

Gastrointestinal functional diseases in children

Plan of the lecture

- **1. Definition of gastrointestinal functional diseases in children**
- **2. Etiologic factors**
- **3. Classification**
- **4. Clinical presentation**
- **5. Treatment**

Functional gastrointestinal Disorders:

Definition

- **Functional gastrointestinal disorders is combination of different gastrointestinal symptoms without structural or biochemical impairments**
- **Functional gastrointestinal diseases are understood as psychological disorders or simply as absence of organic diseases**

Functional gastrointestinal Disorders:

Definition

- **According to conventional definition functional diseases are those ones when any morphological, genetic, metabolic impairments that can explain present clinical symptoms are absent**

Functional gastrointestinal Disorders (FGD): Classification

- **According to adopted FGD classification in children they were divided for 2 groups: G и H;**
- **Into group G there were included FGD of newborns and infants**
- **Into group H there were included FGD of schoolchildren and adolescents**
- **According to view of the authorities such division is absolutely reasonable and necessary because symptoms and clinical forms of FGD are firmly dependant of age and developmental peculiarities of children**

Functional gastrointestinal Disorders (FGD):

Classification

- **G. Functional gastrointestinal Disorders : Newborns/ Infants**
 - **G1. Infant regurgitation**
 - **G2. Rumination syndrome in infants.**
 - **G3. Cyclic vomiting syndrome.**
 - **G4. Infant colic.**
 - **G5. Functional diarrhea.**
 - **G6. Infant dischezia.**
 - **G7. Functional constipation.**

Functional gastrointestinal Disorders (FGD): Classification

- **H. Child FGD :Children/Adolescents**
- **H1. Vomiting and aerophagia.**
 - **H1a. Rumination syndrome in adolescents.**
 - **H1b. Cyclic vomiting syndrome.**
 - **H1c. Aerophagia.**

