General information of children infection's diseases

Whooping-cough (H. Pertussis)

Infectious diseases

- Are a group of diseases, which are caused by bacteria, viruses, Protozoa, etc

- A common trait for the majority of infectious diseases is the possibility of transmitting them from one infected patient to a healthy person in certain conditions

In children's pathology

- The infectious diseases draw the main attention
- There is a great variety of acute respiratory viral infections and their numerous complications

Common clinical peculiarities of modern infectious diseases

- less severe clinical manifestations
- rarity or decrease of malignant forms (dysentery, scarlet fever, etc)
- more frequent cases of mild forms
- growth of the amount of atypical forms (scarlet fever, whooping cough, dysentery, etc)
- reduction of complication cases

Periods of Infectious Disease Course

Clinically, acute epidemic diseases are characterized by a cyclic course and subsequent succession of disease periods and their more or less ***defined duration***:

- incubation (latent)
- prodromal
- full development
- convalescence

Incubation period

- begins from the moment of entry of the causative agent into the body
- ends with the appearance of the first signs of the disease
- in each infection, it has a certain duration, which may change depending on the individual peculiarities of body reactivity and on the dose of the infectious agent

Prodromal period

- nonspecific signs of the disease characterize it

Period of conval-escence

- renewal of normal functions of the body and its homeostasis

The period of full development

maximally marked causative agent activity

- this period of the disease is characterized by a complex of symptoms characteristic for each infectious disease
- there are typical syndromes as well (such as rash on the skin and mucous membranes, characteristic organ changes, biochemical disorders, etc.)
- common signs (fever, development of dystrophic inflammatory processes, intoxication syndrome)

Clinical forms

The clinical forms of infectious diseases are numerous

depend on the age,

physical state,

former diseases,

and influence of the environmental factors

Epidemic process consists

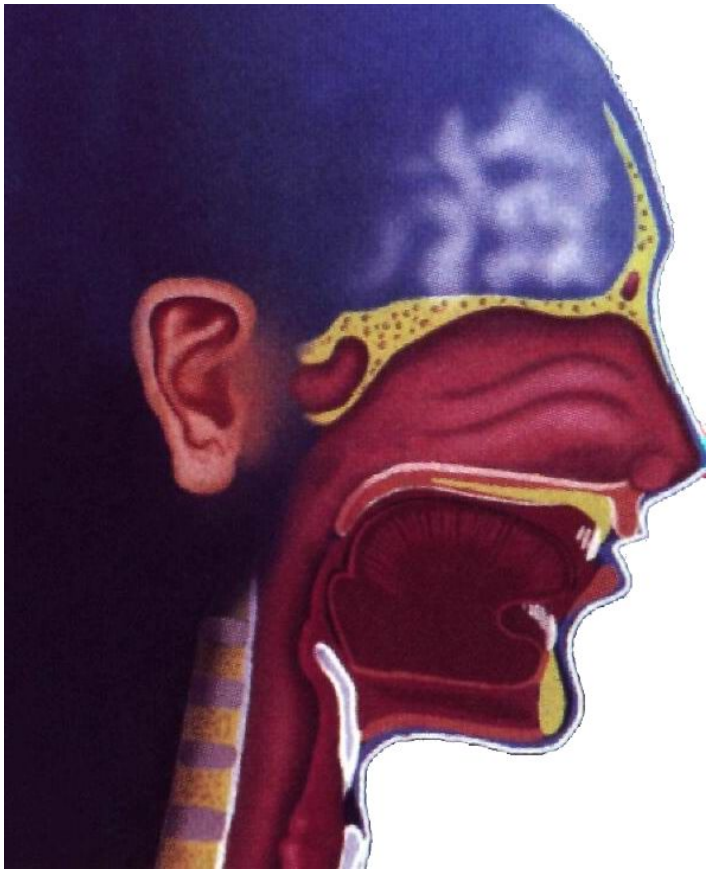
1) source of infection
2) mode of transmission
3) susceptibility of the human body

Sources of infection

- patients with clinically marked forms of infection like
- patients with attenuated and atypical forms of infectious disease
- virus and bacteria carriers

