bronchi.

**On the left**, the examination starts with the basal bronchi and their finer branches, then they examine B6 and its subsegmental branches, then the uvular and upper lobular bronchi and their segmental and subsegmental branches.

On the left, the mouths of the upper lobular and lower lobular bronchi are practically located at the same level and separated by a distinct spur.

The left upper lobular bronchus leaves the frontal surface of the primary bronchus upwards and outwards: it is divided into 4 segmental bronchi.

The lower lobular bronchus on the left leaves the back surface of the primary bronchus and is divided into 4 segmental bronchi.

## **METHODS OF BIOPSY IN FBS.**

### **I. ASPIRATIONAL /transbronchial, transtracheal/.**

#### **Indications:**

- tumours of the mediastinum of unclear genesis which are localized near the bronchus;
- all the diseases of the respiratory organs accompanied by the enlargement of the mediastinal lymphatic nodes.

Conduct the needle under visual control. Puncture is performed along the right lateral descent of the trachea, having stepped aside the carina 0.5 cm, or through the carina, or along its left descent.

The syringe and needle are completely dry. The material should be taken in with effort. The needle is plunged by 1 cm into the wall. The absorption of the material is slow. In taking out the needle absorption continues. Then smears are done onto the absolutely dry glass.

#### **II. Forceps:**

Is taken out of any exophite tumours and of spurs of the primary, lobular, segmental bronchi.

**REMEMBER!!! It is impossible to take biopsy from the wall with forceps!!!**

The diameter of obtained pieces is 1-2 cm. If hemorrhage ever occurs, it is not profuse.

**At least 6 pieces are taken.** They are fixed in 5% formalin. It is also necessary to make cytological imprints.

### **III. BRUSH-BIOPSY**

It is taken with a brush from the walls of bronchi, that is in endophyte formations of fine bronchi. Several sliding movements are performed, the brush is taken out together with the apparatus. 3-4 smears-imprints are taken.

**8. What should one remember after finishing FBS?**

**REMEMBER!!!** After the investigation, the brush is washed with soap solution together with the apparatus, only then the brush is taken out of the bioptic channel.

IV. Sampling the material for inoculation and testing the sensitiveness to antibiotics. Before the examination, they introduce 10-20 mm of physiological solution into the tracheobronchial tree. Then, with the help of the catheter some amount of the contents is taken in the syringe - in a dry bottle, 2-3 ml are taken in + in a sterile vial. There should be no blood.

V. Target (aimed) biopsy of peripheral formations under x-ray control is performed in an x-ray room.

After x-ray they find out the rough localization of the pathological focus.

In the mouth of the corresponding segment under visual control bioptic forceps are introduced: with the help of an x-ray tele-attachment they define the needed direction, trying to get the instrument immediately to the focus.

A sign of the forceps's location by the target - the displacement of the shade at an attempt of the subsequent conducting of the opened forceps + their correct position in a direct and lateral projection in x-ray control. The forceps are slightly pulled towards the surgeon and, staying in the shade, are opened.

The patient is given the command 'breathe out! Detain breathing!'. Then the instrument is sent forward with the simultaneous closing of the forceps's branches.

Manipulation is performed being oriented at one's own tactile sensations+orientation at the position of the forceps.

In x-ray control the traction of the forceps, as a rule, displaces the shade in the proximal direction, while the moment of (???) happens to be seen in roentgenoscopy.

After aimed biopsy, brush biopsy is performed.

#### **VI. TRANSBRONCHIAL BIOPSY OF THE LUNG.**

It is performed in disseminated diseases of the lungs. Under x-ray control, introduce the forceps till a slight prick (the patient's sensations). Take away the forceps by 1-2 cm.

Conduct biopsy at breathing out. If pain is noted, then the pleura has been touched upon.

The forceps are opened and biopsy is repeated through another bronchus. After sampling the material - brush biopsy.

**One should not!!!** Conduct the transbronchial biopsy of the lungs in patients with polycystic of the lungs and with an expressed emphysema.

#### **9. Describe complications after FBS.**

#### **COMPLICATIONS OF FBS.**

They are observed in 0.2%.

By the degree of severity they single out:

- Mild - 0.2%.
- Heavy – 0.08%.
- Fatal – 0.01.
- Besides, they single out the following complications:

- 1) conditioned by the conductance of local anesthesia;
- 2) conditioned by the procedure itself and endobronchial manipulations.

A slight increase of the pulse rate and a moderate increase of the blood pressure represent a common reaction in performing FBS.

