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# Digestive tract disorders

MUDr. Matěj Hrunka, MUDr. Jakub Pecl, doc. MUDr. Petr Jabandžiev, Ph.D.

EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání

MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

# 1. Introduction

The following text is an insight into the world of **paediatric gastroenterology**. However, the reported clinical symptoms and diagnoses are not exclusively the domain of paediatrics. Several experts caring for adult patients will also encounter similar cases, from general practitioners, internists, or surgeons to pathologists. The issues discussed below are based on precise knowledge from preclinical fields. They aim to use it for basic differential diagnostic decision-making in a specific clinical scenario.

**Diarrhoea** is one of the two most common gastrointestinal symptoms, which usually lead paediatric patients and their parents to visit their doctor. Diarrhoea is the defecation of unformed stool more than three times a day. It can be **acute**, lasting for several days, or **chronic** if it lasts more than 2–4 weeks.

Pathophysiological view of the origin of diarrhoea:

- **Osmotic** – the result of the accumulation of osmotically active substances in the lumen with subsequent water retention.
- **Secretory** – the result of a malfunction of the transport mechanisms of enterocytes.
- **Structural damage to the intestinal wall** – the result of an absorption failure (usually due to inflammation), with inflammatory exudation, leucocytes, and plasma cells arising from ulcerations.
- **Hyperfiltration** – caused by increased intravascular capillary pressure in the villi or obstruction of the lymph flow in the mesenteric arteries, which leads to excessive intraluminal loss of proteins and leucocytes.
- **Hypermotility** – the result of increased intraluminal transport of solutes and electrolytes, increased intraluminal secretion and accelerated intestinal transit time.

The second symptom is **abdominal pain**, which can be **acute** or **chronic**. In the case of acute abdominal pain, it is necessary to look for warning signs of severe disease, the so-called **red flags**, which are in particular:

- Vomiting
- General state alteration
- Stool and gas passage failure
- Localisation of pain to one point, strictly localised pain
- Positive signs of peritoneal irritation
- Fever
- Symptoms of pre-shock or shock state (hypotension, tachycardia, etc.)

These symptoms should lead to a proactive approach resulting in a correct diagnosis as soon as possible so that optimal therapy can be established. The differential diagnosis of acute abdominal pain is broad and includes internal and often surgical diagnoses.

On the other hand, there are **chronic abdominal pains** that occur intermittently or repeatedly over several weeks or months. A large proportion of paediatric patients with this symptomatology suffer from so-called **functional GI disorders** that are not of organic origin. However, in the flood of these patients, it is necessary to be active in searching for cases with an organic origin requiring more extensive, precise diagnosis and specific therapy. To correctly select these patients, we use **red flags**:

- Localised pain (other than around the navel)
- Pain irradiation
- Night-time pain (and generally nocturnal symptomatology, e.g. diarrhoea, vomiting, etc.)
- Weight loss
- Delayed growth and pubertal development
- Bile or blood-stained vomit
- Perianal symptoms (abscesses, fistulas, etc.)
- Jaundice
- General symptoms (fever, arthralgia, rashes, anaemia)
- Positive family history of ulcer disease, coeliac disease, or inflammatory bowel disease (IBD)

The basis of the diagnostic approach to each patient with these symptoms is a detailed analysis of **anamnestic data**, including targeted questions about the red flags mentioned above. A precise history leads paediatricians to select targeted examinations that establish the correct diagnosis. Naturally, an integral part of this is a careful **physical examination**. In addition to the usual examination of the **abdomen**, we must not forget in its course to examine other parts such as the **skin** (we look for various exanthemas such as erythema nodosum, pyoderma gangrenosum, and others), **mucous membranes** (we look for aphthous ulcers in particular), **joints** (signs of arthritis – swelling, pain, redness, etc.), or the **perianal area**, including a **per rectal examination**. An integral part of the physical examination is an overall **assessment of growth and nutrition**. The following steps include various laboratory tests, imaging and sometimes even endoscopic examinations (often requiring general anaesthesia in children). Indications for these diagnostic methods will be discussed in the following text.

