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Clinical features and complications of neonatal jaundice

(Monograph)

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C O N T E N T

List of abbreviations

1. **NNJ** - Neonatal Jaundice
2. **TB** - Total Bilirubin
3. **UBC** - Unconjugated Bilirubin
4. **CB** - Conjugated Bilirubin
5. **G6PD** - Glucose-6-Phosphate Dehydrogenase
6. **ABO** - ABO Blood Group System
7. **Rh** - Rhesus Factor
8. **TcB** - Transcutaneous Bilirubin
9. **IVIG** - Intravenous Immunoglobulin
10. **PT** - Phototherapy
11. **TSB** - Total Serum Bilirubin
12. **BMJ** - Breast Milk Jaundice
13. **NICU** - Neonatal Intensive Care Unit
14. **HDN** - Hemolytic Disease of the Newborn
15. **RBC** - Red Blood Cell
16. **ABR** - Auditory Brainstem Response
17. **Kp** - Kell, Duffy, and Kidd Blood Group Systems
18. **HPLC** - High-Performance Liquid Chromatography
19. **GTT** - Glucose Tolerance Test
20. **NMR** - Nuclear Magnetic Resonance

Introduction

Jaundice in newborns is a common condition in which the skin and mucous membranes take on a yellowish tint. This occurs due to increased levels of bilirubin in the blood, a pigment that is formed during the breakdown of hemoglobin.

Etiology and prevalence

Physiological jaundice: Common in newborns and usually harmless. Usually develops 2-4 days after birth and disappears within 1-2 weeks.

Pathological jaundice: May be associated with a number of diseases, including hemolytic disorders, infections, liver disorders, metabolic disorders.

Pathophysiology

At birth, high fetal hemoglobin levels and rapid breakdown of red blood cells lead to increased bilirubin levels.

The immaturity of the newborn's liver does not allow it to effectively process and remove bilirubin.

Clinical manifestations

Jaundice begins in the face and spreads to the trunk, limbs, and whites of the eyes. The degree of jaundice can vary from mild to severe.

Diagnostics

Determined clinically and confirmed by laboratory tests (serum bilirubin level). It is important to distinguish physiological from pathological jaundice .

Complications

The main complication is kernicterus, in which high levels of bilirubin cause brain damage . Other complications include dehydration and malnutrition due to feeding problems.

Treatment and prevention

Treatment includes phototherapy, which helps convert bilirubin into a form that can be easily eliminated from the body. In severe cases, an exchange transfusion may be required. Prevention involves early identification and monitoring of children at high risk of developing jaundice.

Conclusion

Jaundice in newborns is common but requires close monitoring and, in some cases, aggressive treatment to prevent complications. Understanding its causes, developmental mechanisms, and treatment approaches is an important component of neonatal care.

The relevance of the topic of jaundice in newborns in modern pediatrics and neonatology is due to several key factors: High prevalence: Jaundice occurs in approximately 60% of term and 80% of preterm infants. This makes it one of the most common problems faced by health care providers in the neonatal period.

Variety of Causes: Jaundice can be caused by a variety of factors, from physiological processes to serious pathological conditions. Understanding these causes is important for timely diagnosis and treatment.

Risk of complications: Although most cases of jaundice are harmless, certain conditions can lead to serious and even life-threatening complications, such as kernicterus. This requires vigilance and readiness for immediate action on the part of medical personnel.

The need for early intervention: Early diagnosis and initiation of treatment significantly reduces the risk of complications. This highlights the importance of awareness of jaundice among healthcare professionals and parents.

Advances in Diagnosis and Treatment: Modern advances in medicine are expanding the ability to diagnose and treat jaundice. However, this also requires constant updating of the knowledge and skills of medical professionals.

Psychosocial aspects: Neonatal jaundice may affect the psychological well-being of parents, causing anxiety and stress. Parent support and education are an important part of caring for these infants.

Interdisciplinary approach: Management of jaundice in newborns requires the coordinated efforts of pediatricians, neonatologists, nurses, family physicians and other specialists.

Research and Education: Further research is needed to better understand the mechanisms of jaundice and develop more effective treatment and prevention

methods. Education of healthcare providers and parents also plays a key role in the management of this condition.

In general, jaundice in newborns remains an important and relevant topic in pediatrics and neonatology, requiring attention and constant updating of knowledge in the field of diagnosis, treatment and care.

The etiology of jaundice in newborns includes a wide range of causes that can be divided into several main categories:

Physiological jaundice:

Occurs due to the immaturity of the newborn's liver, which leads to the accumulation of bilirubin. Occurs in most full-term infants, usually begins on days 2-4 of life and goes away on its own.

Hemolytic conditions:

Destruction of red blood cells (hemolysis), which leads to increased bilirubin levels. Causes include hereditary diseases (eg, spherocytosis), Rh or ABO incompatibility between mother and child.

Hereditary and metabolic disorders:

Disorders of bilirubin metabolism, such as Gilbert's syndrome or Crigler-Najjar syndrome. Inherited metabolic disorders affecting the liver.

Infections:

Sepsis and viral infections (eg, cytomegalovirus, toxoplasmosis) can cause pathological jaundice.

Endocrine disorders:

Hypothyroidism can lead to a delay in the excretion of bilirubin.

Liver damage:

Liver diseases, including congenital hepatitis and biliary atresia, can cause jaundice.

Absorption disorders:

Intestinal problems leading to reabsorption of bilirubin from the intestine (for example, intestinal obstruction).

Maternal-fetal factors:

Taking certain medications or exposure to toxic substances during pregnancy. Maternal diseases affecting the fetus (for example, diabetes).

Miscellaneous:

Hemorrhages (eg, subdural hematomas) in newborns can also lead to increased bilirubin levels due to the breakdown of hemoglobin from the blood.

Understanding these diverse causes of jaundice in newborns is important for accurate diagnosis and effective treatment. Determining the specific cause of jaundice helps in choosing the appropriate treatment and reduces the risk of complications.

Relevance of the problem

In recent years, public health systems have been able to achieve improvements in population-level health on a global scale. However, health inequalities within and between countries vary widely and continue to increase. Most of these inequalities are attributable to social factors, so public health actions aimed at tackling the underlying causes of disease burden will continue to be less effective than necessary, and perhaps until the greater focus on addressing the root causes of morbidity and mortality. This general conclusion is true primarily for protecting children's health. In this regard, WHO decided that the health of children and mothers should become one of the important issues on the agenda of ministries of health, as well as in the activities of the United Nations.

Despite certain achievements of modern perinatal medicine, there remains a tendency to increase morbidity rates in newborns, which makes the problems of neonatology very relevant. Jaundice in newborns remains a pressing problem. In the structure of morbidity and causes of mortality in the early neonatal period, hyperbilirubinemia occupies a fairly significant place and is the most common pathological condition.

The relevance of this problem is determined not only by the high frequency of jaundice among newborns, but also by the fact that excessive accumulation of unconjugated bilirubin in the blood due to imperfections in the system of cleansing the body of pigment can cause damage to the central nervous system, as well as other equally dangerous complications and consequences. This problem remains relevant also because icteric syndrome in the newborn period accompanies many infectious and non-infectious diseases, sometimes having a severe course with a fatal outcome. In some cases it has a prolonged course. Prolonged neonatal jaundice (PNI) is a diagnosis - exclusion of various pathological jaundices

Jaundice is a visual manifestation of hyperbilirubinemia, which is observed in full-term infants with a bilirubin level of 85 μmol/l, in premature infants - more than

120 μmol/l.

Dynamics of bilirubin concentration in the blood serum of newborns

		Mg %	μmol/l
Full-term newborns	Venous blood of the umbilical cord	3	50
	1st day	6	100
	3-5th day	12	200
	7th day	10	170
	10th day	4	70
	1 month	1.7	thirty
Premature newborns	Venous blood of the umbilical cord	3.5	60
	1st day	8	140
	3-8th day	23	400
	3rd week	12	200
	1 month	3	50

Jaundice is a syndrome complex, the main symptom of which is icteric discoloration of the skin and mucous membranes and develops as a result of excessive accumulation of bilirubin.

In contrast to transient (physiological) jaundice of newborns, hyperbilirubinemia, which is a sign of disease (pathological jaundice) requiring laboratory examination and therapy, has one or more characteristic features:

1 And they are present at birth or appear on the 1st day or 2nd week of life;

2 Combined with signs of hemolysis (anemia, high reticulocytosis, blood in the smear - nuclear erythroid forms, excess spherocytes - +++, ++++), pallor, hepatosplenomegaly;

3 D lasts more than 1 week in full-term infants and 2 weeks in premature infants;

4 They flow in waves (the yellowness of the skin and mucous membranes increases in intensity after a period of its decrease or disappearance);

5 The rate of increase (increase) of unconjugated bilirubin (NB, indirect bilirubin) is >3.4 μmol/l/h (0.2 mg%/h) or 85 μmol/l/day. (5 mg%/day).

6 NB level in umbilical cord blood serum - >60 μmol/l (3.5 mg%) or 85 μmol/l (5 mg%) – in the first 12 hours of life, 171 μmol/l (10 mg%) – on the 2nd day life, the maximum values of NB on any day of life exceed 221 μmol/l (12.9 mg%);

7 Maximum level of bilirubin diglucuronide a (BDG. Direct bilirubin) >25 μmol/l (1.5 mg%).

It is advisable to emphasize that :

1 Physiological jaundice is a diagnosis excluding pathological jaundice;

2 In children with pathological jaundice, only based on clinical and anamnestic data (i.e., without additional laboratory tests), a correct diagnosis can be made only in no more than 10-15% of cases.

Jaundice, caused by the accumulation of free (indirect) bilirubin in the blood, is common in newborns and in most cases requires urgent treatment, since free bilirubin is a neurotoxic poison and, under certain conditions, causes specific damage to the subcortical nuclei and cerebral cortex - bilirubin encephalopathy . In older children and adults, the mechanisms for neutralizing and removing bilirubin are well developed. In newborns, they are noticeably reduced, and in addition, a number of circumstances contribute to the accumulation of free bilirubin and facilitate its penetration into tissues, including cells of the central nervous system.

Before talking about jaundice in newborns, we will briefly outline the metabolism of bilirubin.

Features of bilirubin metabolism in the perinatal period

In the fetus and newborn, the metabolism of bilirubin has features that, under certain conditions, contribute to the accumulation of pigment in the blood and facilitate its penetration into tissues.

This age period is characterized by increased formation of bilirubin from

erythrocytes with fetal hemoglobin due to their shorter lifespan (70-80 days) and from immature erythrocytes in the bone marrow (normoblasts, reticulocytes, etc.).

In the prenatal period, bilirubin practically does not undergo conjugation, which is currently explained by the absence of ligandin and Z-protein in the fetal liver, which ensure the uptake of bilirubin by hepatocytes, and inhibition of the activity of the enzymes uridine diphosphodehydrogenase and glucuronyltransferase by pregnancy hormones. The main organ that removes bilirubin from the fetal body is the placenta. The concentration of bilirubin in fetal plasma is low. Due to the concentrating ability of the placenta, hemolytic disease is not accompanied by a significant increase in bilirubin in the blood plasma, even in severe edematous-anemic form of the disease. For conjugated (direct) bilirubin, the placenta is impermeable in both directions, and therefore, with fetal hepatitis in the fetus, icteric staining of the amniotic fluid, placenta membranes and skin can be observed. Unconjugated bilirubin is a constant component of meconium, even in fetuses with biliary atresia. The mechanism of entry of bile pigments into the fetal intestinal lumen is not clear enough. Apparently, one should agree with the opinion that in the fetus the mucous membrane of the stomach and intestines has the ability to form glucuronides.

Pathophysiological features of bilirubin metabolism The main source of bilirubin is hemoglobin, released during the breakdown of red blood cells. Aged and changed red blood cells are captured by reticulohistiocytic cells, which are concentrated in the spleen, and are destroyed into 3 components: heme, globin and verdoglobin. The latter is released by the cell into the bloodstream and immediately combines with albumin and turns into indirect bilirubin. The bilirubin-binding ability of blood depends on the albumin content. Unbound bilirubin is capable of diffusion into tissues and is toxic. Consequently, not only the concentration of bilirubin in the blood is of great importance, but also the binding ability of the protein. When the bilirubin-binding capacity of the blood decreases (premature babies), the toxic properties of indirect bilirubin will appear at a lower concentration. The bilirubin-binding capacity of the blood decreases under the influence of sulfonamide drugs,

salicylates, and caffeine. Indirect bilirubin is highly soluble in lipids. Tissues with a high affinity for this bilirubin, especially nervous tissue, can accumulate significant amounts of this pigment and cause significant changes in them. Because indirect bilirubin is bound to protein, it is not excreted in the urine. The next stage of pigment metabolism is associated with the liver cell. Hepatocyte receptors capture indirect bilirubin from the bloodstream and release it from albumin. The conversion of free bilirubin to bilirubin glucuronide (direct bilirubin) occurs in liver microsomes. Conjugation is a complex process in which various enzymes are involved, including glucuronyl transferase. The release of conjugated bilirubin into the bile capillaries is an independent link in intracellular metabolism. This is an active secretory process that increases the concentration of bilirubin in bile compared to plasma by 1000 times. Direct bilirubin, unlike indirect bilirubin at the same concentration, is less toxic, highly soluble in water, therefore, when it accumulates excessively in the blood, it is excreted in the urine and turns it the color of "beer." Further conversion of direct bilirubin occurs in the intestine under the influence of bacterial flora. Part of it is absorbed by the intestinal wall and enters the portal vein system in the form of urobilinogen, captured by Kupffer cells and re-excreted into bile. Another fraction of direct bilirubin, passing through the intestinal tract, is converted into stercobilinogen. In newborns and children in the first months of life, stercobilinogen is not formed and direct bilirubin is excreted unchanged in the feces, determining the golden color of the feces. There are many reasons associated with increased bilirubin in healthy and sick children. One of these reasons is the physiological immaturity of the liver.

