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Habitual constipation in children as a challenge in the physiotherapist's practice

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Summary

Stool constipation, according to the opinion of GPs, pediatrics and pediatric gastroenterology specialists, is one of the most common ailments among the youngest patients. The incidence of constipation varies and depends on many factors, mainly environmental, sociological and economic ones. It also depends on the gender and age of the child. It is estimated that up to 10% of the developmental age population suffers from chronic constipation. The above-mentioned ailment is most common in children from 2 to 4 years old and is slightly more common in boys than in girls. In 90–95% of cases, constipation develops on an idiopathic functional basis [1-4].

Habitual constipation in children is a very serious clinical problem because it prevents the patient from proper functioning, and thus contributes to a reduction in life quality and lowers self-esteem. In the international literature, issues related to physiotherapeutic treatment of habitual constipation appear quite rarely. Nowadays, there has been a significant increase in the interest in improving the quality of life in the youngest patients.

An attempt to treat functional constipation in children should be made at the level of primary care, including comprehensive treatment and physiotherapy.

Key words: children; physiotherapist's practice

Introduction

Constipation of the stool is one of the most common ailments among the youngest patients. The incidence of constipation varies and depends on many factors, mainly environmental, sociological and economic ones. It also depends on the gender and age of the child. It is estimated that up to 10% of the developmental age population has chronic constipation. The above-mentioned ailment most often occurs in children aged 2–4, slightly more often in boys than in girls. In 90–95% of cases, constipation results from functional idiopathic causes. Organic constipation occurs in a small percentage [1-4].

Habitual constipation is most often diagnosed in children over 3 years of age (at this age the vast majority of children acquire the ability to consciously control the defecation reflex) [2].

The functional constipation of the stool belongs to the group of functional disorders of the gastrointestinal tract, and it has a definite clinical picture, without any detectable etiological factor nor characteristic morphological or laboratory changes [2,4].

The diagnostic procedure consists of a medical history examination, physical examination as well as auxiliary and specialistic examinations. Only after excluding organic causes, it is possible to establish the functional basis of the abnormalities. The diagnostic criteria for functional stool constipation in children are defined by the Rome Criteria III of 2006. Compared to the Rome Criteria II, the duration of functional constipation symptoms has been reduced from 12 weeks to at least one month in infants and younger children, and to at least 2 months in older children and adolescents. Unfortunately, the longer the duration of the symptoms, the lower the effectiveness of the therapy is [2,3,5].

The treatment of habitual constipation in children should be comprehensive and prolonged. Many specialists should be involved in the therapeutic process: a doctor, physiotherapist, nutritionist, psychologist. It is recommended to educate the patient's family in terms of bad habits and lifestyle changes. Non-pharmacological treatment includes the implementation of a high-fiber diet, education of the child and the family regarding lifestyle changes and behaviour modification, also moderate and regular physical activity, defecation training, relaxation techniques, osteopathy techniques, behavioral therapy (biofeedback) and psychotherapy [1,5- 7].

Pharmacological treatment consists of three stages: the first stage - the intestines unblocking phase, the second stage - the maintenance treatment phase, and the final stage - drug discontinuation [1].

The work presents physiotherapeutic procedures, with particular emphasis on osteopathic techniques in the treatment of habitual constipation in children and adolescents.

Etiology

Constipation occurs in about 15% of the children population and it is a very common cause for concern for children, parents and many specialists. In Western European countries, constipation is the cause of about 5% of all outpatient visits and more than 25% of referrals to children's gastroenterologists [1,3].

The frequency of stool defecation decreases with the age of the child. In the first weeks of life it is 4-5 times a day, up to 1-2 at the age of 2 years. The time of intestinal passage of food from the mouth to the anus increases from 8 hours in the first month of life, to 16 hours at the age of 2, and 26 hours at the age of 10 [3,5].

