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Functional gastrointestinal disorders in infants
The methodological guidance material, written by the group of authors of Pediatrics Department of the Uzhhorod National University, deals with the problem of functional digestive disorders in young children. Recent studies concerning etiology, pathogenesis, clinical manifestations, diagnostic criteria and treatment of childhood functional digestive disorders are represented. It is recommended for 6th year medical students, medical interns, pediatric and family medicine specialists and gastroenterologists.

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Функціональні розлади шлунково-кишкового тракту у дітей раннього віку
Методична розробка, написана групою авторів кафедри педіатрії з дитячими інфекційними хворобами медичного факультету ДВНЗ «УжНУ», містить інформацію про сучасні погляди на функціональні захворювання шлунково-кишкового тракту у дітей раннього віку, основні відомості про причини виникнення, коротку клінічну картину та методи лікування тих чи інших нозологій, а також алгоритм харчування при різних функціональних розладах травного тракту. Розрахована для студентів 6-го курсу медичних вузів, лікарів-інтернів, фахівців за спеціальністю педіатрія, сімейна медицина, гастроентерологія.

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(протокол №4 від 16 квітня 2024 р.)

LIST OF CONVENTIONAL ABBREVIATIONS

FGID – functional gastrointestinal disorders

GER – gastroesophageal reflux

AR - formula – antireflux formula

CVS – cyclic vomiting syndrome)

FD – functional diarrhea

FC – functional constipation

CONTENT

INTRODUCTION

All pathological conditions that occur in any system of the human body are divided into organic and functional. Organic pathology means damage to the structure of one or another organ, the degree of severity of which can vary widely. In functional disorders, in contrast to organic disorders, the absence of a biological marker is noted.

Functional gastrointestinal disorders (FGID) are a common pathology among young children. According to statistical data, they account for the largest percentage in the structure of the pathology of the digestive organs in young children [Shadrin, 2018]. Children with functional pathology make up about 30% of all hospitalized gastroenterological patients. Functional gastrointestinal disorders in early childhood worsen the child's health and quality of life, quite often have long-term negative consequences, such as formation of chronic organic pathology of the gastrointestinal tract, disorders of psycho-emotional status, pathology of the nervous system.

The above-mentioned factors explain the need to study and develop effective treatment methods of functional gastrointestinal disorders.

I. Anatomical and physiological features of the digestive system in children

Mechanical processing of food takes place in the digestive tract - grinding, mixing, dissolution, chemical processing, absorption and removal of undigested residues from the body.

The digestive system consists of the oral cavity, pharynx, esophagus, stomach, small and large intestine, and ends with the rectum with the anus (Fig. 1).

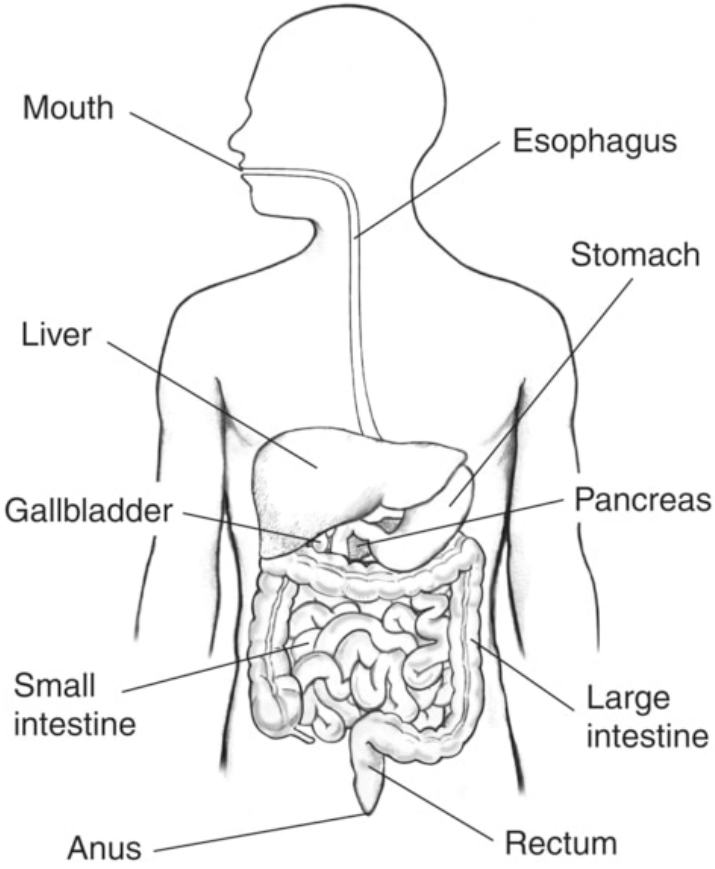


Fig. 1. The structure of the digestive tract in children

Oral cavity

In young children, it is relatively small and almost completely occupied by the tongue (shorter, thicker than in adults).

The mucous membrane of the oral cavity is relatively dry, very thin, delicate, well vascularized, vulnerable and easily injured.

In infants, the entrance to the larynx lies high above the lower-posterior edge of the palatine curtain; food moves laterally from the protruding larynx, which provides the possibility of simultaneous breathing and swallowing, which is important during sucking.

The flattened palate, the wide and large tongue, duplications of the mucous membrane on the gums together with transverse folds of the mucous membranes of the lips and well-

developed masticatory muscles, as well as the presence of fat lumps of Bish (consisting of solid fatty acids - palmitic and stearic) are factors that serve to facilitate the act of sucking.

Three pairs of large salivary glands (parotid, mandibular, sublingual) in the newborn period are already functioning, but the secretion of saliva is insufficient, it increases up to 2-3 months of age, reaching the adult level at 7 years of age (approximately 0,5-2 l / day) . At 4-6 months of age, increased salivation is noted in infants, which can be explained by several reasons:

- irritation of the trigeminal nerve by teeth that are beginning to erupt;
- introducing complementary foods into the diet;
- inability of children to swallow saliva.

The reaction of saliva is neutral, over time it becomes alkaline. Bactericidal properties are less pronounced, but early application to the mother's breast helps to increase the production of lysozyme. Candida albicans infection of the mucous membrane of the oral cavity often occurs with the development of stomatitis. Salivary amylase activity depends on the type of feeding (higher when fed with cow's milk) and the age of the child - it increases up to 2-4 years of age [8].

Pharynx

The continuation of the oral cavity is the pharynx, which is a common part of the gastrointestinal tract and respiratory tract.

Esophagus

The esophagus connects the pharynx with the cardiac part of the stomach. The upper border of the esophagus in infants is located higher than in adults - at the level of CIII-CIV vertebrae, in children under 2 years old - at the level of CIV-CV vertebrae, up to 12 years old - at the level of CV-CVI vertebrae, in adults - at the level of the CVI vertebra. The ratio between the length of the esophagus and the height of children is 1:5 [4].

The mucous membrane is dry and tender, elastic fibers and the muscle layer are poorly developed. The mucous membrane has a well-defined folding, which leads to complete closure of its walls in a state of rest. Glands almost do not function.

The intermuscular (Auerbach) plexus is located between the outer longitudinal and inner circular layers. Its ganglia receive nerve impulses from the swallowing center located in the medulla oblongata. In addition to central regulation, the work of the esophagus is also determined by the autonomic activity of the Auerbach plexus (local regulation, when the inner surface of the esophagus is irritated, is aimed at removing the contents of whatever enters the stomach). In newborns, the peristalsis of the esophagus is not formed, it can pass only liquid food (milk).

Stomach

The stomach is located between the esophagus and the initial part of the duodenum. In young children, the shape of the stomach changes depending on the content and nature of the food. It is located more horizontally than in adults (in the left hypochondrium, its cardiac part is fixed to the left of the X thoracic vertebra, pyloric - approximately in the middle of the distance between the navel and the xiphoid process somewhere at the level of the XII thoracic vertebra). Only at the end of the 1st year of life does it acquire a vertical position.