### **Complications from local anesthesia.**

- toxic action in the overdose of drugs.

**The clinical pattern:** symptoms of overdose develop very quickly which is conditioned by quick absorption, for example of dicaine, which causes cardiovascular complications up to the heart arrest.

Impacting the cardiovascular centre, one provokes a spasm of the brain vessels. The patient develops weakness, nausea, vertigo, paleness of the cutaneous integument, cold sweat, a frequent low pulse rate.

If the irritation of the brain joins, then there develop excitation, convulsions, fainting.

The treatment:

- to stop anesthesia immediately;
- to lift the lower extremities;
- to let breath in a moistened oxygen;
- to introduce respiratory analeptics;

intravenously:

cordiamine – 2 ml;

caffeine – 2 ml;

bimigrin – 2 ml.

In a decrease of the blood pressure:

- intravenously slowly 0.1-0.3 ml of adrenalin per 10 ml of physiological solution, or 1 ml of 5% ephedrine per 10 ml of physiological solution;
- intravenously streamingly 400.00 of polyglucogen+ 30-120 mg, prednisolone or 50-125 mg of hydrocortisone;
- in heart arrest – close massage, intracordially 1 ml of adrenaline per 10 ml of CaCl with the addition of hormones+ artificial pulmonary ventilation;
- in the irritation of the brain cortex - intravenously barbiturates – 10-20 mg.

**ANAPHYLACTIC SHOCK** develops in intolerance to anesthetics.

The treatment also starts with an immediate stop of anesthesia. The patient is laid down with the elevated lower extremities and allowed to breathe in a moistened oxygen.

Intravenously streamingly: 400.0 ml of polyglucogen+1 ml of adrenaline+ 2 ml of 2% suprastin or 2 ml of 1% of diphenhydramine or 2 ml of 0.1% **tavegye**+ obligatorily 90 mg of prednisolone/hydrocortisone.

### **BRONCHOSPASM**

- Intravenously 2 ml of ephedrine per 20 ml of 40% glucose+10 ml of NaCl+hormones . In the edema of the larynx, stridorous breathing through a mask, they let breathe in the mixture of nitrous oxide with halothane and oxygen before artificial pulmonary ventilation.

**Prophylaxis:** testing individual sensitiveness/anamnesis, performing a trial.

The doses of the preparations must be measured in advance:

- cocaine 1% not more than 5 ml;
- trimecaine 4% not more than 15 ml;
- lidocaine 2% not more than 10 ml.

It is possible to add 5 ml of ephedrine drops per 5 ml of anesthetic.

**REMEMBER!!!** If in the anamnesis there is intolerance to novocaine, cocaine should not be used , it is necessary to perform a local trial for trimecaine.

Aerosole can be only used in the anesthesia of the nasal meatuses and pharynx.

The patient should be quiet.

In the insufficiency of anesthesia there develop spastic vagus reactions manifesting in laryngospasm and bronchospasm.

**Laryngospasm** develops in the conducting of the apparatuses through the fissure of glottis.

The investigation in this case should not be stopped. One should stop above the fissure of glottis and let the patient breathe enough –inspiration through the nose, expiration– through the mouth.

Then anesthesia should be added on the fissure of glottis.

**Bronchospasm** develops more often in patients with bronchial asthma.

It is displayed in:

- expiratory dyspnea/prolonged breathing out;
- cyanosis;
- excitation of the patient;
- tachycardia;
- hypertension;
- sometimes up to convulsions against the background of the hypoxia of the brain.

The investigation should be stopped immediately; the patient should be laid down and allowed to breathe in a moistened oxygen. Then let him breathe in 2 doses of aerosole, intravenously ephedrine 10 ml per 10 ml of physiological solution+ 60 mg of prednisolone. For the prophylaxis of the insufficiency of anesthesia it is necessary to introduce atropine 30 minutes before the investigation.

All the solutions should be warmed up+ a thorough performance of anesthesia.

**Complications caused by the procedure of FBS itself and endobronchial manipulations:**

- hypoxic , that is the mechanical obstruction of the airways;
- bleeding;
- pneumothorax;
- perforation of the bronchial wall;
- the feverish state of the patient;
- exacerbation of the pulmonary process;
- bacteremia.

Hypoxic complications: develop in patients with initial hypoxemia: it is dangerous if the patient develops additional bronchospasm or laryngospasm. For the prophylaxis of such complications the investigation should be performed. If the patient develops convulsions, then: intravenously by drops – barbiturate/ sodium thiopental/+forced diuresis/by drops 4-5% solution of soda 200-400 ml with the addition of ephedrine/+hormones.