Physiological immaturity of the liver

The physiological immaturity of the liver in the perinatal period is due to the formation of its functional systems, which affects the metabolism and clearance of potentially toxic endogenous and exogenous compounds. The main reasons for these changes are: low concentration of cytochrome P450 in the liver of infants (drug clearance dependent on cytochrome P450 in older children is higher than in adults);

 low activity of aminopyrine N-demethylase and aniline p-hydroxylase (the clearance of some drugs and bilirubin decreases, which leads to the rapid

achievement of toxic concentrations of these compounds in the blood);

 low levels of glutathione peroxidase and glutathione S -transferase (potential vulnerability to oxidant damage). Physiological immaturity of the liver is also characterized by changes in the concentration and composition of bile acids.

Summarizing the above, we can conclude that almost all stages of bilirubin metabolism in newborns are characterized by a number of features: a relatively larger amount of hemoglobin per unit of body weight, moderate hemolysis of erythrocytes even under normal conditions, even in a healthy full-term newborn baby the content Y- And Z-proteins A Also uridine diphosphoglucuronyl transferase (UDPGT) activity is sharply reduced in the first day of life and account for 5% of the activity of such systems in adults. An increase in bilirubin concentration leads to an increase in the activity of liver enzyme systems within 3–4 days of life. The complete formation of liver enzyme systems occurs by 1.5–3.5 months of life. Morphofunctional immaturity, endocrine disorders (hypothyroidism, increased progesterone in human milk), carbohydrate metabolism disorders (hypoglycemia), the presence of concomitant infectious pathology significantly extends the development of liver enzyme systems. The processes of removing bilirubin from the body are also imperfect, which is associated with increased intestinal reabsorption bilirubin. Check-in intestines newborn normal intestinal microflora sharply reduces the amount of bilirubin absorbed from the intestines and helps to normalize the processes of its removal from the body.

Difference between the two types of bilirubin.

As you know, there are two types of bilirubin. Indirect, or free and direct, or bound bilirubin, which vandenBergh and Muller were the first to establish in 1916. They noted that blood serum samples from patients with hemolytic jaundice did not immediately react with diatized sulfanilic acid (diazoreagent) and began to react only after prior addition of alcohol, while blood serum and urine from patients with obstructive jaundice reacted immediately upon addition of the diazo reagent.

Depending on the reaction with the diazo reagent, the designations were introduced - indirect and direct bilirubin.

Indirect, or indirectly reacting bilirubin is bilirubin that is formed directly as a result of the destruction of hemoglobin and tends to react with diazorectant only after pre-treatment with alcohol.

Indirect bilirubin is secreted by the cells of the reticuloendothelial system into the blood and then carried by the blood flow to the liver, where it is further converted into bilirubin, which gives a direct reaction with the dazoreagent.

These two bilirubins differ from each other not only in the nature of their reaction with the diazoreagent, but also in other physicochemical properties. Billing and Lathe summarized the differences between indirect and direct bilirubin (Table 1).

Difference between indirect and direct bilirubin

Property of bilirubin	Indirectly reacting free bilirubin	Directly reacting conjugated bilirubin
Van den Berg reaction	Indirect	Straight
Solubility in aqueous solution at acidic and neutral pH	+	-
Solubility in lipoids and chloroform	+	-
Found in urine with jaundice	-	+
Found in bile	-	+
tendency to damage brain tissue	-	+
Ability to attach to albumin	+	+
Affinity to denatured plasma proteins	-	-
Ease of oxidation	+	++
Sensitivity to light	++	+
Association with hemolytic	++	(+)

jaundice		
Association with obstructive jaundice and hepatitis	+	+++

From Table 1 it can be seen that there is a large difference in solubility between indirect and direct bilirubin. If indirect bilirubin is a compound insoluble in water, then, on the contrary, direct bilirubin dissolves well in it . The solubility of direct bilirubin in water determines its excretion by the liver and kidneys. There is also a difference in the solubility of the two pigments in lipoids. Direct bilirubin is insoluble in lipoids. In contrast, free bilirubin is highly soluble in lipoids, which seems to be the basis for its affinity with tissues such as the brain, which contain lipoids in large quantities.

Classification of newborn jaundice.

<table>
<tr><td>Hereditary</td><td>Purchased</td></tr>
<tr><td colspan="2">Increased production of bilirubin I. Hemolytic</td></tr>
<tr><td>1) Defects of erythrocyte membranes (Minkowski-Choffard anemia, elliptocytosis, etc.);</td><td>1) HDN according to the Rh factor or ABO system;</td></tr>
<tr><td>2) Defects in red blood cell enzymes (glucose-6-
phosphate dehydrogenase pyruvate kinase, etc.);</td><td rowspan="2">2) Drug hemolysis (prescribing large doses of vitamin K to a child , prescribing salicylates, sulfonamides, oxytocin, etc. to a pregnant woman before giving birth);</td></tr>
<tr><td rowspan="2">3) hemoglobinopathies:
a) defects in structure , hemoglobin (sickle-shaped
cell disease, etc.);
b) defects in hemoglobin synthesis (thalassemia);
c) heme defects (congenital erythroporphyria).</td></tr>
<tr><td>3) Hemorrhages (cephalohematomas, intracranial and other internal hemorrhages, multiple petechiae and ecchymoses, etc.);</td></tr>
<tr><td></td><td>4) Swallowed blood syndrome.</td></tr>
<tr><td colspan="2">II. Non-hemolytic</td></tr>
<tr><td></td><td>1) Polycythemia (idiopathic, due to feto-fetal, feto-maternal transfusion, with late umbilical cord clamping, ZRUR, etc.);

2) Increased enterohepatic circulation of bilirubin (pyloric stenosis, intestinal obstruction, meconium ileus,</td></tr>
</table>

	etc.)
Reduced bilirubin clearance (hepatic jaundice)	
1) Impaired transport of bilirubin into hepatocytes (Gilbert's disease); 2) Violation of bilirubin conjugation: a) lack of enzymes (Crigler ’s Najara type I and II); b) inhibition of enzymes (Lucea-Driscola sm); 3) Impaired excretion of bilirubin from the hepatocyte (Dubin-Jones and Rotor).	1) Excess estrogen (jaundice from breast milk); 2) Hypothyroidism; 3) Infectious hepatitis; 4) Toxic and metabolic hepatoses; 5) Total parenteral nutrition.
Mechanical	
1) Alagille syndromes , trisomies of 13, 18, 21 pairs of autosomes, etc. (accompanied by atresia and hypoplasia of the extrahepatic bile ducts); 2) Deficiency of α-1-antitrypsin; 3) Niemann-Pick disease; 4) Cystic fibrosis.	1) Atresia or hypoplasia of the intrahepatic bile ducts; 2) Atresia or hypoplasia of the extrahepatic biliary tract; 3) Bile duct cyst or compression from outside the bile duct (hemangiomas, tumors); 4) Bile thickening syndrome

International Statistical Classification of Diseases and Related Health Problems, 10th Revision, adopted by the 43rd World Health Assembly.

P55 Hemolytic disease of the fetus and newborn P55.0 Rhesus - isoimmunization of the fetus and newborn P55.1 ABO isoimmunization of the fetus

and newborn

P55.8 Other forms of hemolytic disease of the fetus and newborn P55.9 Hemolytic disease of the fetus and newborn, unspecified P56 Hydrops of the fetus due to hemolytic disease

P55.0 Hydrops fetalis due to isoimmunization

P56.9 Hydrops fetalis due to other unspecified hemolytic disease

P57 Kernicterus

P57.0 Kernicterus due to isoimmunization P57.8 Other specified forms of kernicterus

P57.9 Kernicterus, unspecified

P58 Neonatal jaundice due to excessive hemolysis P58.0 Neonatal jaundice due to bruising P58.1 Neonatal jaundice due to bleeding

P58.2 Neonatal jaundice due to infection P58.3 Neonatal jaundice due to polycythemia

P58.4 Neonatal jaundice caused by drugs or toxins taken from the mother or administered to the newborn

P58.5 Neonatal jaundice due to ingestion of maternal blood

P58.8 Neonatal jaundice due to other specified forms of excessive hemolysis

P58.9 Neonatal jaundice due to excessive hemolysis, unspecified

P59 Neonatal jaundice due to other and unspecified causes

P59.0 Neonatal jaundice associated with preterm delivery

P59.1 Bile thickening syndrome

P59.2 Neonatal jaundice due to other unspecified liver cell damage

P59.3 Neonatal jaundice caused by drugs that inhibit lactation

P59.8 Neonatal jaundice due to other specified causes

P59.9 Neonatal jaundice, unspecified

Classification of newborn jaundice (A. Gregen, 1994) I. Conjugation jaundice

o 1.1 Physiological (transient) **jaundice** of newborns o 1.2. Jaundice of

premature newborns

o 1.3. Hereditary jaundice (Gilbert, Crigler-Najjar and Lucey-Driscol syndromes)

o 1.4. Jaundice of children who are breastfed (pregnanova or Aries syndrome)

o 1.5. Jaundice in children with asphyxia o 1.6 Drug-induced jaundice

o 1.7 Jaundice in children with endocrine pathology **II. Hemolytic jaundice**

o 2.1 Hemolytic disease of the newborn

o 2.2 Erythrocyte membranopathy (Minkowski-Choffard anemia, pycnocytosis, etc.)

o 2.3 Erythrocyte fermentopathy (deficiency of glucose-6-phosphate dehydrogenase, hexokinase, etc.)

o 2.4 Hemoglobinopathies (thalassemia, sickle cell disease)

o 2.5. Polycythemia

III. Mechanical or obstructive jaundice. o 3.1. Malformations of the bile ducts (atresia). o 3.2. Intrahepatic hypoplasia.

o 3.3. Intrauterine cholelithiasis. o 3.4 Compression of the bile ducts by the tumor.

IV. Parenchymal jaundice

o 4.1 Fetal giant cell hepatitis

o 4.2 Fetal hepatitis associated with intrauterine infections (cytomegaly, listeriosis, toxoplasmosis, herpes, viral hepatitis A , B, neither A nor B, D)

o 4.3 Toxic-septic liver damage during sepsis. o 4.4 Toxic-drug-induced liver damage.

o 4.5 Jaundice in hereditary metabolic diseases (galactosemia, cystic fibrosis).

Conjugation includes, first of all, physiological jaundice of newborns, which is associated with delayed maturation of the glucuronyl transferase system of the liver.

I. Conjugation jaundice

1.1. Transient hyperbilirubinemia , physiological jaundice (icterus neonatarum). It develops in all newborns in the first days of life, while jaundice of the skin occurs in only 60-70%. The normal concentration of bilirubin in umbilical cord blood serum is considered to be 26-34 μmol/l. In almost all newborns, in the first days of life, the concentration of bilirubin in the blood serum increases at a rate of 1.7-2.6 μmol/l/h, reaching an average of 103-107 μmol/l on days 3-5. In approximately 1/3 of full-term newborns, the increase in bilirubin concentration is smaller and in 1/3 it is greater, reaching 171 μmol/l. With transient jaundice, an increase in the level of bilirubin occurs due to its unconjugated fraction - indirect bilirubin. Yellowness of the skin appears with transient jaundice of newborns on the 2-3rd day of life, when the concentration of indirect bilirubin reaches 105-120 μmol/l in full-term newborns. And in premature infants – 85 μmol/l. Transient jaundice is less common and less pronounced in children who are put to the breast early, who are often put to the breast, who are bottle-fed, who have a hormonal crisis, compared to newborns who are put to the breast on the 2nd day, who are fed strictly according to the clock, who are on natural breastfeeding or who have not had a hormonal crisis. It develops more often and is more pronounced in newborns with placental transfusion syndromes leading to polycythemia, as well as in premature infants, in whom it is accompanied by higher hyperbilirubinemia. Moreover, in premature infants, kernicterus can occur with hyperbilirubinemia of about 171 μmol/l. Transient jaundice develops relatively less frequently in children with intrauterine meconium passage . The pathogenesis of transitory jaundice in newborns is associated with a number of factors. Its pathogenesis is due to the accumulation of indirect bilirubin in the blood in the first days of life after birth. During different periods of intrauterine development, different types of hemoglobin are synthesized. From the 3rd month, fetal hemoglobin (HbF) is synthesized, and from the 5th month, adult hemoglobin (HbA). Up to 8 months, the amount of HbA does not exceed 10%. Fetal hemoglobin differs from adult hemoglobin in its greater affinity for oxygen, which is very important under conditions of intrauterine hypoxia. Towards the end of pregnancy,

the fetus undergoes a change in red blood cells from HbF to HbA. As soon as a baby is born and takes its first breath, the oxygen saturation of hemoglobin increases sharply . Excessive oxygenation of red blood cells causes hemolysis of the latter, mainly those containing HbF.

Reduced functional capacity of the liver, manifested in : a) reduced uptake of indirect bilirubin by hepatocytes; b) low ability to gluuronidate bilirubin due to low activity of glucuronyl transferase and uridine phosphoglucose dehydrogenase, mainly due to their inhibition by maternal hormones; c) reduced ability to excrete bilirubin from the hepatocyte.