During the 1st year of life, intensive growth of the body and the pyloric section occurs. The motor activity of the stomach of newborns is characterized by a low rhythm and speed of contraction waves. Peristalsis is sluggish, the rate of contractions of peristalsis is 2-4 per minute. Stomach motor periodicity is absent in fasting newborns. In infants, an increase in the tone of the stomach muscles in the pyloric region is possible, the maximum manifestation of which is pylorospasm.

The muscular layer is weakly and unevenly developed. It is much less developed in the cardiac department, more strongly - in the pyloric department. The elastic tissue of the stomach in infants is also insufficiently expressed. The mucous membrane is thick, has rich vascularization.

By the time the child is born, gastric juice contains all the necessary components, however, the activity of its enzymes is low. Insufficient differentiation of parietal cells and weak production of hydrochloric acid is the cause of low acidity of gastric juice in young children.

The gastric juice of children of the first year of life contains the enzyme chymosin, the caseinogen of which carries out the preliminary curdling of the proteins of human milk. Digestion of cow's milk proteins requires preliminary denaturation of proteins with hydrochloric acid, after which they are split under the influence of pepsin. The amount of pepsinogenic cells per unit of surface in children under 2 years is significantly lower than in older children and adults. Other cells (main, covering, additional) of the mucous membrane are not completely differentiated. It is believed that the histological differentiation of the stomach continues until the end of the 2nd year.

The enzyme composition of gastric juice does not differ from that of adults. Despite this, in the 1st year of life, the proteolytic activity of gastric juice is low. The activity of pepsin is 30-50% lower than in adults: in newborns - 2-16 units, in older children - 16-32 units. The reason is the small number of pepsin-producing cells and the alkaline reaction of gastric juice. During the 1st year of life, the proteolytic activity of gastric juice increases 3 times.

Total acidity in the 1st year of life is 2,5-3 times lower than in adults and constitutes 20-40. Stomach acidity depends on the nature and mode of feeding (Table 1.).

Age	Total acidity, units	Free acidity, units
1-2 months	3,6 – 10	0,8-4,5
12 months	12 – 21	6-10
4 – 7 years	30-36	10-15
8 – 12 years	40-60	15-20

Table 1. Gastric secretion in children of different ages

Intestines. Duodenum

In young children, the duodenum is located at the level of the ThI-LII vertebrae and only at the age of 12 occupies the same position as in adults (at the level of the LI-LIV vertebrae). In young children, it is quite mobile, but by the age of 7, fatty tissue appears around it, which fixates the intestine.

The glands that produce duodenal juice are underdeveloped. Duodenal juice is of weak alkaline reaction, contains mucin and a pepsin-like enzyme activated by hydrochloric acid. The mucous membrane produces some enzymes (enterokinase, alkaline phosphatase, etc.) and substances of hormonal nature (secretin, cholecystokinin-pancreozymin).

Small intestine

It starts from the pylorus of the stomach and ends at the ileocecal region. It is a cylindrical tube that narrows slightly in the distal direction. The length in infants is 120-300 cm (in adults 6,5-7 m), the transverse diameter is 7-17 mm. The small intestine lies intraperitoneally, weakly fixated by a long mesentery to the back wall of the abdominal cavity. From the front, the small intestine is covered with the large omentum.

The relatively long length of the mesentery in children leads to more frequent occurrence of volvulus and intussusception, the relative weakness of the ileocecal valve in young children - throwing the contents of the cecum into the ileum with the possibility of further development of the inflammatory process in its boundary part.

In children, it has an unstable location, which depends on the degree of its filling, body position, tone of the intestines and muscles of the abdominal wall. Compared to adults, the length is relatively longer, and the loops lie more compactly due to a relatively large liver and underdevelopment of the small pelvis. After the 1st year of life, as the pelvis develops, the location of the loops becomes more permanent. The small intestine of young children contains a relatively larger amount of gases, which gradually decreases and they disappear by the age

of 7 (in adults, there are no gases in the small intestine under normal conditions).

The muscular layer is loosely connected to the submucosa, which, in combination with pronounced peristalsis of the intestine, can be an additional factor contributing to the occurrence of intussusception. The muscules of the intestine are poorly developed, especially in premature babies, easily "bloating" with flatulence. Elastic fibers are also underdeveloped. The mucous membrane has high permeability, it is thin and delicate, there are fewer villi (7-12 per 1 mm) than in adults. At the bottom of the crypts, there are more enterocytes that secrete digestive enzymes than in adults. The enzymatic capacity of the small intestine is high.

Features of intestines of premature babies:

- weak peristalsis, which easily leads to bloating and overstretching of the intestines, constipation;
- low lactase activity (increases with the start of enteral feeding);
- low absorption of fats due to reduced production of bile acids and emulsification;

Colon

The colon starts from the iliac opening of the ileocecal valve and ends with the anus. There are four sections in the large intestine: the cecum with the appendix, the colon (which in turn is divided into the ascending, transverse, descending and sigmoid), and the rectum.

The development of the large intestine is completed by the age of 1-1,5 years, its position in the abdominal cavity changes in the first months of life. The length of the large intestine at any age is approximately equal to the length of the body.

The cecum in children can be of various shapes (funnel-shaped, sac-shaped, etc.) In young children, it is more mobile, with age it descends to the iliac crest. Its position varies: it can be located directly above the entrance to the small pelvis or much higher - in the right hypochondrium , under the right lobe of the liver. Newborns have no omentum, no haustra.

The anatomical structure of the colon after 3-4 years of age is the same as in adults. The ascending colon in young children is characterized by the presence of folds and the absence of haustra. The position of the middle part of the transverse colon is unstable: it can sag and reach the level of the navel.

The vermiform process is most often located more medially and below the cecum, less often – behind the cecum or even in the small pelvis. It has a sufficiently wide entrance, which contributes to good evacuation of its contents.

The sigmoid colon is considered the most developed department. A characteristic feature of children under 5 years old is a long mesentery, which contributes to the formation of loops.

Therefore, the intestine can be located closer to the right half of the abdomen, behind the front midline.

The rectum in preschool children is located above the entrance to the small pelvis, in older children - in the small pelvis, is relatively long and when full can occupy a small pelvis. In newborns, the ampulla of the rectum is not formed, fatty tissue is not developed, as a result of which the ampulla is poorly fixed. Due to the well-developed submucosal layer and weak fixation of the mucous layer, young children may experience prolapse of the rectal mucosa.

Liver

Up to 5-7 years, the liver always protrudes from the right costal margin (along the midclavicular line: by 2-3 cm at 3 years, by 1,5-1,0 cm at 4-5 years, by 0, 5-1,0 cm before the age of 7). After 7 years of age, the lower edge of the liver is usually palpated only along the midline;

The liver is functionally immature at birth. In infants, the liver is well vascularized, parenchymal differentiation is insufficient, connective tissue is poorly developed. The histological structure reaches the level of an adult at the age of 8.

Gallbladder

In newborns, the length of the gallbladder is around 3 cm (the volume is less than 3 ml), it has a spindle-like shape, and by the 6-7th month of life it becomes pear-shaped (the capacity doubles).

Bile is produced in small quantities in the first months of life. Contains a small amount of bile acids (which can lead to steatorrhea in newborns), a lot of water and mucin, more taurocholic acid than glycocholic acid (high bactericidal property).

Pancreas

The pancreas is located extraperitoneally in the posterior upper part of the abdominal cavity, occupies a part of the epigastric and left hypocostal areas. It is projected on the front abdominal wall in the middle of the distance between the navel and the xiphoid process. By the time of birth, the weight is 2,5-3 g, the length is 4-6 cm, the width is 0,5-1,6 cm.

The secretory function of the pancreas increases after the introduction of feeding, reaching the level of an adult at the age of 5 years.

II. Functional gastrointestinal disorders in young children

Functional gastrointestinal disorders are disturbances in the function of the digestive organs, which are associated with a change in their regulation and are accompanied by a diverse combination of gastrointestinal symptoms without structural or biochemical disorders.

According to the definition, functional diseases include conditions in which it is not possible to detect morphological, metabolic, genetic and other changes that could explain the observed clinical symptoms. The causes of functional disorders are related to disorders of the regulation of certain organs. Extraorgan causes of functional disorders are explained by situations when, against the background of the disease of one organ, dysfunction of neighboring organs develops [3,4].