It is difficult to find a standard definition of constipation, since it is a subjective and not very precise symptom, hence there are some discrepancies in its assessment. Most often constipation is defined as the slowing down and obstruction of the intestinal passage, which consequently leads to the hard and dry stool excretion. The frequency of defecation is also taken into account, it can range from 3 stools per day to 1 in 3 days and may require some effort [5-7].

Etiopathogenesis

Functional constipation of the youngest patients may be accompanied by normal, increased or decreased motor activity of the large intestine. Colonic inertia is the weakening of contractile activity throughout the whole large intestine, which results in ineffective shifting of the fecal masses and stool retention. The obstruction of fecal excretion (outlet obstruction), which is associated with disorders in the anorectum area is an example of another abnormality. The cause of the above-mentioned may be spastic contraction of the pelvic floor muscles while pushing on the stool [1,4,5,7]. Increased motor activity of the large intestine may be associated with longer-lasting segmental contractions. Excessive agitation movements (so-called "back and forth" movements) are characteristic here and they reduce the propulsive activity of the colon. The contact time of the intestinal contents with the epithelium is prolonged, what results in excessive drying of the fecal masses. Stool constipation may occur in children with normal motor activity, but with impaired coordination between particular segments [5,8].

Constipation in children most often results from organic or inorganic reasons in which the most important factor is chronic stool retention associated with poor hygiene habits, improper diet, dehydration, mental disorders (e.g. anorexia nervosa), prolonged sitting and low physical activity. Constipation often occurs along with a change in the young patient's environment, for example after starting kindergarten or school, where the child holds the stool back. The reasons for holding it back may be rush, reluctance to stop playing in order to defecate, poor hygiene conditions in school toilets, or fear of painful stool excretion that a child experienced before [1,8].

Contemporary social changes influence the psychosomatic nature of a child. A meal is a signal that triggers the cycle of changes, and the end result should be the stool excretion. During emotional stress (e.g. rushing through a meal, compulsion to eat), the child tightens the external anal sphincter and the gluteal muscles, thereby suppressing the reflex. The fecal masses are moved to the rectal arch and as a result they weaken defecation. The stimulated sympathetic system reduces the muscle tone of the colon and increases the tone of the internal anal sphincter. Long transit time increases water reabsorption, making the stool hard, difficult and painful to expel. The above situation may be caused by the lack of access to a toilet in the kindergarten or school and / or incorrect housing conditions. Often, parental hyperactivity or

excessive demands placed on a child (eg to stop using diapers as soon as possible) may create in a child a pathological reflex to stop defecation [3,6,9].

The influence of social factors is closely related to the group of psychological factors.

About 40% of children with constipation and fecal incontinence develop behavioral disorders (10). The inhibition of expression and emotions was found in children with increased general sensitivity or hypersensitivity to stimuli with a strong and long-lasting negative meaning. Difficulties in passing stools, and especially involuntary contamination in older children, is associated with a lot of stress. Pain and effort accompanying defecation intensify unpleasant sensations and reinforce the existing negative associations [5, 6].

Treatment

The treatment of habitual constipation in children should be a comprehensive and long-term care. Therapeutic treatment should begin as soon as possible, before smooth muscle tension in the rectum and sigmoid colon is relieved, as the consequence is their distension and lowering the feeling of filling the rectum. The proper treatment of functional constipation consists of non-pharmacological and pharmacological treatment [1-7].

Pharmacological treatment

Pharmacological treatment consists of three stages: the first stage - the intestinal unblocking phase that means evacuating the residual stool from the megarectum. The second stage, the maintenance phase, that is keeping the stool passage and restoring the proper tone of the lower gastrointestinal tract. Final stage – gradual medication cease phase. Discontinuation of therapy that is too rapid may lead to the disease reoccurrence [1,3,6].

Non-pharmacological treatment

Non-pharmacological treatment includes the implementation of a high-fiber diet, education of the child and his family regarding lifestyle changes and behavior modification, moderate and regular physical activity, defecation training, relaxation techniques, osteopathy techniques, behavioral therapy (biofeedback) and psychotherapy [1,6- 14].

