Meningeal a syndrome in clinic of infectious diseases. Differential diagnosis of a serous and purulent meningitis.

BOS (brain edema-swelling).

Infectious diseases of CNS show:

- **fever, a headache, weakness, vomiting, photophobia,**

- **meningism (a rigidity of a neck, positive Kernig's and Brudzinski's symptoms,**
- **mental deviations,**
- **signs of the increased intracranial pressure,**
- **cramps,**
- **paresises and paralyses cranial nerves.**

Sometimes expression of these signs happens too weak: children can have only a weakness, and deviations in behaviour, sometimes a protrusion of a cranial fontanel and a rigidity of a neck, and at old men only a fever and mental deviations.

Etiological diagnosis of the infection affecting CNS is very important, as many of them are fulminant and present hazard to life, but on the other hand many of them are curable at timely diagnosis and adequate treatment.

In diagnosis of infectious diseases CNS the leading part belongs to examination CSF, changes in which can be parted on 3 types: A,B,C by following criterions: transparency, cellular composition, level of protein and a glucose in its.

normal CSF – transparent and in 1 cubic mm contains of : mononuclear cells < 5, protein 0.1- 0.4 g/l, glucose > 2/3 – 1/2 from quantity in blood

Type A –turbid and in 1 cubic mm contains of: monocytes - less than 50, polymorphonuclear neutrophils – 1000-10,000 (90 %), protein 0.5 – 2 g/l, a glucose <1/2 from quantity in blood.

They are characteristic for:

- **bacterial meningitis produced: Meningicoccus, Haemophilus, Streptococcus pneumonia, Listeria and т.д.**
- **perforated abscess of a brain**
- **amebic meningoencephalitis**

Type B slightly turbid or transparent, sticky and in 1 cubic mm contains of: monocytes 100 - 300, polymorphonuclear neutrophils 0 - 200, protein 0.5 – 3 g/l, a glucose <1/2 from quantity in blood

They are characteristic for: granulomatous meningitis – tubercular, mycotic

Type C– transparent or slightly turbid and in 1 cubic mm contains of: , monocytes : 10 – 100 -1000, polymorphonuclear neutrophils - 0, protein – 0.4 – 0.8 g/l, glucose–> 1/2 from quantity in blood. They are characteristic for:

Parameningial infection (a brain abscess, a subdural abscess, cerebral both spinal and epidural abscesses, a cerebral thrombophlebitis, an otitis or sinusitis)

Various infections mycoplasmosis, listerosis, rickettsis, lues, Lyma - disease, leptospirosis, cerebral malaria, trypanosomiasis, trichinosis, toxoplasmosis,)

Toxic encephalopathies caused by the systemic bacterial infections

Viral infections (simple herpes of the 1st and 2nd types, VZV)

Viral infections not giving in to treatment by specific antimicrobic drugs:

- **Postinfectious and postvaccinal encephalitises** (rabies, Influenza, pertusis etc.)
- **Virus meningitis:** parotitis, Coxsakie A and B, lymphocytic choriomeningitis, arboviral, etc.

The most characteristic representative of the diseases proceeding with change CSF for type A, is

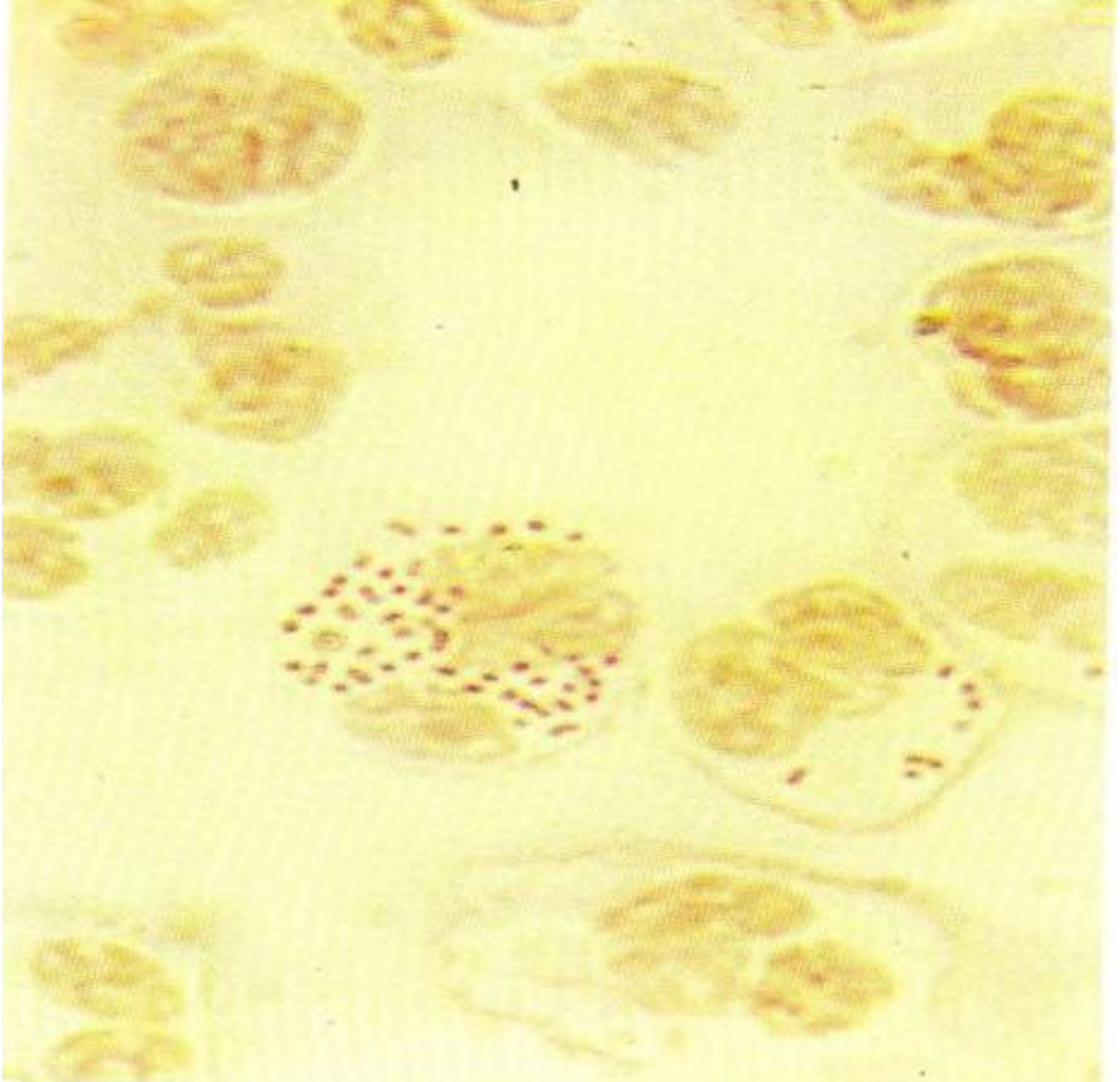
MENINGOCOCCAL INFECTION - acute polymorphic disease of the man manifesting itselfs as a nasopharyngitis, meningococcal sepsis, meningitis or meningoencephalitis.