Functional gastrointestinal Disorders (FGD): Classification

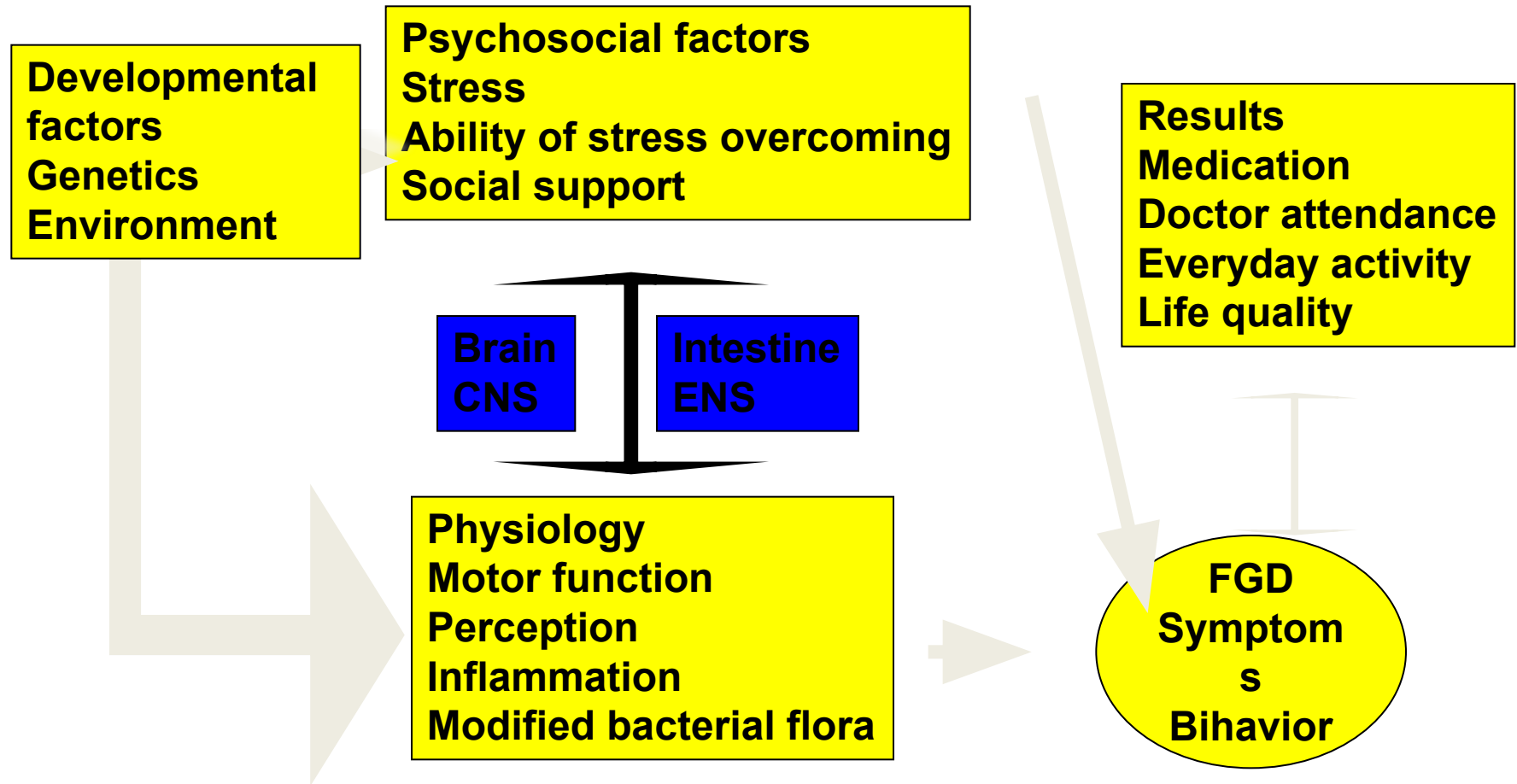
- **H. Child FGD :Children/Adolescents**
- **H2. Abdomen pain due to FGD.**
 - **H2a. Functional dyspepsia.**
 - **H2b. Irritated bowel syndrome.**
 - **H2c. Abdomen migraine.**
 - **H2d. Child functional abdomen pain.**
 - **H2d1. Child functional abdomen pain syndrome.**
- **H3. Constipation and anal incontinence.**
 - **H3a. Functional constipation**
 - **H3b. Anal incontinence.**

Functional gastrointestinal Disorders (FGD): reasons

- **Anatomic and functional immaturity of gastro-intestinal system;**
- **Uncoordinated work of different organs and parts of digestive tract;**
- **Regulatory impairment due to immaturity of enteral nervous system;**
- **Undeveloped intestine biocenose.**

Functional gastrointestinal Disorders : Pathogenesis

Conceptual model of FFGD



Infant Regurgitation

- **Morbidity in 20-50 % of first 6 mo old infants (after active questioning is revealed in 85 % infants);**
- **This condition can be regarded as normal for infants;**
- **Uncomplicated regurgitation in healthy child is transient condition but not disease.**

Infant Regurgitation

- **Regurgitation is a passive involuntary food passage into oral cavity and outside**
- **Vomiting is a reflex action with stomach, esophagus musculature, diaphragm and anterior abdominal wall contractility that propel stomach content outside**
- **Gastro-esophageal reflux is retrograde acidic stomach content regurgitation into esophagus;**
- **Gastro-esophageal reflux disease is gastro-esophageal regurgitation accompanied by inflammation and tissue impairment (esophagitis, obstructive apnoea, reactive respiratory system disease, aspiration, swallowing difficulties)**

RUMINATION SYNDROME IN INFANTS: DEFINITION

- **Rumination is constant regurgitation with recently consumed food when child chew it and swallow once more without any signs of organic disorder.**