Defecation training is a part of non-pharmacological therapy. The aim is to encourage the patient to use the toilet regularly at certain times of the day, especially after meals. Defecation training is aimed at teaching the child to allocate time for defecation and creating comfortable conditions for this activity. A very important aspect of learning is the lack of rush and the feeling of intimacy while passing stools. The child should consider the act of defecating as painless. The main goal of the above-mentioned training is to strengthen the reflexes (gastro-angular, gastro-colonic and duodenal-colonic) and to develop a regular bowel rhythm in the child [7,8,10]

The development of techniques used in medicine enables the use of modern equipment in the non-pharmacological treatment of functional constipation. The beneficial effect of biofeedback as an adjunctive therapy in the treatment of constipation in children is a topic that is constantly discussed. Behavioral therapy is used only in cooperating patients, it is based on a surrogate feedback - called EMG biofeedback. It takes place under the control of a manometer in order to create proper control over defecation activities. Biofeedback training is based on learning to control the muscle tone of the anal sphincters, reducing increased muscle tone, activating weakened muscles and improving neuromuscular coordination. The above action consequently reduces pain during defecation and has a positive effect on the discussed dysfunction. The child performs certain relaxation exercises for the pelvic floor muscles and the external anal sphincter. The patient can observe on the chart how the pressure changes in the rectal ampulla. The analysis of the test results proves that the improvement of manometric parameters is not always associated with a satisfactory clinical effect [7, 9, 10, 17].

Comprehensive treatment of habitual constipation in children requires the care of a clinical psychologist, both for the child and the family. The task of the psychologist is to determine the source of the problem and motivate to complete the long-term treatment [8, 14, 18].

Vagus nerve anatomy

Neurostructural studies confirm the existence of significant multisynaptic anatomical connections of the nuclei of the vagus nerve. The vast majority of the ascending sensory fibers of the vagus nerve are located within the solitary tract and end at a different height in the nucleus mentioned above. The nucleus of the solitary tract is connected in three directions with other structures of the brain: 1) some of the fibers switch within the autonomic feedback

loop (to the parasympathetic dorsal nucleus); 2) part of the fibers goes to the reticular formation of the core elongation; 3) the projection routes "follow" towards forebrain and pass through: the locus coeruleus and the peribular nucleus. Noradrenergic neurons located in both of the above-mentioned structures have multiple connections with the amygdala, hypothalamus, islet, thalamus, prefrontal cortex and other limbic structures related to the control of mood and anxiety [19, 20].

Anatomical connections of the vagus nerve are used in osteopathy (mobilization of the vagus nerve) to modify the functions of the areas of the brain that are responsible for emotions and mood, in order to reduce the fear of unpleasant experiences, e.g. painful defecation.

The vagus nerve (VN) has a complex neuro-endocrine network that maintains homeostasis in the body. Due to the interconnection of neurons with many areas of the brain, the vagus nerve is a kind of "control center" that integrates interoceptive information and responds through appropriate adaptive modulating feedbacks. The majority of the VN fibers are unmyelinated C fibers from the internal organs, and myelinated A and B fibers play a key role in sensory, motor and parasympathetic somatic innervation. The fibers of the vagus nerve are predominantly cholinergic, and other non-cholinergic non-adrenergic neurotransmitters are also involved. The VN has four vagus nuclei that provide control of the cardiovascular, respiratory, and digestive systems. Modern research has shown that VN is involved in inflammation, mood and pain regulation. The above responses can potentially be modulated by stimulation of the vagus nerve (VNS). Due to the wide network of vagus nerves, the VNS can exert a neuromodulatory effect, activating health processes [21, 22].

The autonomic nervous system (AUN) is a complex neural network essential for homeostasis and the reflex regulation of most organs. The AUN is responsible for the functioning of the cardiovascular, digestive, urogenital systems and thermoregulation. Scientific research confirms the possibility of a partial influence on the function of the autonomic nervous system, which is responsible for the somatic-emotional balance. An interesting example may be the relationship between the so-called autonomic balance and the occurrence of irritable bowel syndrome. Researchers found a direct link between automatic emotional responses and the functional balance of the autonomic system. Abnormalities in the functioning of the autonomic system may include: orthostatic hypotension, constipation, diarrhea and urinary incontinence [23].