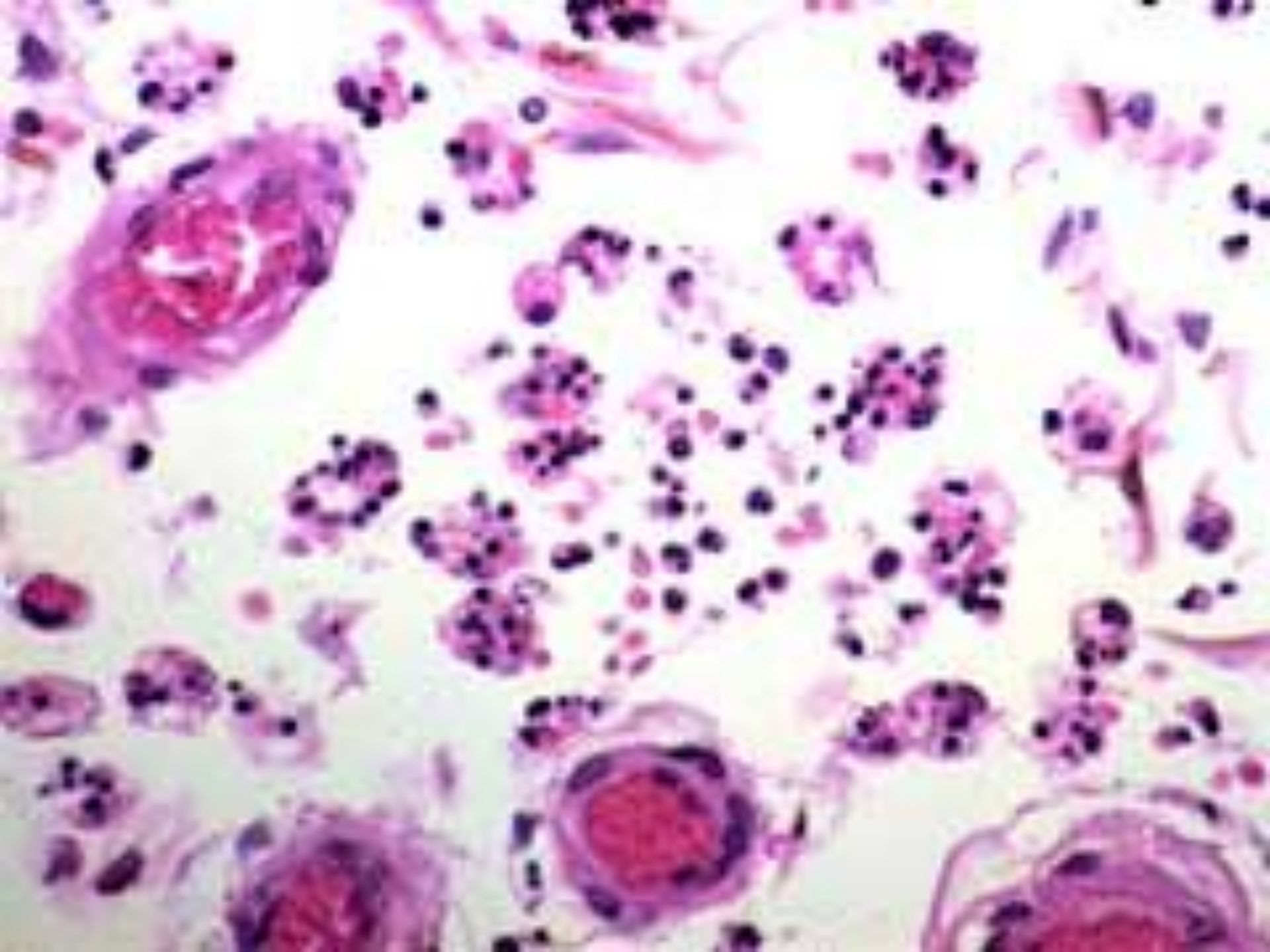
ETIOLOGY: Neisseria meningitidis N.m. (F. Neisseriaceae, G.Neisseria) shallow gram (-) cocci by a size 0.6 – 0.8 microns, the strict aerobes, are immobile and in smear more often they were found out inside cells on one, pairs or tetrads.

All N.m. (except for group B) have a mucous capsule.

N.m. are divided on 10 serological of groups:

A, B, C, D, X, Y, Z, 29E, 135W, P.





N.m. are very sensitive to changes temperature, humidity and pH (optimal temperature for the reproduction within the limits 36 – 37.6 dg. C and pH within the limits 7.2 – 7.4).

Stability in the external environment minimum:

- all disinfectant solutions (even in minimum concentra - tion), boiling, ultraviolet light are inactivated their

- antibiotics suppression their, but to some antibiotics fast acquire stability.

Extremely changeability under effect of the unfavorable factors with appearance of, atypical forms, L - forms and K - forms of colonies.

Pathogenic of properties are stipulated:

- by an endotoxin having potent pyrogenic and sensitising effect in a phenomenon Шварцмана
- hyaluronidase facilitating to them easy to penetrate in all tissues.
- the antiphagocytic effect stipulated by presence of a mucous capsule (except for group B)

Has the following antigenes:

- Genus (protein and polysaccharides) - common for all N.m.
- Specific antigene (protein) - only for N.m
- Groupspecific (glycoprotein. complex) - arrange on groups A, B, C etc.
- Typespecific (protein)–allocation serotype among groups B and C

EPIDEMIOLOGY - anthroponosis

Sources:

	Epidemiological danger	danger infection
- patients with the genera-lised forms of disease	low	high
- patients with a nasopharyngitis	moderate	moderate
- carriers N.m.	high	low

Duration of infectious period 3 - 4 weeks.

Patients are infectious - during a prodrome and acute phases of disease!!!

The sporadic cause rate is supported by carriers of groups A, B, C with identical frequency.

At epidemic upraises - the group A is more often!!!

The carriage exceeds a cause rate in 2.000 times and during epidemic upraise and can reach 6 - 8 % of all population

Frequency of a carriage among contacts in the focus of infection is:

- with the generalised forms 22 %
- with nasopharyngites 14 %
- with carriers N.m. 8.6 %
- outside of the focus infection 0.6 – 0.8 %

The mechanism of transmission – air-drop, flaccid (for effective infection it is necessary - small distance (0.5 m) and long-lived exposure).

Urbanization and moving of the people in conditions of close expanse (bus) - play a main role in distribution

N. m.

The man can be ill in any age, but children till 10 years of life are sick more often (80 %)

Characteristicly sluggish distribution on territories and focal of a damage.

gisters everywhere with periodic upraises of a cause rate:

hrough 8 - 30 years in the developed countries (are more often A)

often irregular uprises in the African countries:
“a meningitis girdle" along southern on the border of Sahara - where the upraises of a case rate register every 2 years.
ften types B and C)

e upraises of a cause rate connect to increase of a not immune layer of the population with years.

