

# CHRONIC DISEASES of the SMALL INTESTINE

# CELIAC DISEASE

also called gluten-sensitive enteropathy, celiac sprue, nontropical sprue  
is an inflammatory condition of small intestine,  
precipitated by ingestion of grains (wheat, rye,  
barley) in individuals with certain genetic  
predisposition.

# Etiology

The main serological markers for celiac disease are: antigliadin (AGA), antiendomysial (EMA) and anti-tissue transglutaminase (anti-tTG) antibodies.

Environmental factor: the alcohol-soluble protein fraction of wheat gluten, the gliadins and similar prolamins in rye and barley trigger the intestinal inflammation.

Genetic factor: predisposition to gluten sensitivity is mapped to the HLA-D region on chromosome 6. More than 90% of individuals with celiac disease have DQ2 heterodimer.

# Pathogenesis

$\alpha_2$  – gliadin is a natural digestion product which is important in the pathogenesis of celiac disease. This peptide resists terminal digestion by intestinal brush-border proteases and contains three previously identified antigenic epitops. It also reacts with tissue transglutaminase and stimulates HLA DQ2-restricted intestinal T cells.

# Clinical classification of celiac disease

- Classic CD (active form) – characterized by diarrhea and malabsorption syndrome.
- Atypical CD (subclinical, extraintestinal form) – gastroenterological symptoms are absent, extraintestinal symptoms prevale.
- Latent CD – positive serological test but morphological changes are absent.
- Refractory CD – characterized by resistance to treatment.

# Clinical features

**Celiac disease usually manifests early in life at about 2 years of age after wheat has been introduced into the diet, or later in 20-40 years of life, but can occur at any age.**

**CD usually has atypical course, without any specific clinical symptoms.**

## **Classic gastrointestinal signs include:**

- **Watery diarrhea and weight loss. All major nutrients, most notably carbohydrates, fats, proteins, electrolytes, fat-soluble vitamins, calcium, magnesium, iron, folate and zinc are malabsorbed.**
- **Meteorism, abdominal pain.**
- **Functional dyspepsia, disorders of motor function of gastrointestinal tract, gastroesophageal reflux.**
- **Disorders of exocrine function of pancreas.**

# Mechanisms of diarrhea

- Decreased surface area for water and electrolyte absorption
- Osmotic effect of unabsorbed luminal nutrients
- Increased surface area for chloride secretion (crypt hyperplasia)
- Stimulation of intestinal fluid secretion by inflammatory mediators and unabsorbed fatty acids
- Some patients have impaired pancreatic enzyme secretion caused by decreased mucosal cholecystokinin release or bacterial overgrowth that may contribute to diarrhea

# Extraintestinal signs of CD

- Folic acid and/or iron-deficiency anemia, osteoporosis, osteopenia, pathologic fractures and pain in joints
- Muscle atrophy, cramps, growth retardation, pallor and dry skin, stomatitis
- Peripheral neuropathy, calcification of brain, epilepsy, demyelination damage of central nervous system  
Syndrome of chronic fatigue, neurosis, ataksia
- Follicular hyperkeratosis and dermatitis herpetiformis (Dühring's disease), psoriasis.
- Secondary hyperparathyrosis
- Transitory increase of transaminases, hypoalbuminemia, prolongation of prothrombin time
- Amenorrhea, infertility, spontaneous abortion, impotence



# Diagnosis

- **Family history of celiac disease, intolerance to grains**
- **Serological assay of antibodies:**
  - **IgA-AGA (antigliadin antibodies)**
  - **IgA-EMA (antiendomysial antibodies)**
  - **IgA-tTG (anti tissue-transglutaminase antibodies)**

**Serologic markers are useful in supporting the diagnosis, in screening first-degree relatives and in following the response to gluten-free diet**

# Diagnosis

**Endoscopy** of retrobulbar part of duodenum (small intestine) + **BIOPSY** with hystological investigation of mucosa - gold standart for diagnostics of celiac disease.

Characteristic features found on intestinal biopsy include:

- the absence of villi
- crypt hyperplasia
- increased intraepithelial lymphocytes
- infiltration of the lamina propria with plasma cells and lymphocytes.

# Additional tests

- Coprological test (steatorrea)
- Liver function test
- Proteinogram
- Glucose level in blood or HbA1
- Electrolytes and microelements contents in blood
- Faeces elastase-1
- Ultrasound of abdomen and thyroid gland
- Colonoscopy or videocapsule endoscopy
- Densitometry for diagnostics of osteoporosis

# Diagnostic criteria

The diagnosis of celiac disease is made by characteristic changes found on small intestinal biopsy specimen and **improving** when a gluten-free diet is instituted.

# DIFFERENTIAL DIAGNOSIS OF CELIAC DISEASE

- Collagenic sprue
- Tropical sprue
- Lymphoma of the small intestine
- Lactase insufficiency

# Complications of celiac disease

- **Ulcerative colitis**
- **T-cell lymphoma of small intestine**
- **Adenocarcinoma of small intestine**
- **Bleeding**
- **Osteoporosis**

# Treatment

- LIFELONG GLUTEN-FREE DIET.
- Wheat, rye and barley grains should be excluded from diet
- Rice, corn and oat grains are tolerated (if not contaminated by wheat grain)

# Treatment

- **In case of anemia - preparations of iron (tardiferon, tagamet, ferrum-lek, ferrogradumet); folic acid 1 mg/d**
- **in case of the syndrome of malabsorbtion - parenteral nutrition, protein solutions, correction of electrolite balance, Ph balance, enzyme preparations (Creon, Mezym-forte, Pangrol, Festal, Digestal)**