**Hemorrhages** – often from the nasal meatus, especially in hypertensive. The endoscope should be introduced delicately. The most frequent complication – hemorrhage in biopsy, especially from the adenoma of a bronchus or from disintegrating tumours.

Hemorrhage is considered to be a one-moment delivering of over 50 ml of blood.

In this case, it is necessary to stop biopsy, start washing away with cold water – 10-20 ml.

One can locally introduce adrenalin 0.0025% 1-2 ml – the biggest effect in capillary hemorrhage. It can be dissolved with 1-2 ml of cold water. Also locally aminocaproic acid, dicynon 2 ml.

One can also use the apparatus by closing the mouth of the small bronchus with it.

If one fails to stop hemorrhage, it is necessary to get down to hard bronchoscopy.

**Pneumothorax** - develops in taking biopsy from pulmonary tissue. For prophylaxis the –x-ray control of manipulation is obligatory.

The further measures depend on the degree of the lungs collapsing:

- if it is for 1/3 – puncture;
- if it is not more than 1/3 – draining the pleural cavity with the interference of active aspiration.

**Perforation** of the bronchial wall develops in the elimination of sharp foreign bodies.

**REMEMBER!!!** Turn the foreign body around only above the carina.

The treatment is surgical only.

**A feverish state and the exacerbation of the inflammatory process** of the bronchi are observed after therapeutic FBS.

The treatment is general only.

**Bacteremia** – develops as a consequence of the trauma of the mucous membrane against the background of the suppurative process (especially in the presence of GRAMM ‘  ’ **flora+npn**-sterile bronchoscope).

Can lead to sepsis.

## **PULMONARY CANCER**

Men are ill 4 times more often as compared to women. The mortality of pulmonary cancer has increased by 30% during the recent 10 years.

It is believed that chronic obstruction lung diseases are referred to precancer, but it is correct because **they are considered background diseases**.

**10. Give the existing classifications of pulmonary cancer?**

**Types of pulmonary cancer:**

I. **Epidermoid cancer** – the process starts with the injure of the epithelium which is resulted in:

- atrophy;
- substitution of the glands by fibrous tissue;
- the decrease of the number of goblet cells;
- gradual transformation of the cylindrical epithelium into the flat one;
- there appears the focus of planocellular metaplasia;
- then there develop displasias etc.;

The first lung is damaged in 60% of cases, besides the upper lobe is damaged first, the lower and middle lobe.

Bilateral spreading is rare.

Central cancer appears in the area of segmental bronchi, in this more often – in the middle there are segments of the upper lobes. In pulmonary cancer they observe quick and early metastazing.

**After the data of FBS , x-ray and clinical picture it is necessary to find out the stage and morphology of the tumour.**

**The classifications of TMN:**

**N0** – no signs of the enlargement of the lymphatic nodes.

**N1** – the enlargement of the upper pectoral lymphatic nodes.

**M0** – no MTS.

**M1** – there are remote MTS or pleural exudate.

**T0** – tumour is not defined.

**T1** - tumour is restricted by a segmental bronchus.

**T2** - tumour is restricted by a lobular bronchus.

**T4** - tumour spreads on the primary bronchus.

**T5** – tumour spreads beyond the lung.

**In 1967 the WHO adopted the histological classification:**

**I. Planocellular cancer (epidermal).**

**II. Small cell carcinoma.**

**III. Adenocarcinoma.**

**IV. Large cell carcinoma.**

**V. Combination of planocellular cancer with adenocarcinoma.**

**After Krayevskiy:**

**I. PLANOCELLULAR CANCER:**

- with cornification (the high degree of differentiation).
- without cornification (the middle degree of differentiation).
- with the low degree of differentiation.

**II. GLANDULAR CANCER:**

Adenocarcinoma

Slightly differentiated glandular cancer.

**III. NON-DIFFERENTIATED CANCER:**

- round cell carcinoma;
- oat cell carcinoma;
- polymorphocellular carcinoma .

**After SOKOLOV (1956 r):**

**1. Central cancer.**

**2. Peripheral cancer (bronchi of 4 and other orders).**

**3. Apical cancer (Pancost).**

**4. Mediastinal cancer.**

**5. Milliary cancer.**

**It is a manifestation MTS, that is why they single out:**

**1. Central cancer.**

**2. Peripheral cancer.**

### **3. Bronchoalveolar cancer.**

The clinical picture is diverse and depends on:

- background diseases of the lungs;
- presence of MTS;
- concomitant diseases.