Mode of transmission

- the transmission is ***by droplet route*** (measles, rubella, whooping-cough, scarlet fever, epidemic parotitis)



Mode of transmission

- ***fecal-oral one*** (dysentery, salmonellosis, typhoid fever, paratyphoid A and B types, escherichiosis, viral hepatitis A)

Mode of transmission

- occurs in direct entry of the causative agent ***into blood*** (viral hepatitis B, C, D; HIV-infection)

Susceptibility of population

Susceptibility is defined by the index of ***susceptibility or contagion*** that is correlation of the number of the all people with those in contact

Susceptibility to infection determined of ***Specific immunity:***

- *active immunity* is formed after the disease and vaccinations
- *passive immunity* newborn gets his passive immunity from the mother via placenta

Age peculiarities of immunity formation

1. The younger is the child, the slower and the less is the growth of specific antibodies. At first, antibodies of class M are formed. And later (in the 2-3 month) immunoglobulin G are formed.
2. Babies have not specific response to bacterial toxins. In the 5th-6th month, there is immunity to antitoxins - physiological hypo-activity.
3. Babies have more developed nonspecific factors of defense: systems of complement, properdins; phagocytosis reaction is completely formed before birth.
4. Only babies have transplacental immunity

Differentiated peculiarities infectious disease of the babies

1. Due to placental immunity babies are unsusceptible to most viral infectious diseases.
2. The younger is the child, the more frequently deviations from the typical picture of the disease may be observed.
3. Children of an early age have the course of the infectious diseases of a septic type more often; toxic forms of the disease occur more seldom.
4. Frequent development of complications (otitis, pneumonia, etc).
5. The early age is characterized by prolonged and chronic diseases which are especially often

Preventive measures

The nonspecific prevention: includes measures directed at the improvement of general resistance of the child's body:

- rational nutrition,
- physical training,
- prevention of rickets hypotrophy.

General prevention measures –

teaching the sanitary-hygienic habits to children,

conducting sanitary educational work with their parents

Elaborated complex of emergency measures are directed at the four stages of the infectious process

- isolation of the patient
- measures concerning the people in contact
- disinfection
- report to the sanitary-epidemiologic authorities