According to a number of researchers, more than in one third of patients with complaints of diseases of the digestive system morphological or structural disorders cannot be detected. Functional diseases of the digestive tract occur in 18 out of 1000 children [10]. Prevalence estimates of FGIDs show wide variation in the published literature. According to clinical studies, 55% of infants show at least one FGID symptom from birth to 6 months [18].

Although FGIDs are generally described as separate entities, as many as 78% of infants with FGIDs may present with more than one disorder, with colic being the most frequent concomitant disorder [2].

FGIDs impair infant and parent quality of life and may have a lasting impact on later life. Regurgitation can negatively impact infant quality of life due to food refusal, crying, back arching, and irritability [5]. Colic and excessive crying can lead to later health outcomes, including recurrent abdominal pain, sleep disorders, aggression, fussiness, and migraine, poor mother–child interactions, parental frustration, exhaustion, and an increased risk of child abuse [5,18].

According to studies, male and female infants show a comparable prevalence of FGIDs, in contrast to the female preponderance seen in older children [18].

Classification

The first classification of functional gastrointestional disorders (FGID) in children is known as the Rome II criteria (1999), according to which children's disorders are classified into a separate classification group (group G).

At the symposium within the framework of the Gastroenterological Week (Digestive Disease Week), which took place on May 23, 2006 in Los Angeles, an improved classification and new criteria for diagnosing FGID in children were adopted (Rome III Diagnostic

Criteria). According to the classification of FGID in children, they are divided into two groups: G and N [23,25,34]. Group G included FGID, which are observed in newborns and young children, and group H - FGR, which occur in children and adolescents (Table 2.).

G. Children's functional gastrointestinal disorders: Newborns/Young children
G1. Infant Regurgitation
G2. Infant Rumination Syndrome
G3. Cyclic Vomiting Syndrome
G4. Infant Colic
G5. Functional Diarrhea
G6. Infant Dyschezia
G7. Functional Constipation
H. Children's functional gastrointestinal disorders: Children/Teenagers
H1. Vomiting and Aerophagia
H1a. Adolescent Rumination Syndrome
H1b. Cyclic Vomiting Syndrome
H1c. Aerophagia
H2. Abdominal Pain-related FGiDs
H2a. Functional Dyspepsia
H2a1 — postprandial distress syndrome
H2a2 — epigastric pain syndrome
H2b. Irritable Bowel Syndrome
H2c. Abdominal Migraine
H2d. Childhood Functional Abdominal Pain
H2d1. Childhood Functional Abdominal Pain Syndrome
H3. Constipation and Incontinence
H3a. Functional Constipation
H3b. Non-Retentive Fecal Incontinence

Table 2. Classification of functional gastrointestinal disorders in children

On May 22, 2016, at the 52nd American Gastroenterological Week (Digestive Disease Week) in San Diego, USA, with the support of the American Gastroenterological Association,

a presentation of the Rome IV criteria (RomeIV) took place. 117 researchers and experts from 23 countries took part in the conference. The updated recommendations present changes in diagnostic criteria and new approaches to optimizing treatment [17].

The agreed definition of FGID according to the Rome IV criteria is as follows: "Functional disorders of the gastrointestinal tract are disorders of the interaction between the gut and the brain" (Drossman, 2016). According to experts, this definition best corresponds to the modern understanding of several pathophysiological processes, which individually or together determine the features of the symptoms that characterize the Rome classification of disorders. According to Drossman (2016), this definition is easy to understand and accept for doctors, scientists, representatives of regulatory bodies and the pharmaceutical industry, as well as patients [3,4].

Regarding the etiology and pathogenesis of FGID, a biopsychosocial model has been formed, which includes several determinants: motility disorders, visceral hypersensitivity, changes in mucosal immunity and inflammatory potential [35]. It is believed that FGIDs are polyetiological diseases. Violations of motor function and visceral sensitivity are considered to be the main factors in their pathogenesis, but they are often accompanied by changes in secretory and absorptive functions, gastrointestinal tract microflora, and the inflammatory potential of the mucous membrane.

1. Infant regurgitation

Functional infant regurgitation refers to regurgitation (spitting up) in a healthy infant younger than 1 year of age that occurs 2 or more times daily and lasts at least 3 weeks.

Unlike vomiting, this process is not accompanied by the involvement of the muscles of the small intestine, stomach, esophagus and diaphragm. Infant regurgitation is by far the most common FGID, present in up to 67% of infants and peaking at 4 months of age [18]. With age, the frequency of vomiting during the day decreases: at 10-12 months, it is noted in only 5% of babies.

Usually vomiting appears in the second half of the 1st month of life, in the 2nd month the intensity and frequency increases, remaining at the maximum level until 5-6 months of age. After the age of 6-7 months, the prevalence and intensity of vomiting gradually decreases, but may partially persist in 10% of children at the age of 12-13 months.

Predisposition of babies to reflux can be explained by anatomical and physiological features [20]:

-relatively short lower esophageal sphincter (1,5 cm in infants, 3 cm in adults)

- in adults, the lower esophageal sphincter is located at the level of the diaphragm, in young children - 2 cm above the level of the diaphragm;

- compared to older children and adults, the angle formed by the esophagus and the bottom of the stomach (angle of His) is obtuse due to the horizontal location of the stomach;

- the high position of the diaphragm in infants limits the possibility of reducing intra-abdominal pressure by raising the diaphragm; ·

tendency to spasm of the pylorus causes an increase in intragastric pressure;

- young children are prone to violations of the motor function of the digestive tract due to the immaturity of vegetative regulation.

GER in infants is considered physiological in case:

- it is observed mainly after eating (that is, only during the day);
- has an insignificant frequency (up to 20 episodes per day) and duration (up to 15 — 20 s);
- there is a small amount of refluxate;
- does not cause irritation of the mucous membrane and the occurrence of esophagitis;
- is not accompanied by any clinical manifestations. Such children are called "happy spitters".

In infants, GERD is considered pathological in case:

- it leads to a decrease in the caloric intake of food and, accordingly, to loss of body weight;
- causes esophagitis;
- causes aspiration.

To objectively assess the symptoms of regurgitation in infants, the regurgitation intensity scale of the European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) (Table 3.) is used, which takes into account the frequency and volume of regurgitation (Y. Vandenplas et al.).

Scores	Manifestations
0	No regurgitation
1	Fewer than 5 regurgitations per day, with a volume of no more than 5 ml
2	More than 5 regurgitations per day, with a volume of more than 5 ml
3	More than 5 regurgitations per day, with the volume of up to ½ of breast milk or formula, introduced for one feeding, present at no more than half of the feedingss
4	Regurgitation of a small volume for 30 minutes or more after each feeding
5	Regurgitation of ½ to full volume of breast milk or formula given at one feeding, after each feeding

Table 3. ESPGHAN regurgitstion intensity scale (Y. Vandenplas et al.).

Complications of vomiting:

• iron deficiency anemia,

• otitis,

• esophagitis,

• aspiration pneumonia,

• sudden death syndrome,

• worsening of the quality of life of the child's family,

• possible long-term impact on children's health.

Regurgitation and vomiting must be differentiated from pylorospasm, pylorostenosis, chalazia, achalasia of the esophagus, congenital stenosis of the esophagus, atresia of the esophagus, its diverticulum, stenosis of the duodenum, adrenogenital syndrome, hypoaldosteronism, intolerance of food components, enzyme diseases, malabsorption, lactase-glucose-galactosemia, isomaltose deficiency, celiac disease, dysbacteriosis.

The diagnosis of infant regurgitation in children aged 3 weeks to 12 months is established based on the presence of the following criteria:

- regurgitation (flowing of food from the mouth or through the nose) 2 or more times a day for 3 or more weeks;

- absence of vomiting, blood admixture in vomitus, aspiration, apnea, general condition disorders, complications during feeding and swallowing, or incorrect position during and/or after feeding.