# 2. Differential diagnosis of diarrhoea and abdominal pain (symptoms, diagnostics)

The differential diagnosis of abdominal pain and diarrhoeal diseases is broad. **History** and **clinical examination** are the main clues in deciding the indication for some of the many complementary examinations. The approach to diagnosis and treatment is individualised for each patient and further determined by the severity and duration of the problem.

## (a) Acute diarrhoea

Acute diarrhoea is one of the most common infectious diseases in minors. In the vast majority of children, an outpatient examination at a general practitioner's office for children and adolescents with possible microbiological examination of the stool is sufficient. In typical cases, the diseases are accompanied by **fever** (they may not be present in the case of alimentary intoxication, so-called enterotoxicosis), **vomiting** (more likely in viral gastroenteritis), and **watery diarrhoea**, sometimes with blood or mucus in the stool (predominantly in bacterial enterocolitis). Regarding etiologic agents, they are mainly **viruses** (*rota-, noro-, adeno- and astroviruses*), less often **bacteria** (*campylobacteriosis and salmonellosis*), and rarely **parasites** (especially Giardia lamblia and Entamoeba histolytica after travel). In immunosuppressed children, the aetiology can even be **mycotic**. The incidence of post-antibiotic colitis caused by *Clostridium difficile* is increasing, mainly due to aminopenicillin treatment in predisposed children. Accurate diagnosis of the causative agent of acute diarrhoea in children involves a microbiological examination of stool (culture, latex agglutination, ELISA, PCR, toxin identification) or serological tests (Widal test, yersiniosis).

## (b) Acute abdominal pain and diarrhoea

Acute abdominal pain and diarrhoea are only symptoms and may be present in several infectious and non-infectious diseases. In unclear cases or the presence of **warning signs**, it is necessary to actively search for the actual origin of the symptoms, which may require early and specific treatment. For example, vomiting or abdominal pain may be observed in bronchopneumonia, tonsillopharyngitis, or diabetic ketoacidosis in a child with undiagnosed type 1 diabetes. Diarrhoeal stools with predominant abdominal pain do not exclude the coexistence of acute appendicitis or ileocecal intussusception. These situations are relatively rare but require urgent and specific treatment, and their omission in the differential diagnosis may have fatal consequences.

## (c) Chronic abdominal pain and diarrhoea

Chronic or recurrent abdominal pain and diarrhoea in older children is one of the most common situations in clinical practice. In the vast majority of cases, it is not the result of a somatic disease (90–95 %). These patients often require a long-term follow-up, imaging, a series of laboratory tests, or even an endoscopic examination with multiple biopsies to establish a definitive diagnosis. The differential diagnosis is broad and requires the collaboration of a paediatric and adolescent general practitioner with a gastroenterologist and a clinical psychologist.

At the forefront of their collaboration is the need to rule out an **organic disease** that reported symptoms could manifest. Complementary examinations are indicated individually based on the **course of the disease**, **anamnestic data** obtained from the patient and parents, and a detailed **physical examination**, including a **growth assessment** (reconstruction of the growth chart over time). **Laboratory methods** include the determination of the **blood count with a differential leucocyte count**, the **erythrocyte sedimentation rate** (so-called ESR), **serum biochemistry** (CRP, urea, creatinine, bilirubin, aminotransferases, amylase, lipase, glycemia, ionogram, albumin and prealbumin, iron metabolism, total IgA antibodies and tissue transglutaminase antibodies (tTGA), endomysium antibodies (EmA), anti-Saccharomyces cerevisiae antibodies (ASCA), and neutrophil cytoplasmatic antigens antibodies (pANCA) in IgA or IgG classes (in case of selective IgA deficiency)), **biochemical, cytological examination,** and **urine culture**.

A **microbiological examination** is used to exclude an infectious cause of the symptoms while including the same tests as in the case of acute problems, plus a parasitological examination of the stool (usually repeated due to low sensitivity).