Fore-runners of upraise of a case rate:

- appearance of diseases in the closed establishments, not connection among themselves
- acceleration of selection from CSF (cerebrospinal fluid) or blood N.m. groups A and C

Fore-runners of wane of a case rate:

- early beginning of seasonal upraise
- absence of differences of a case rate in opened and closed children's collectives
- lowering group cause rate,
- increase of number of carriers
- acceleration of selection from CSF and blood N.m. others serogroups except for A and C.

PATHOGENY - disease develops in 3 stages:

- the local forms develop more often diseases as a nasopharyngitis or carriages

- at infiltration N.m. in a blood, that following them lysis and endotoximia - disease proceeds as an acute sepsis with onset of hemorrhagic changes on skin and in internal organs

- into a brain N.m. will penetrate by hematogenous path. Other paths of infiltration - casuistry!!!

Serum antibodies and high concentration Ig A on mucous URT (upper respiratory tract) - play important role in to protection of an organism from N.m.!!!

PATHOMORPHOLOGY

- the N.m. causes acute inflammatory response in a place of implantation (statifield plane epithelium).

Endotoximia results in a diffuse vasculitis and DIC -
(disseminated intravascular coagulopathy)

Vessels are filled by clots of blood with a major contents of a fibrin and leucocytes, that results in hemorrhages in all bodies, but on a skin they are most appreciable and frequently are accompanied by necrosises at the centre large eruptions.

The cause of a generalisation of the process is not clear. N.m. “love" well-nourished children and proof body build of the adults »- probably influence of the genetic factors and inadequate response of an organism to implantation of the N.m.!!!

CLASSIFICATION.

It is allocates the following forms of diseases:

Localized

- **Carriage**
- **Nasopharyngitis**

Generalized

- **Meningococcal sepsis (acute and chronic)**
- **Meningitis**
- **Meningoencephalitis**
- **Mixed (sepsis + meningitis and etc.)**
- **Infrequent forms of disease: endocarditis, arthritis, pneumonia, iridocyclitis, otitis etc.)**

MENINGOCOCCAL CARRIAGE STATE - not clinical manifestation, is taped by detection N.m. in culture and smears from a nasopharynx. The antibodies against N.m. in a blood will not be derivated!!!

NASOPHARYNGITIS - clinical manifestations:

Moderate parietofrontal headache	52 %
Malaise/fatigue	46 %
Dry cough	66 %
Pharyngalgia	51 %
Stuffiness of a nose	68 %
Violation of dream	33 %
Fever	59 %
(Subfebrile - 78 % and febrile - 22%	
Mild current of disease	88 - 95 %
Moderate current	5 - 12 %

Common duration of illness 5 - 7 days

The nasopharyngitis precedes the meningococcal sepsis in 33 %!!!

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MENINGOCOCCAL SEPSIS:

- acute beginning with chill and fast rise high intermittent temperature up to 38 40 dg. C. - is reduced at aggravation of symptoms (manifestation TIS)
- expressed intoxication (headache, thirst, weakness, paleness and dryness of a skin)
- appearance of signs hemorrhagic syndrome: appearance of a hemorrhagic eruption with a necrosis on a skin of buttocks, femurs, legs, trunk, arms, eyelids

Already after 6 hours from a beginning of disease!!!

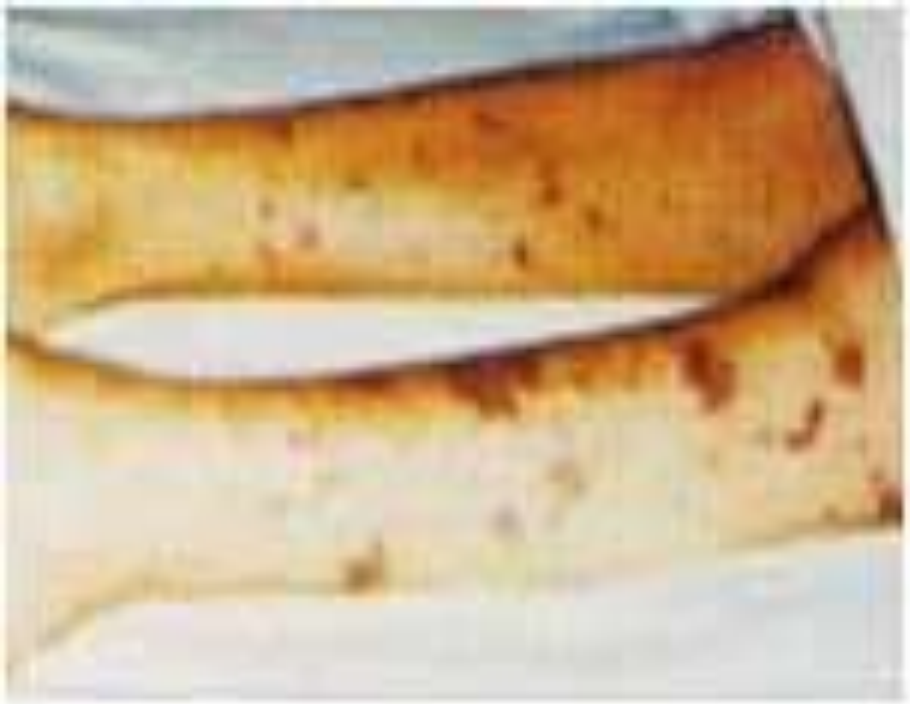
- enanthema in a transitional fold conjuctivas, hemorrhages in scleras

the hemorrhages in joints 5 - 13 % (fingers arms and legs more often are affected than the large joints)

- common manifestations of a hemorrhagic syndrome - nasal, uterine, internal bleedings

Менингококкемия. Крупные кровоизлияния в кожу рук и ног.

Менингококкемия. Некроз кончиков пальцев (12-й день болезни).




A.D.A.M.

The scar after of a hemorrhagic eruption with a necrosis on a skin

- CCC - dull of cardiac sounds, hypotonia, tachycardia
- respiratory system - dyspnea, cyanosis, shallow breathing, dry rales

- GIT (gastrointestinal tract) - coated tongue, increase liver and spleen, constipations,
- kidneys - function violations 87 %, decrease of a diuresis, rise of a contents in urine protein, leucocytes, erythrocytes, cylinders

WBC - hyperleukocytosis in a blood and HYPER - ESR (40-65 mm/h)

ABB - metabolic acidosis and respirotory an alkalosis (as compensation of an acidosis)

- electrolitical an EXCHANGE - hypopotassimia, hyposodimia, hypochloremia

- injure of adrenal glands follow decrease BP down to development of a syndrome WATERHAUSE - Fridrechsen

Independently MENINGOCOCCAL SEPSIS arises only in 7,3 % of causes. To othen is combined with a meningitis or meningoencephalitis!!

