
FUNCTIONAL DEFECATION DISORDERS IN THE FIRST 3 YEARS OF LIFE - Prof. M. Benninga

At our Novalac Symposium held on June 6th 2019 in Glasgow (UK), parallel to the ESPGHAN 2019 congress, Prof. Marc Benninga, pediatric gastroenterologist at the Emma Children's Hospital (Academic Medical Center, Amsterdam, The Netherlands) gave a presentation related to the functional defecation disorders in the first 3 years of life.

«If you don't treat constipation within three months after symptoms, the chance of having symptoms later is very high: after three years of follow-up, almost half of the children still have symptoms of constipation. If you start with a beneficial therapy, after three years more than 80% of the children never have symptoms again. So, please don't use a «wait and see» policy but start with an effective treatment.»

Prof. Marc Benninga
Pediatric gastroenterologist at the Emma Children's Hospital
(Academic Medical Center, Amsterdam)



1 PASSAGE OF FIRST STOOLS

The meconium is produced within the first 24 hours for 99% of term infants whereas it is produced after 48h in 20% of preterm, low birth weight babies.

The **bowel frequency is the highest** in the youngest infants. It decreases as the infant's age increases. From 3 years of age, the defecation pattern (i.e. from 3 times per day to 3 times per week) is the same as adults¹.

The **bowel frequency is higher** in breastfed infants with more soft stools compared to formula-fed infants. However, after the age of 4 months there is no difference in stool frequency and consistency^{2,3}.

Stools can vary in terms of **amount, consistency, and color**. White and black stools are considered abnormal. Based on the stool characteristics, the Amsterdam infant stool scale (AISS) has been developed to assess defecation patterns in infants⁴.

2 FUNCTIONAL CONSTIPATION

Rome IV criteria definition

Based on the Rome IV diagnostic criteria for functional constipation^{5,6}, it must include 1 month of at least 2 of the following in infants up to 4 years of age, children and adolescents:

- Two or fewer defecations per week.
- History of excessive stool retention.
- History of painful or hard bowel movements.
- History of large diameter stools.
- Presence of a large fecal mass in the rectum.

In toilet-trained children, the following additional criteria may be used:

- At least 1 episode/week of incontinence after the acquisition of toileting skills.
- History of large diameter stools which may obstruct the toilet.

A common clinical entity

Symptoms of constipation develop during the first year of life in **40%** of children, in **19.2%** of children aged 4-9 years and in **15.2%** of children aged 10-18 years. More boys than girls have constipation.

Prevalence

In a systematic review and meta-analysis of 35 studies, the pooled prevalence of functional constipation in children was **9.5%** with a similar prevalence of constipation in very different countries⁷.

Mechanisms

The underlying pathophysiological mechanisms of constipation are not well understood. In the first 10 years of life, behavior must be involved. Functional constipation is often the result of repeated attempts of voluntary withholding of feces by a child who tries to avoid unpleasant defecation because of fears associated with evacuation. Other factors may include stress, food, genetics, microbiome, abnormalities in nerves and muscles related to defecation, and sexual abuse. After the age of 10 years, the causes are often unknown.

Differential diagnostic in infancy

In **90%** of the cases, the cause of constipation is unknown.

In **10%** of the cases, constipation is due to a change from breastfeeding to formula feeding, cow's milk allergy, anorectal malformation, anal stenosis, Hirschsprung's disease, internal anal sphincter achalasia, etc.

Rome IV special issue in
Gastroenterology journal, May 2016



3 HIRSCHSPRUNG'S DISEASE

Hirschsprung's Disease (also called congenital aganglionic megacolon) occurs when some of the infant's intestinal nerve cells (ganglion cells) do not develop properly in the distal colon, delaying the progression of stools through the intestines which can lead to severe constipation and intestinal obstruction.

In contrast to functional constipation, infants with Hirschsprung's Disease have a delay in the meconium production (more than 48h after birth), often fail to thrive, and fecal incontinence is rare. Infants with Hirschsprung's Disease can suffer from enterocolitis while it never happens in constipated infants. The anorectal examination shows an explosive diarrhea but no fecal impaction.

Hirschsprung's Disease can be identified by doing an X-ray analysis with barium enema where the transition zone can be seen, but this analysis is not recommended due to the high radiation exposure. The rectal suction biopsy is recognized as the most accurate diagnostic tool for the Hirschsprung's Disease by detecting the presence of increased and thickened neurites that are characteristic of the disease⁸.

4 ANAL ACHALASIA

Internal anal sphincter (IAS) achalasia is a clinical condition with presentation similar to Hirschsprung's disease, but with the presence of ganglion cells on rectal suction biopsy (normal rectal biopsy). The diagnosis is made by anorectal manometry, which demonstrates the **absence of the rectosphincteric reflex** on rectal balloon inflation⁹.

IAS achalasia can be treated with the **injection of botulinum toxin** but studies have shown a variable response, a wide individual variability in terms of defecation frequency after therapy, and the duration of response can range from 1 week to 18 months^{9,10}. However, this treatment is too expensive and needs to be performed under general anesthesia.