Negative stool microbiology results usually lead to stool testing for **occult bleeding** and determination of **faecal calprotectin** (leucocyte cytosolic protein) concentration. These parameters are not disease-specific, but their negativity indicates the absence of an organic disease underlying the reported symptoms. Otherwise, the positivity of these parameters strengthens the suspicion of, for example, inflammatory bowel disease, Meckel's diverticulum and others that require a more detailed (often invasive) diagnosis.

The primary imaging method is an **ultrasound examination** of the abdomen. In specific cases, a native abdominal X-ray (suspicion of intestinal obstruction), CT scan of the abdomen or MR enterography (to exclude inflammatory involvement of the small intestine) is performed. **Endoscopic examinations** (esophagogastroduodenoscopy and colonoscopy) are not among the initial examinations of chronic abdominal pain and diarrhoea. Since it often requires general anaesthesia in children, it must be judiciously indicated by a paediatric gastroenterologist based on anamnestic data (especially the warning signs mentioned earlier) and the above results. **Histological findings** are crucial for the diagnosis of eosinophilic gastrointestinal disease (most commonly eosinophilic esophagitis with infiltration of the oesophageal mucosa by eosinophils) and inflammatory bowel diseases (diffuse

inflammatory involvement of the mucosa and submucosal tissue in ulcerative colitis, transmural inflammation with ulcers, fissures, granuloma formation, and vasculitis in Crohn's disease).

A common manifestation of **malabsorption** is **weight loss** or **failure to thrive**. In infants, it is most commonly encountered in **short bowel syndrome** (often after necrotising enterocolitis requiring resection of part of the intestine in premature infants). **Allergic enterocolitis** is the result of allergy to cow's milk proteins, especially in infants and toddlers, where the gold standard of diagnosis is the elimination of cow's milk with the selection of an adequate substitution (formula with extensively hydrolysed protein or amino acid mixtures) with an oral food challenge. Confirmation of the diagnosis is the relief of symptoms and their recurrence after the reintroduction of cow's milk proteins into the diet. Malabsorption in older children (4 years and older) is most often a manifestation of **coeliac disease**. Diagnosis of this autoimmune disease involves the determination of tTGA and EmA and in selected cases histological examination of small bowel biopsies, which is the definitive confirmation of the diagnosis (increased number of intraepithelial lymphocytes). A wide range of **selective intestinal malabsorption** (lactose intolerance, fructose intolerance, isomaltase deficiency, trehalase and others) is called enzymopathies. These rare disorders (except lactose intolerance, which is not rare) of the intestinal mucosa require an immunohistochemical examination of an intestinal biopsy for a correct diagnosis. Clinically, they are mainly characterised by osmotic diarrhoea after ingestion of a specific food component, with the disorder's resolution after its exclusion from the diet.

Inflammatory bowel involvement in **inflammatory bowel disease** is accompanied by increased inflammation parameters (leucocytosis, increase in serum CRP, ferritin or erythrocyte sedimentation rate), normochromic or sideropenic anaemia, or thrombocytosis. However, physiological laboratory results do not definitively rule out IBD, so further monitoring should always be recommended in patients with chronic abdominal pain or diarrhoea. In typical cases, **ulcerative colitis** manifests in bouts of diarrhoea with fresh blood and mucus in the stool (imperative defecations), followed by asymptomatic periods. In most patients with **Crohn's disease**, the course of the disease is chronic, intermittent with relapses. However, an aggressive course with the formation of fistulas, abscesses, intestinal perforations or strictures requiring surgical resection of the affected parts of the intestine is not uncommon. Some **extraintestinal manifestations** affect approximately a third of children with IBD and should be actively sought (examination of joints, perianal area, oral mucosa, etc.). These manifestations may precede intestinal manifestations by several years. The most common is inflammatory joint involvement (oligo- or polyarthritis, predominantly affecting the lower limbs but not excluding spondyloarthritis and sacroiliitis). Mucosal manifestations include aphthous stomatitis and cheilitis, cutaneous manifestations include erythema nodosum, pyoderma gangrenosum and perianal involvement, and ocular manifestations include iridocyclitis and uveitis. Hepatobiliary manifestations in UC are often associated with primary sclerosing cholangitis whereas CD is more commonly associated with autoimmune hepatitis. Chronic systemic inflammation is a thrombophilic condition; therefore, thrombotic complications may be one of the first manifestations or complications of active IBD. Other

consequences of IBD include premature osteoporosis, hypovitaminosis B12, delayed onset of puberty and growth disorders.