The gravity of a sepsis is stipulated by appearance TIS, which in the development passes stages:

- compensation (BP in norm),
- subcompensations (BP is reduced up to 80 мм.рт.ст)
- decompensation (BP below 80 мм.рт.ст)

Differential diagnosis will be carried out with:

- hematosepsis,
- severe influenza,
- hemorrhagic vasculitis,
- Werlhof's disease (idiopathic thrombocytopenic purpura).

THE CHRONIC MENINGOCOCCAL SEPSIS

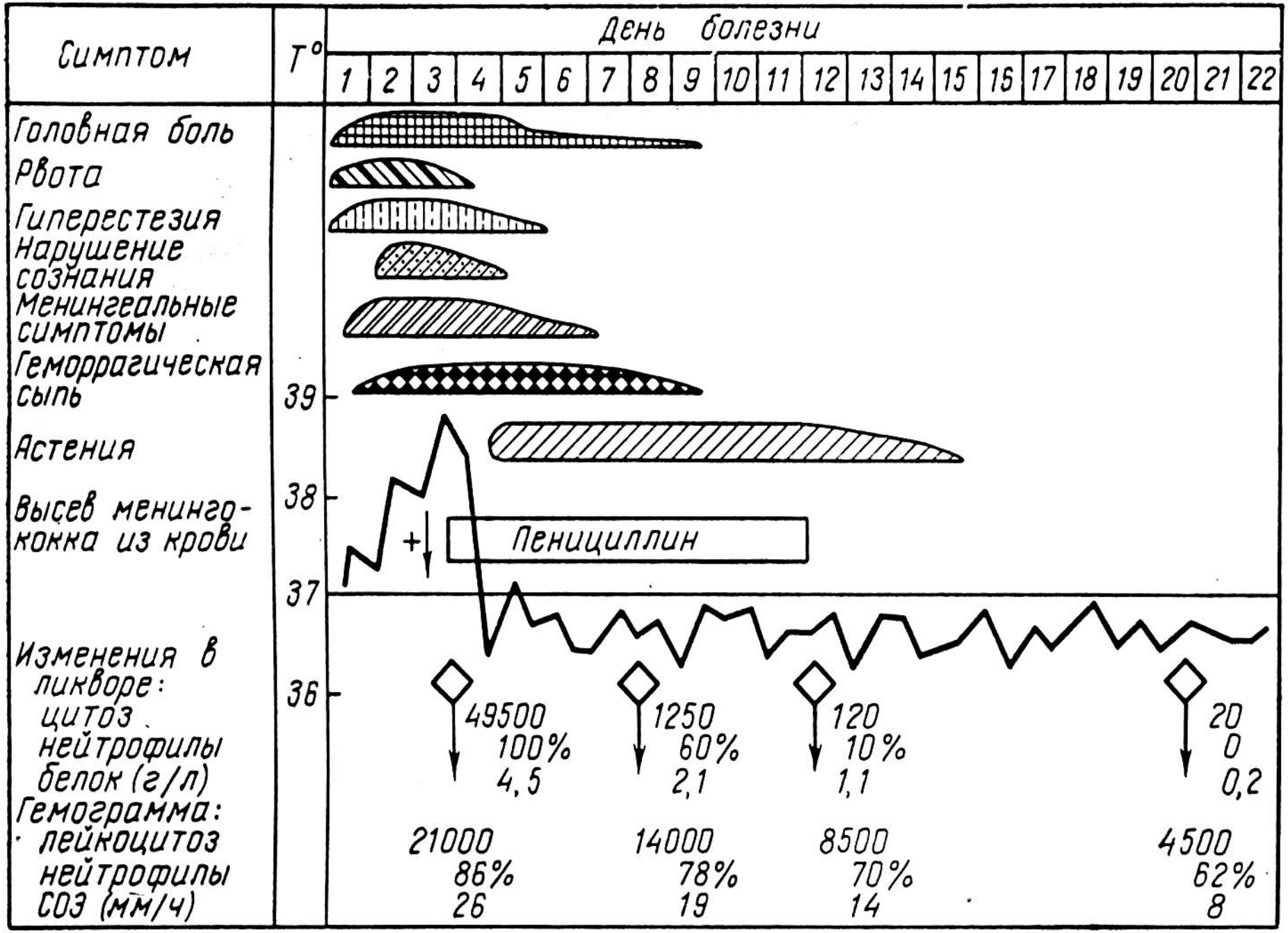
- is more often for the impaired patients and appears:

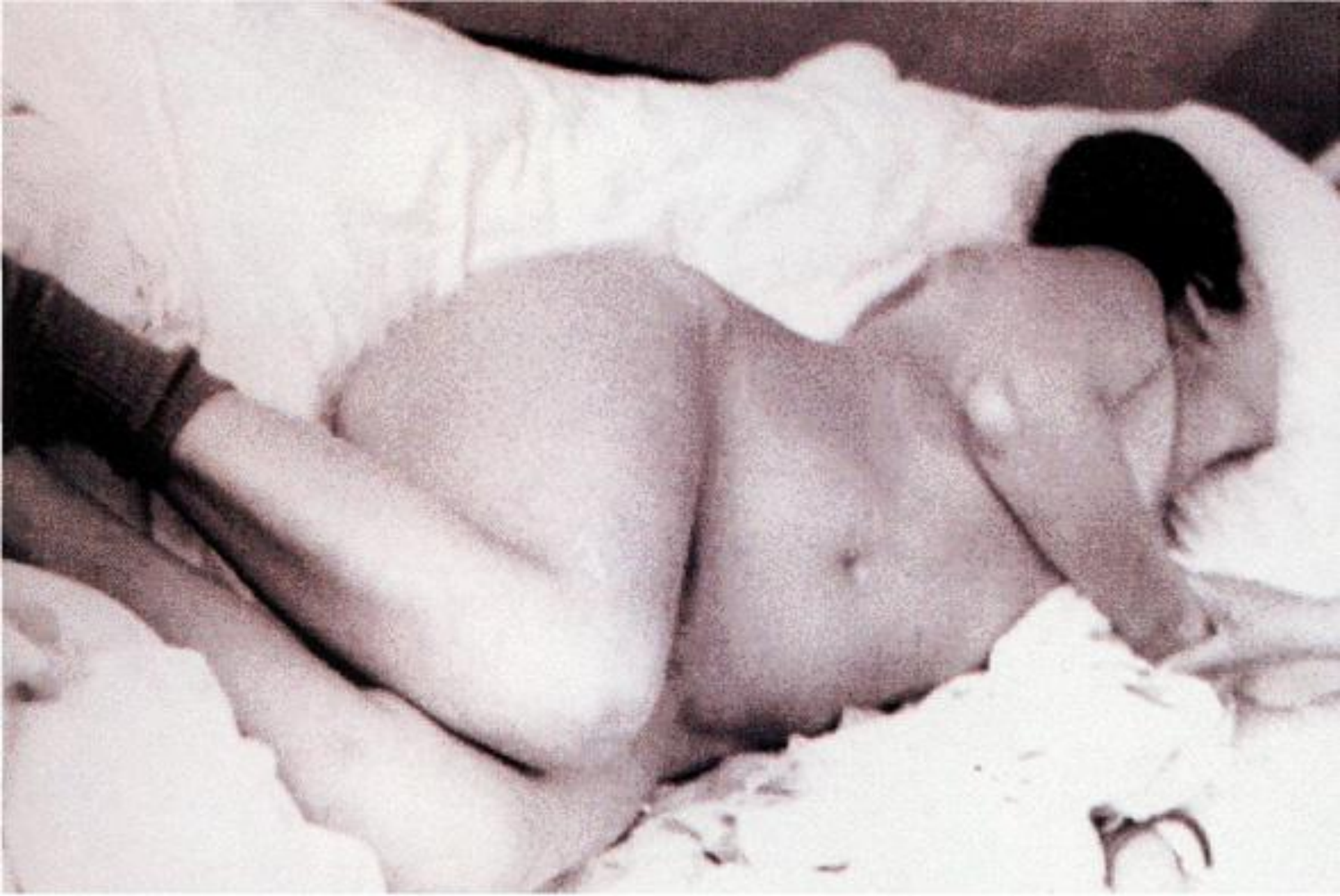
- Lowering or losses of appetite
- Lowering mass of a body
- Temperature rise (different intensive)
- Arthralgias or purulent arthritises
- Spotty - papular eruption on a skin
- Meningococcal subacute ENDOCARDITIS!!!