Craniosacral therapy

Craniosacral therapy (CST), also known as cranial osteopathy, belongs to the so-called ‘‘soft osteopathy’’. It affects the basic physiological processes, has a stimulating effect and regulates the mechanisms of self-regulation in the body. The method is characterized by a holistic approach to the patient's health problem. The main form of working with the patient is a very subtle touch that calms down, relieves excessive tension and stimulates the nervous system. CST improves the circulation of the cerebrospinal fluid, blood circulation in the vessels and the blood supply to all organs. The therapy also involves working on the patient's emotions, it is a specific type of tissue psychotherapy. The therapist uses the mobilization of the connective tissue that surrounds all organs and systems. The craniosacral system is a physiological system consisting of the meninges and spinal cord, bone structures (mainly the skull and sacrum) connecting to the meninges, and elements related to the production and resorption of cerebrospinal fluid. The basic assumptions of the therapy include minimal movement of the skull bones, possible due to flexible cranial sutures. Another aspect of the craniosacral system is the involuntary movement of the sacrum between the pelvic bones, caused by fluctuations of the cerebrospinal fluid and reciprocal stresses in the dura mater. CST uses five basic grips (both diagnostic and therapeutic): occipital grip, ear grip, arch grip, face grip, and fronto-occipital grip [24-27].



Fig. 1. Assessment of the mobility of the occipital bone - the so-called occipital grip.

The therapist's hands are placed on the occipital scales in the so-called occipital grip, used to assess the regularity of pulsation of the cerebrospinal fluid. According to Sutherland, pulsation contributes to minimal movement of the skull bones, which affects the tone of the brain's meninges. Cerebrospinal fluid fluctuation "washes the brain stem", which belongs to the autonomic nervous system, and controls basic vital functions (respiration center, thermoregulation center, heart regulation center, metabolism center and reticular formation) [30].



Fig. 2. Assessment of the mobility of the temporal bone - the so-called temporal grip [30].



Fig. 3. Assessment of the mobility of the sphenoid bone - the so-called wedge grip [30].

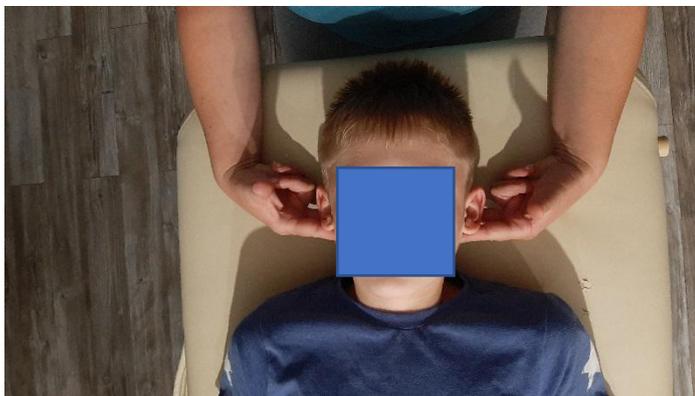


Fig. 4. Normalization of the vagal tone - the "spread V" technique.

It is a technique aimed at inhibiting the activity of the vagus nerve. The hands of the therapist are placed on the temporal bone: finger II - on the styloid process, finger III - on the mastoid process (fingers form "spread V"). During the patient's exhalation, the therapist makes a gentle movement away from the above-mentioned bone elements, normalizing the nerve tone [30].