**Functional GI disorders** result from the individual disposition (so-called visceral hypersensitivity) in situations of increased psychosocial stress. Currently, they are considered to be psychosomatic diseases demonstrating the existence of a functional gut-brain axis. This group of disorders includes, among others, **functional dyspepsia** and **irritable bowel syndrome**. In their development, an important role is played by the child's family, classmates, or environmental overload. The diagnosis is assessed by anamnestic fulfilment of the so-called **Rome criteria**, clinical examination (a thriving child with normal somatic findings), and exclusion of relevant organic diseases (routine laboratory, ultrasound, and other ancillary examinations). **Functional abdominal pain** accompanies children from 4 years of age, is usually localised in the epigastrium or around the navel and does not wake the child from sleep. However, it significantly limits the daily activity of the child and the family, is often accompanied by polymorphic complaints (headache, limb pain or difficulty falling asleep) and cannot be trivialised. It is advisable to reassure the parents and the child and follow them up.

# 3. Therapy

## (a) Gastrointestinal infectious diseases

The vast majority of GI infectious diseases do not require specific treatment. Therapy is usually only **symptomatic**. It includes ensuring adequate intake of fluids that are lost due to diarrhoea, vomiting, or fever. If the child is capable of oral intake, special **oral rehydration solutions** (e.g. according to WHO or ESPGHAN) should be used. Otherwise, **infusion therapy** is necessary. It is also advisable to reduce the fever with antipyretics and ensure adequate re-alimentation. In exceptional cases, targeted therapy should be considered. It usually involves using **antibiotics** in certain bacterial intestinal infections, especially if they are septic (salmonella) or occur in immunosuppressed patients (*Campylobacter jejuni* infection). A particular situation is *Helicobacter pylori* infection, which requires combined therapy with **antibiotics and proton pump inhibitors**. Concerning the population of preschool children, there is a frequent parasitic *Enterobius vermicularis* infection, which is treated with **mebendazole**. Other parasitic diseases are rare in our region apart from the imported ones.

## (b) Inflammatory bowel disease

Unfortunately, inflammatory bowel disease (IBD) remains incurable mainly due to its as yet unclear pathophysiology. Therefore, treating patients with these diagnoses is lifelong, multidisciplinary, and often very challenging. It usually consists of two basic phases: the **induction phase**, which aims to achieve a resting stage of the disease as soon as possible, i.e. remission, and the **maintenance phase**,

where the effort is to maintain remission for as long as possible. Concerning the management of IBD, we use a variety of treatment modalities, ranging from **special diets, immunosuppressants,** and **biological therapy** to **surgical procedures**. The choice of appropriate treatment modality depends on the disease's clinical, endoscopic, and histological activity while considering specific risk factors.

## *Crohn's disease*

In patients with Crohn's disease (CD) in the induction phase of treatment, we currently choose a **special therapeutic diet** in 70-80 % of cases. There are two options. The older, shorter, but more requiring patient cooperation (compliance or adherence) is the **exclusive enteral nutrition** (EEN). In this diet, the patient is fed only enteral nutrition products (so-called "nutridrinks"). It is not uncommon to be administered via a nasogastric tube to ensure adequate intake. The diet lasts 6–8 weeks. The EEN provides the complete caloric intake of the patient. Its great advantage is the absence of side effects and its efficacy reaching up to 80% remission, comparable to corticosteroids as an alternative to dietary treatment. Another indisputable advantage is the improvement in the patient's nutritional status. The disadvantage remains the compliance mentioned above, as eating a monotonous diet for 6–8 weeks is logically challenging.