MENINGITIS

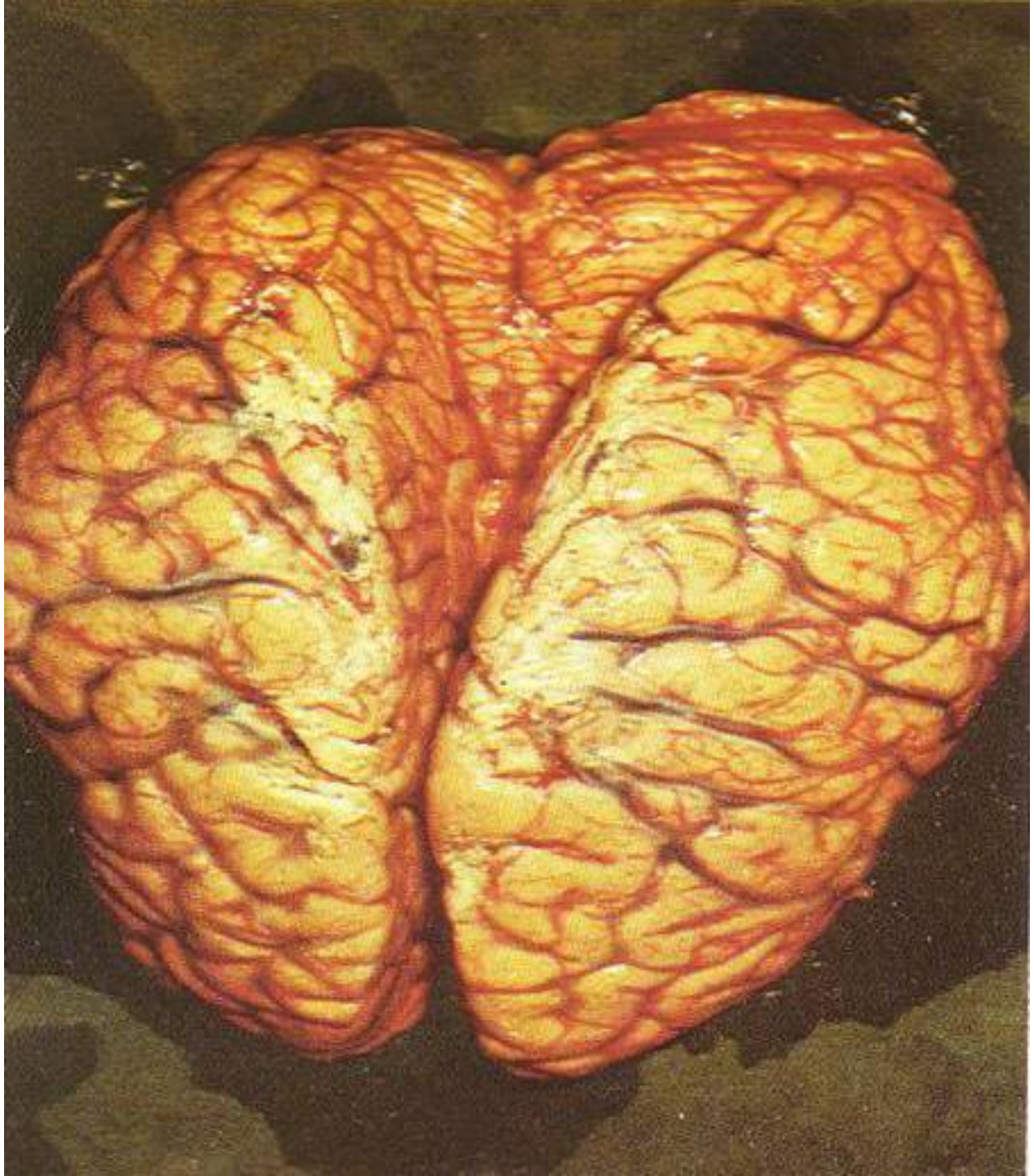
- the sudden beginning (remembers hour of onset disease)
- high fever
- Intensive headache in the field of a nape
- the vomiting, which does not bring simplification
- hyperstesia, hyperacusia, photophobia
- appearance and increase of an expressiveness of meningitis signs (rigidity of muscles of a nape, Kernig, s, Brudzinsky, s symptoms etc.)
- damage cranial nervous :
- 3- 4 paers (diplopia, ptosis, anisocoria)
- 7- 8 pairs (12,7 %) - injure of an acoustical nerve with by the subsequent lowering of hearing for 6 % of the patients

In CSF - neutrophils it is more 1000 in 1 mcl for 83 % of persons increase of protein and falling of a level of a glucose.


Симптом
T°
День болезни
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
Головная боль
Рвота
Гиперестезия
Нарушение сознания
Менингеальные симптомы
Геморрагическая сыпь
Астения
Высев менингококка из крови
39
38
37
36
+
Пенициллин
Изменения в ликворе:
цитоз
нейтрофилы
белок (г/л)
49500
100%
4,5
1250
60%
2,1
120
10%
1,1
20
0
0,2
Гемограмма:
лейкоцитоз
нейтрофилы
СОЭ (мм/ч)
21000
86%
26
14000
78%
19
8500
70%
14
4500
62%
8



Менингококковый менингит (2-й день болезни).
Синдром «укорочения» (характерная поза).