RUMINATION SYNDROME IN INFANTS: etiology and pathogenesis

- **There is hypothesis that rumination syndrome is due to sensor and motor stomach dysfunction Performed later trials show that patients with rumination syndrome has more sensible stomach and more easy lower esophagus sphincter relaxation after meal**
- **Intra-abdomen pressure increasing stimulate active contractility of esophagus-gastric conjugation and tonic contractility of diaphragm peduncle. These mechanisms are thought to be the causative ones to provide pressure for lower esophagus sphincter.**

RUMINATION SYNDROME IN INFANTS:

symptoms

- **Rumination syndrome is presented by periodic attacks of anterior abdomen musculature, diaphragm, tongue contractility that produce stomach content regurgitation into oral cavity where food is chewed and swallowed once more**
- **Morbidity onset is typical at 3-8 mo old**
- **Food regurgitation, chewing and swallowing appear without nausea and another signs of dyspepsia**
- **Rumination syndrome can be the causative factor of child height gaining, and psycho-motor development especially at second half year period of life.**
- **Loosing of previously swallowed food can produce progressive malnutrition and even death**

RUMINATION SYNDROME IN INFANTS:

Rome criteria III

Diagnosis is made when symptoms are present not less than 3 mo:

- **Recurrent abdomen muscle, diaphragm, tongue contractility**
- **Food content regurgitation into oral cavity that can be once more chewed and swallowed or removed due to cough**
- **Presence of 3 or more signs from listed below:**
 - **Onset at 3-8 mo old;**
 - **Inefficient efforts of esophagus-gastric regurgitation treatment with anticholinergic medications, diet and way of food intake changing (naso-gastral tube or gastrostoma).**
 - **It isn't accompanied by nausea or another signs of discomfort**
- **Rumination doesn't appear during sleeping or communication with surrounded people**

RUMINATION SYNDROME IN INFANTS: treatment

- **Provide favourable surrounding for child and calming regimen**
- **Behavioral therapy**
- **Food consistency changing, more slow its eating and restrictions of water intake during meal**

AEROPHAGIA: Definition

- **Aerophagia is sensation of epigastrium spreading due to excessive air swallowing that decreases after air eructation**
- **Air swallowing is unwilling physiologic process, but in the case of aerophagia air swallowing is excessive and can be not only at meals**

AEROPHAGIA: Clinical presentation

- **It appears with loud air eructation enhanced by psycho-emotional excitability**
- **Frequently this eructation isn't connected with meals**
- **Complaints are sensation of stomach overloading, epigastrium bulging after meal, decreased after air eructation**
- **Hiccup also can occur**
- **Abdomen bulging decreases during sleeping**
- **Child can swallow air invisible for parents**

AEROPHAGIA: Rome criteria III

- **Diagnosis is made if not less than 2 signs are present**
 - **Air swallowing**
 - **Abdomen bulging due to air accumulation in bowel**
 - **Recurrence of eructation or/and gase evacuation from bowel**
 - **These signs can appear not less than once per week for 2 mo before diagnosis**

AEROPHAGIA: Treatment

- **To provide information**
- **Dietetic recommendations (prohibit candies, chewing gum and carbonate water, slow food consuming)**
 - **Anxiolytics (tranquilizers)**
 - **Antiemetics with slight neuroleptic effect (ethapirasine, tietylperasine)**

Cyclic vomiting syndrome: definition

- **Cyclic vomiting syndrome (CVS) – is a disease predominantly of child period manifested with stereotype recurrent episodes of vomiting subsided by normal periods**

Cyclic vomiting syndrome: Etiology

- **More frequent provoked factors are**
- **Infection (41 %), especially chronic sinusitis;**
 - **Psychological stresses (34 %);**
 - **Food products like chocolate, cheese etc.**
 - **Physical exhausting, lack of sleeping (18%);**
 - **Atopic reactions (13 %);**
 - **Mensis (13 %)and other factors**

Cyclic vomiting syndrome: Pathogenesis

There are two mechanisms of nausea and vomiting

First one:

- **Is connected with vomiting stimuli influence to vomiting center. Impulses from digestive organs, bile ducts, pharynx, coronary arteries, splanchnic organs, vestibular apparatus, thalamus and hypothalamus, cortex are sent through vagus afferent sympathetic fibers into vomiting center.**
- **Motor impulses from vomiting center return to diaphragm, intercostal muscle, and abdomen muscle and through spinal nerves to pharynx, esophagus, stomach.**

Cyclic vomiting syndrome: Pathogenesis

- **Second mechanism:**
 - **Is connected with chemoreceptor trigger zone stimulation. From this zone stimuli are sent to vomiting center and activate it.**
 - **Stimulators of trigger zone are various mediators like seroptonine, angiotensine II, neurotensine, vasoactive intestine peptide, gastrin, antideuretic hormone, dopamine), medications, uremia, hypoxia, diuabetic ketoacidosis, endotoxins. Gr(+) bacteria, radiation.**

Cyclic vomiting syndrome: Clinical presentation

- **Prodrome period is a time interval when patient feel cyclic vomiting syndrome episode but can control it by taking medication orally This period finishes with the first vomiting**
- **Prodrome period can elongate from several minutes to several days Sometimes it is absent (25%)**

Cyclic vomiting syndrome: Clinical presentation

- **Period of exacerbation is manifested with recurrent nausea and vomiting in all affected children**
- **Vomiting can recur 6 or more times per hour and can contain bile (76%), or blood (32 %);**
- **Drinking and meal become impossible as well medication intake**
- **All children has presentation of vegetative disorders**

Cyclic vomiting syndrome: Clinical presentation

- **Lethargy (pathologic condition manifested by suppressing of all life signs) can be seen in 93% of patients**
- **Lethargy can be deep and patients can't move, speak, some of them look like comatose**
- **Besides there are paleness and excessive saliva production**
- **Children are dormant, somnolent. If vomiting is frequent dehydration becomes evident**
- **Hypovolemia and hypocapnia is developed**
- **Metabolic alkalosis is developed**

Cyclic vomiting syndrome: Clinical presentation

- **Lot of patients with CVS have neurologic disturbances which can connect migraine with CVS. In 82 % family history indicate for migraine**
- **Quite frequently CVS is accompanied with head ache, photophobia, and dizziness**
- **Quite frequently attacks of CVS are accompanied with gastrointestinal symptoms like abdomen pain, vomiting, anorexia, nausea, diarrhea**
- **Duration of attack is 24-48 hours (min 2 h and can prolong for 10 and more days)**

Cyclic vomiting syndrome: treatment

Period	I	II	III
Symptoms	Absent	Prodrome	Attack
Therapy goal	Attack prevention	Abortion of attack	Attack termination or sedation to the end of exacerbation
Therapy	<p>Eliminate triggers. Migraine prophylaxis (cyproheptadine, amitriptyline, propranolol)</p>	<p>Lorasepam or/and ondacetron (per os) Sleeping Analgesia (in abdomen pain) Triptan (in case of head ache)</p>	<p>IV rehydration +H2-blockers. Lorasepam or/and ondacetron IV For sedation chlorpromasine (0,5-1,0 mg/kg) and dyphenylhydramine 0,5-1,0mg/kg altogether). Repeat every 3-4 h</p>

Functional constipation

Diagnostic criteria:

- Elongation of intervals between defecation more than 32-36 h
- Long period of straining effort – not less than 25% of defecation time
- Stool consistency is solid like globule
- Sensation of insufficient bowel emptying (in adolescents)

Risk factors

- Early artificial feeding
- Perinatal CNS affection
- Prematurity
- Morpho-functional newborn immaturity
- Food intolerance
- Dysbacteriosis
- Gastro-intestinal diseases abnormal inheritance

Treatment

Diet

- Improvement of mother's diet (decreasing of fats and subsiding it by oils, include into diet milk acidic products, vegetables, fruits, cereals, optimal drinking regimen, hypoallergic food)
- Prevent overfeeding
- Weaning must be introduced according to age. Start with juice, fruit pure, then vegetable pure, and then porridges
- Medications if previous therapy inefficient Lactulose 0,5ml/kg per day