Increased intake of indirect bilirubin from the intestine into the blood due to: a) high activity of ß- glucuronidase in the intestinal wall; b) the flow of part of the blood from the intestine through the ductus venosus (Arantius) into the inferior vena cava, bypassing the liver, i.e. disturbance of hepatoenterogenous circulation of bilirubin; c) intestinal sterility and weak reduction of bile pigments.

Physiological jaundice in most children appears on the 2-3rd day of life and disappears by the end of the first, beginning of the second week. No treatment required.

1.2. Jaundice of prematurity Almost all premature babies have jaundice, and it has a prolonged course, as it is associated with the immaturity of red blood cells and liver enzymes. Jaundice of premature newborns manifests itself when the level of indirect bilirubin (BI) is in the range of 85-103 μmol/l and is observed in 90-95% of premature infants. In more than 20% of children, the maximum concentration of NB in the blood exceeds 171 μmol/l and in such cases the development of kernicterus is possible.

Unlike physiological jaundice in full-term infants , the content of indirect bilirubin in the blood of premature infants is usually higher, but its accumulation is slower. If in premature infants the maximum concentration of NB in the blood is reached by 5-8 days and averages 137-171 μmol/l, then in full-term infants the peak level of indirect bilirubin occurs on the 3rd day and amounts to 77-120 μmol/l. The decrease in NB content in premature infants is also slow - up to 3 or more weeks. The

slower development of liver enzyme systems in a premature baby creates a threat of bilirubin intoxication. Tactics of management and treatment of a sick child with jaundice in premature infants.

 If serum bilirubin concentration is at a level requiring phototherapy (Table 6), continue phototherapy

 If the child is less than three days old, monitor for jaundice for 24 hours after stopping phototherapy.

 If jaundice persists for three weeks or more, treat prolonged jaundice.

The causes of prolonged jaundice may be due to the following factors : Inhibition of glucuronyl transferase activity can occur under the influence of estrogens in mother's milk, with congenital endocrine diseases (hypothyroidism), and in children from mothers with diabetes. Protracted and pronounced physiological jaundice is observed in children with intrauterine and concomitant diseases, when using certain medications, then they speak of paraphysiological jaundice.

Guidelines for treating prolonged physiological jaundice: Stop phototherapy

 If the child has acholic stools or dark urine, arrange for the child to be transferred to a tertiary hospital or referral center for further evaluation

 Elimination of factors contributing to the development of jaundice (drug withdrawal).

 Drug stimulation of enzyme activity in the liver cell (**Cartan** - 60-150 mg in two doses for 14-28 days).

 If the mother is diagnosed with syphlis, treat the child for congenital syphilis

Conjugation jaundice also develops with hereditary defects in the liver cell: Gilbert's disease (impaired uptake and transport of indirect bilirubin).

Crigler-Nayjar disease (inability of cells to conjugate indirect bilirubin), Dubin-Jones-Rotor syndrome (defect in the release of direct bilirubin).

Lucey-Driscoll syndrome

1.3. Hereditary conjugative jaundice (Gilbert's syndrome) - This syndrome is named after the Parisian physician Augustine

Gilbert (1858-1927). The syndrome is defined as benign familial unconjugated hyperbilirubinemia of moderate severity (serum bilirubin level in the range of 17-85 μmol/l (1-5 mg%), not associated with hemolysis and having a benign course. Hyperbilirubinemia is familial in nature and is not accompanied by disturbances in biochemical indicators of liver function and its histological picture. In the population, the frequency of Gilbert's syndrome is 2-5%. It is transmitted in an autosomal dominant manner. It can be accidentally detected during a preventive medical examination or during examination for another disease (for example, viral hepatitis). Prognosis favorable The development is based on a defect in the uptake of bilirubin by hepatocytes due to a violation of their function and a decrease in the activity of liver glucuronyltransferase.

Jaundice is moderate and intermittent. It may worsen after intercurrent infections or after fasting. A typical sign of this type of jaundice is the absence of anemia, splenomegaly, reticulocytosis and other signs of cytolysis. The rise in indirect bilirubin in the blood serum is not high, and no cases of kernicterus have been described. It is usually not possible to identify any other symptoms during examination ; the spleen is not palpable.

When making a diagnosis, importance is attached to long-term indirect hyperbilirubinemia, pedigree analysis, and exclusion of other causes of hyperbilirubinemia. Treatment. A positive effect is achieved from the use of phenobarbital - the intensity of jaundice decreases or it disappears.

1.3. Hereditary jaundice (Crigler-Najjar syndrome).

In this form of familial nonhemolytic jaundice, the level of unconjugated bilirubin in the serum is very high. Conjugating enzyme deficiency can be detected in the liver. The pigment concentration in bile is minimal. Crigler syndrome— Na Jara type 1 is inherited in an autosomal recessive manner. There is no conjugating enzyme activity in the liver, and conjugated bilirubin is absent in the bile. No bilirubin glucuronides are detected in the serum. Since serum bilirubin levels stabilize over time, the existence of an alternative pathway for bilirubin metabolism should be assumed. In the first type, jaundice appears in the first days of life and steadily

increases in intensity. NB in the blood serum reaches 428 μmol/l or more. The development of kernicterus is typical . Taking phenobarbital is ineffective. Usually, although not always, patients die during the first year of life due to kernicterus.. Bloodletting and plasmapheresis, used to reduce the level of bilirubin in the serum, gave only a temporary effect. With phototherapy, serum bilirubin levels can be reduced by almost 50%; This treatment method can be used on an outpatient basis.

Crigler-Nayjar syndrome type 2 is also inherited in an autosomal recessive manner. The activity of the enzyme that conjugates bilirubin in the liver is significantly reduced (to 10% of normal or less) and is not determined by conventional methods.

In the second type of syndrome, neonatal hyperbilirubinemia is not as severe , and NB is about 257 μmol/L (usually does not exceed 376 μmol/L). The development of kernicterus is possible only in the neonatal period. In response to phenobarbital therapy, hyperbilirubinemia and jaundice decrease until they disappear, but may recur after treatment is discontinued. Crigler-Nayjar syndrome type 2 is not always benign and requires a combination of phototherapy and phenobarbital to achieve bilirubin levels below 450 μmol/L (26 mg%).

New approaches to treatment are also being developed - liver transplantation and the defective gene.

Distinguishing between types 1 and 2 of Crigler-Najjar syndrome is not always easy. They can be differentiated by assessing the effectiveness of treatment with phenobarbital by determining bilirubin fractions using high-performance liquid chromatography. In addition, these types can be distinguished by determining the content of bile pigments in the bile after the administration of phenobarbital. In type 2, serum bilirubin levels and the proportion of unconjugated bilirubin decrease, and the content of mono- and diconjugates in bile increases. In type 1, the level of bilirubin in the serum does not decrease, and predominantly unconjugated bilirubin is detected in the bile. Apparently, in the future, diagnosis will be based on *in vitro expression* of mutant DNA from patients.

-Johnson syndrome

Dubin-Johnson syndrome is a chronic benign disease manifested by intermittent jaundice with an increase in the level of predominantly conjugated bilirubin and biliribinuria. It is inherited in an autosomal recessive manner and is prevalent mainly in the Middle East among Iranian Jews. The syndrome is based on a deterioration in the transport of many organic anions, not related to bile acids, into the bile, which is caused by a defect in the ATP-dependent transport system of the tubules. In Dubin-Johnson syndrome , alkaline phosphatase activity and serum bile acid levels remain within normal limits. The prognosis is favorable.

1.3.Rotor syndrome

This form of chronic familial hyperbilirubinemia with increased unconjugated bilirubin fraction resembles Dubin-Johnson syndrome . Its main difference from the latter is the absence of brown pigment in hepatocytes. In addition, in Rotor syndrome, the gallbladder is contrasted during cholecystography.

Study of family history suggests the possibility of autosomal inheritance. The prognosis is favorable.

1.3. Hereditary jaundice Lucey-Driscoll syndrome is inherited in an autosomal recessive manner and is caused by a profound, but transient, neonatal defect in glucuronyl transferase activity. High hyperbilirubinemia is represented mainly by the indirect fraction of bilirubin and is noted already in the first days of life. The development of kernicterus is possible. It is believed that the factor inhibiting bilirubin conjugation is one of the pregnancy hormones, because it was detected in mothers' blood serum. Diagnosis is made by sequential exclusion of other hyperbilirubinemias and analysis of family history. Timely replacement blood transfusion and phototherapy are effective, but relapses of the disease are possible.

1.4. Jaundice in children who are breastfed or Aries syndrome.

Described for the first time in 1963 by I. Aries et al. In 10-30% of breastfed newborns, jaundice is observed at 2-6 weeks of life, and hyperbilirubinemia persists for up to 3 months. The incidence of pathological hyperbilirubinemia during the first week of life is 3 times higher in children than in children who were artificially fed with adapted formulas from cow's milk from the first days.

Hyperbilirubinemia (serum bilirubin level above 12 mg%) is detected in 34% of breastfed newborns, and only in 15% of bottle-fed infants.

The causes of LAIV and FFM are undoubtedly not established, but the importance of the following factors is discussed: fasting, frequency of feeding, severity of loss of initial body weight, deficiency of fluids and (in relation to LAIV), components of human milk (pregnanediol, lipase activity and fatty acid levels, unidentified factors - in relation to FMM), increased reabsorption of bilirubin from the intestine.

The basis of the pathogenesis of SM M is a decrease in bilirubin excretion and/or an increase in its enterohepatogenic circulation. Early attachment and frequent feedings reduce the incidence of hyperbilirubinemia in newborns. The cause of LAIV may be increased activity of pregnane-3-α-, 20-ß-diol in the milk of some women , which can inhibit the activity of glucuronyl transferase in the child’s liver. At the same time, some of these mothers had high lipoprotein lipase activity and levels of non-esterified long-chain acids in their milk . The high concentration of free fatty acids in breast milk can inhibit bilirubin conjugation.

Hyperblirubinemia in newborns and LAB is promoted by late passage of meconium (after 12 hours of life), delayed clamping of the umbilical cord, administration of oxytocin to the mother during childbirth, etc. It has been established that the concentration of bilirubin and the formation of urobilin in the feces of newborns who are bottle-fed are higher than in children, breastfed. In the intestinal wall of breastfed children, ß-glucuronidase is also more active (it is also found in human milk, but not in cow's milk), which cleaves glucuronic acid from DHB and again forms NB, which, being absorbed from the intestine due to the open arantium The duct, bypassing the liver, enters the systemic circulation. Some newborns with LAIV had higher blood levels (compared to children without LAIV) of cholic and deoxycholic acids. Thus, in different newborns, the pathogenesis of LAIV and FMM may be heterogeneous, but nevertheless, the leading mechanism is currently considered to be a violation of excretion, rather than conjugation.

The duration of jaundice is from 2 weeks to 2 months or more. Stopping

breastfeeding for 2-3 days leads to a decrease in bilirubin levels.

Newborns with FMM have good weight gain and breastfeed well. Their body weight gain in the first or second month of life reaches 1.0-1.5 kg. They do not have an enlarged liver or spleen and other signs of increased hemolysis, and there are no neurological abnormalities. No cases of kernicterus have been described. A diagnostic indirect test for “mother's milk jaundice” can be a decrease in the level of NB by 85 μmol/l or more when breastfeeding is stopped for 48-72 hours. A test for icterogenicity of milk, based on the reaction of non-esterified fatty acids contained in milk, has also been proposed with Nile blue paint. The therapeutic effect can also be from the administration of magnesium sulfate orally, phenobarbital, bilirubin adsorbents in the intestines (agar-agar, cholestyramine, etc.), phototherapy.

1.5. Jaundice in children with asphyxia and birth trauma.

Under conditions of hypoxia and asphyxia, the formation of the glucuronyltransferase system is delayed, the dissociation of the bilirubin-albumin complex occurs, the permeability of blood vessels and the blood-brain barrier increases, as a result of which the newborn may develop hyperbilirubinemia and even the clinical picture of kernicterus.

Intracranial hemorrhages and cerebral circulation disorders, significant hematomas that occur during complicated labor and breech birth, as well as significant hemorrhage in the skin can be sources of the formation of NB and its increased penetration into the blood with the development of icteric staining of the skin and internal organs.

The clinical picture will depend on the severity of the hypoxic-asphyxia syndrome of cerebrovascular accident and the level of bilirubin in the blood serum.

Treatment: elimination of hypoxic-asphyxial syndrome; prescription of drugs aimed at reducing hyperbilirubinemia (phototherapy , enterosorbents , etc.); frequent blood replacement at critical bilirubin levels.

1.6. Drug-induced jaundice. Medicines that can bind to glucuronic acid

include chloramphenicol, menthol, salicylates, sulfonamides, large doses of vit. K , g ormones, quinine. Prescribing them to newborns can lead to severe hemolysis of red blood cells, hyperbilurbinemia and the development of jaundice. In this case, anemia, stool discoloration and hepatosplenomegaly do not occur. In the clinic, only against the background of intense hyperbilirubinemia will lethargy, loss of appetite, and late restoration of the original mass appear.

Treatment: providing a sufficient amount of fluid (5% glucose solution as a source of glucuronic acid formation daily intravenously); ATP; vit . B_1 B_6 , B_{15} , orotate K , enterosorbents to prevent possible reabsorption of bilirubin from the intestine; phototherapy, partial blood replacement.

Prescribing the above medications to the mother is contraindicated.