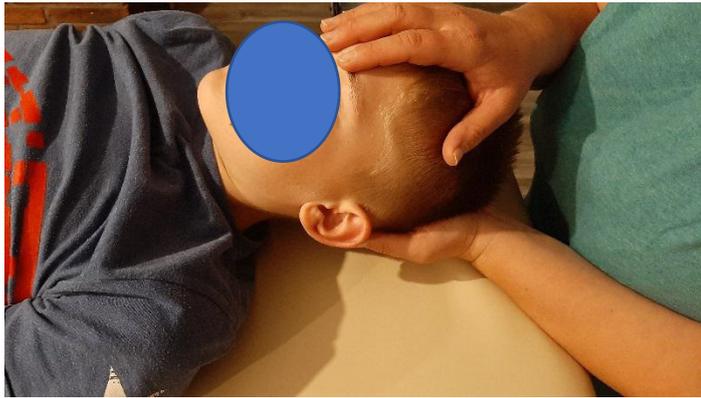


Fig. 5. Fronto-occipital grip - reducing the tone of the dura mater of the brain.

The therapist's hands are placed on the occipital scales and frontal bone in the so-called the fronto-occipital (cradle) grip, used to assess the regularity of the pulsation of the cerebrospinal fluid and the mobility of the frontal and occipital bones [30].



Fig. 6. Mobilization of the parotid fascia [30].



Fig. 7. Relaxing the hyoid and thyroid-hyoid muscles [30].



Fig. 8. Relaxing the respiratory diaphragm - relaxing the ligaments of the pericardium. One hand of the therapist is placed on the Th4 – Th6 spinous processes, the other - on the sternum. The technique is based on the transmission of gentle vibrations (oscillatory movements) to individual structures: pericardial ligaments (upper posterior, lower posterior, upper sternal and inferior sternum ligaments), pre-vertebral fascia, pericardial vertebral ligament and pre-tracheal fascia [30].



Fig. 9. Mobilization of the temporal fascia [30].

Summary

The diagnostic management in case of constipation in children is a very important aspect to identify habitual constipation. During a medical examination, a specialist must pay attention to the symptoms accompanying the child, but also to the presence of such coexisting diseases as: diabetes insipidus, diabetes, Hirschsprung's disease, hypothyroidism, hyperparathyroidism, adrenal insufficiency, hypokalemia, hypercalcemia, uremia, childhood cerebral anorexia nervosa, mental retardation, autism, scleroderma, visceral lupus. The diet of the child is essential, in particular the amount and quality of food consumed (the presence of

fiber and fluid). A very important aspect of the success of treatment is the period when constipation occurred (infancy, early childhood, while toilet training, at the point of starting kindergarten or school). The older the child is, the more difficult it is to treat.

Diagnostics consists of medical history, physical examination, as well as auxiliary and specialistic examinations. Treatment of habitual constipation in children should be comprehensive and conducted in a long-term period. Many specialists should be involved in the therapeutic procedure: a doctor, physiotherapist, dietician, psychologist. It is recommended to educate the patient's family about changing bad habits and lifestyle. Non-pharmacological treatment includes the implementation of a high-fiber diet, education of the child and the family regarding lifestyle changes and behaviour modification, moderate and regular physical activity, defecation training, relaxation techniques, osteopathy techniques, behavioral therapy (biofeedback) and psychotherapy.

Loening-Baucke has shown in his research that chronic constipation in children predisposes them to the development of other diseases, including urinary incontinence and irritable bowel syndrome in adulthood [15]. The above statement should motivate to expand research into effective and non-pharmacological treatment of chronic constipation.

In accordance with the assumptions of the health care reform, a correct algorithm for diagnostic and therapeutic procedures should be developed, what will result in optimization of costs related to the provision of health services. In developing the optimal scheme of managing habitual constipation in children, the following should be considered: psychosocial conditioning, sanitary and social conditions (access to a toilet), family and peer problems.

There is a need to train therapeutic teams, especially physical therapists, in the field of osteopathy. An important aspect of comprehensive therapy is educating patients and their families.

The aim of the multifaceted therapy is to consolidate such a defecation model in which the child regularly passes a soft stool without experiencing unpleasant pain.

Therapeutic success depends on the long-term and conscientious cooperation between the therapeutic team and the child and his / her closest environment. Psychological support for the whole family is extremely important.

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