In particular, clinically they observe:

- appearance of backing cough;
- change of the nature of cough;
- increase of temperature up to high figures;
- hemoptysis (in 40-50% it can be the only sign of disease);
- dyspnea;
- fatigue.

By the character of growth they single out:

**-endobronchially;**

**- exophytes (in the lumen of the bronchi);**

**- endophytes (growth into the wall in the form of infiltrates or ulcers);**

**-peribronchially.**

**Exophytes occur most often.**

**Direct signs of pulmonary cancer in FBS:**

**EXOPHYTES:**

#### **1. Semispherical form:**

- on a wide base with a tuberous surface;
- grayish-pink colour;
- sizes are different ;
- but the tumour always narrows the lumen of the bronchus;
- tumour of dense consistency (in taking biopsy - contact bleeding sickness).

#### **2. Resembles a raspberry:**

- consists of granulomatous excrescences of the bright-red colour;
- on a wide base;
- very dense. (an expressed diffuse bleeding sickness, even contactlessly).

#### **2. Of an irregular form:**

- with uneven, festoon margins;
- a free margin partially or completely (???) the bronchial lumen;
- hyperemia of the mucosa at the base;
- in instrumental palpation the tumour is soft;

- insignificant contact bleeding sickness.

- **ENDOPHITES:**

- more often have the form of infiltrate;
- can be placed in the mouth and on the bronchial wall;
- can have distinct contours;
- the form is irregular;

the surface is rough, slightly lifted above the level of the mucous membrane of the tracheobronchial tree;

- the colouring of tumour does not differ from the surrounding mucosa, but can be brighter or paler;
- at the later stage, infiltrate spreads over the whole bronchus which has the form of a tube and is immobile;
- the vessel pattern is impoverished or somewhere enforced.

**The diagnosis reads:** Central cancer of the right lung, the endobronchial form of growth.

**A rare form of endophytic tumour can be ulcer:**

- it is of an irregular form;
- with a tuberos uneven bottom;
- with a dirty-grey film;
- in instrumental palpation the margins are rigid;
- in biopsy there is insignificant contact bleeding sickness.

**REMEMBER!!!** In any form of tumour – first aspiration biopsy, and then – excisional brush-biopsy and smears-imprints on 5-6 glasses.

The oblique signs of pulmonary in FBS – they are conditioned by the peribronchial growth of tumour:

**1. The anatomical signs:**

- constriction and deformation of the bronchial mouth;
- the bronchial rings are not differentiated;
- the vessel pattern is changed – the vessels are short, twisted unevenly dilated;
- can be the rough foldedness of the mucous membrane.

**2. The functional signs:**

- rigidity of the bronchial wall;
- absence of transmitting pulsation.
- the syndrome of ‘the dead mouth’- when the secret in the mouth is not displaced by the air which testifies to the obturation of the bronchus below.

The prevalence of the process is testified to by:

- yellowish plaques, tubercles, insignificantly elevated above the surrounding mucous membrane;
- roughness of the mucosa and disorderly foldedness;
- spotty, red-white colouring of the mucous membrane and the obliterated pattern of the cartilaginous rings;
- multiple, not deep, small ulcers;
- disorderly vascular;
- increased contact bleeding sickness of the mucous membrane.

In the presence of at least one sign biopsy is taken into a separately marked flacon.

The form of the carina also changes – extension or its immobility or the carina attains a saddle-like form. In this case, one should think of the presence of MTS and, thus, transbronchial biopsy is needed;

- infiltration of the carina;
- tumour of the mouth of the primary bronchus.

The inoperability of the patient is testified to by the paresis of one or both vocal folds.

**Early pulmonary cancer** - a tumour with the diameter of under 2 cm without metastases (TNN). In the interference at this stage, the survivability in the course of 5 years in 98% of cases. In Japan, they use a roentgenological-cytological screening-test, the frequency of delectability in the test like this is 74 patients per 200000 of the examined patients.

## **PULMONARY HEMORRHAGES**

Pulmonary hemorrhages are called the states characterized by the excretion of blood out of the air ways during cough.

Hemoptosis – the admixture of blood in the sputum.

**Pulmonary hemorrhage:**

**By degree:**

- the 1<sup>st</sup> degree – loss of blood – 50-100ml.
- the 2<sup>nd</sup> degree – loss of blood – 100-200 ml.
- the 3<sup>rd</sup> degree – loss of blood – more 200 ml.