1.7. Jaundice in children with endocrine pathology.

It is one of the symptoms of congenital hypothyroidism and usually has a protracted course. Occurs in 70–80% of children suffering from congenital hypothyroidism. . Its occurrence is explained by: carotenemia (the liver loses the ability to convert carotene into vitamin A) ; violation of the formation and secretion of bile; increased ability of the skin to retain bilirubin; thyroxine deficiency (the production of glucuronyltransferase enzyme is slowed down and the process of conjugation of indirect bilirubin is disrupted. The clinical picture of hypothyroidism is characterized by prolonged jaundice. It occurs on 2-3 days of life and persists from 3 - 12 to 16 - 20 weeks. Accompanied by symptoms of hypothyroidism (moderate edema syndrome, lethargy , adynamia, rough voice, marbled and dry skin , enlarged liver).

Laboratory diagnostics.

1. Biochemical blood test. Hyperbilirubinemia with a predominance of indirect bilirubin is detected. The level of total bilirubin does not exceed 200 – 220 μmol/l.

2. Determination of T3, T4, TSH in the blood.

Treatment of the underlying disease - hypothyroidism. The administration of thyroid hormones leads to normalization of bilirubin levels.

may occur in children born to mothers with diabetes. Clinical picture: delayed maturation of the liver glucuronyltransferase system in newborns due to the development of hypoglycemia and acidosis in the fetus. Manifested by indirect hyperbilirubinemia and severe icteric syndrome.

Treatment is aimed at normalizing carbohydrate metabolism and eliminating acidosis. Use 5-10% glucose solution orally or intravenously ; cocarboxylase; 4% sodium bicarbonate solution ; B complex vitamins. Blood sugar and pH levels should be checked daily. **II.**

Hemolytic jaundice.

2.1. Hemolytic disease of the newborn (HDN). Caused by an immunological conflict due to the incompatibility of the blood of the fetus and mother with respect to erythrocyte antigens.

Isoantigen incompatibility of the blood of mother and fetus Isoimmunization is one of the clinical forms of immunopathology

pregnancy, which occurs when the organisms of the mother and fetus are incompatible for different antigens and leads to severe impairment of the condition of the fetus and infant.

The most common:

- isoimmunization to rhesus (Rh) factor; - isoimmunization according to the ABO system.

Rh – isoimmunization is a humoral immune response to erythrocyte antigens (A r) of the Rh-group fetus. Antibodies (Ab), penetrating the placenta, cause extravascular hemolysis and anemia, which causes fetal erythroblastosis.

Risk factors:

- history of induced abortion;

- history of spontaneous abortion;

- history of Rh-positive blood transfusion; - ectopic pregnancy;

- lack of specific prevention of Rh conflict after a completed previous pregnancy;

- presence of Rh conflict in previous pregnancies. **The risk of isoimmunization increases** :

- placental abruption;

- surgical interventions (manual separation of the placenta, cesarean section, amniocentesis) in history or during this pregnancy;

- viral infection (herpetic, cytomegalovirus).

An ABO conflict develops when there is incompatibility between the blood

groups of the mother and the fetus and in the presence of antibodies to the erythrocytes of the fetal blood group. Group Abs can be formed in the mother's body in response to hemotherapy, administration of vaccines and therapeutic serums, or when the mother comes into contact with bacteria that contain antigenic factors A and B.

Most often, immune incompatibility occurs when the mother has blood group 0(I), and the fetus has blood group A(II), less often B(III) or AB(IV). Isoimmunization according to the ABO system can cause hemolytic disease (HD) in an infant from a subclinical mild form to severe erythroblastosis or intrauterine fetal death. However, with ABO incompatibility, fetal red blood cells enter the pregnant woman's body and are quickly destroyed, so Abs do not have time to be synthesized and the disease often occurs in a mild form.

Testing for group Abs is advisable in women with recurrent miscarriage or a history of antenatal fetal death.

ABO incompatibility softens the course of pregnancy during Rh conflict. An Rh conflict often occurs if the pregnant woman and the fetus have the same or the same blood group according to the ABO system.

Diagnosis of isoimmune conflict

History: blood transfusion without taking into account Rh-relatedness, abortion, stillbirth or birth of children with hypertension, information about specific prevention of isoimmunization in previous pregnancies.

Rh-Ab titer determinations: an increase and instability of the Rh-Ab titer indicate an Rh conflict. With a titer of 1:32 and higher, headache is more common and the risk of intrauterine fetal death is high.

Determination of group Abs is carried out in pregnant women with O(I) blood group who have a history of spontaneous abortions, stillbirths, or death of a child from hypertension.

Diagnosis of fetal hypertension

Ultrasound scanning makes it possible to identify signs of early hydrops fetalis and hydrops fetalis that has developed.

Signs of early fetal hydrops : - polyhydramnios;

- hepatosplenomegaly.

A sign of fetal hydrops that has developed : - increased echogenicity of the fetal intestine;

- cardiomegaly and pericardial effusion; - ascites and hydrothorax;

- Buddha pose;

- decrease in physical activity; - thickening of the placenta.

Pregnant women at risk of developing an Rh conflict undergo ultrasound:

- up to 30 weeks of pregnancy once a month;

- after 30 weeks – 2 times a month;

- if signs of fetal damage appear - every day until delivery.

CTG - signs of chronic fetal hypoxia and a decrease in the compensatory ability of the fetoplacental complex.

Transabdominal amniocentesis is performed after 26 weeks of pregnancy.

The question of the need for amniocentesis is decided depending on the Ab titer and medical history. If there are indications for amniocentesis, the woman is sent to a health care facility of the third level of medical care.

Indications for amniocentesis: - Ab titer 1:64 and higher;

- increase in titer by 4 times when repeated testing after 2 weeks; - increase in Ab titer and ultrasound sign of fetal hypertension;

- stillbirth, birth of children with a history of hypertension and ultrasound evidence of fetal hypertension.

Contraindications: - threat of premature birth;

- fever.

Examination of amniotic fluid allows us to assess the severity of anemia in the fetus.

In the case of fetal hypertension, an increase in the concentration of bilirubin in the amniotic fluid and an increase in the amniotic fluid optical density (OPOD) indicator reflect the severity of the headache (table 2).

If OPOV is 0.1 and below, then pregnancy can be prolonged; at 0.15 and above, preparations for delivery begin.

Overall OPVO indicator	Amniotic fluid bilirubin content mg/ml	Fetal condition
0.15-0.20	0-2.8	The risk of developing fetal hypertension is low
0.21-0.34	2.9-4.6	The risk of developing fetal hypertension is moderate
0.35-0.70	4.7-9.5	The risk of developing fetal hypertension is high
More than 0.7	More than 9.5	The risk of developing hypertension is extremely high

Cordocentesis - taking blood from the fetal umbilical cord through the anterior abdominal wall of a woman (carried out in a health care institution of the III level of medical care in the presence of trained specialists). In the umbilical cord blood of the fetus the following is determined:

- hemoglobin and hematocrit; - blood group and Rh factor; - bilirubin level;
- number of reticulocytes;
- whey protein;
- Abs fixed on fetal red blood cells.

If the fetus has Rh-negative blood, there is no need for further testing.

Postnatal diagnosis of hypertension in a newborn - blood type, Rh factor, and bilirubin level are determined in the blood from the vessels of the fetal umbilical cord. The rate of hourly increase in bilirubin level, Hb and Ht levels. The direct Coombs reaction is performed from the peripheral blood of the fetus.

Tactics of pregnancy and childbirth At the stage of antenatal consultation:

The Rh-Ab titer in the blood is determined at the first visit, at 20 weeks, and thereafter - every 4 weeks.

If a pregnant woman has blood type 0(I), the man's blood type is determined to identify the infant's risk group for ABO conflict.

At the obstetric hospital stage:

Delivery of a pregnant woman with an Rh-negative blood type, subject to the presence of isoimmunization, is carried out ahead of schedule depending on the level of Ab titer in the blood of the pregnant woman.

Indications for early delivery in case of Rh conflict: - At titer 1:64 (critical level);

- Increase in titer during repeated analysis by 4 times;

- OPOV 0.35-0.70 and higher, bilirubin concentration in amniotic fluid 4.7-9.5 mg/l;

- Ultrasound sign of headache in the fetus;

- History of stillbirth and birth of children with hypertension.

Immediately after the birth of the child, the umbilical cord is clamped to avoid the entry of Rh-Ab into the bloodstream of the newborn baby; the placental end of the umbilical cord is not clamped (to reduce the risk and volume of fetomaternal transfusion). During a caesarean section, the placenta is not separated by hand.

Prevention of Rh immunization :

Prevention in time pregnancy at In the absence of immunization of a pregnant woman , it is carried out by intramuscular administration of 1 dose (300 mcg) of anti-Rh (D) immunoglobulin:

- during pregnancy 28-32 weeks;

- in case of symptoms of a threat of termination of pregnancy before 28 weeks;

- after amniocentesis or chorionic villus biopsy; - after removal of a hydatidiform mole;

- after an ectopic pregnancy;

- after termination of pregnancy (no later than 48 hours after the abortion);

- after accidental transfusion of Rh-positive blood to an Rh-negative woman;

- after platelet transfusion;

- in clinical situations that are accompanied by the entry of fetal cells into the mother's bloodstream;

- placental abruption, uterine bleeding (of unclear etiology); - trauma to the mother (for example, a car accident).

For pregnancy up to 13 weeks, the dose of anti-Rh (D) immunoglobulin is 75 mcg, for pregnancy over 13 weeks - 300 mcg.

Postpartum prophylaxis at the birth of an Rh-positive child: within 72 hours, 1 dose (300 mcg) of anti-Rh (D) immunoglobulin intramuscularly.

Contraindications to the administration of anti-Rh (D) immunoglobulin are known anaphylactic or severe systemic reactions to human globulin.

Prevention of hypertension using the ABO system during pregnancy is not carried out.

Nonspecific drug prevention and treatment of Rh conflict in pregnant women is not carried out.

2.1 HEMOLYTIC DISEASE OF NEWBORN (HDN)

Etilogy. HDN is a disease that is caused by the passage from the mother's body through the placenta of antibodies directed against the baby's red blood cells, which leads to their increased destruction - hemolysis. This disease remains an important cause of anemia and jaundice in newborns, despite preventive measures. Most often, the disease develops when the blood of mother and child is incompatible with the Rh antigen. At the present stage, more than 60 erythrocyte antigens have been identified that can form antibodies. The most important of them is D-antigen. The cause of HDN may be incompatibility according to the ABO system.

Pathogenesis. When the blood of mother and child is incompatible, the pregnant woman's body produces antibodies that pass through the placental barrier into the blood of the fetus and cause hemolysis of its red blood cells. Due to increased

hemolysis, bilirubin metabolism and indirect hyperbilirubinemia increase.

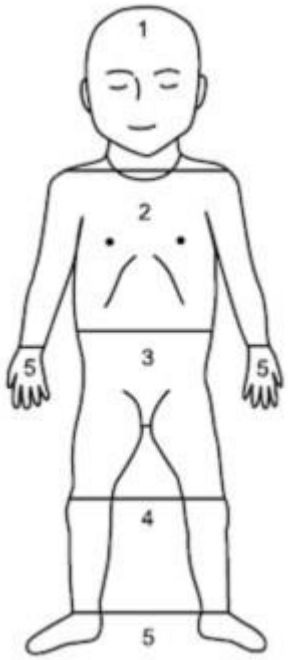
Clinic. Hemolytic disease has a wide range of clinical manifestations, which depends on immunological reactivity and manifests itself in the following variants:

– the child dies during pregnancy; – born with universal edema;

– born with severe jaundice; – is born with severe anemia.

Common symptoms for all forms of the disease are normochromic anemia of a hyperregenerative nature with the appearance in

blood of young forms of red blood cells (erythroblasts, normoblasts, increased



reticulocytes), enlarged liver and spleen.

Methodology for clinical examination and evaluation of jaundice

Skin color : the presence of icteric coloration of the skin should be carried out when the child is completely undressed and under conditions of sufficient (optimally daylight) lighting.

Prevalence of icteric skin coloring : To assess the stages of the appearance of jaundice and the correlation with the level of bilirubin in the blood serum, it is advisable to use the modified Cramer scale. Fig.1.

Rice. 1. Determination of bilirubin content in blood serum depending on the prevalence of jaundice (see Table 3).

Table 3.

Range of bilirubin content in blood serum depending on the severity of

jaundice

Skin areas	Bilirubin, µmol/l
1	31.5–136
2	93.5–204
3	136–280
4	187–306
5	>255

If symptoms of “dangerous” jaundice appear, phototherapy should be started immediately (Table 4).

Time of appearance of jaundice:

Child's age (hours)	Localization of jaundice	Conclusion
24	Any	“dangerous jaundice”
24-48	Limbs	
> 48	Feet, hands	

Clinical condition of the newborn

 When emergence jaundice should evaluate clinical condition of the child:

o The degree of adequacy of the child, the activity of reflexes.

o Adequacy of breastfeeding, which should occur at least 8 times a day.

o Condition of skin turgor and moisture of mucous membranes. o Sizes of the liver and spleen.

o Frequency of urination and character of urine.

 In newborns with jaundice, it is extremely important to monitor for symptoms that indicate damage to the central nervous system (bilirubin encephalopathy):

o Early signs are the appearance of lethargy, drowsiness, lethargy and

suppression of the sucking reflex.

o Increased irritability, muscle hypertension, high-pitched screaming, possible increase in temperature in a later period.

o In a terminal condition, the child experiences opisthotonus, convulsions, apnea, a monotonous high-pitched cry, deep stupor or coma.

Clinical variants of HDN.

The edematous form is accompanied by severe swelling and accumulation of fluid in the cavities. Anemia is pronounced. The placenta is enlarged, with edema. This form is severe and ends in death.