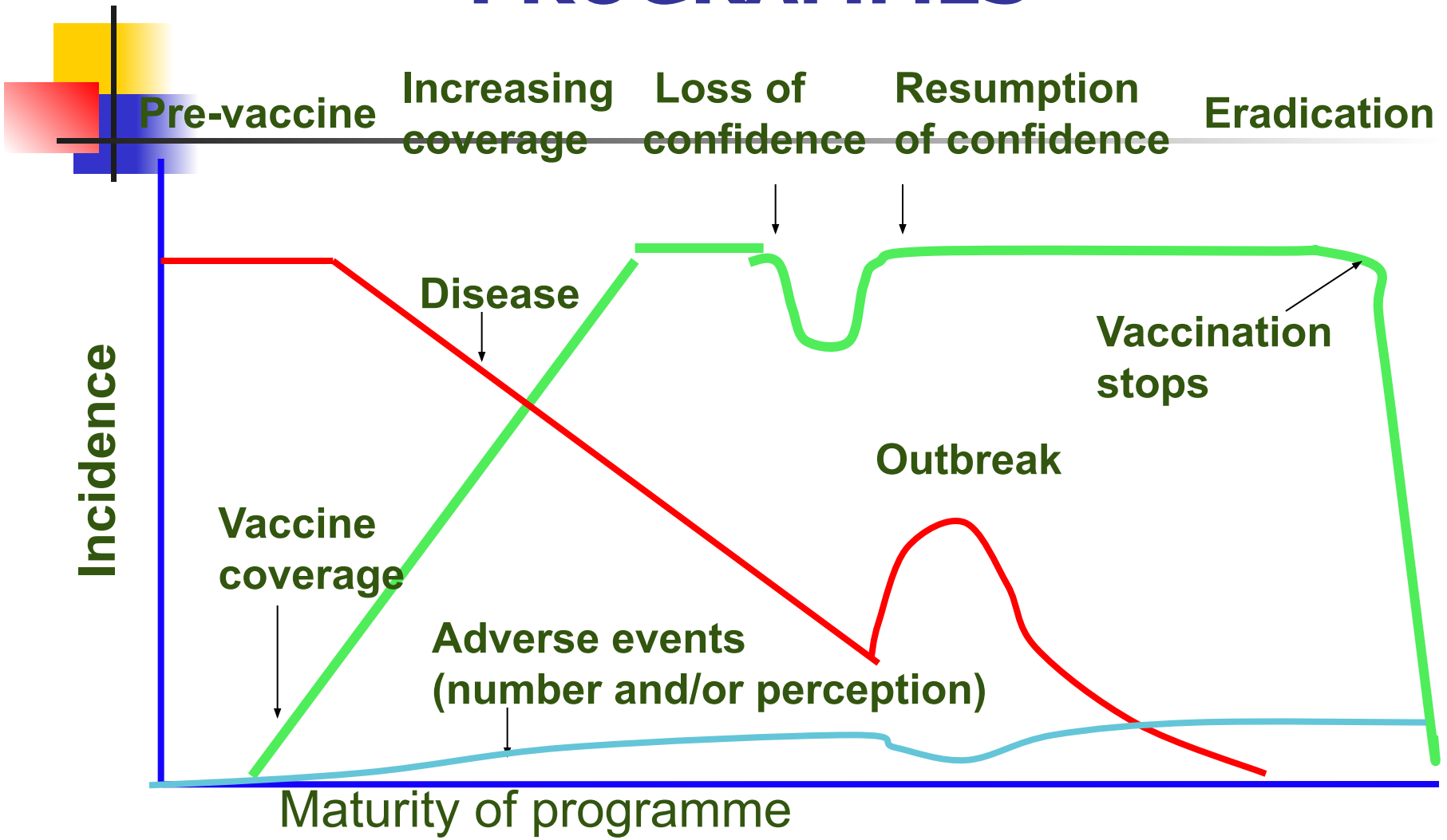
Specific prevention

- **Vaccination** (groups of diseases where the epidemic structure may be changed call ***controlled infections***)
- **Various gamma-globulins** are used mainly in those who are in contact with the patients

TYPES OF VACCINES

1. ***Live attenuated*** (oral polio, MMR, BCG, Yellow fever)
2. ***Killed vaccine*** – whole cell particle or split vaccines (influenza, IPV, hepatitis A, pertussis)
3. ***Subunit vaccines*** (meningococcal vaccine, *Haemophilus influenzae* vaccine)
4. ***Toxoid*** (diphtheria, tetanus)
5. ***Recombinant antigen*** (hepatitis B)
6. ***Combined vaccines*** (DTP, MMR, OPV, DTP+Hib+Hep B)

EVOLUTION OF IMMUNIZATION PROGRAMMES



Adapted from: Chen RT et al, *Vaccine* 1994;12:542-50

Whooping-cough (H. Pertussis)

ETIOLOGY

- Bordet-Gengou bacillus *Haemophilia (Bordetella) pertussis*
- Gram-negative
- Strictly aerobic
- Resistance is very low

Epidemiology

- the source of infection is a sick person
- particularly infective in the initial stage, but gradually becomes less contagious
- patients continue to discharge *H. pertussis* up to the 28-30th day
- infection is transmitted by the aerial-droplet route, (only by direct, more or less lengthy, contact with a patient)
- index of susceptibility is 0.7

Pathogenesis

- The ***portal of entry*** of infection is the respiratory tract
- ***H. pertussis*** settles in the mucous membrane of the bronchi, and bronchioles, but ***no bacteriemia***
- The principal pathogenic factor is the **toxin produced by *H. Pertussis*,** which ***brings die cough reflex***
- The continuous flow of impulses coming from receptors in respiratory tract leads to the development of stable ***focus of ex-citation in the central nervous system***

Pathogenesis

- Because of the frequent and prolonged paroxysms of coughing, and the circulatory disorders in the lungs, pulmonary ventilation becomes disturbed leading to ***hypoxemia and hypoxia***

Clinical manifestations

- The ***incubation period*** of whooping-cough is 3 to 15 days.