**Profuse hemorrhage** - the excretion of blood is up to 500 ml/h.

Besides they single out massive hemorrhage – over 600 ml per 24 hours.

**11. What tasks are solved by FBS in pulmonary hemorrhages?**

**The tasks of FBS in pulmonary hemorrhages and hemoptosis:**

- to define where hemorrhage goes from (the side);
- to find out the causes of hemorrhage.

The causes:

- tuberculosis;
- pulmonary cancer;
- bronchial adenoma;
- bronchoectases;
- pulmonary abscess;
- hemangioma;
- etc.

**It is necessary to differentiate pulmonary hemorrhage from gastric hemorrhage:**

**A. PULMONARY HEMORRHAGE:**

- excreted in cough;
- the blood foams;
- bright-red colour;
- the blood goes on discharging with the sputum in the form of blood streaks during several days;
- blood is always mixed with the sputum.
- melena is absent;
- no anemia, as a rule.

**B. GASTROINTESTINAL HEMORRHAGE:**

- in nausea;
- in vomiting;
- does not foam;
- blood is mainly dark;

Practically always

There are signs of the anemia of different degrees of severity.

**The source of hemorrhage:**

**A disrupted vessel** in tuberculosis when the process spreads over the vascular wall. It is observed in patients with the active form of tuberculosis (**BK+**)open tuberculosis.

**Mycetomes** – excrescence of fungi in false cysts and caverns (very often is formed in tuberculous caverns);

**Pulmonary cancer** - hemorrhages at the late stage in the disintegration of the lung (in 20% pulmonary cancer is complicated by hemorrhage).

**In CNDL** (chronic non-specific disease of the lungs) – the cause is:

- varicosely dilatated bronchial veins together with the sclerotic changes of the vascular walls;

- there are frequent hemorrhages in patients with bronchoectases;
- and in patients inclined to them (patients with 'dry' bronchoecstases);
- long before aspirated foreign bodies.

***12. What should one remember in hemoptysis and pulmonary hemorrhages of different degrees?***

**REMEMBER!!!** In hemoptysis and pulmonary hemorrhage, **the 1st -2<sup>nd</sup> ordinary FBS** is performed.

If pulmonary hemorrhage is of the 3<sup>rd</sup> degree – hardbronchoscopy under narcosis.

In pulmonary hemorrhage they strive to perform FBS as early as possible, because it is easier to define the source (in lasting hemorrhages it is simpler to do).

There must be hemostatics at hand.

In pulmonary hemorrhage of the 3<sup>rd</sup> degree, hemorrhage can only be arrested temporary. In hard bronchoscopy, they use ordinary tampons and press the vessel, tamponize the bronchus.

They use the Fogarti probe during 10-15 minutes, then they introduce into the bronchus a sponge of porolone 2-3 times larger in the **diameter** ??? the lumen of the bronchus ??? it is in the form of a ball introduced into the bronchus. They leave it for 48-72 hours. In the failure of the arrest of the hemorrhage, they repeatedly introduce the obturator (up to 10-15 days).

**Hemostatic measures in FBS:**

- adraxone 0.025% -1-2 ml on a cool physiological solution;
- lavaging the bronchus with cool physiological solution.
- endobronchial laser photocoagulation.

## **A system of tasks for determining the ultimate level of knowledge.**

Patient S. 24 years independently addressed to the surgical hospital with complaints about abdominal pain of spilled nature, which occurred acutely after ingestion. Similar complaints for the first time. A history of 14 years confirmed peptic ulcer. On Objective Inspection - the patient responds to palpation in the epigastric region, there is liver dullness. Tongue dry. JSC 90/60 mmHg, heart rate 98 min, low filling.

1. What diseases are most likely for the patient?  
A. gastric ulcer;

- B. acute cholecystitis;
  - C. acute pancreatitis;
  - D. spastic colitis;
  - E. Myocardial infarction.
2. What are the main research methods for establishing the correct diagnosis.
- A. Observation Ro-graph of the abdominal cavity;
  - B. fibrogastroduodenoscopy;
  - C. fibro colonoscopy;
  - D. laparoscopy.
3. An endoscopic examination may be performed:
- A. without special training;
  - B. after gastric lavage;
  - C. after aspiration of the contents of the stomach;
4. Contraindications to performing fibrogastroduodenoscopy are:
- A. abdominal pain;
  - B. vomiting;
  - C. a pulse of more than 98 beats per minute;
  - D. BP below 80 mmHg.