Jaundice form. Enlarged liver, spleen, anemia are accompanied by intense jaundice of the skin. The child is born at term, with normal skin color, but already on the 1st or 2nd day of life, jaundice appears, which quickly increases. Amniotic fluid and cheese-like lubricant have the same color. In children, there is an increase in bilirubin in the umbilical cord blood of more than 51 μmol/l, an hourly increase - from 0.85 to 3.4 μmol/l. Kernicterus develops when the level of free unconjugated bilirubin reaches a level at which it can penetrate the blood-brain barrier. It is controversial what level of bilirubin can lead to kernicterus. It is believed that the risk of clinically significant kernicterus is minimal when the serum bilirubin level in full-term newborns is below 342 μmol/l, and in premature infants - 171 - 256.5 μmol/l. Damage to the central nervous system in children is associated not only with the accumulation of toxic bilirubin. These factors include: the immaturity of the child with damage to the central nervous system of a hypoxic or traumatic nature; large cephalohematomas and soft tissue damage during childbirth; polycythemia; acute asphyxia.

Bilirubin encephalopathy

A progressive increase in the concentration of unconjugated bilirubin in the blood in some cases is accompanied by its penetration through the blood-brain barrier and accumulation in the neurons of the brain (mainly in its subcortical formations, primarily in the nuclei of the brain). The penetration of bilirubin into cells blocks the

respiratory enzymes of mitochondria, inhibits reactions involving adenylate cyclase and K- Na -ATPase, disrupts the functional state of the cell membrane and leads to the death of neurons. In this case, the nuclei of the brain acquire a characteristic yellow color, due to the accumulation of bilirubin in them, which serves as the basis for using the term “kernicterus.” Along with this term, another term is used - “bilirubin encephalopathy”. Bilirubin encephalopathy is rarely clinically detected in the first 36 hours of life, and usually its first manifestations are diagnosed on days 3-6 of life.

The clinical picture of bilirubin encephalopathy includes 4 phases:

1. Dominance of signs of bilirubin intoxication: suppression of unconditioned reflex activity - apathy, lethargy, drowsiness, poor sucking, maybe a monotonous cry, regurgitation, vomiting, “wandering gaze.” (The first hours of the disease. Previously, with an unfavorable course of hemolytic disease of the newborn, the clinical picture of damage to the central nervous system usually appeared by the 4th day of life - “fourth day disease”. In this phase of the disease, dysfunction of neuroglia predominates. During an urgent operation of exchange blood transfusion , the changes that arise usually reversible);

2. The appearance of classic signs of kernicterus: spasticity, stiff neck, forced body position with opisthotonus, “stiff” limbs and clenched hands; periodic excitement and a sharp cerebral cry, bulging of a large fontanelle, twitching of facial muscles, large-scale tremors of the hands, disappearance of the Moro reflex and the visible reaction to a strong sound, the sucking reflex; nystagmus, apnea, bradycardia, lethargy, sometimes fever; cramps, a symptom of the setting sun. (This phase takes from several days to several weeks . The damage to the central nervous system is irreversible)

3. Phase of false well-being and complete or partial disappearance of spasticity (2-3rd month of life);

4. The period of formation of the clinical picture of neurological complications (usually 3-5 months of life): cerebral palsy, paralysis, paresis, athetosis, choreoathetosis, deafness, mental retardation, dysarthria, etc.

Anemic form. The main symptoms are pale skin and mucous membranes, low levels of hemoglobin and red blood cells, and an increase in young forms of red blood cells.

Modern principles of prevention and treatment. Lead tactics.

An important condition for the prevention and treatment of hyperbilirubinemia in newborns is the creation of optimal conditions for the early neonatal adaptation of the child. At the same time, all healthy and relatively healthy newborn children need early (starting from the first hour of life) and regular breastfeeding. In cases of contraindications to early breastfeeding for newborns, it is necessary to organize the feeding of the newborn with an adapted nutritional mixture. The benefit of preventive (from the 1st day of life) supplementary feeding or supplementation of children with water or a 5% glucose solution during the period of relative hypogalactia is questionable.

In all cases of illness in a newborn, care must be taken to maintain optimal body temperature, provide his body with a sufficient amount of fluid and nutrients, and prevent metabolic disorders such as hypoglycemia, hypoalbuminemia, hypoxemia and acidosis.

The management tactics for children with tension-type headache over 24 hours of age depend on the absolute values of bilirubin and the dynamics of these indicators.

Phototherapy at the present stage is the most effective method of treating indirect hyperbilirubinemia.

History of the issue.

In the early 50s. In England, at Rochford General Hospital in Essex, nurse Ward took the children outside to get some air and warm up in the sun. The next day, she noticed that the children's skin had brightened. Here is RHDobbs' report on this discovery.

“One fine summer day in 1956. While on duty, Nurse Ward undressed the premature baby. The child was pale yellow. Except for a triangle of very yellow skin. I asked her: “Sister, what did you put on these areas: iodine or flavin, and why?” But

she replied that she associated this effect with the action of the sun. " What do you have in mind? After all It takes time for a tan to appear after the erythema disappears .” Nurse Ward explained that this jaundiced baby's skin was darker in the areas that were covered by the sheet. “The exposed areas of the body have turned pale.” The child felt well and was discharged home. Outdoor therapy for premature babies was continued.”

Phototherapy (table 5.6):

- phototherapy begins when icteric discoloration of the skin appears, with simultaneous blood sampling to determine total serum bilirubin;

- the question of stopping or continuing phototherapy is decided after receiving the results of total serum bilirubin;

- in case of unsuccessful phototherapy for 4-6 hours, when determining the level of total serum bilirubin, which corresponds to the levels of an exchangeable blood transfusion, an exchangeable blood transfusion is performed (Table 5.6).

Birth weight (grams)	**Phototherapy**	**ZPK**
<1500	*85-140 μmol/l	*220-275 μmol/l
1500-1999	*140-200 μmol/l	*275-300 μmol/l
2000-2500	*190-240 μmol/l	*300-340 μmol/l
> 2500	*255-295 μmol/l	*340-375 μmol/l

. **Indications for phototherapy and exchange transfusion in newborns based on the level of bilirubin in the blood serum**

Age	Phototherapy				Exchange transfusion			
	Healthy full-term baby		Any factor		Healthy full-term baby		Any factor	
	m	μ	m	μ	m	μ	m	μ

	g/dl	mol/l	g/dl	mol/l	g/dl	mol/l	g/dl	mol/l
Day 1					15	260	13	220
Any visible jaundice								
Day 2	15	260	13	220	25	425	15	260
Day 3	18	310	16	270	thirty	510	20	240
Day 4 and later	20	340	17	290	thirty	510	20	340

Phototherapy is based on the ability of bilirubin molecules, under the influence of light energy, to change the chemical structure and associated physicochemical properties. Phototherapy leads to a gradual decrease in the concentration of unconjugated bilirubin in the blood serum and reduces the risk of bilirubin encephalopathy.

Blue light fluorescent lamps are most commonly used in standard phototherapy units. The combination has proven itself well: 4 blue light lamps and 2 fluorescent lamps, creating a sufficient luminous flux in the range of 400-500 nm. At the same time , the therapeutic effect on the child's body is provided predominantly by blue light.

Currently, standard phototherapy units use high-power fluorescent blue light lamps, providing about 12 μW/cm ^{2} /nm, which is sufficient for effective photoisomerization of bilirubin in the skin of a child. In recent years, along with fluorescent light sources, halogen lamps have also been used. Along with standard phototherapy installations, "photo blankets" can be used. In the latter case, light is transmitted to the child's skin from powerful halogen lamps using light guides. In the most severe cases, the combined use of "classical" installations and "photo blankets"

or the use of high-power installations has worked well.

Since photoisomerization of bilirubin occurs in the skin, the larger the surface of the body exposed to light, the more effective phototherapy is. Conversely, the more severe the hyperbilirubinemia, the larger the body area that should be used for phototherapy. When using standard settings, it is necessary to regularly change the position of the child in relation to the light source, turning him alternately upside down with his stomach or back;

Duration of phototherapy sessions.

Considering that in recent years the equal effectiveness of continuous and intermittent phototherapy regimens has been proven, the duration and frequency of phototherapy sessions can be determined by the following considerations:

a) the maximum break between phototherapy sessions that does not harm the final effectiveness of phototherapy is no more than 2-4 hours;

b) as long as indications exist, phototherapy sessions should be repeated regularly;

c) the optimal phototherapy regimen for most newborns with conjugative hyperbilirubinemia is a sequential alternation of phototherapy sessions with breaks for feeding;

e) with a rapid increase in bilirubin levels and with critical hyperbilirubinemia, phototherapy must be carried out continuously.

Side effects . The use of phototherapy in medical practice for more than 40 years has not revealed any adverse long-term consequences for the human body. At the same time, experiments on laboratory animals have shown the potential damaging effect of bright light on the retina of the eye and the testes of the testes. This was the basis for appropriate protection (shielding) of the eyes and male genital organs of newborn children during the period of phototherapy.

Some children may experience an allergic rash and increased bowel movements in response to phototherapy. In isolated cases, the skin color may acquire a bronze tint. All three effects are associated with the accumulation of bilirubin

photoisomers in the body and, as a rule, disappear without a trace after phototherapy is stopped.

Indications for replacement blood transfusion.

The concentration of total bilirubin in the blood of the umbilical cord vein at birth is >85 μmol/l and Hb<110 g/l;

The hourly increase in the concentration of total bilirubin is >8.5-9.0 μmol/l/hour with an examination interval of the child of 6-8 hours;

Total bilirubin concentration >340 μmol/l at any age, if there are risk factors: complicated obstetric history, prematurity, sepsis, hypoxia, acidosis, hypoproteinemia; Clinical manifestation of kernicterus at any age (drowsiness, increased excitability, changes in muscle tone, refusal to eat, shuddering, convulsions, hyperthermia, high-pitched scream, coma);

Blood test: anemia (HB less than 110 g/l), normoblastosis and proven incompatibility of the blood of mother and child by group and factor

Taking into account the severe degree of hemic hypoxia, clinical and laboratory signs of a severe form of hemolytic disease in a newborn child are an absolute indication for emergency (in the first 2 hours of life) surgery. In this case, the partial PCD technique is used, in which 45-90 ml/kg of the child's blood is replaced with a similar volume of donor red blood cells of group 0(1), Rh-negative.

In other cases, the PCD operation is performed with the replacement of 2 volumes of the child's circulating blood (160-180 ml/kg).

Preoperative preparation.

a) In children in serious condition, acidosis, hypoxemia, hypoglycemia, electrolyte disturbances, hemodynamic disorders, and hypothermia must be eliminated before surgery using standard intensive care methods.

b) To perform the PCD operation, a clean incubator or resuscitation table heated by a radiant heat source must be prepared.

c) Children should not receive enteral nutrition for the last 3 hours before the expected start of surgery.

d) A permanent probe must be inserted into the stomach of such children

before the operation, through which it is necessary to periodically remove gastric contents . In addition, before the operation it is necessary to do a cleansing enema.

e) Before the start of the operation, the POC must be prepared:

- umbilical catheters, syringes of different volumes, a set of instruments necessary for the operation

- bottles with erythromass and plasma heated to 27-37 degrees (C), - a kit for determining blood type and its compatibility,

- a set of medications necessary for resuscitation measures and equipment for auxiliary ventilation,

- trays for used blood and instruments,

- 70% medical alcohol, 0.5% chlorhexidine solution or 5% iodine solution,

- saline solution and sterile heparin solution,

- sterile dressings (cotton wool, napkins, bandages) , silk, - sterile diapers, surgical gowns and gloves.

The operation can be performed in an operating room, treatment room or clean room, on a resuscitation table heated by a radiant heat source, or in an incubator. Before the operation begins, the child's limbs are secured with tight swaddling, the skin of the abdomen is exposed, and the area around the umbilical cord is covered with sterile diapers. After standard disinfection of the operator's hands, the remainder of the umbilical cord is disinfected with a sterile gauze ball moistened with a 70% alcohol solution and 0.5% chlorhexidine solution. First, the umbilical ring and the skin around the umbilical remnant are treated in a circular motion, and the umbilical remnant itself is treated with another gauze swab. In the absence of chlorhexidine in full-term infants, sequential treatment of the umbilical cord with 70% alcohol, 5% aqueous iodine solution and again 70% alcohol is permissible. A test is carried out to determine the individual compatibility of the child's blood with donor blood or red blood cells.

The PCD operation is performed by a doctor with the help of an assistant. Before starting PCP, the operator and assistant carry out preoperative hand treatment according to generally accepted methods, put on sterile gowns and gloves.

Technique of exchange blood transfusion for HDN.

1. Necessary means : packed red blood cells, fresh frozen plasma, 10-20 ml syringes (at least 20 pcs), a container for collecting syringes with drained blood, a sterile polyethylene catheter (No. 6,8,10 - depending on the diameter of the vein) , inserted after cutting off the upper part of the umbilical cord into the umbilical cord vein at a distance of 3-5 cm (in large children up to 6-8 cm) from the umbilical ring up towards the liver. If you are over 4 days old and/or if there are contraindications to catheterization of the umbilical vein, the PPV operation is performed through any other central vein through a central venous catheter , clean disposable sterile gloves, a sterile gown, a mask, a cap, safety glasses, sterile dressings (wipes, balls), sterile lye thread, sterile instruments (scalpel, scissors, clamp, tweezers), 70 ^{0} alcohol, tray for used dressings, saline solution, ampoule of 10% calcium gluconate (if citrated blood is used) , oxygen (if necessary) , anti-shock and resuscitation kits, monitor (if possible), radiant heat source, resuscitation table, instrument table, thermometer, water thermometer.