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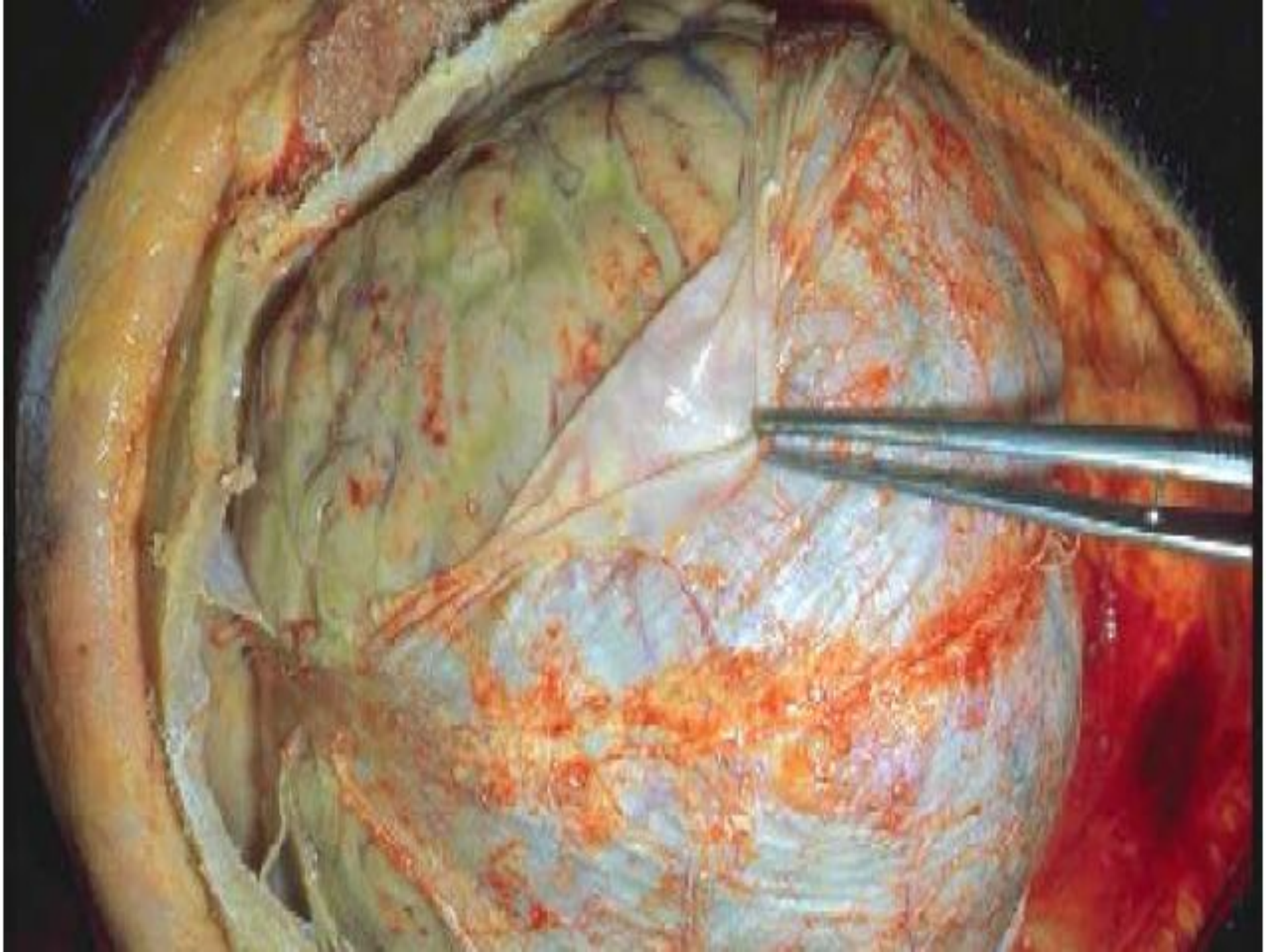


Frequently is accompanied by a syndrome of an EDEMA or BLOATING of a brain with such manifestations:

- **violation of consciousness**
- **involantary movements, cramps**
- **disorder of respiration and activity CVS**
- **wedge of an oblong brain into foramen magnum or subepindemal edema in the field of 3 - 4 ventricles of a brain**
- **without adequate treatment - lethal outcome!!**

The syndrome CEREBRAL HYPOTENSION

- **more often occurs for 3-4 days for children at treatment by massive doses of penicillinum or carrying out of an excessive dehydration.**

Is characterised by a sharp toxicosis and dehydration.