Another possibility to induce remission in a patient with CD using a special diet is the so-called **Crohn's disease exclusion diet** (CD-ED), consisting of three phases. The first two last six weeks each, while the last (maintenance) phase is indefinitely long (depending on the patient's tolerance). Again, part of the patient's energy intake is represented by enteral nutrition products (50% of the energy intake in the 1$^{st}$ phase, 25% in the 2$^{nd}$ and 3$^{rd}$ phases), and the rest is precisely defined food. It is essential that this food is fresh and a quality source of macro- and micronutrients. Semi-finished products and other components of the so-called Western diet (fast food, etc.) are entirely excluded. Even this special diet has an effect comparable to corticosteroids.

These are appropriate in patients who do not tolerate or refuse dietary treatment. **Prednisone** or **methylprednisolone** is usually administered for 2–3 months. The disadvantage of corticosteroids remains several side effects (growth retardation, alteration of bone metabolism, risk of steroid diabetes, steroid acne, etc.); therefore, they cannot be prescribed long-term.

Biological drugs are the last treatment method used to induce remission. They are reserved for severe forms of CD, such as the perianal form, the fistulating or stenotic disease phenotype, or in case of severe growth retardation, where remission must be induced as soon as possible. Currently, there are several biologic drugs with varying efficacy. The most commonly used are drugs with **anti-TNF alpha effect** (infliximab and adalimumab).

In most cases, immunosuppressive treatment is required to maintain remission. The most commonly used is the thiopurine drug **azathioprine**, which is in tablet form. Concerning this treatment, it is necessary to think about possible side effects, especially bone marrow suppression, acute

pancreatitis, or hepatopathy. An alternative to azathioprine is **methotrexate**, which is used less often as it has to be administered by subcutaneous injections at the beginning of treatment, which is particularly difficult for younger children to tolerate. While administering this immunosuppressant, it is necessary to monitor liver and renal functions closely, as these may be altered. Biologic drugs are also used in maintenance treatment. They are indicated when the baseline treatment (i.e. diet/corticoids + azathioprine/methotrexate) fails, or they are continued if they have already been used in the initial induction phase.

Other treatment modalities include surgical procedures (resection of affected segments, treatment of perianal manifestations, etc.), anaemia treatment, nutritional support, or antibiotic treatment of relapses.

## *Ulcerative colitis*

The treatment of paediatric patients with ulcerative colitis (UC) is very similar to the treatment of CD, but there are some exceptions. One of these is the absence of any therapeutic diet whose efficacy has been validated by controlled clinical studies and is listed in official guidelines. Therefore, we have to be content with medical treatment alone. In milder forms of UC, **aminosalicylates** are often used, especially **mesalamine**, and less frequently **sulfasalazine**. They can be administered systemically, i.e. in tablets or topically in suppositories or enemas. Aminosalicylates are used not only in the induction phase of therapy but should be continued in the subsequent maintenance phase. Allegedly, they reduce the risk of colorectal cancer, a severe complication of UC. Treatment of moderate to severe forms of UC is usually expanded by **corticosteroids**. The administration of prednisone or methylprednisolone and the length of treatment are the same. They can be administered intravenously or orally. If therapy with corticosteroids fails, biologic drugs are reinstituted. Similar to CD, especially with **the anti-TNF alpha effect**.

Subsequent maintenance treatment is virtually identical to CD. Regarding immunosuppressants, **azathioprine** is more effective, so we choose it more often. Complementary therapy is no different from that for Crohn's disease. Perhaps with only one exception, the lower frequency of surgical interventions, as UC usually requires radical surgery in the form of total or subtotal colectomy followed by pouch reconstruction.

### *Unclassified IBD*

Unclassified inflammatory bowel disease (IBD-U) has many features in common with ulcerative colitis. Therefore, the therapy is based on the treatment principles of this disease.