2. Warm the red blood cells and plasma in a water bath, the temperature of which should not exceed 37 ^{0} C

3.Draw red blood cells and plasma into separate syringes (for full-term - 20 ml, for premature - 10 ml); the ratio of the number of syringes with red blood cells and the number of syringes with plasma should be 2:1. Place the syringes with collected red blood cells and plasma on a sterile covered instrument table under a source of radiant heat in the following order: two syringes with red blood cells and one with plasma, etc. .d. 4. Place the child on a pre-warmed table . Suction the stomach contents before surgery.

5. Wash your hands and treat them with an antiseptic; wear sterile clothing and sterile disposable gloves.

6. The catheter is inserted into the umbilical vein no more than 7 cm and the tip of the catheter is thoroughly treated with 70 ^{0} alcohol.

7. Using a sterile syringe, take 2-5 ml of the child’s blood to determine total

bilirubin , glucose, hemoglobin, hematocrit, and red blood cells. 8.The PCD procedure is carried out by alternately introducing the appropriate blood components and removing the child's blood. PCP begins with the introduction of blood components

9. After every 100 ml of injected and withdrawn blood, in order to neutralize glyglycer (citrate), inject 1 ml of 10% calcium gluconate solution into the child

10. From the last portion of withdrawn blood, take 2-5 ml of the child's blood to determine total bilirubin, glucose, and calcium concentration in the blood. The PCP is completed with the introduction of red blood cells . In case of severe anemia, additional red blood cells can be administered at the rate of 10 ml/kg. During PCD, carefully record the amount of blood injected and removed.

The average duration of the operation is 1.5-2.5 hours, depending on the child's body weight. Faster or slower operation may have a negative impact on the general condition of the newborn.

At the very end of the operation, a broad-spectrum antibiotic (half the daily dose) is injected into the umbilical catheter. The umbilical catheter is removed.

If there is a long umbilical cord remnant, a silk ligature is applied to it, and if it is absent, a sterile pressure bandage soaked in a hemostatic solution or a hemostatic sponge is applied. The area around the umbilical wound is treated with alcohol.

As a result of the operation (taking into account the blood taken for research), the total volume of injected components of donor blood must be equal to the total volume of the child's blood removed. The unconditional effectiveness of the performed PCP is evidenced by a more than 2-fold decrease in bilirubin concentration by the end of the operation.

In ***the postoperative period,*** the vital functions of the child's body are monitored and maintenance, syndromic and phototherapy are continued.

2.2. Jaundice at erythrocyte membranopathy (Minkowski-Choffard anemia, pycnocytosis, etc.)

The development of jaundice is based on increased hemolysis of erythrocytes of hereditary origin (the role of an immunological conflict in genesis is rejected). In diagnosis, it is necessary to study the child's pedigree; examine a smear of his peripheral blood with the preparation of a Price-Jones curve; calculate the thickness, sphericity index and average volume of red blood cells; determine the osmotic resistance of red blood cells. The diagnosis is confirmed by three cardinal signs: jaundice, anemia, splenomegaly. In the blood there is indirect hyperbilirubinemia, microspherocytosis, the minimum osmoresistance of erythrocytes is reduced (0.7-0.56%), the maximum is increased - 0.3-0.25%, high reticulocytosis, normoblastosis. Acute crises with severe symptoms are often observed. Urobilinuria is detected in the urine. In the bone marrow there is a sharp increase in erythropoiesis. Coombs' reaction is negative. The current is wavy. Increased hemolysis of erythrocytes is provoked by intercurrent diseases.

Treatment: radical and effective in 100% of cases is splenectomy at the age of no earlier than 5 years; with frequent crises, splenectomy is resorted to at an earlier age. Symptomatic treatment is urtic choleretic therapy, hepatoprotectors to prevent the formation of gallstones in the gallbladder and ducts. Treatment with corticosteroids, vitamins and blood products is ineffective. 2.2. **Pycnocytosis in newborns (erythrocytes with "styloid processes").**

It is detected already in the first days of life, in premature infants - at 3-4 weeks of life with vitamin E-deficiency anemia. In addition to the altered morphology of erythrocytes, such children have low hemoglobin levels, thrombocytosis, edema, and high NP.

Treatment of vit . E at a dose of 10 mg/kg per day for 10-14 days leads to recovery. The clinical picture is similar for elliptocytosis in newborns with hemolytic anemia. By the end of the neonatal period - 2-4 weeks of life - the typical oval shape of red blood cells is already detected, confirming the diagnosis.

2.3. Hemolytic jaundice of hereditary origin .

Possible with erythrocyte fermentopathy due to deficiency of glucose-6-

phosphate deeogenase, hexokinase and other enzymes. Jaundice is accompanied by high hyperbilirubinemia in the neonatal period against the background of anemia. In addition to anemia and jaundice, the clinic notes a disturbance in the general condition, hyperexcitability and sometimes fever, vomiting, pallor, splenomegaly; in the blood - high reticulocytosis, normoblastosis. This pathology is provoked by hypoxia, acidosis, nitrofuran drugs, paracetamol, antihistamines, acetylsalicylic and ascorbic acids. The diagnosis is made on the basis of spectrophotometric or cytochemical determination of the activity of erythrocyte enzymes.

Treatment: involves eliminating factors that provoke hemolysis; prescription of red blood cells or partial replacement blood transfusion, symptomatic therapy.

2.4. Hemolytic jaundice that occurs with hemoglobinopathies (thalassemia, sickle cell disease).

These diseases are associated with an abnormality in the protein part of the hemoglobin molecule. There is a decrease in the lifespan of red blood cells and their destruction in the organs of the RES and the spleen. Thalasemia is clinically manifested by the specific appearance of the child: “tower skull”, wide-set eyes, wide bridge of the nose, enlarged abdomen due to the spleen; synthesis of all types of hemoglobin and high indirect bilirubinemia are noted. The clinical picture is approximately the same for sickle cell disease. Treatment: attempts to stimulate hemoglobin synthesis in various ways are unsuccessful, allogeneic bone marrow transplantation stabilizes the patient's condition by 3-5 R ; methods of genetic engineering are being developed. Splenectomy is performed for increasing hypersplenism. Replacement therapy - transfusion of red blood cells 1-2.5 g per administration.

2.5. Polycythemia of the newborn.

It is clinically manifested by jaundice in a child in the first days of life, cyanosis with a cherry tint, shortness of breath, some swelling of the back and abdomen, drowsiness or a tendency to convulsions. The hematocrit exceeds 0.65-0.7, and the hemoglobin level exceeds 220 g/l. Hyperbilirubinemia can reach values that require replacement blood transfusion (above 342 (μmol/l, with a rate of increase of

bilirubin above 6.0 μmol/l per hour and its level in the umbilical blood above 60 μmol/l).

III. Mechanical or obstructive jaundice.

Mechanical (obstructive) jaundice in newborns and young children is observed mainly with malformations of the bile ducts and bile thickening syndrome. The excretory function of the liver is impaired, cholestasis syndrome occurs. They arise due to gross disturbances in bile flow, obstruction of the bile ducts. Jaundice is diagnosed with malformations of the bile ducts (atresia and aplasia), intrahepatic hypoplasia, intrauterine cholelithiasis, compression of the bile ducts by a tumor, as well as with fibrocystic liver disease, bile thickening syndromes, etc.

Among the malformations of the biliary tract there are partial or complete atresia of the intrahepatic or extrahepatic ducts, polycystic disease, torsion or kinks of the gallbladder. Cholestasis can be caused by a tumor, infiltration, gallstones, impaired synthesis and excretion of bile acids. Bile thickening syndrome occurs against the background of intense hemolysis of red blood cells, so it often accompanies hemolytic anemia (familial hemolytic anemia of Minkovsky Shoffar, hemolytic disease of the newborn, etc.).

Violation of the outflow of bile leads to stagnation, destruction of the hepatic beams and communication between the bile and blood capillaries. This causes an increase in direct and, to a lesser extent, indirect bilirubin.

The clinical manifestations of bile duct atresia in newborns are usually similar, regardless of the reasons for their development.

The main signs are discolored stools, dark-colored urine and jaundice, which is prolonged. Jaundice persists and takes on a greenish tint (bilirubin in the skin turns into biliverdin). In the first weeks of life, there is no intoxication, but jaundice persists. The liver is moderately enlarged and later becomes dense. The spleen enlarges later due to the development of biliary cirrhosis of the liver. Laboratory studies are characterized by an increase in total cholesterol, alkaline phosphatase activity, direct bilirubin, with normal levels of liver cell enzymes (AST, ALT, etc.), thymol test, prothrombin. Direct bilirubin is detected in urine. Other research methods for diagnosing biliary atresia are: retrograde cholangiopancreatography,

scintigraphic study with rose bengal, laparoscopy with revision of the gallbladder and bile ducts.

Liver cirrhosis and portal hypertension can occur at any time, starting from 2 months of age. In the clinic, anemia, malnutrition, intoxication are increasing, liver function is impaired, and symptoms of portal hypertension are increasing. Without treatment, death usually occurs by 2 years of age. Such children should be referred to specialized medical centers. For patients for whom surgical treatment has failed, the only option is liver transplantation.

Thickening syndrome should be suspected when a child with hemolytic jaundice has discolored stools and greenish urine. Along with this, the liver enlarges and the patient's condition worsens. Ultrasound and computed tomography may be crucial for diagnosis. Treatment is supplemented with detoxification therapy and the prescription of choleretic drugs (chophythiol, 25% solution of magnesium sulfate, etc.), and physiotherapy.

Cholestasis is a decrease or cessation of bile flow. Clinically, obstructive jaundice appears more often at 2-3 weeks of life, when constantly or periodically discolored or poorly colored stool appears. Cholestasis is characterized by a greenish tint of jaundice due to the accumulation of biliverdin in the blood. There is no stercobilin in the stool, it is intensely colored , but there is no urobilin in the urine. The liver becomes dense. The spleen enlarges, portal hypertension, ascites may develop, and hemorrhagic syndrome may appear due to vitamin deficiency. K-dependent factors, etc. Hyperbilirubinemia is often direct and less often mixed. Depending on the causative factor, obstructive jaundice may have some specific features. Differential diagnosis is possible using liver ultrasound, surgical cholangiography, percutaneous biopsy and other studies.

Treatment: determined by the etiology of cholestasis: for complete atresias, tumors - surgical, for irreversible liver damage - liver transplantation after the age of 3-4 months; for incomplete, transient cholestasis - physiotherapy (electrophoresis of magnesium sulfate), "blind probing", cholekinetics: chofitiol, sorbitol, magnesium sulfate, etc., antispasmodics; fat-soluble vitamins (A, E orally, age-related doses and

K), symptomatic therapy. Glucocorticosteroids do not have a positive effect; they are indicated only for hepatitis. Anabolic steroids and cholestyramine are contraindicated.

IV. Parenchymal jaundice.

Parenchymal jaundice refers to acute or chronic inflammatory-dystrophic diseases of the liver.

In young children, hepatitis can be congenital or acquired, caused by viruses, bacteria, and protozoa. With hepatitis, the liver cell is damaged, which normally takes bilirubin from the blood and transports it inside it to microsomes, where free bilirubin is converted into bilirubin glucuronide. The release of conjugated bilirubin into the bile capillaries represents an independent link in the intracellular exchange of bilirubin. This is an active secretory process that increases the concentration of bilirubin in bile compared to plasma by 1000 times. Due to damage to the lysosomes of the liver cell and a change in its permeability, intracellular bile retention develops, followed by regurgitation of bilirubin back into the blood. Intracellular cholestasis is currently considered to be the main causative factor of all hepatocellular jaundices.

In the etiology of congenital hepatitis, the leading place is given to hepatitis B , cytomegaly, and herpes simplex viruses, which pass through the placental barrier, while the hepatitis A virus does not have these properties. In the pathogenesis of congenital hepatitis, the leading role is played by the long-term, high concentration persistence of the pathogen in the body of a pregnant woman, as well as disease of the placenta and fetal membranes with a violation of the fetoplacental complex.

The incidence of antenatal HB virus infection is directly dependent on the concentration of HBSAg. The risk of infection is high if high concentrations of HBSAg remain at the time of delivery.

Perinatal HB virus infection can occur as a persistent low-symptomatic infection with the formation of primary chronic hepatitis B and as an acute cyclic infection.

With manifest congenital hepatitis, all symptoms of liver damage are observed from birth. The child's condition is serious, jaundice appears from the first days of life and increases by 2-3 weeks, the urine is dark, the stool is discolored. The liver and spleen are slightly enlarged and compacted. Intoxication is manifested by lethargy, anxiety, loss of appetite, regurgitation, and vomiting. Often from birth, hemorrhagic

syndrome is observed in the form of petechiae, ecchymoses, and bleeding from injection sites.

In the blood, the content of conjugated bilirubin and moderately indirect bilirubin is increased, the level of ALT activity increases 3-5 times, the levels of the thymol test and beta-lipoproteins increase, while the prothrombin complex decreases. The disease is severe and can be fatal.

A morphological study of the liver tissue of deceased children reveals a picture of massive or submassive liver necrosis, less often subacute, chronic cholestatic hepatitis with the formation of biliary cirrhosis. Differential diagnosis is carried out with obstructive jaundice, mainly with biliary atresia, taking into account the commonality of clinical and paraclinical symptoms. They rely on data that is not typical for hepatitis: the absence of intoxication in the first 2 weeks of the disease with atresia, a yellowish-greenish tint of the skin, the absence of positive dynamics when prescribing prednisolone. A needle biopsy of the liver helps. If a child receives blood transfusions during the neonatal period, then after 2-3 months he may develop serum hepatitis. With the enteral route of infection, Botkin's disease is possible. In these cases, jaundice appears later and there is no need to differentiate it from other jaundices of the newborn period.