"**Red flag symptoms" for regurgitation in infants** (NASPGHAN and ESPGHAN guideline, 2018):

• progressive increase in regurgitation;
• vomiting of bile;
• gastrointestinal bleeding;
• onset of vomiting at the age of over 6 months;
• tension, bloating and flatulence;
• progressive deterioration of the child's condition;
• loss of body weight;
• hepatosplenomegaly;
• delay in physical development;
• inflammatory changes in the blood test;
• hyperthermia;
• pulsation/protrusion of the fontanelle;
• convulsions;

Treatment:

In most cases, regurgitation, as a result of general morphofunctional immaturity of the organism, does not require systemic therapeutic measures and passes independently as the child's body matures [3], but sometimes there may be a need for correction to reduce the severity of regurgitation.

According to ESPGHAN (2018) recommendations, therapy should be comprehensive and step-by-step:

Stage I: explanatory work and psychological support of parents.

Stage II: correct positioning

• feeding the infant in a semi-vertical position at an angle of 45-60°;
• after feeding for 20-30 minutes, continue to hold the baby in this position or vertically;
• position of the child in bed with the headboard raised by 30°;

Stage III: normalization of the feeding regimen, adequate diet therapy.

• increasing the frequency and decreasing the volume of breastmilk/formula per feeding;
• in case of breastfeeding, it is necessary to exclude from the mother's diet products that can cause increased gas production and flatulence in the baby.
• in case of significant intensity of vomiting, thickeners are used (they are given to the child in small quantities at the beginning of feeding). Milk-free rice porridge or commercially

produced rice broth is used (1-2 teaspoons are diluted in 30-40 ml of expressed breast milk and given to the child from a spoon).

• it is possible to add antireflux (AR) formula - a mixture with increased viscosity due to the introduction of special thickeners into the product composition - to breast milk from a spoon before feeding [30]. However, regurgitation cannot in any case be the reason for transferring the child to artificial feeding. Two types of polysaccharides are used as thickeners: digestible (rice, corn, potato starch) and non-digestible (carob bean gum).

Gum, unlike digestible thickeners, has no nutritional value, which allows it to reach the colon in an unchanged form and cause a more pronounced anti-reflux effect. In addition, antireflux mixtures can be recommended for children prone to constipation, as they provide water with a laxative effect [3]. Duration of taking the mixture is also determined by the achievement of a stable therapeutic effect and is an average of 4-5 weeks.

Mixtures containing starch are indicated for children with mild forms of reflux (1-3 points), both with normal and unstable stool.

Stage IV: medical treatment.

Domperidone in the form of suspension or tablets in the dose of 0,25 mg/kg 3-4 times a day for 20-30 minutes. before eating normalizes motility of the gastrointestinal tract, restores contractile function of the stomach and improves evacuation of its contents, antroduodenal coordination, reduces duodenogastric reflux, strengthens the peristalsis of the esophagus, the tone of its lower sphincter.

2. Infant Rumination Syndrome

Rumination is a constant regurgitation of recently eaten food, which the child re-chews and re-swallows, but at the same time there are no signs of any obvious organic disease.

According to the classification and diagnostic criteria, a distinction is made between rumination syndrome in infants and adolescents.

Rumination syndrome in infants is characterized by periodic bouts of contractions of the abdominal muscles, diaphragm and tongue, which lead to the ejection of stomach contents into the oral cavity, where it is chewed again and swallowed. Most often, the disease begins at the age of 3–8 months, but it can also be observed at an older age. Rumination is associated with anatomical and physiological features and general morpho-functional immaturity of the gastrointestinal tract and nervous system, which leads to the discoordination of the functioning of the esophageal sphincters and the sequence of their interaction. Infant rumination can be a symptom of a mental illness caused by psychosocial deprivation or a manifestation of severe organic damage to the central nervous system.

Diagnostic criteria of infant rumination syndrome

The diagnosis is established in the presence of signs for at least 3 months:

1. Repeated contractions of the abdominal muscles, diaphragm and tongue;
2. Regurgitation of stomach contents into the oral cavity, which is either coughed up or chewed and re-swallowed;
3. The presence of three or more of the following signs:
   - Onset at the age of 3-8 months;
   - Ineffectiveness of treatment used in gastroesophageal reflux disease or anticholinergic drugs, changes in the nature of nutrition;
   - Not accompanied by nausea or signs of discomfort;
   -Rumination does not occur during sleep and when the child communicates with others.

Rumination syndrome in children and adolescents occurs more often in girls (68%), and half of patients require hospitalization. In older children, rumination usually occurs 15–20 min after a meal and lasts for 40–60 min, usually until the stomach contents become acidic as a result of exposure to hydrochloric acid. In the anamnesis of the patients, it is possible to identify stress factors that contribute to the occurrence of rumination, various surgical operations, mental disorders, as well as anorexia or bulimia.

III. Quite often, children and adolescents with rumination syndrome experience weight loss, abdominal pain, constipation, nausea, and diarrhea. At the same time, night episodes of

rumination are very rare. Children with rumination often have mental disorders in the form of depression, anxiety, and obsessive behavior.

Treatment

1. Permanent positional treatment is recommended: the child should be laid with the head end raised at 50° (in the position on the back or on the side) or at 30° (in the position on the stomach).
2. Diet therapy – change in the composition and nature of the child's diet, slow consumption, restriction of liquid intake during meals.
3. Psychotherapy – family, behavioral, rational (explanatory) psychotherapy.
4. Pharmacotherapy - Prokinetics [D] and antisecretory drugs (histamine H2 receptor blockers, proton pump inhibitors) can be used, but evidence and effectiveness are lacking. Rumination, which continues in children after one year of age, requires auxiliary examinations and consultation of a psychoneurologist.

IV.5. In case of ineffectiveness of the mentioned measures - surgical treatment of gastroesophageal reflux (fundoplication according to Nissen, operations according to Thal, Dore, Tope).

3. Cyclic Vomiting Syndrome

Cyclic vomiting syndrome (CVS) is a disease mainly of childhood, which is manifested by stereotyped repeated episodes of vomiting, alternating with periods of complete well-being. Cyclic vomiting syndrome is more common in girls, accurate data on incidence and prevalence are not available.

The onset of an attack is usually caused by provoking factors, such as infection (especially chronic sinusitis), psychological stress, certain food products (chocolate, cheese), physical exhaustion.

Pathogenesis is probably caused by sympathetic hyperactivity. The pathogenetic proximity of the pathogenetic mechanisms of the development of CVS and migraine has been proven. There is a genetic predisposition to cyclic pain syndrome, which is confirmed by family cases of migraine in 82% of patients.

In the clinical manifestation of cyclic vomiting syndrome, four periods are distinguished: period between attacks, prodromal, attack period and recovery period [30].

In the period between attacks, children feel well and often do not even want to talk or even think about the suffering they endured while they were sick.

The prodromal period is the period of time during which the patient begins to feel an episode of cyclic vomiting approaching. This period ends with the onset of vomiting. The prodromal period can last from several minutes to several hours and even several days. However, this period is often absent. Thus, symptoms of CVS are found in only 25% of children in the prodromal period. At the same time, due to the uniformity of the onset of the disease, patients mostly sense an approaching attack. This feature of CVS should be used for preventive measures.

The attack period is characterized by unbridled nausea and vomiting, which are observed in all children. Vomiting can occur up to 6 times within an hour and can be mixed with bile or blood. This makes it impossible to drink and take food and medicine. Practically all patients show signs of vegetative disorders during an attack. Lethargy is observed in 93% of children. As vomiting increases, the phenomena of dehydration increase. Moreover, the lethargy can be deep, and patients are unable to move or speak, some of them may seem comatose. In addition, pallor of the skin and hypersalivation appear. Many patients with CVS have neurological disorders that support the relationship between migraine and CVS. Headache, photophobia, phonophobia and dizziness are often noted during the attack. Frequently, the course of the attack is accompanied by gastrointestinal symptoms, such as abdominal pain, vomiting, anorexia, nausea and diarrhea.

Usually, the average duration of the attack period is 24–48 hours (minimum 2 hours), but it can last for 10 days or more. The duration of the attack period, as a rule, is from 3 to 10 days (an average of 5 days). In 50% of patients, attacks are noted every 2–4 weeks, episodes occur at night or in the morning in 30–60% of patients.