### *IBD treatment modalities*

| | Crohn's disease | Ulcerative colitis (IBD-U) |
|---|---|---|
| **Induction phase** | Special diet/Corticosteroids | Aminosalicylates |
| | Biologic drugs | Corticosteroids |
| | | Biologic drugs |
| **Maintenance phase** | Azathioprine/Methotrexate | Aminosalicylates |
| | Biologic drugs | Azathioprine/(Methotrexate) |
| | | Biologic drugs |

## (c) Malabsorption syndrome

### *Coeliac disease*

The only currently available effective therapy for coeliac disease is a **gluten-free diet**. Gluten is a protein complex found in cereals (wheat, barley, and rye). Oats are different. Their proteins are not so immunologically active, so they are tolerated by up to 95% of coeliac patients. However, secondary contamination of oats is a common problem in our conditions, so they are generally not recommended for these patients and, if so, only from reliably uncontaminated preparations and only after disease remission. Gluten is a significant component of the food industry. It is found in hidden form in several foodstuffs, so the patient must know the exact composition of each dish. We consider fruit and vegetables, meat, rice, and legumes or nuts naturally gluten-free. Due to the atrophy of the intestinal mucosa, a secondary lactase deficiency is often present at the beginning of the disease. Therefore, it is necessary to recommend a lactose-free diet temporarily.

## (d) Functional GI disorders and others

### *Irritable bowel syndrome*

The therapy of the gastrointestinal tract's functional disorders is very complex and requires a comprehensive approach. The mental state of the patients plays a crucial role. Therefore, educating them about the natural history of the disease is as imperative as reassuring them that no danger arises from their problems. In many cases, cooperation with **psychologists** is necessary. Empirically, some patients find various dietary measures helpful. Often a **lactose-free diet** and a so-called **low FODMAP diet** are effective. The latter is a diet restricting fermentable oligosaccharides, poorly absorbed in the intestine and fermented by intestinal bacteria; this can lead to the typical symptomatology of irritable bowel syndrome. Sometimes, **spasmolytics** (e.g. mebeverine, drotaverine, etc.), **deflators** (e.g. simethicone), or **antidiarrhoeals** (e.g. loperamide) are used symptomatically. In some patients, an appointment with a psychiatrist and the administration of antidepressants are necessary.

### *Eosinophilic gastrointestinal disease*

The treatment of eosinophilic gastrointestinal disease (EGID) is best defined in its most common type, which is eosinophilic esophagitis (EoE). However, it is very similar to other forms of EGID. The treatment of eosinophilic esophagitis rests on three pillars: **proton pump inhibitors**, **an elimination diet**, and **corticosteroids**. The effect of proton pump inhibitors in oesophageal eosinophilia is not completely clear. However, given the increased presence of eosinophils in oesophageal biopsies in patients with gastroesophageal reflux disease (GERD), and thus an inevitable overlap between EoE and GERD, they are an essential part of every patient's therapy.

Since EoE is a manifestation of food allergy, it can be assumed that the disease will cease to be active once the causative allergen is removed. However, the identification of this allergen remains a problem. Laboratory and other ancillary examinations are often unfavourable due to the combined immunopathological reaction (IgE and non-IgE mechanisms). Particularly in younger patients, it is sometimes difficult to identify which food is causing the problem, so special diets have been formulated to exclude the most common triggers of this disease from the patient's diet. In our conditions, we prefer the so-called **6-food** or **4-food diet**. The 6-food elimination diet removes dairy products, wheat, gluten, soy, eggs, and fish, while the 4-food elimination diet removes dairy products, eggs, soy, and wheat from the diet. Subsequently, individual foodstuffs are gradually reintroduced into the diet with histological control by oesophageal biopsy.

The third treatment modality is corticosteroids, which ensure rapid remission induction. We mainly choose topical forms, especially **budesonide** or **fluticasone**. In severe forms, systemic corticoids can be administered.