The clinical manifestations of serum hepatitis and Botkin's disease are the same,

as with hepatitis of newborns. The course of the disease is very severe with high mortality. A severe complication of hepatitis is liver dystrophy , the harbingers of which are increasing jaundice, vomiting, especially coffee grounds, daytime drowsiness, decreased liver size, increased liver enzymes and indirect bilirubin in the blood.

1. May occur with **fetal gigantic hepatitis** in premature infants with a gestational age of less than 32 weeks receiving parenteral nutrition for more than 3 weeks. Liver biopsy in such children shows hepatocellular damage, cholestasis, and giant cell transformation of hepatocytes. Hepatocyte dysfunction develops under the influence of administered amino acids and fat emulsions. Jaundice is caused by direct

hyperbilirubinemia. Canceling parenteral nutrition leads to rapid disappearance of hepatitis symptoms.

2. Jaundice in fetal hepatitis associated with intrauterine infections:

cytomegaly, listeriosis, toxoplasmosis, herpes, rubella, viral hepatitis A , B, C, neither A nor B.

Clinically, jaundice manifests itself at birth or in the first 2-3 weeks of life. Hyperbilirubinemia is of mixed origin, i.e. the level of direct and indirect bilirubin in the blood is high . Other characteristic signs are an enlarged liver with palpable dense edges, poor appetite, regurgitation, low weight gain, low-grade fever, bloating, lethargy, discolored stool, enlarged spleen, sometimes hemorrhagic syndrome, signs of cholestasis, liver failure.

The diagnosis is made based on the detection of high activity of hepatospecific enzymes (aminotransferase, glutamate dehydrogenase, urokinase, etc.) in the serum, as well as often elevated levels of α- fetoprotein, detection of antibodies to HBsAg and the results of serological tests for cytomegaly, rubella, etc.

3. Jaundice of mixed origin with toxic-septic liver damage. With sepsis, newborns may develop jaundice, especially often with coli-sepsis . Bacterial toxins affect hepatocytes, suppressing their excretory function. Liver biopsy reveals signs of cholestasis, focal necrosis of hepatocytes and areas of fibrosis without the development of purulent inflammation. Despite high levels of bilirubin in the blood serum, the increase in the activity of transaminases and alkaline phosphatase is often small or absent altogether. Does not require specific treatment (treatment of bacterial sepsis). Liver damage usually goes away without a trace, sometimes cholecystitis develops later.

4. Neonatal jaundice with indirect bilirubinemia in hereditary metabolic diseases:

1.Galactosemia is a metabolic abnormality in which galactose accumulates in the body. This may also result in neonatal jaundice.

The disease is inherited in an autosomal recessive manner. There is a functional

deficiency of the enzymes galactokinase or galactose-1-phosphate uridyl transferase. Jaundice appears on days 2-3 of life. Somewhat later, hepatomegaly, vomiting, severe weight loss, attacks of hypoglycemia, convulsions, sllenomegaly, diarrhea, mental loss and cataracts are detected. Liver cirrhosis gradually develops. The diagnosis is made based on the detection of sugar in the urine (galactosuria), aminoaciduria, increased levels of galactose in the blood, decreased galactokinase activity in red blood cells, and analysis of the genealogical history. Treatment: feeding with dairy-free formulas (lactose-free) . Symptomatic therapy is used.

2. Tyrosiemia is the result of a violation of the utilization of tyrosine in the body, due to a deficiency in the activity of a number of enzymes (tyrosine transaminases, etc.). In the acute form, jaundice is caused by direct and indirect bilirubin. Appears at 2 weeks of life; hepatomegaly develops, signs of hyperexcitability develop, vomiting, diarrhea, fever, attacks of hypoglycemia, ecchymosis, hematuria, melena, bleeding, etc. appear. The chronic form of hyperexcitability in the neonatal period is not clinically manifested. It develops in the second year of life and is manifested by malnutrition, developmental delays, progressive cirrhosis of the liver, and delayed psychomotor development.

Treatment: diet with the exclusion or sharp limitation of foods containing tyrosine; liver transplantation.

3. Fructosemia.

It is more benign than galactosemia.

Diagnosis is based on the determination of fructose in urine and blood. 4. Deficiency of alpha - 1 - antitrypsin.

Type of inheritance: autosomal recessive.

Clinic. The picture is similar to cholestatic hepatitis: jaundice appears from the first days of life, is caused by hyperbilirubinemia with a predominance of direct bilirubin, and is characterized by a protracted course. The stool is acholic, bile pigments appear in the urine. The liver is enlarged in size; in case of an unfavorable course of the disease, cirrhosis is possible; in mild forms, recovery is possible by the second half of life. Laboratory diagnostics.

Biochemical blood test - determination of total bilirubin and bilirubin fractions, protein electrophoresis - absence or sharp decrease of less than 1% of alpha-1-globulins . Determination of antitryptic activity of serum and serum concentration of alpha-1-antitrypsin by immunodiffusion - reduced.

Liver histology - portal fibrosis, PAS-positive lumps in the cytoplasm of hepatocytes.

5. Cystic fibrosis.

Incidence of cystic fibrosis: 1 : 2,500 newborns. The liver is affected in 20–40% of cases by this disease.

Clinic. Jaundice in cystic fibrosis is associated with cholestasis due to blockage of the bile ducts by thick mucus. Destructive changes in the liver begin early, sometimes already in the prenatal period, and later cirrhosis may develop.

Laboratory diagnostics.

Biochemical blood test - mixed type hyperbilirubinemia. Coprogram – steatorrhea . The level of sodium and chlorine in sweat is increased to 60 mmol/l.

Screening test for newborns - increased immunoreactive trypsin in the blood.

Stool analysis for trypsin and chymotrypsin is sharply reduced .

Liver biopsy reveals characteristic eosinophilic plugs and hyaline deposits in the interlobular bile ducts and steatorosis.

Principles of hepatitis treatment:

1. Rational feeding. 2. Detoxification therapy. 3. Hormone therapy.

4. Vitamin therapy, cocarboxylase. 5. Choleretic drugs.

Jaundice can be a symptom of parenchymal liver damage due to cytomegaly and toxoplasmosis. In these cases, jaundice appears from the first days of life, is persistent, accompanied by an enlargement of the liver and spleen, changes in the color of urine and feces. Liver damage in these infections is rarely isolated, but is a manifestation of a generalized generalized infection. Cytomegaly affects the respiratory system such as interstitial pneumonia (persistent cough, shortness of breath, tachypnea), the nervous system (meningoencephalitis, hydrocephalus), vision

(chorioretinitis, cataracts, optic nerve atrophy), the gastrointestinal tract (ulcerative enterocolitis) and other organs. With toxoplasmosis, malformations of the brain are detected in the form of micro- and hydrocephalus with the presence of calcifications in the brain, characteristic neurological disorders: lethargy, anxiety, tension of the fontanelle, tremor of the chin and limbs, chorioretinitis. The diagnosis is made taking into account the clinical picture after the mandatory exclusion of jaundice of other origins and paraclinical data (examination of urine sediment, cytomegaly virus culture, complement fixation reactions for toxoplasmosis, cerebrospinal fluid smears, bone marrow for toxoplasmosis).

In therapy, the main emphasis is on treating the underlying disease. Summarizing the above data, we can draw the following conclusions in the diagnosis, differential diagnosis , prevention and treatment of various groups of neonatal jaundice.

General principles for diagnosing jaundice

1. Anamnesis (family history, features of the course of pregnancy, childbirth in the early neonatal period, previous infections).

2. Clinical examination (skin color, mucous membranes, sclera, weight dynamics

body, the presence of vomiting, hepatosplenomegaly, hemorrhagic manifestations, hematomas, signs of an infectious process, the nature of the stool, the color of urine).

3. Determination of blood group and Rh factor. 4. Conducting direct and indirect Coombs tests.

5. Determination of specific erythrocyte antibodies.

6. Determination of total protein and its fractions, C-reactive protein (CRP), procalcitonin (PCT), seromucoids, alkaline phosphatase, thymol test, transaminases.

7. Study of a general blood test with determination of hematocrit, reticulocytes, erythrocyte morphology.

8. Determination of osmotic resistance of erythrocytes. 9. Coagulogram, determination of prothrombin index. 10. Study of the presence of hepatitis markers in the blood.

11. Ultrasound of the abdominal organs.

12. Serological examination of the blood of mother and child for intrauterine infections (rubella, toxoplasmosis, herpes, etc.).

13. Bacteriological examination of blood, urine, feces and other body fluids for pathogenic flora.

14. In case of prolonged and severe hyperbilirubinemia, especially with an increase in direct bilirubin, an in-depth examination is necessary in the center of medical genetics to exclude metabolic diseases and in a children's surgical center using puncture biopsy and cholangiography to exclude biliary pathology.

Differential diagnosis of jaundice

Basic diagnostic clinical and laboratory criteria for various groups of neonatal jaundice.

I. Hemolytic jaundice is characterized by:

1) Early onset and early appearance of jaundice caused by indirect hyperbilirubinemia.

2) High hourly increase in bilirubin.

3) The color of the skin ranges from bright yellow (saffron) to lemon yellow.

4) The presence of normochromic hyperregenerative anemia - reticulocytosis, normo- and erythroblastosis.

5) Hepatosplenomegaly.

6) Normal color of stool.

7) Normal color of urine (with the exception of jaundice due to deficiency of glucose-6-phosphate dehydrogenase).

8) Toxic effect of indirect bilirubin on all organs and tissues. I I. Conjugation jaundice is characterized by:

1) Hyperbilirubinemia with a predominance of indirect bilirubin. 2) Low hourly increase in bilirubin.

3) Later onset of jaundice - from 3 to 4 days of life (with the exception of Crigler-Nayar syndrome).

4) No signs of hemolysis (anemia, reticulocytosis).

5) Absence of splenomegaly. 6) Long term.

7) Normal color of urine.

8) Normal color of stool (with the exception of Crigler-Nayar syndrome. 9) Absence of a pronounced toxic effect of bilirubin on the central nervous system (for

with the exception of Crigler-Nayar syndrome). I I I. Mechanical jaundice is characterized by : 1) An increase in the level of direct bilirubin.

2) Low hourly increase in bilirubin. 3) Increase in liver size.

4) Skin color from olive-yellow to greenish. 5) Dark coloration of urine.

6) Periodically discolored feces.

7) Hemorrhagic syndrome - petechiae, bruises.

8) Laboratory signs of cytolysis and mesenchymal inflammation.

Prevention and treatment of different groups of neonatal jaundice.

The success of the prevention and treatment of hyperbilirubinemia in newborns depends on the optimal conditions for the early neonatal adaptation of the child. In all cases of illness in a newborn, care must be taken to maintain optimal body temperature, provide the child's body with a sufficient amount of fluid and nutrients, and prevent hypoglycemia, hypoalbuminemia, hypoxemia and acidosis.

Test questions on the topic.

1. Fetal hepatitis begins in utero during the period - please indicate correct answer:

a) embryogenesis, + b) **fetogenesis** c) b lastogenesis

d)p late fetal

2. Immaturity of liver glucoronyltransferase in a newborn causes hyperbilirubinemia - indicate the correct answer :

+a **) is,** b) is not c) unlikely d) in 3% of cases

3. With hyperbilirubinemia in newborns, kernicterus may develop, if the level of indirect bilirubin increases to - please indicate correct answer :

a) 150 μmol/l, b) 240 μmol/l,

+c) **340 μmol/l** d) 170 μmol/l

4.When carrying out phototherapy pathogenetically due to simultaneous administration - indicate the correct answer :

a) intravenous administration of glucose, b) glucocorticoids,

c) piracetam

+d) **give the newborn a drink**

5. Conjugation jaundice is characterized by - indicate the correct answer:

+ a) **increased indirect bilirubin,**

b) increased alkaline phosphatase levels, c) anemia,

d) discoloration of stool

6. **In case of transient jaundice, the development of kernicterus – indicate correct answer :**

a) perhaps

+ b) not possible c) m unlikely

d) not in all cases

7. Jaundice due to hypoxia in newborns may be accompanied by - <u>indicate the correct answer</u> :

+a) **anemia,**

b) an increase in hemoglobin above 220 g/l,

c) an increase in the number of red blood cells above $8.5 \cdot 10^{12}$ /l, d) the appearance of urobilin in the urine

8.If the mother has blood type AB (IV) and in child O (I), there is a possibility of developing hemolytic disease - <u>indicate the correct answer</u> :

+ a **) absent,** b) present c) unlikely d) in 0.3% of cases

9.Symptoms of kernicterus may develop in a newborn - <u>please indicate correct answer</u> : a) in the first days of life,

+b) **on days 3-6 of life,**

c) in the second week of life,

d) by the end of the first month of life

10. The classic signs of kernicterus are – <u>please indicate</u> <u>correct answer</u> :

a) positive physiological reflexes

+b) **opisthotonus, spasticity, nystagmus, lethargy**

c) retraction of the large fontanelle,

d) facial nerve paralysis

11.Characteristic clinical signs edematous forms of hemolytic disease of the newborn are – <u>indicate the correct</u> <u>answer:</u>

a) mild anemia, b) l eukocytosis,

+ **c) edema, hepatosplenomegaly , d hypoalbuminemia** d) jaundice,

12. **Hemolytic disease of the newborn should not be differentiated from - indicate the correct answer:**