The course of the disease can be divided into ***three stages***:

- catarrhal,
- paroxysmal
- convalescent.

Catarrhal stage

- is manifested by a **moderate rise in temperature**, but it may sometimes be subfebrile, or even normal.
- by the end of the catarrhal period, the **cough progresses** in severity and frequency acquiring the character of more or less prolonged paroxysms, occurring mostly **at night**.
- the patient's **general state** is ***not*** much ***disturbed***
- the catarrhal stage lasts for ***3 to 14 days***, but may sometimes be shorter especially in 1-year-old babies.

Paroxysmal stage

- **Paroxysms of coughing** develop.
- The paroxysm ***consists*** of a series of short coughs following one another in rapid succession without a break.
- Then the child makes an inspiration, which owing to ***laryngeal spasm***, is accompanied with a ***crowing sound*** (**whoops**).
- A coughing bout often ends in expectoration of a pellet of viscid transparent mucus and sometimes ***vomiting***.

Paroxysmal stage

The outward appearance of the patient during a fit is characteristic: the face becomes red and sometimes takes on a cyanotic hue; the cervical veins become engorged; the eyes are bloodshot; the tongue is protruded to the limit, and its tip curves upward

Paroxysmal stage

- As a result of frequent paroxysms, the patient's face and eyelids become swollen and ***hemorrhages*** sometimes appear in the skin and ***conjunctiva***

Paroxysmal stage

- The ***ulcer on the tongue*** results from mechanical rubbing of the frenulum against the sharp edges of the lower incisors
- Signs of ***emphysema*** are often found on percussion of the lungs.
- ***Auscultation*** reveals dry rales and dull moist-rales in pneumonia complications
- The ***pulse*** rate is increased during paroxysms and there is an elevation of ***arterial pressure***
- In the patients ***blood*** counts reveal marked leukocytosis and lymphocytosis. The ESR is either lowered or normal

Clinical forms

There are three principal forms of whooping-cough: ***mild, moderate, and severe***

In the mild form

- the frequency of **coughing** fits is between ***five and fifteen*** a day
- only rarely end in vomiting
- The patient's **condition is *undisturbed***

Clinical forms

In the moderate form

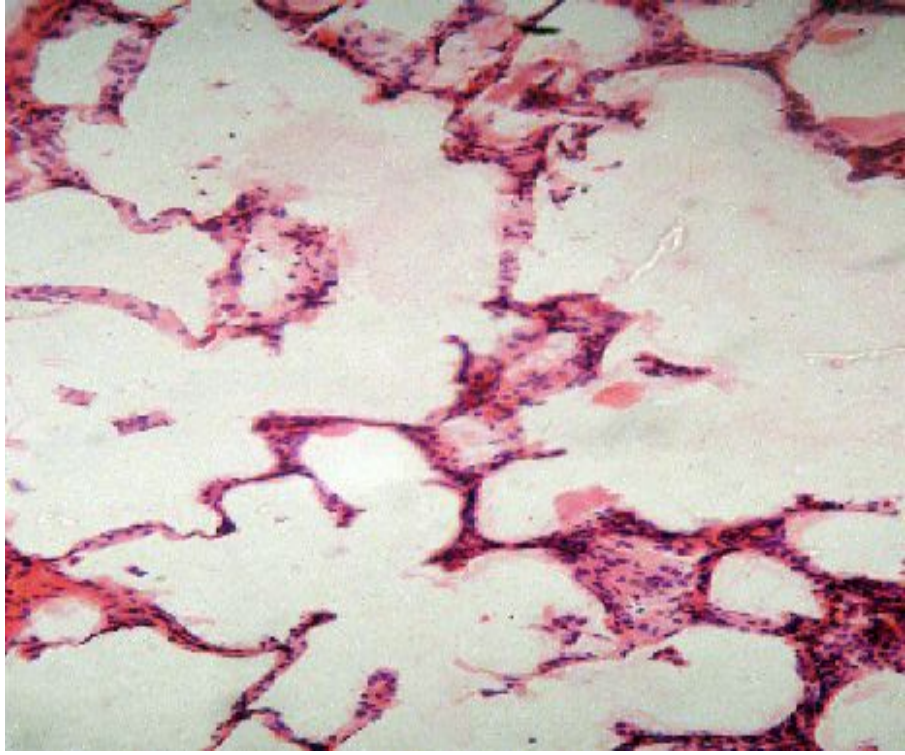
- the number of fits varies between ***15 and 24***
- with ***several whoops***