# 4. Complications and prognosis of the most common GI diseases

The most common complication of acute diarrhoea in children is isoosmolar **dehydration**. Infants and toddlers are especially at risk. In young children with high fever in acute diarrhoeal diseases, febrile convulsions are not uncommon. A fearful complication of some intestinal infections is the **haemolytic uremic syndrome**, typical of infections caused by Shiga toxin produced by *E. coli* but also described in infections caused by certain *Shigella* or *Campylobacter* species. A relatively common complication of intestinal infections is **transient parainfectious hepatopathy** manifested by increased transaminases (especially with rotavirus and campylobacteriosis). Salmonellosis or campylobacteriosis, especially in immunosuppressed children, may be accompanied by **extraintestinal complications** (sepsis or meningitis, endocarditis, abscesses, osteomyelitis, etc.). **Immune-mediated complications** are relatively rare in children (erythema nodosum after salmonellosis, campylobacteriosis or yersiniosis, aseptic arthritis, acute Guillain-Barré polyradiculoneuritis after campylobacteriosis). With adequate rehydration, infectious gastroenteritis in childhood is usually a self-limiting disease with a good prognosis. The most common complication is **post-enteritis syndrome** with transient hypolactasia, which requires the temporary restriction of dietary lactose intake. Complicated cases of acute gastroenteritis and enterocolitis are more common in children with other underlying diseases (e.g. primary immunodeficiency, secondary immunosuppression after oncological or autoimmune disease treatment, psychomotor retardation in cerebral palsy, or cystic fibrosis).

## (a) Coeliac disease

Coeliac disease is a lifelong condition often associated with the manifestation of other autoimmune diseases during life (10–30 times more common than in the general population). The most frequent are **autoimmune thyroiditis** (more than 10%) and **type 1 diabetes mellitus** (4.1%). Therefore, these complications in patients with coeliac disease should be actively looked for during regular check-ups. Other disorders associated with coeliac disease include autoimmune hepatitis, sclerosing cholangitis, primary biliary cirrhosis, systemic lupus erythematosus, Sjögren's syndrome, and connective tissue diseases, myasthenia gravis, juvenile rheumatoid arthritis, polymyositis, IgA nephropathy, interstitial pulmonary fibrosis, idiopathic pulmonary hemosiderosis, sarcoidosis, and microscopic colitis. The predominant symptoms before the diagnosis of coeliac disease may be metabolic osteopathy and neuropsychiatric manifestations (idiopathic ataxia, behavioural disturbances, and depression). A severe complication of coeliac disease is a **refractory coeliac** disease that does not respond to treatment with an elimination gluten-free diet. Risk factors for its development are intestinal mucosal atrophy, weight loss, and some of the associated autoimmune diseases mentioned above. The most severe late complication of coeliac disease is cancer, which affects coeliac patients

1.3 times more often than the general population. It is predominantly **non-Hodgkin's B-lymphoma or T-lymphoma**, which develops as a late complication of coeliac disease in 8–10% of cases. Coeliac patients also have a higher risk of developing small intestine, oesophagus, and pharynx cancer. The risk of complications in coeliac patients is inversely proportional to adherence to a gluten-free diet, which must be lifelong.

## (b) Inflammatory bowel disease

Complications of Crohn's disease in children include the formation of **abscesses, fistulas** with **adhesions**, **strictures** and resulting **intestinal obstructions**. In ulcerative colitis, a severe complication is the development of **toxic megacolon**. This condition is associated with the risk of perforation, sepsis, electrolyte disturbances and bleeding, requiring immediate surgical intervention. Compared to healthy children, paediatric patients with IBD have a significantly higher risk of developing a **malignant disease**, including small intestine adenocarcinoma and colon cancer. Malnutrition and lack of physical activity in children with IBD, together with long-term corticosteroid treatment, often contribute to the development of **osteopenia**. Chronic malnutrition results in a **reduced growth rate** and **delayed sexual maturation**. The complexity of these complications is a significant stressor, which is why children with IBD are often associated with **anxiety** and **depressive disorders** accompanied by antisocial and addictive behaviour. IBD is a serious lifelong illness that significantly reduces the quality of life of the affected child and their parents, and psychological or psychiatric care is an integral part of disease management. Adherence to treatment and long-term follow-up for early detection of relapses are determining factors in the prognosis of IBD patients.

## (c) Eosinophilic gastrointestinal disease

The risk of a late recognised or inadequately treated eosinophilic disease of the gastrointestinal tract lies mainly in the transition to the fibrostenosis stage with the development of **irreversible strictures** (most often oesophageal strictures). The prevention of this complication is to achieve and maintain remission of the disease with adequate treatment with the three modalities mentioned above.

# Resources


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