The child is view similar on “squeeze" a lemon

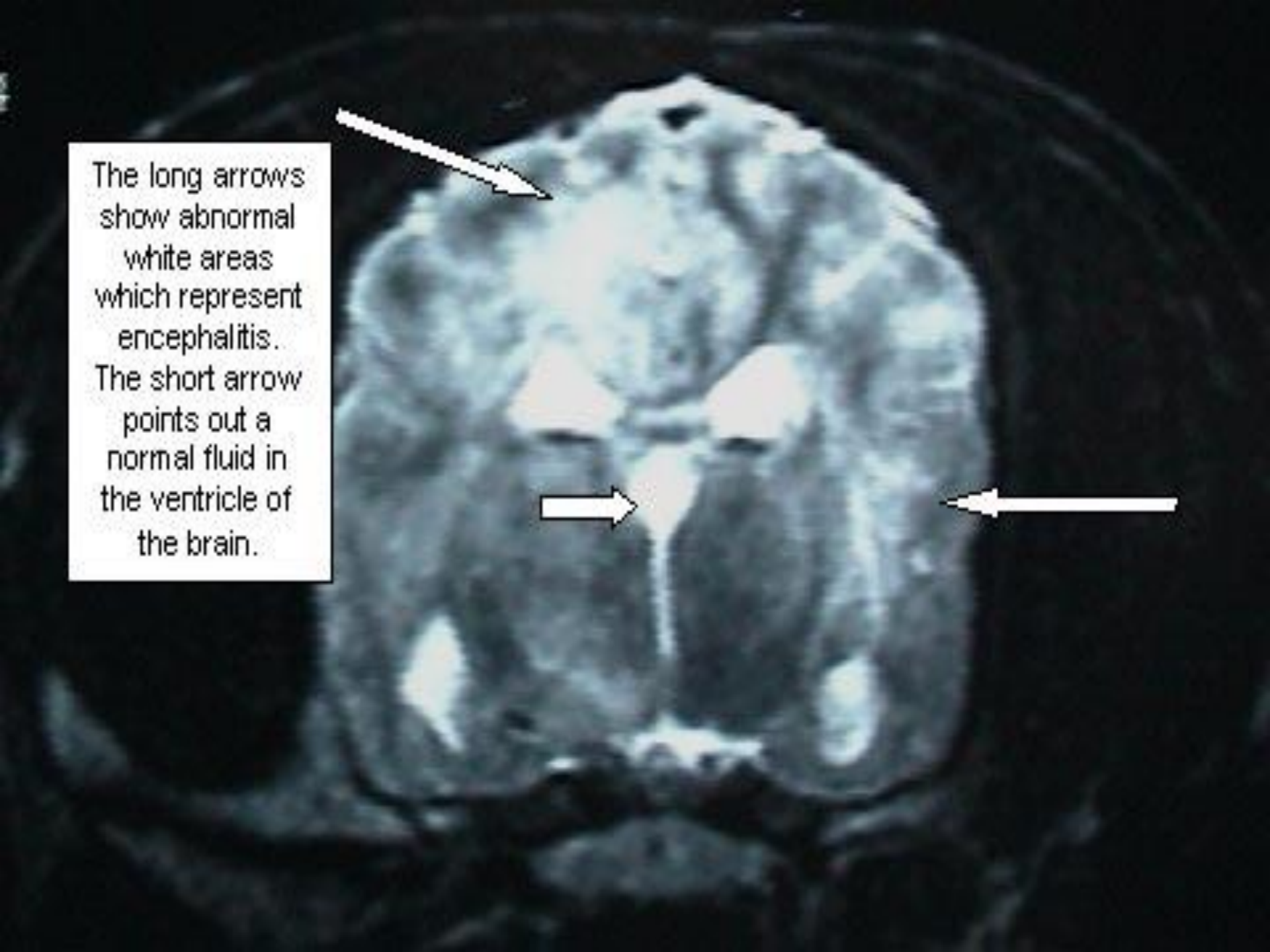
THE MENINGOCOCCAL MENINGOCEPHALITIS

- more often appears by a diffuse damage of a brain with a loss of consciousness and less often by separate focal changes:
- Aphasia 3 %
- Psychosensorial disorders 1 %
- Cramps, mono and hemipareses 3 %
- Oculomotor disorders 27 %

COMPLICATIONS:

- Acute renal unsufficiency
- Dural and subdural exudates
- Virus or bacterial superinfections
- Activation of simple herpes in 38 %
- Pneumonias 6 - 22 %, otites, cystopyelitis 4,1 %

Менингококковый менингит (период выздоровления).
Парез лицевого нерва.


The long arrows show abnormal white areas which represent encephalitis. The short arrow points out a normal fluid in the ventricle of the brain.

DIFFERENTIAL DIAGNOSTIC:

- edema of the brain - in CSF a cytosis, glucose and protein in norm, but at a puncture it extrusions under pressure
- pneumococcal meningitis - colour CSF greenish, the protein increased, frequently it is preceded with a pneumonia
- haemophilus infuenzae meningitis - fluid greenish, is steady against penicillinum (if for 3 days of treatment is not present improvements - it is necessary to think of an its)
- staphylococcal meningitis - it is secondary, frequently ls complicated abscess of a brain
- pseudomonadal - CSF of blue-green colour
- tubercular, virus, lues - CSF transparent also contains mainly lymphocytes
- the subarachnoidal hemorrhage – CSF contains Impurity of blood!!!

But only the bacteriological inspection allows to instal an aetiology of meningitis!!!

LABORATORY DIAGNOSIS:

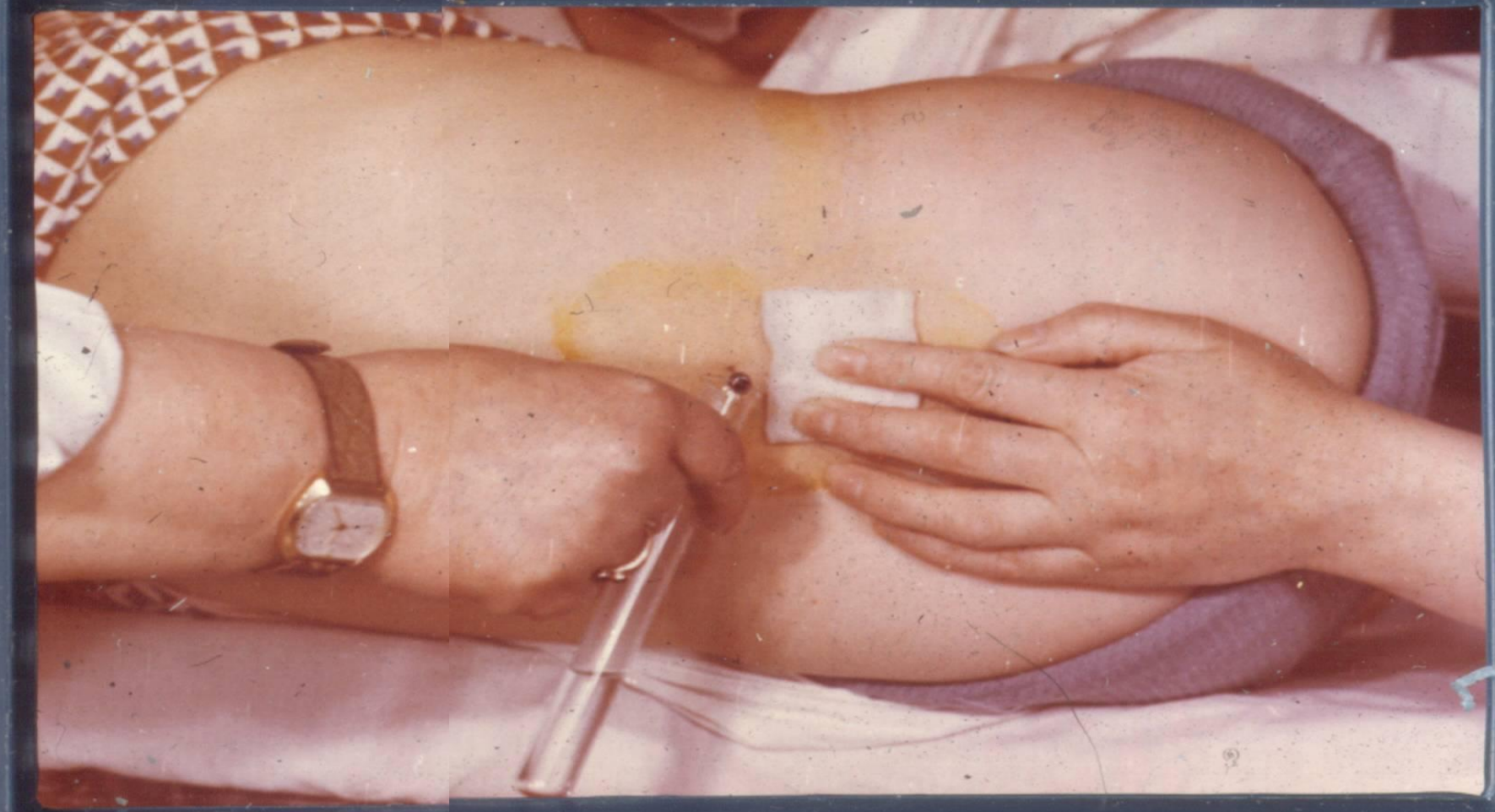
Microscopy smears from a mucous stomatopharynx, CSF and thick drop of a blood of (detection endocellular gramme (-) diplococci)