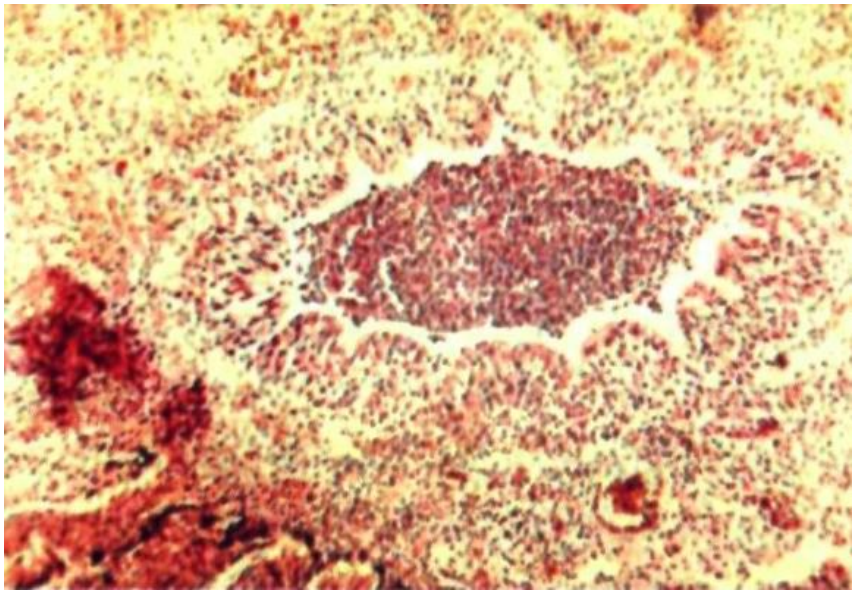
In the severe form

- numerous bouts of coughing of ***25 to 30***, or more, a day
- Paroxysms are severe and last up to ***15 min***, with ***10 whoops***, and always terminate in vomiting
- ***disturbed sleep***, loss of appetite, loss of weight, adynamia and often a long febrile state are noted