During the recovery period, an increase in the child's activity, restoration of appetite, normalization of the color of the skin, positive emotions return, and the water-salt balance is gradually restored.

The diagnosis is established in the presence of all the signs indicated below:

1. Two or more periods of intense nausea and persistent vomiting or prolonged vomiting lasting several hours or days.
2. Return to normal health within several weeks or months.

The diagnosis of CVS can be established only if other pathology accompanied by vomiting is excluded.

Treatment

Management of the patient should be as individualized as possible, adapted depending on the specifics of the course of the disease in this patient [31]. Treatment depends on the period of the disease. Each period has its own goal and treatment options that allow to achieve the goal of treatment (Table 4.).

Period	I	II	III	IV
Symptoms	Absent	Prodromal	Attack	Recovery
Treatment goal	Prevention of the attack	Abortion of the attack	Termination of the attack and, if unsuccessful, sedation until the end of the attack	Restoration of nutrition without relapse
Treatment	liminating triggers. Prevention of migraine (cyproheptadine, amitriptyline, propranolol)	Lorazepam and/or ondansetron (per os or sublingual). Sleep. Analgesia (for abdominal pain). Triptan (for headache)	Intravenous fluid replacement in combination with H2-blockers. To terminate an attack - IV lorazepam or ondansetron. For sedation -chlorpromazine (0,5-1,0 mg/kg each) and diphenylhydramine (0,5-1,0 mg/kg) together. Repeat every 3-4 hours for nausea while awake	Extension of the diet, if tolerated

Table 4. Therapeutic tactics in cyclic vomiting syndrome

4. Infant Colic

Intestinal colic is characterized by sudden and pronounced bouts of crying and restlessness in infants for 3 or more hours a day at least 3 days a week for at least one week.

Anatomical and physiological features of the digestive tract play a significant role in the occurrence of intestinal colic:

1. Slowed motility and sluggish peristalsis of the stomach in the first months of life;
2. Relatively longer intestine length than in adults and well-developed circular musculature, which can provoke spasms.

The following factors are also important in the etiology of intestinal colic:

• Hyperexcitability of the child;
• Incorrect daily regime and nutrition;
• Early transfer to artificial feeding;
• Improper attachment to the breast;
• Evening hunger of the child;
• Stress and anxiety of parents, transmitted to the child;

Increased (motilin) or decreased (cholecystokinin) activity and concentration of certain gastrointestinal enzymes can indirectly affect the development of colic in infants. Transient deficits in the synthesis of digestive enzymes, as well as various kinds of enzymopathies, are important. A significant role in the occurrence of colic belongs to functional transient lactase deficiency, which is more common in children with a low gestational age who are on artificial feeding.

Some researchers believe that intestinal colic can be a typical clinical manifestation of IgE-independent food allergy associated with the nutritional characteristics of the child or the nursing mother. The role of dysbiotic deviations arising in the process of formation of intestinal microbiota cannot be ruled out as well.

In addition, it has been proven that prematurity and low birth weight increase the risk of developing intestinal colic in infants. Colic is more common in children with perinatal central nervous system lesions of hypoxic and traumatic genesis [13,29].

Regardless of the prevailing etiological factor in each specific case, there are two main mechanisms of colic development - dyskinetic phenomena in the intestine (due to a violation of central, vegetative and endocrine regulation, the peristaltic wave may not cover the entire intestine, but only its individual parts) and increased gas formation (intestinal irritation the accumulation of gases provokes painful sensations) [44].

Usually, colic first appears in the 3-4th week of life. Pain attacks occur suddenly, during or immediately after feeding, are repeated several times during the day, intensifying in the evening. During a pain attack, crying is often accompanied by redness of the face or pallor of the nasolabial triangle. An attack of colic, as a rule, begins suddenly, the child screams loudly and piercingly. The abdomen is swollen and tense, the legs are pulled to the abdomen and can instantly straighten, the feet are often cold to touch, the hands are pressed to the body.

The pain tends to decrease after passing gas or defecation. Despite the described clinical manifestations, the general condition is not disturbed and in the period between attacks, the infant is calm, gains weight properly, has a good appetite. A pattern called the "Rule of Three" is characteristic: colic begins in the first 3 weeks of life, lasts about 3 hours a day and occurs mainly in children in the first 3 months of life.

Most children with suspected intestinal colic do not need special examinations. The diagnosis is established in the presence of all the following signs in an infant under 4 months of age:

1. Paroxysms of irritability, restlessness or screaming, which begin and cease without an obvious reason;
2. Duration of episodes of 3 or more hours per day, appearing at least 3 days per week for at least 1 week;
3. There are no signs of progression.

In the presence of a clinical manifestation of intestinal colic in an infant, it is necessary to exclude the so-called "**red flag symptoms":**

• fever;
• body weight loss;
• dysphagia;
• blood in vomitus or stool;
• anemia;
• leukocytosis;
• increased ESR;

Approach to management:

Modern principles of treatment of FGID provide a comprehensive and consistent approach, taking into account all etiopathogenetic mechanisms of development of each form of functional disorder [12,18,19]. According to current clinical protocols, the therapy of primary FGID should be carried out sequentially, moving from one stage to another in the absence of positive effect (step-by-step therapy).

1. Breastfeeding support.
2. Rational nutrition of the mother during breastfeeding (hypoallergenic diet with the recommendation to exclude cow's milk) or transfer to hypoallergic formula during artificial feeding).
3. Correction of the child's feeding regime: shorten the intervals between feedings, and, accordingly, reduce the volume of feedings (especially with artificial feeding).
4. Postural therapy: after feeding, it is necessary to hold the child in an inclined position (at an angle of 45°) for 10-15 minutes, to expel the air swallowed during feeding. Between feedings and during the attack of colic, the baby is placed on the stomach. A positive effect is caused by tactile contact together with rhythmic, soothing movements, applying warm, but not hot, diapers to the baby's abdomen.
5. Phytotherapy: according to the recommendations of the unified clinical protocol of medical care for children with functional gastrointestinal disorders (order of the Ministry of Health of Ukraine No. 59 of 01.29.2013), it is possible to use medications with carminative and mild antispasmodic effects [C] to correct the functional condition of the intestines. Dill and fennel are considered to be the most effective among medicinal herbs, which have antispasmodic, soothing effect on the gastrointestinal tract, improve digestion, and have a mild laxative effect. Meanwhile, the use of herbal teas has its drawbacks: the impossibility of exact dosing, the need for regular preparation, insufficient purity of raw materials, which increases the risk of infection, the occurrence of allergic or other negative reactions [33]. With intense colic, phytotherapy often turns out to be ineffective.
6. When intestinal colic develops against the background of dysbiotic disorders, it is recommended to identify the cause with further use of probiotic drugs [9].
7. Drug therapy:

• Lactase enzyme can be used: 750 Units (1/4 capsule) per 100 ml of expressed breast milk or formula (10-15 ml), leave for 5-10 minutes for fermentation and give to the child at the beginning of feeding. • Simethicone preparations: have an antispasmodic effect, reduce the surface tension of gas bubbles in the chyme and mucus in the intestinal lumen, causing them to rupture or merge, reducing gas formation and flatulence.

• In the absence of a positive effect from the above-mentioned drugs, prokinetics and antispasmodics are prescribed, and to relieve the severity of pain at the time of colic, a gas tube or enema may be used.

5. Functional Diarrhea

Functional diarrhea is painless defecation 3 or more times a day with a large number of irregular stools lasting 4 or more weeks with a debut in the newborn period or in preschool years.

Functional diarrhea is relatively uncommon among other FGIDs, with a prevalence of up to 7% [18]. On the other hand, according to various authors, in 60-80% of cases, persistent diarrhea in infants is due to functional disorders. Functional diarrhea is more often observed in children under 3 years of age (toddler's diarrhea). Persistent diarrhea can be a clinical variant of irritable bowel syndrome or an independent disease (in approximately 20% of cases).

The etiology of the disease has not been sufficiently studied, but it is believed that patients have an increase in the propulsive activity of the intestines, which in turn leads to a decrease in the transit time of intestinal contents.