Gastro-esophageal Reflux disease (GERD)

Disease is manifested with inflammation in esophagus distal part mucous membranes or/and typical symptoms due to recurrent stomach or intestine content reflux into esophagus

Classification

- Endoscopy-negative HERD or not erosive (60-65%)
- Reflux-esophagitis (30-35%) – is damaging of esophagus mucous membrane, revealed by endoscopy

Predisposing factors for HERD

- **Diaphragm hernia**
- **Smoking**
- **Medication intake that decrease pressure in lower esophagus sphincter (nitrates, Ca antagonists, β -blockers, theophylline, anticholinergic drugs)**
- **Motor disorders of esophagus and stomach**
- **Cardia insufficiency**
- **Enhancing reflux agent damage properties (hydrochloride acid, pepsin, bile acids)**

Clinical symptoms

Esophagus symptoms

- **Burning** (retrasternum or epigastrium sensation of burning) , enhanced after meal, carbonate water, physical efforts after meals, after trunk banding or in horizontal position
- **Eructation with** acid content enhanced after meals or carbonate water
- **Dysphagia** (pain during swallowing)—impaired food passage through esophagus
- **Pain** retrasternal pain can irradiate into intrascapular region, neck, lower mandibula, left side of chest

Another symptoms:

- **Respiratory** – cough, dyspnea attacks
- **Otholaryngologic** –voice mutation, dryness of throat, sinusitis, pharyngytis
- **Stomatologic** – caries, teeth enamel erosions

Diagnostic methods

Necessary instrumental examining:

- **Fibrogastroduodenoscopy**
- **Esophagus mucous membrane biopsy in complicated cases**
- **Radiologic methods of esophagus and stomach**

Additional methods

- **24-h intraesophagus pH –metry is a “gold standard”: elongation of reflux time (pH less than 4,0 in more than 5%per day) and reflux duration more than 5 minutes**
- **Intra-esophagus manometry - for lower esophageal sphincter functioning and motor function of esophagus**
- **Echography of abdomen organs functioning**
- **ECG**

Treatment

Main aim:

- Stop symptoms
- To heal erosions
- To prevent complications
- To improve life quality
- Prophylaxis of recurrence

Recommendations of life style:

- Avoid overeating, after meal avoid bending and laying
- Minimize consuming of fats, alcohol, coffee, chocolate, citrus, tomato, onion, garlic, frying dishes
- To sleep with elevated head
- Control body weight
- Don't wear tight clothes, belts, don't lift weights

Medications

- **Prokineticso** (stimulate food passage through GI tract) domperidon (motilium), methoclopramide
- **Antisecretory medications:** lasnprosol, rabepprasol, esomeprasol. In the case of not erosive HERD once per day for 4-6 weeks, in esophagitis 2 times per day for 4-8 weeks
- **Antacids** (symptomatic relief of burning) 3 times per day 40-60 min after meal
- In infants – antireflux formula (content of casein is increased in these formula) and they contain also thickeners

Questions

- 1. **Anatomo-fisiological features of organs of digestion depending on age.**
- 2. **Influence of the state of the nervous system and immune system on development of defects of upper organs of digestion.**
- 3. **Etiology and pathogenesis of functional diseases of stomach and duodenum.**
- 4. **Clinical features and methods of diagnostics.**
- 5. **Treatment of functional diseases of upper parts of organs of digestion.**
- 6. **Gastroesophageus reflux. Etiology, pathogenesis. It's role in forming of chronic diseases of upper departments of GIT.**
- 7. **Etiology and pathogenesis of chronic gastritis. Clinic. Methods of diagnosis. Plan of treatment, depending on the form of gastritis**
- 8. **Differential diagnosis of diseases of upper parts of GIT (chronic gastritis, ulcer, functional diseases of stomach).**