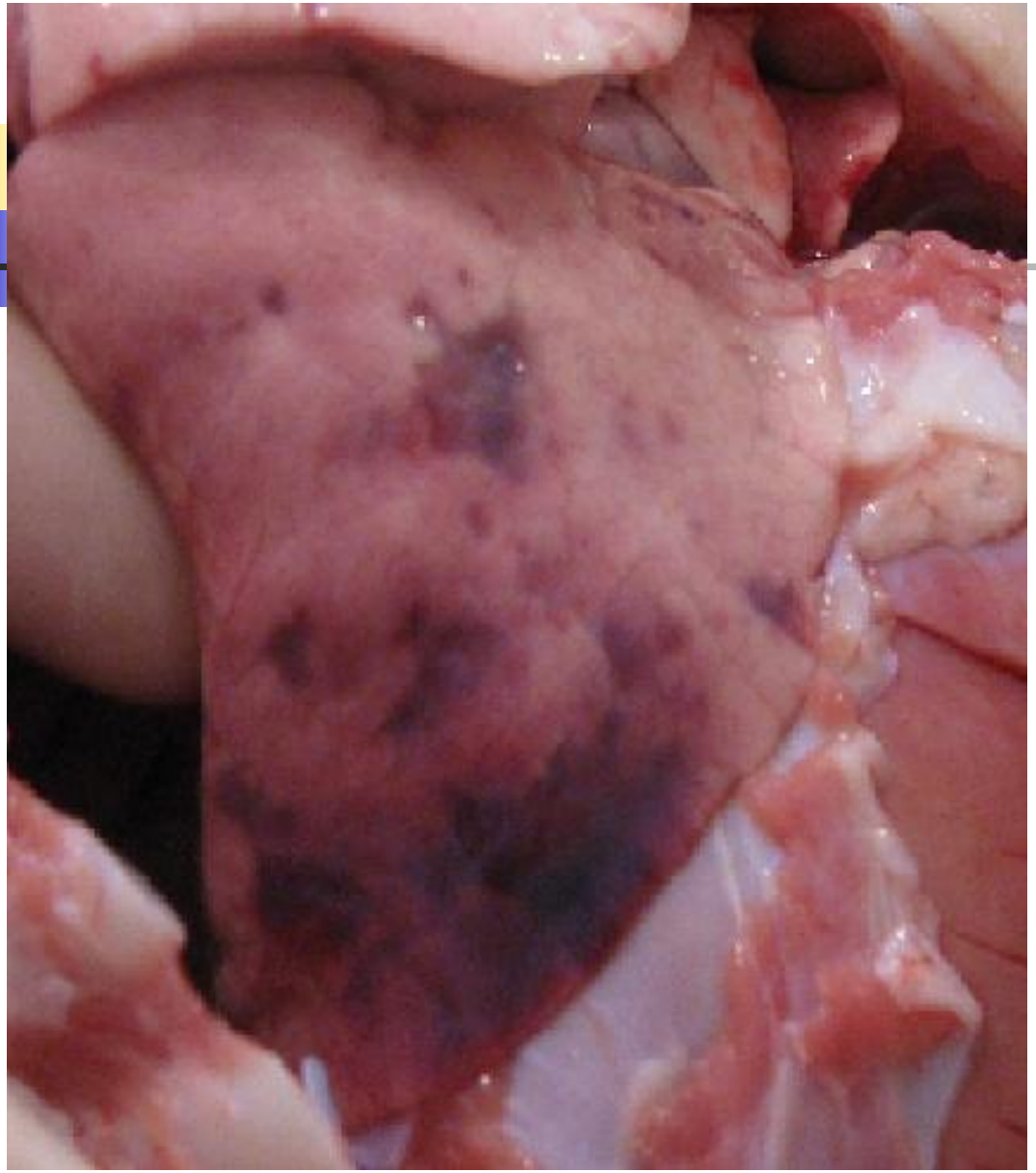
Complications

- ***respiratory*** bronchitis and bronchopneumonia
- ***bronchopneumonia***
- spontaneous ***pneumotorax***





- ***emphysema*** of the mediastinum
- the nervous system is most often affected - epileptiform convulsions and ***encephalopathy***



THE CIRCULATORY DISORDERS IN THE LUNGS WITH THE GEMORAGIC

In one year old babies whooping-cough

- incubation period and catarrhal stage is usually ***shorter***
- the fits of coughing often cause ***apnoea***
- ***mental confusion***, attacks of ***epileptiform*** convulsions, and twitching of the facial muscles are also more common
- respiratory ***complications*** (bronchitis and bronchopneumonia) are more frequent

Diagnosis

clinical course

- cyclic character, paroxysmal bouts of coughing with whoops, ending with vomiting, typical appearance of the patient

- hematological shifts
- results of X-ray examination of the chest
- analysis of the epidemiological situation

- ***Bacteriological tests***
- ***Agglutination and complement***

Treatment

- Properly organized ***regimen*** and nursing
- ***Cold fresh air*** has a wonderful effect on patients.
- ***Antibiotics*** are successfully used today as a specific (etiotropic) therapy of whooping-cough. Erythromycin, ampicillin, amycacin, are given in the catarrhal or early spasmodic period.
- In order to attenuate the pertussis attacks, neuroplegics are recommended: ***aminazine, propazone.***
- ***Oxygen therapy*** (oxygen tent) is especially valuable in pertussis.

Prophylaxis

Measures to be taken in an epidemic focus

- The patient is usually left at home and put in a separate room or behind a screen.

Hospitalization

- in severe and complicated forms of whooping-cough,
- particularly in children under two years of age,
- children from families living in poor conditions,
- and from families where there are babies under six months of age.

patients are ***isolated*** for 30 days from the onset of the disease

Active immunization

immunization against whooping-cough is given by pertussis - diphtheria - tetanus vaccine beginning from 3 months of age 3 times with 30 days interval and revaccination in the second year of age.