# Treatment

- **For prevention and treatment of osteoporosis – preparations of calcium citrate/carbonate (500 mg/d), calcitonin, vitamin D (25000-50000 UI/d)**
- **In severe cases - prednizolon 20-30 mg/d, methylprednizolon 8 mg/d, hydrocortizon 125 mg/d with gradual reduction of the dose.**
- **Follow-up on regular basis, including correction of the diet and treatment, prevention of complications, associated diseases and etc.**

# Syndrome of insufficiency of disaccharidases (SID)

- Decreased activity or absence of one or several disaccharidases, which causes disorders in digestion and absorption of disaccharides
- The most typical representative of SID is lactose insufficiency
- SID can be found in 5-15% of white europeans
- Patients with pathology of small intestine after treatment with antibiotics, contraceptive agents are susceptible to development of SID

# ETIOIOLOGY AND PATHOGENESIS

- Disorders of digestion due to insufficiency of enzymes and deficiency of the bile components
- Disorders of digestion due to microbial colonization of the small intestine
- Malabsorption of nutrients due to morphological and functional changes of epithelium of the small intestine
- Affection of specific transport mechanisms (lymphatic and/or circulatory system of the intestine)
- Disorders of the bile acids metabolism due to microbial colonization of the small intestine or impaired intrahepatic circulation of the bile acids
- Disorders of motor function of gastrointestinal system

# **Main clinical symptoms of SID**

- **Spastic pains in abdomen**
- **Diarrea 0,5 - 3 hours after intake of intolerable disaccharide**
- **Polyfecalia**

# **Syndrome of malabsorption:**

- Diarrhea
- Weight loss
- Protein insufficiency and signs of hypovitaminosis which develop due to the processes of the maldigestion and malabsorption in small intestine

# **CLINICAL symptoms**

## **include intestinal and extraintestinal manifestations**

- Involvement of the digestive system: diarrhea, steatorrhea, meteorism, abdominal pain, anorexia, nausea.
- Involvement of biliary system: gallstone formation.
- Metabolic disorders: insufficiency of proteins, decrease of energy metabolism, electrolyte disbalance, hypovitaminosis.
- Involvement of the blood system: anemia, hemorrhages.
- Involvement of the bones and muscular system: pain in bones, osteoporosis.
- Involvement of the kidneys: stone formation.
- Involvement of the endocrine system: pituitary insufficiency, hypothyroidism, hypofunction of adrenal cortex and sexual glands.

# Physical examination:

- **Weight loss:**

- 1 st. (mild form) - 5 kgs**

- 2 st. (moderate form) - 10 kgs**

- 3 st. (severe form) progressive loss of weight.**

- **Examination:**

- Abdomen – increase in size due to meteorism and formation of gases**

- Palpation - local resistance and hyperesthesia on the left side and around umbilicus**

- Percussion – tympanic sound on small intestine**

# DIAGNOSIS OF SID

- ❑ **The clinical signs appear after intake of intolerable disaccharide.**
- ❑ **Coprogram – acid reaction of feces ( $\text{pH} < 6,0$ )**
- ❑ **Lactose tolerance test - ingestion of 50 g of lactose causes insufficient increase of glucose level in blood; meteorism, tenesmus, diarrhea.**
- ❑ **Morphology - absence of the lactose in biopsy specimen of small intestine**



# DIAGNOSTIC CRITERIA :

- **Degree of insufficiency of the feeding :**
  - **- mild : albumin (g/l) - 35-30;  
transferrin (g/l) - 2,0-1,8;  
lymphocytes ( $10^9/\text{л}$ ) - 1800-1500; skin  
reaction on antigens (mm) - 15-10**
  - **- moderate : albumin (g/l) - 30-25;  
transferrin (g/l) - 1,8-1,6;  
lymphocytes ( $10^9/\text{л}$ ) - 1500-900; the  
skin reaction on antigens (mm) -10-5**
  - **severe : albumin (g/l) <25;  
transferrin (g/l) <1,6; lymphocytes  
( $10^9/\text{л}$ ) <900; skin reaction on  
antigens(mm) - 15-10**

# Metabolic changes

- Fat metabolism: steatorrhea, hypocholesterolemia, hypoammoniumemia, hypotriglyceridemia
- Carbohydrates metabolism : decrease of glucose level
- Water and electrolyte metabolism : dehydration, hypokaliemia, hypocalciemia

# TREATMENT

- ✓ Diet - increased amount of protein (130-135g per day), vitamins, minerals, normal contents of fats and carbohydrates.
- ✓ Elemental therapy – mixtures of balanced chemical composition, containing triglycerides (nutrizan, filotakt)
- ✓ Syntetic therapy - mixtures, consisting of aminoacids, unsaturated fatty acids, polymers of the glucose with low osmolarity.

# TREATMENT

- Protein insufficiency – aminoacids solutions, albumin, plasma.
- Electrolite disbalance - saline solutions, glucose, potassium solutions (asparkam, panangin).
- Correction of hypovitaminosis and anemias: iron preparations, vitamin C, vitamins of group B, nicotinic acid.
- Correction of hemostasis - plasma, dicinon, vicasol and others.
- Immunostimulators
- Improvement of digestion and absorbtion processes – enzyme preparations.
- Decrease of meteorism - espumisan.
- Normalization of motor function - spasmolytics and prokinetics.
- Antidiarrhea preparations – imodium, smekta.
- Enterosorbents - enterosgel, smekta .