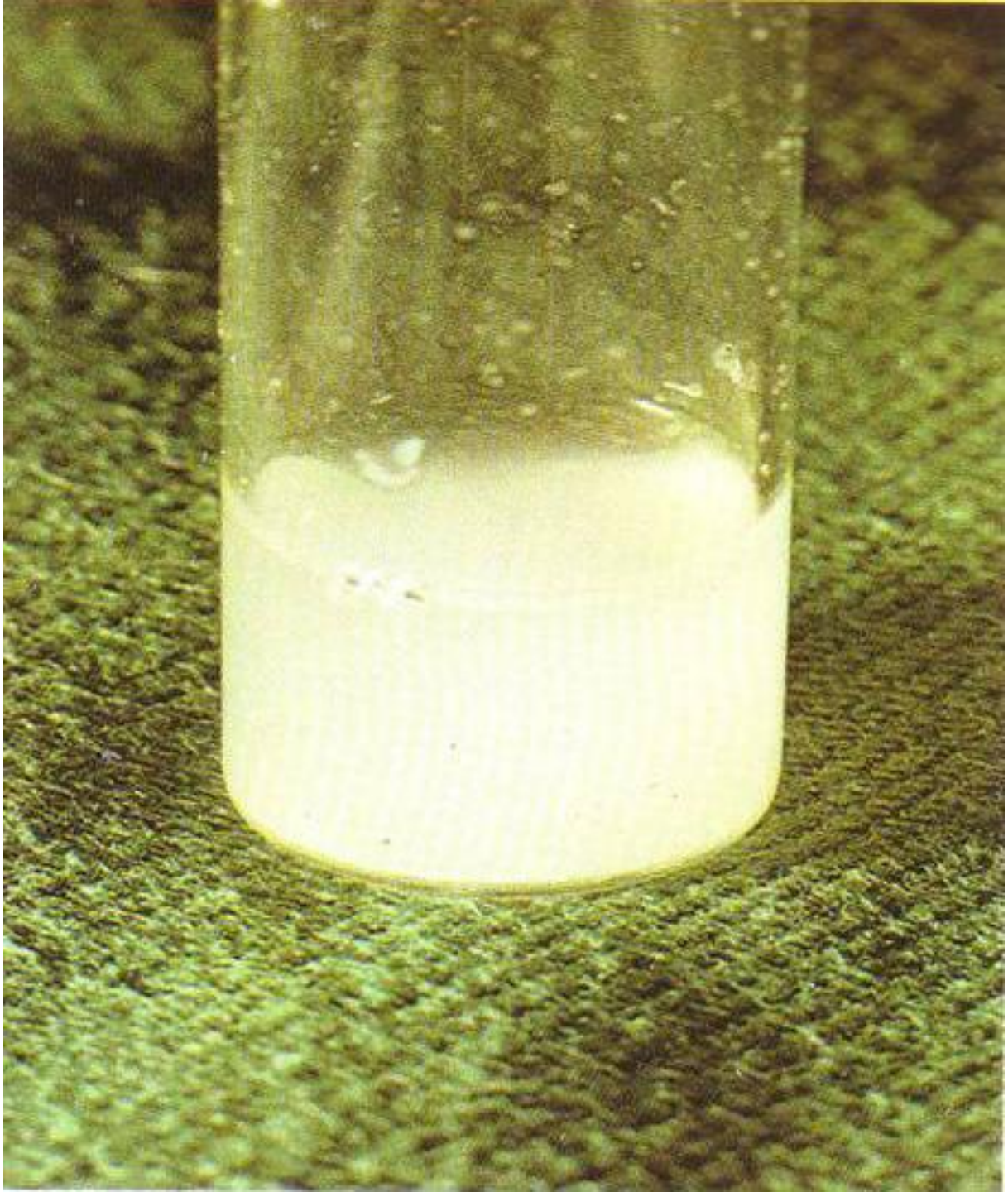
plating for bed of the patient on warming up to 37 dg.C from the nutrien medium (Хоттингера, Muller-Hintona, Number 199) 2.5 mls CSF and 5-10 mls of a blood.

Biochemical and morphological learning CSF (cytosis, contents of protein and glucose, detection of a film at the bottom test tubes

Common analysis of a blood and urine

Immunological inspection HA (diagnostic a credit 1:160) and PHA (1:200), ELISA





Examination of a cerebrospinal fluid CSF (6-7 ml)

- **The tube 1** (1 ml) – total quantity of erythrocytes and leucocytes (calculation monocytes and neutrophiles)

The tube 2 (1 ml) – the content protein and glucose + a glucose of blood

- **The tube 3** (2 ml)– inoculation of medium: a blood agar, chocolate - agar-agar in 10 % CO_2 at 37гр (bacteria), Sabourand`s medium (fungi), acid-fast bacteria (MBT)

The tube 4 (1 ml) - after centrifugation and sedimentation smear colour on the Gram. If result negative- stain with the Indian ink (detection of cryptococcuses) and on acid-fast bacteria (MBT) The residual CSF sends in laboratory for revealing of venereal diseases and a cryptococcal antigen

The tube 5 (1 – 2 ml)- is saved and if the previous examinations subzero (negative) is used for detection of viruses and carrying out more specialised analysises, **ELISA** and **PCR**.

TREATMENT

The lethality from the generalised forms of a meningococcal infection changes in limits from 8.6 % up to 24 % also depends on efficiency of treatment!!!

The major role in treatment belongs antibacterial of therapy, which should start immediately with usage all period fevers + 3 days (at a sepsis) or at decrease of a cytosis in CSF less than 30 cells (lymphocytes) :

Sodium salt of penicillin 50.000 - 80000 IU/kg IV q4h

- Chloramphenicol 15 – 25 mg/kg IV in q8h

,

Tetracycline in a dose 8 mg/kg IM in q6h

Ampicillin, metacycllin, oxacillin in a dose 30 50 mg/kg in q4h IV or IM

- Cefatoxim 1g. IV or IM in q12h
- Ceftriaxon 1 - 2 g. IV or IM in q12h
- Byceptol 980 мg PO, IV in q12h
- Sulfamonomethoxinum 4 g the first day, then 2 g. PO in q12h

The nasopharyngitis is treated 3 - by 5 days by erythromycin, azytromicin or sulfanilamidums, etc.)

Pathogenetic therapy:

- dehydrational therapy (at an edema brain)
- disintocsication therapy and glucocorticoids at TIS (TOXI - infectious shock)
- correction ABB.WEB, protein metabolism
- treatment of a hemorrhagic syndrome

Symptomatic therapy

PROPHYLAXIS

Measures directional on a source of illness:

- Earlier revealing of the patients and carriers and them treatment
- Overseeing contact: clinical and bacteriological

Tearing up of the mechanism of transmission:

- Sanitary - hygienic measures and disinfection, wet sweeping with disinfection drugs
- Liquidation cram people, is especial in the closed collectives (boarding schools, barracs etc.)
- Often airing of a rooms and its processing UVL

Rise of nonspecific stability and immunization of POLYSAC -charid vaccine. (it contents antigenes A.C.B)