The development of FD can be associated with the introduction of new food products during the first years of life, which can be considered as the formation of intestinal adaptation to the assimilation of qualitatively different food. Consumption of large amounts of fruit juices may also contribute to the development of FD, due to the presence in them of sorbitol, which is not absorbed in the intestine, and large amounts of fructose and glucose, which are not fully absorbed due to the functional immaturity of the enzyme systems. Insufficient absorption of carbohydrates in young children is considered a frequent cause of FD. It is possible that the cause of functional disorders of gastrointestinal motility can often be the development of sensitivity to food allergens.

Symptoms usually appear between 6 and 36 months of age, defecation occurs while awake and there is no developmental delay (if energy needs are adequately met), no signs of malabsorption are present. Defecation is painless. Symptoms spontaneously disappear during school years.

In addition to the frequency of bowel movements, in infants, an important criterion for diagnosing functional diarrhea is the volume of stools of more than 15 g per 1 kg of body weight per day.

The diagnosis is established in the presence of all the signs listed below:

1. Painless daily repeated defecation 3 or more times a day with irregular stools.
2. Symptoms last for more than 4 weeks.
3. The onset of symptoms is noted between the ages of 6 and 36 months.

4. Defecation occurs while awake.
5. There is no delay in development if energy needs are adequately met.

Differential diagnosis should be carried out with intestinal infectious diseases, syndrome of impaired digestion and absorption of food substances, gastrointestinal food allergy, use of some drugs that have a laxative effect, and antibiotics.

When evaluating the diet, attention should be paid to overeating, excessive consumption of fruit juices, and the presence of a significant amount of carbohydrates. Excess fat in the diet is also important.

Treatment

Treatment of functional diarrhea most often does not require drug therapy. It is important to continue adequate nutrition of the child in order to prevent nutritional and energy deficiency.

An important point is to reassure parents to prevent dietary restriction and avoid energy deficiency. The use of probiotics [B] is quite effective for functional diarrhea (Yan, Polk, 2006; Guandalini, 2006; 2008). One of the probiotics that meets most requirements is Linex, which has antagonistic properties to pathogenic and opportunistic flora, acts on all levels of the intestines, has high acid resistance and antibacterial resistance.

For the treatment of functional diarrhea, it is also recommended to use Smecta, which, due to its adsorbing and mucocytoprotective properties, is an effective medicine [C].

In case of secretory insufficiency of the pancreas, replacement therapy is prescribed.

The prognosis is favorable. Spontaneous recovery occurs at school age.

6. Functional Constipation

Functional constipation is a violation of bowel function, manifested by an increase in the intervals between defecation (compared to the individual norm) or systematic insufficient bowel emptying.

According to the data of the American Association of Pediatricians, 95% of constipation in children is functional in nature [42]. In 40% of cases, the symptoms of functional constipation appear in the first year of life. Constipation is a frequent complaint of parents both in the newborn period and in other age periods as well.

There are a number of factors that can lead to functional constipation:

• genetic factors - occurs in 52% of children of parents with chronic constipation.
• functional disorders of the motor-evacuatory function of the colon and rectum;
• perinatal oxygen deficiency;
• intrauterine infections;
• immaturity of the newborn child, which leads to late activation of intestinal enzymes;
• sudden transition from breastfeeding to artificial feeding;
• taking drugs with high iron content (12 mg/l);
• gastrointestinal form of food allergy (milk protein, gluten, soy sensitivity);
• introduction of new products, beginning of supplementary feeding;
• low fluid and/or fiber intake in older children; excessive use of fats, proteins or pureed dishes;
• psychological reasons, emotional stress;
use of certain medications (anticonvulsants, diuretics, antibiotics, iron preparations).

In addition, anatomical and physiological features of development are important in the occurrence of constipation in children of the first year of life. Thus, during this period, the length of the body increases by an average of 25 cm, which may be accompanied by certain clinical symptoms, the formation of physiological dolichosigma, one of the manifestations of which is a tendency to constipation.

Pathogenesis

The pathogenesis of functional constipation includes the following factors:

- Delay in the movement of fecal masses through the intestines;
- Low intra-abdominal pressure;
- Dysfunction of the rectum and/or anal sphincter, muscles of the pelvic diaphragm (anorectal dysfunction).

It is important to note, that in children of the first 3 years of life (especially the first year), the frequency of stool varies widely.

Clinical manifestation

Mature healthy newborns have their first defecation within 48 hours after birth; newborns with a lower birth weight (from 1000 to 1500 g) - somewhat later.

In physiological conditions, the frequency of defecation may vary, depending on the nature of the feeding, the amount of liquid consumed, the age of the child and other circumstances. In the first weeks of life, the frequency of defecation is 3-4 per day, while breastfed babies have more frequent bowel movements. When switching to artificial feeding, the stool becomes denser, the interval between acts of defecation increases. After the introduction of supplementary food, the frequency of defecation decreases to 1-2 times, but individual norms vary widely.

Therefore, the clinical manifestation of functional constipation may be different in each specific case: some children may be bothered only by constipation, others by a large number of various complaints. Fecal masses are often of increased hardness, dry, fragmented.

Symptoms of functional constipation, as a rule, are milder compared to organic diseases. Some patients do not have independent bowel movements. Some children have daily bowel movements, but the act of defecation is difficult, or there are several bowel movements per day in small portions of stool, without the feeling of having a bowel movement. Accompanying symptoms that disappear after defecation are as follows: irritability, decreased appetite or rapid satiety.

Progressive accumulation of fecal masses in the rectum can lead to dystonia of the muscles of the pelvic floor and anal sphincter, manifested by fecal incontinence. This symptom is observed in 84% of children with functional constipation.

It should be remembered that stool frequency is not always the only and reliable criterion for diagnosis, and a more sensitive sign of constipation is excessive straining. An auxiliary criterion is the consistency of feces. Prolonged delay in defecation can lead to chronic fecal intoxication, increased vegetative dysfunctions, traumatization of the rectal mucosa during defecation.

Functional constipation can be diagnosed on the basis of the anamnesis (time of the first passage of meconium, the time of the onset of complaints, the characteristics of bowel movements, the presence of accompanying symptoms, indications for the restraint of defecation by the child, the presence of neurological disorders and problems with the urinary system), as well as an objective examination (detection of the accumulation of fecal masses

during palpation of the abdomen, external examination of the perianal area to rule out spinal dysraphism, digital rectal examination to detect the accumulation of fecal masses and determine the anal reflex).

The diagnosis of functional constipation in accordance with the Rome IV criteria is established in children under 4 years of age if at least 2 of the following signs are present within a month:

- 2 or less bowel movements per week;
- 1 or more episodes of faecal incontinence per week after acquiring hygienic skills;
- the presence of episodes of delayed defecation;
- painful bowel movements or hard fecal masses of type 1 or 2 according to the Bristol stool scale;
- the formation of fecal stones, which can make defecation difficult.

In addition to the well-known Bristol stool scale, to determine the nature of the stool, the Amsterdam assessment scale had been developend specially for young children - the Beccali scale (Appendix 4), which describes the amount (4 points each), consistency (4 points each) and color of stools (by 6 categories). According to this scale, the frequency of defecation is considered normal if, under the age of 4 months, there are 1 to 7 acts of defecation, from 4 months to 2 years - 1-3 acts, at the age of over 2 years, the allowed frequency ranges from 2 times a day to 1 time in 2 days.

Treatment

The goal of therapy is to normalize the motor activity of the intestines and restore the consistency of its contents.

1. Treatment of functional constipation in breastfed children:
   - mother's diet: foods rich in dietary fiber, drinking enough liquid, limiting stool-fixing foods (bananas, boiled rice, boiled carrots, etc.).
   - the child's diet: after the introduction of complementary foods, the child should consume 100 ml / day of boiled water along with vegetables and cereals;
   - pre- and probiotics in case of confirmed dysbacteriosis.
   - symptomatic treatment: simethicone-containing drugs, herbal teas (chamomile, anise).
   - mechanical stimulation of defecation: use of a gas removal tube, glycerin suppositories (soften the consistency of the contents of the rectum). For the purpose of mechanical stimulation, due to the risk of mechanical damage to the mucous membrane, it is strictly forbidden to use a thermometer and other objects.