+ a **) respiratory distress syndrome,** b) fetal hepatitis,

c) posthemorrhagic anemia,

d) hemorrhagic disease of the newborn

13. Physiological jaundice of a newborn develops as a result of - indicate one correct answer:

a) increased formation of indirect bilirubin due to the shortened lifespan of red blood cells with fetal hemoglobin

b) hypoalbuminemia

c) decrease in glucuronyltransferase activity

+d) **increased formation of indirect bilirubin due to the shortened lifespan of red blood cells with fetal hemoglobin and decreased glucuronyl transferase activity**

14.The cause of hemolytic disease of the newborn is - specify one correct answer :

a) immaturity of liver glucuronyltransferase, +b **) isoimmune hemolytic anemia,** c) hemoglobinopathy,

e) intrauterine infection;

15. If the blood of mother and fetus is incompatible according to the Rh factor, hemolytic disease of the newborn develops more often - indicate one correct answer :

a) during the first pregnancy,

b) with repeated pregnancies

+c) **in case of a previous pregnancy, sensitization of the Rh negative mother to the Rh D antigen**

d) sensitization after preventive vaccinations

16.Hemolytic disease newborn at I pregnancy is most often caused by incompatibility of the blood of mother and fetus - indicate one correct answer:

+ a) **according to the ABO system,** b) according to the Rh factor

c) with double incompatibility without sensitization of the mother's body d) the risk of alloimmunization is not observed in both options

17.More heavy flow hemolytic illnesses a newborn is noted when the blood of the mother and fetus is incompatible - indicate one correct answer:

+ a) **Rh factor** , b) blood group

c) Rh factor and blood group

d) father and mother I(O) and Rh ¯ (negative) blood

18.Hemolytic disease of the newborn is characterized by a type of hemolysis - indicate one correct answer:

a) intravascular, b) intracellular

+c) **in macrophages of the liver, spleen, bone marrow and intravascular** d) in macrophages of the liver, spleen

19. Anemia in hemolytic disease of the newborn is characterized by - indicate one correct answer:

a) hyperregenerative, b) hyporegenerative

+c) d hyperregenerative sometimes hypogenerative anemia d) anemia of varying severity

20. Jaundice appears in hemolytic disease of the newborn - indicate one correct answer:

+a) **1-2 days of life,** b) on 4-6 days of life,

c) after the 7th day of life d)p after 1 month

21. To carry out replacement blood transfusion for hemolytic disease of the newborn according to the Rh factor, red blood cells are used - indicate one correct answer:

a) 0 (I) Rh-positive; b) 0 (I) Rh-negative,

c) the child's blood group is Rh-positive, +d) **the child's blood group is Rh-negative**

22. To carry out replacement blood transfusion for hemolytic disease of the newborn using the ABO system, use - indicate one correct answer:

+ a **) red blood cell mass and plasma of the child's blood type, Rh negative**

b) red blood cell mass 0(I) and plasma AB(IV)

c) red blood cell mass of the child's blood group and plasma 0(I)

d) red blood cell mass of the child's blood group and plasma AB(IV)

23. Manifestations of hemolytic disease of the newborn include - indicate the correct answer:

+a **) hepatosplenomegaly** , b) hemorrhagic syndrome c) DIC syndrome

d) convulsive syndrome

24. In a general blood test for hemolytic disease of the newborn, it is noted - indicate the correct answer:

+a) **decrease in the number of red blood cells** , b)c decrease in hemoglobin,

c) absence of reticulocytes,

d) decrease in color index,

25.V biochemical analysis blood at hemolytic illness of the newborn, complicated cholestasis, are noted - please tell me the correct answer :

a) increased level of indirect bilirubin, + b) **increased level of direct bilirubin,** c) hyperglycemia,

d) hypercalcemia,

26. Clinical symptoms uncomplicated icteric forms of hemolytic disease of the newborn are - indicate the correct answer :

a) discolored stool

b) hemorrhagic syndrome, c) convulsive syndrome,

+d) **jaundice**

27. Clinical manifestations bilirubin encephalopathy that developed against the background of hemolytic disease of the newborn , I include - indicate the correct answer :

+a) **"setting sun" symptom,** b) squeaky cry

c) retraction of the large fontanelle d), lax skin syndrome

28. The indication for replacement blood transfusion in the first day of life for hemolytic disease in a full-term newborn is the level of indirect bilirubin - indicate the correct answer :

a) the level of bilirubin in the venous blood of a newborn is above 50 μmol/l

b) in umbilical cord blood above 38 μmol/l,

c) hourly increase in bilirubin more than 1 μmol/hour

+d) **the level of bilirubin in the venous blood of a newborn is above 340 μmol/l**

29. In the treatment of hemolytic disease of the newborn , indicate the correct answer :

a) infusion therapy, b) hormonal therapy,

+c) phototherapy , d) phenobarbital

30.Complications that are possible during phototherapy include development - indicate the correct answer :

a) bacterial diseases, +b) **"bronze skin" syndrome,** c) hyperthrombocytosis,

e) dyspeptic syndrome

31. When performing an exchange blood transfusion, the risk of development increases - <u>indicate the correct answer</u> :

a) dyspeptic syndrome,

+b) **AIDS , viral hepatitis B, C, etc.** c) hyperkalemia,

d) hypercalcemia

32. If the numbers of indirect bilirubin with conjugation jaundice in a newborn reach critical values, then exchange transfusion - <u>indicate one correct answer</u> :

+a) **shown,** b) not shown

c) according to the standard introduced by the emergency department d) depending on the diagnostic period

33. Recovery as an outcome of fetal hepatitis - <u>indicate one</u> <u>correct answer</u> :

+ a) **possible** , b) impossible

c) depending on the period of infection e) unlikely

34. Liver cirrhosis is noted as an outcome of fetal hepatitis - <u>indicate one correct answer :</u> a) in all cases,

b) not in all cases +c) **at any time**

d) based on the period of infection

35.Formation atresia biliary ways How the result of fetal hepatitis - <u>indicate one correct answer:</u>

a) possible, + b) **impossible** c) unlikely

d) depending on the time of infection

36.The most unfavorable course of fetal hepatitis is - indicate one correct answer:

+a) **cytolytic,** b) cholestatic,

c) dystrophic d) mixed

37. Tactics for managing a newborn born from a mother who is a carrier of the HBS antigen (HBe-positive woman) - indicate one correct answer :

a) there are no management features,

+b) **carrying out specific vaccination,** c) prescribing glucocorticoid therapy d)n prescribing symptomatic therapy

38. Hyperbilirubinemia with an increase in the level of indirect bilirubin is observed when - indicate the correct answer:

+ a **) hemolytic disease of newborns,** c) atresia of the biliary ducts,

d) fetal hepatitis , e) hypothyroidism

39. Hyperbilirubinemia with an increase in the level of direct bilirubin is observed when - indicate the correct answer:

a) hemolytic disease of newborns,

c) conjugation jaundice caused by morpho-functional immaturity,

+ d) fetal hepatitis , e) galactosemia,

40. The etiological factors of fetal hepatitis are - specify correct answer:

a) hepatitis B virus ,

b) toxoplasmosis determined in the father c) radiation,

d) smoking during pregnancy

41. Clinical manifestations of fetal hepatitis are - please specify correct answer :

+a) **jaundice** ,

b) pustular rashes on the skin, c) rough systolic murmur,

d) normal stool

42. Biochemical criteria for fetal hepatitis are - <u>please specify</u> <u>correct answer:</u>

a) increased level of indirect bilirubin, **+ b) p increased level of direct bilirubin,**

c) absence or sharp decrease of less than 1% alpha-1-globulins d) hyperkalemia

43. **When physiological jaundice appears :** a) 1st day

b)n the beginning of 2 days

+ c) end of 2 days – 3 days d) after 5 days

44. **Time of maximum manifestation of physiological jaundice:** a) 2nd day of life

b) 3rd day of life c) 4th day of life

+ d) 5th day of life

45. **What indicator of p - kill in a child 5 days of life cannot be regarded as the maximum level of physiological jaundice:**

a) 70-100 μmol/l b) 100-150 μmol/l c) 150-170 μmol/l

+ d)b more than 210 μmol/l

46. **Jaundice during the newborn period is a symptom of:** a)n anism

b) ileospasm c) adrenogenital syndrome **+ d) intrauterine infections**

47. **When conducting antihemorrhagic therapy, the presence of jaundice in a newborn is a contraindication for the use of:**

a)k Rioplasma **+ b)Vicasol**

c) p calcium preparations d) dicinone

48. **In p , the level of direct bilirubin prevails over the content of indirect**

bilirubin:

a) in case of hemolytic anemia b) Minkowski-Schaffer disease

+ c)a biliary tract tresions d) with conjugation jaundice

49. **Specify a hereditary disease that occurs with impaired conjugation of indirect bilirubin and has a benign course: + a) with Gilbert's syndrome**

b) with Wilson-Konovalov syndrome c) Nayjar-Crigler syndrome d) Rotor syndrome

50. **A hereditary disease manifested by severe deficiency of glucuronyl transferase and usually resulting in death:**

a) with Gilbert's syndrome b) Rotor syndrome

+ c) with Crigler-Najjar syndrome

d) with Wilson-Konovalov syndrome

Situational tasks on the topic.

Task No. 1

On the 6th day of life, a newborn with a severe icteric form of HDN developed the following clinical manifestations. Symptom of the "setting sun" , muscle hypotonia, muscle hypertonicity, tension in the large fontanel, convulsive syndrome. What state can be concluded about? **Answer:**

Blirubin encephalopathy - the appearance of classic signs of bilirubin intoxication

Task No. 2

Child from the first pregnancy of the first birth. Gestation period is 35 weeks. Born from a mother with an Rh-negative blood type . T etr At 1:64 (critical level). Doctor's tactics in this situation.

Answer:

1. Immediately after the birth of the child, the umbilical cord is clamped to

avoid the entry of Rh-Ab into the newborn's bloodstream; the placental end of the umbilical cord is not clamped (to reduce the risk and volume of fetomaternal transfusion).

2. from the first day of life, prevent bilirubin encephalopathy in conjugation jaundice in premature infants

Task No. 3

A child born at full term developed jaundice in the first week of life, which persisted steadily for 4 weeks ; moderate edema syndrome, lethargy, adynamia, rough voice, marbled and dry skin, constipation, hepatomegaly, umbilical hernia, appeared. What disease should be suspected?

Answer:

About congenital hypothyroidism

Task No. 4

A 36-year-old woman gave birth to a child with fetal hepatitis. Which indicator is most important during a biochemical examination.

Answer:

Biochemical criteria for fetal hepatitis are **:** increased direct bilirubin levels, increased transaminase activity, increased alkaline phosphatase levels, increased urea levels,

Task #5

In the first days of life, the child has cyanosis with a cherry tint, shortness of breath, and some swelling of the back and abdomen. Tendency to seizures . Hematocrit exceeds 0.65-0.7, and hemoglobin level exceeds 220 g/l. Hyperbilirubinemia 342 with an increase in bilirubin above 6.0 μmol/l per hour. The level of bilirubin in the umbilical blood is above 60 μmol/l. What pathology are you thinking about ? Your tactics in this situation.

Answer:

1.Polycythemia of newborns 2.Replacement blood transfusion

Task #6

The most rational volume of therapy for HDN in a child aged 3 days with a bilirubin level of 285 μm/l.

Answer:

Phototherapy, infusion therapy , cleansing enema, choleretic drugs, drugs that improve bilirubin conjugation in the liver

Task No. 7

Hypogalactia is observed in a nursing woman for 3 days . The newborn is restless. The skin of a newborn has a yellowish tint . Physiological reflexes of newborns are evoked. On palpation, hepatosplenomegaly is not noted. When trying to express, little milk comes out of the breast. Your tactics:

Answer:

Continue breastfeeding and recommend feeding your newborn frequently .

Problem No. 8

A newborn child was born from a mother who is a carrier of the HBs antigen . The condition of the newborn is satisfactory. Apgar score at 1 and 5 minutes is 7-8 points . Some babies are afraid of infection of the newborn. The doctor's tactics in this situation.

Answer:

In the first hours of a newborn’s life, a specific immunoglobulin should be administered for prophylactic purposes.

Task No. 9

The child was born in severe asphyxia . After resuscitation and intensive therapy, jaundice appeared on the 12th day of life. What can be accompanied by jaundice during hypoxia in a newborn?

Answer:

Anemia , thrombocytopenia, hypoglycemia, hypomagnesemia, hypocalcemia, pathological acidosis, hypovolemia.

Task No. 10

The newborn has discolored stools, dark-colored urine and jaundice, which is protracted. Jaundice persists and takes on a greenish tint (bilirubin in the skin turns into biliverdin). In the first weeks of life, there is no intoxication, but jaundice persists. The liver is moderately enlarged and later becomes dense. The spleen enlarged later due to the development of biliary cirrhosis of the liver. Laboratory studies revealed an increase in total cholesterol, alkaline phosphatase activity, direct bilirubin, with normal levels of liver cell enzymes (AST, ALT, etc.), thymol test, prothrombin. Direct bilirubin is detected in urine. What pathology can you think about?

Answer:

Biliary atresia.

Task No. 11

The child's condition is serious, jaundice appeared from the first days of life and began to increase by 2-3 weeks, the urine is dark, the stool is discolored. The liver and spleen are slightly enlarged and compacted. Intoxication is manifested by lethargy, anxiety, loss of appetite, regurgitation, and vomiting. Hemorrhagic syndrome is observed in the form of petechiae, ecchymoses, and bleeding from injection sites.

In the blood, the content of conjugated bilirubin and moderately indirect bilirubin is increased, the level of ALT activity increases 3-5 times, the levels of the thymol test and beta-lipoproteins increase, while the prothrombin complex decreases. What pathology can you think of?

Answer:

About manifest congenital hepatitis

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