- drugs containing lactulose: in the large intestine, lactulose is broken down by intestinal bacteria into low-molecular organic acids, which lower the pH in the lumen of the large intestine and, due to the osmotic effect, increase the volume of intestinal contents. It stimulates peristalsis of the large intestine and normalizes the consistency of feces.

2. Treatment of functional constipation in formula-fed children:
   - artificial formula containing food fibers or lactulose ("Frisovom" - carob seed extract, "Semper Bifidus" - lactulose) or so-called prophylactic formula ("Nutrilon-1,2" - higher content of oligosaccharides, "NAN-probiotic", "Nestozhen" - high content of casein);
   - The above-mentioned (see point 1.) methods for breast-fed infants. In case of absence of defecation for several days and ineffectiveness of the above methods of treatment, presence of abdominal distention, pain, restlessness of the child, consultation of a pediatrician, if necessary, a pediatric surgeon is indicated.

7. Infant Dyschezia

Infant dyschezia is a violation of the coordination of the muscles of the pelvic diaphragm and the sphincter of the posterior opening, in which complications are observed during the act of defecation. It is most often observed in children aged 2 to 3 months, usually disappears by 6 months of age.

The cause of dyschezia is believed to be the immaturity of the nerve ganglia of the intestine, which results in insufficient coordination of the action of internal abdominal pressure, contraction of the intestinal muscles, and relaxation of the muscles of the pelvic diaphragm and anal sphincter.

Clinical manifestation

Symptoms of infantile dyschezia appear in the first month of life and usually disappear spontaneously after a few weeks. Before the act of defecation, tension and crying, redness of the face are observed. These symptoms last about 10-15 minutes, after which the infane passes stool. At the same time, the frequency (daily, several times a day) and nature of bowel movements (do not contain pathological components) are normal. As a rule, there are no other signs of health disorders in the child.

The diagnosis of infant dyschezia is established on the basis of the following criteria:

- defecation occurs after 10-15 minutes of the infant's anxiety, tension and crying;
- absence of other signs of disease;
- the child's age is less than 6 months;

To rule out anorectal abnormalities, a physical examination with a digital examination of the rectum is necessary. X-ray and endoscopic examination are of auxiliary importance in making the diagnosis.

Differential diagnosis is carried out with functional disorders of the gastrointestinal tract, which occur with constipation, congenital or acquired megacolon.

Treatment

It is necessary to explain the cause of the disease to the parents. Rectal stimulation, the use of laxatives are not indicated. Significant violations of the act of defecation are indications for surgical treatment.

Prognosis

Favorable. In case of significant violations of the motor-evacuatory function of the rectum, a possible surgical intervention is considered.

Questions for self-control

1. Anatomical and physiological features of the digestive system in children.
2. Classification of functional gastrointestinal disorders in children (Rome criteria III, IV).
3. What anatomical and physiological features cause regurgitation in infants?
4. What symptoms are red flags for regurgitation in infants?
5. Basic principles of correction for regurgitation in infants, antireflux formula.
6. Clinical criteria of diagnosis of rumination syndrome.
7. Modern ideas about the etiology and pathogenesis of intestinal colic in infants.
8. Basic principles of treatment of intestinal colic.
9. Differential diagnosis of regurgitation and cyclic vomiting syndrome in young children.
10. Diagnostic criteria for functional diarrhea in young children.
11. Treatment of functional constipation in children depending on the type of feeding.
12. Modern principles of prevention and treatment of functional gastrointestinal disorders in young children.

Tests

1. Anatomical and physiological features that determine the tendency of young children to regurgitation include everything except:
   A. relatively long lower esophageal sphincter
   B. obtuse angle of His
   C. tendency to increase intra-abdominal pressure
   D. immaturity of vegetative regulation

2. In a 4 months old child with the body weight of 7,500 g (3,000 g at birth), who is exclusively breastfed, the mother notices a small amount of milk coming out of the mouth, about 5-10 ml. The above-mentioned symptoms are observed during the last 2 months with a frequency of 5-6 times a day, while the general condition is not disturbed, the child is active. What is the most likely diagnosis?
   A. pyloric spasm
   B. pyloric stenosis
   C. infant regurgitation
   D. cyclic vomiting syndrome

3. The following factors are important in the etiology of intestinal colic, except:
   A. incorrect position of the infant during breastfeeding
   B. early transfer to artificial feeding
   C. excessive birthweight
   D. prematurity and low birth weight

4. The following herbal medicines are used for phytotherapy in intestinal colic in infants:
   A. dill and fennel
   B. thyme
   C. echinacea
   D. oregano

5. Symptoms of functional diarrhea in young children appear more often at the age of:
   A. 1-2 months
   B. 2-12 months
   C. 10-18 months
   D. 6-36 months

6. The main etiopathogenetic factor of functional diarrhea in young children is considered to be:
   A. perinatal hypoxia
   B. increased propulsive activity of the intestines
   C. early transfer to artificial feeding
   D. genetic predisposition

7. Signs of inadequate breatmilk supply are the following:
   A. poor weight gain
   B. insufficient amount of wet or dirty diapers/day
   C. dehydration
   D. all of the above

8. Prophylactic milk formulas include all, except:
   A. Frisovom
   B. Nestozhen
   C. NAN-probiotic

9. To determine the nature of stool in young children, the following scale is used:
   A. Amsterdam grading scale - Beccali scale
   B. Bristol stool scale
   C. Silverman scale
   D. Downes scale

10. Treatment of functional constipation in breastfed infants includes all except:
   A. diet of mother and child
   B. lactulose containing preparations
   C. introduction of artificial milk formula
   D. pre- and probiotics

Correct answers

1– A;

2. – C;

3. – C;

4. – A;

5. – D;

6. – B;

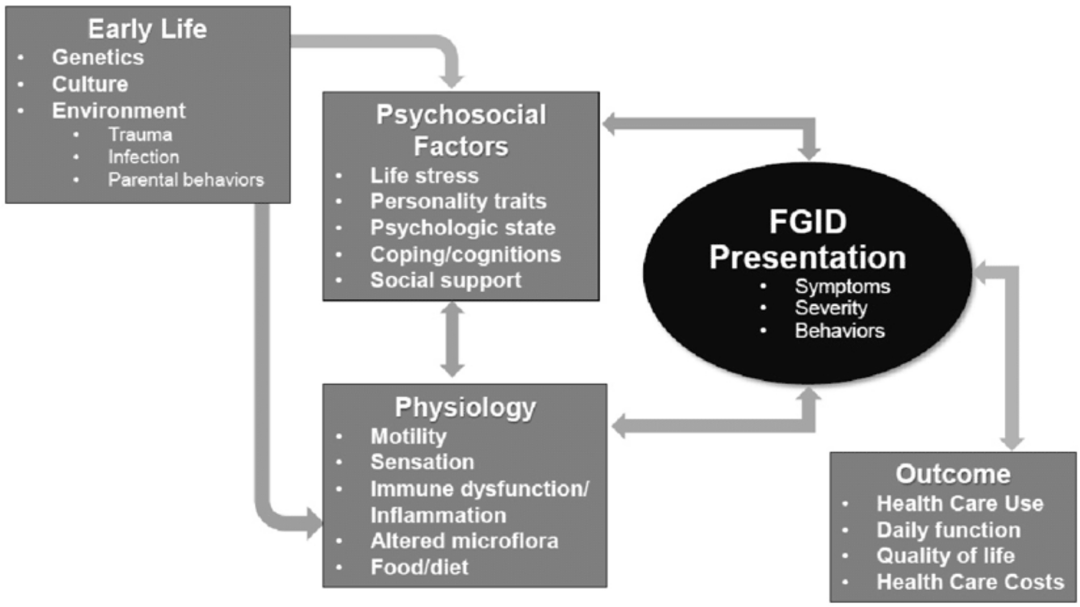
7. – D;

8. – C;

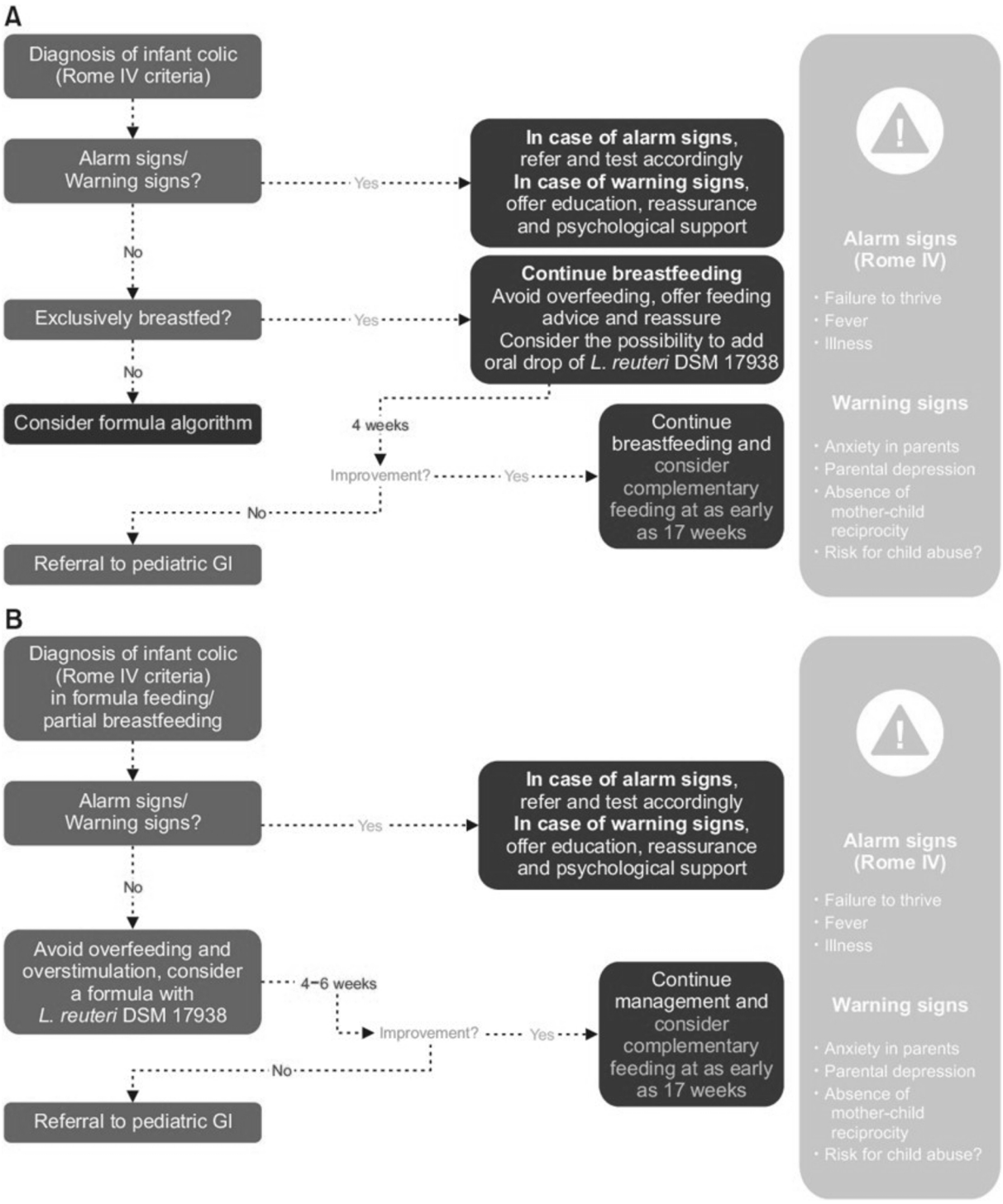
9. – A;

10. – C;

APPENDIX



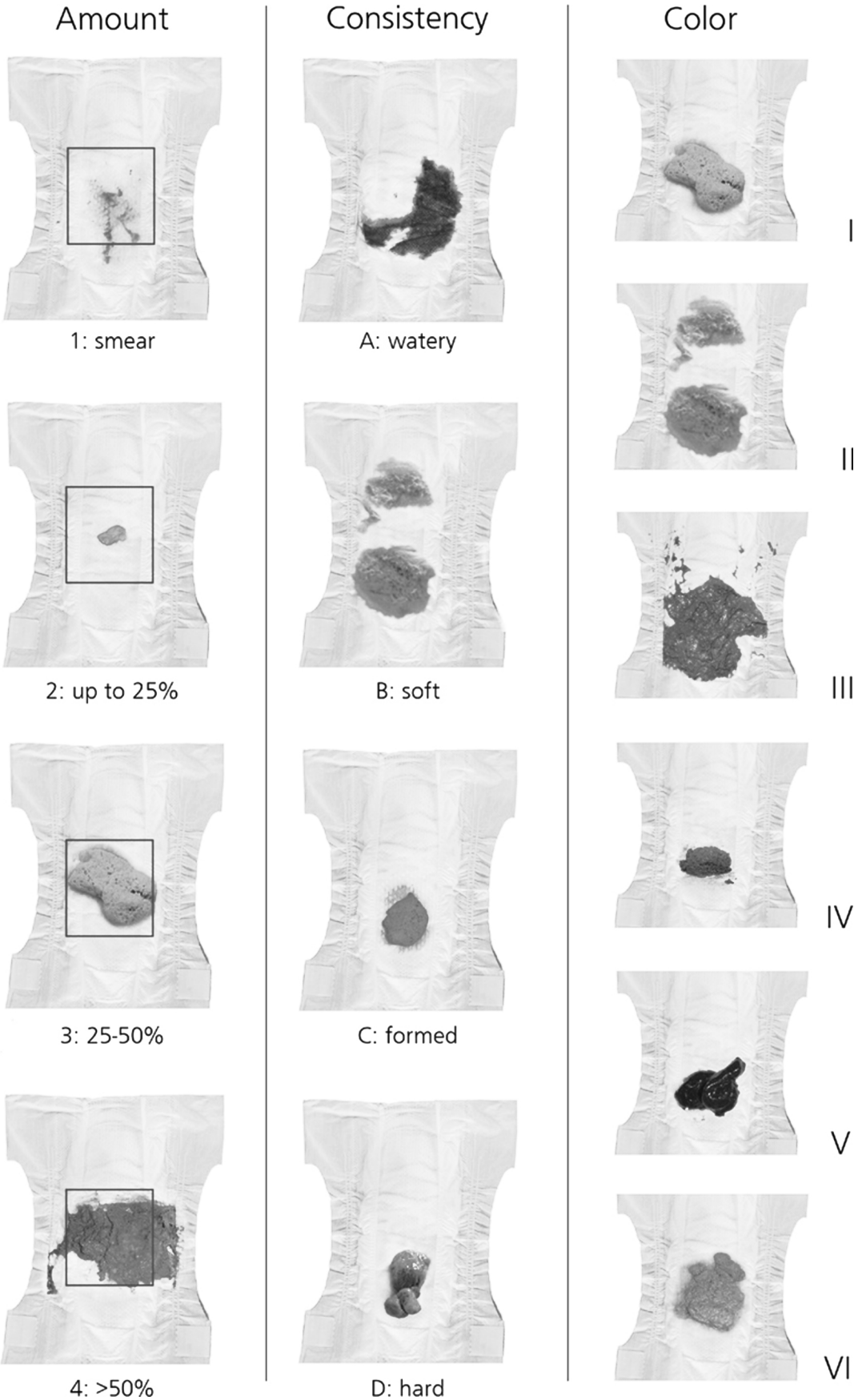
Appendix 1. A biopsychosocial model of functional GI disorders. FGID, functional gastrointestinal disorder (Modified from Drossman, 2016)



Appendix 2. (A) Management algorithm for infant colic in breastfed infants.

(B) Management algorithm for infant colic in formula-fed infants

(Flavia Indrio et al., 2021)



Appendix 3. The Amsterdam infant stool form scale – Bakkali scale (Silva et al., 2021)

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