5 INFANT DYSCHEZIA

Based on Rome IV diagnostic criteria, infant with dyschezia must include both of the following in an infant younger than 9 months of age⁵:

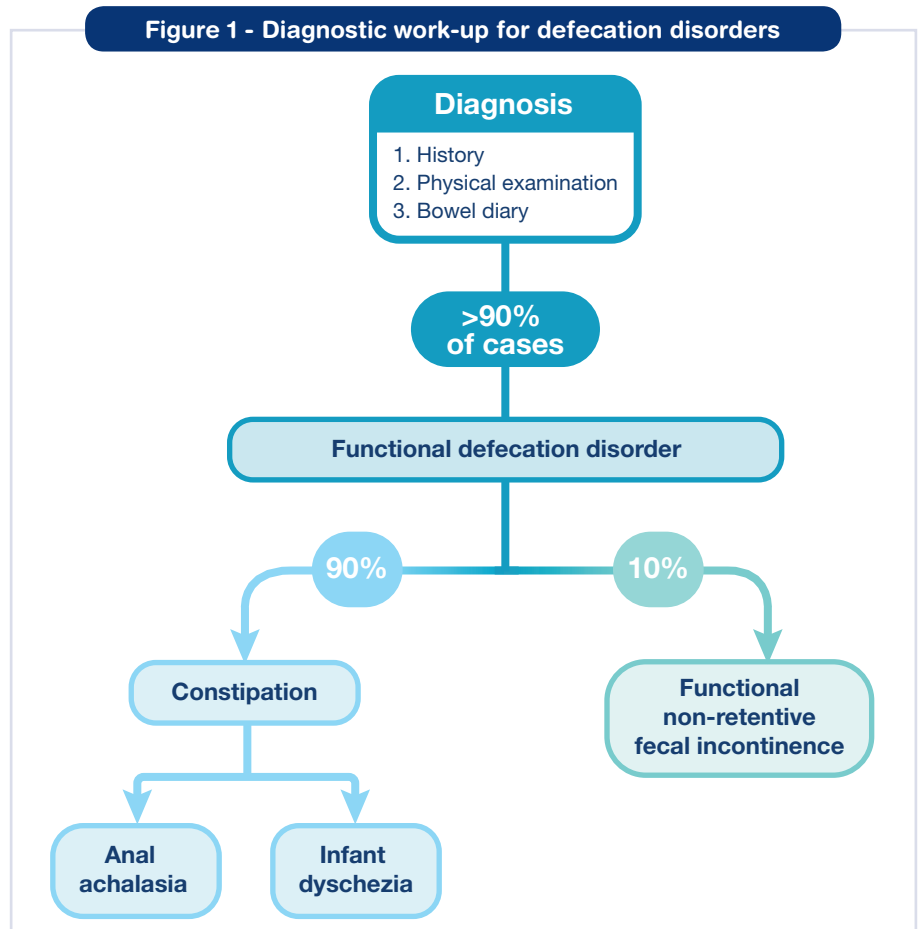
- At least 10 minutes of straining and crying before (un)successful passage of soft stools.
- No other health problems.

Infant with dyschezia results from a failure to coordinate increased intra-abdominal pressure with relaxation of the pelvic floor. The treatment includes reassurance, education and patience for the parents while nothing has to be done for the baby (no laxative should be given to the baby). These symptoms always disappear and never end up with functional constipation⁵.

6 FUNCTIONAL DEFECATION DISORDERS IN THE FIRST 3 YEARS OF LIFE

It is possible to make a diagnosis in more than 90% of the children with defecation problems by using a **simple work-up without performing a single invasive test** (Figure 1)^{5,11}.

In 90% of cases, a complete medical history, a physical examination and a bowel diary are enough to diagnose a functional defecation disorder with the majority (90%) having constipation and the remaining (10%) having functional non-retentive fecal incontinence.



7 TREATMENT OF INFANTS WITH FUNCTIONAL CONSTIPATION

To assist medical care providers in the diagnostic evaluation and treatment of children with functional constipation, the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) have developed **algorithms**¹².

Oral fluid?

In a clinical trial performed on 108 infants with constipation, it was investigated whether the increase of liquid intake would have an effect on stool characteristics¹³. A control group was compared to an increased water intake group (50% increase in water intake) and an increased hyperosmolar liquid group (>600 mOsm/L). No difference was found between the 3 groups in terms of stool frequency, stool consistency and the difficulty to defecate. Based on this study, **increasing oral fluid intake has not been shown to be beneficial** in the treatment of functional constipation.

Olive oil?

Olive oil mainly consists of triglycerides that are almost completely absorbed in small intestine. Except for children with malabsorption, olive oil does not reach the colon to exert a laxative effect. **Adding olive oil to the formula will not be beneficial** in the treatment of functional constipation, and the infant will get fat.

Dietary measures for infants younger than 6 months

Breast milk remains the ideal milk for infants with constipation.

Formula fed babies often present with constipation symptoms. **Novalac IT** is an infant formula adapted to provide a high osmotic load in the colon. **Its efficacy has been clinically established in constipated infants:**

- In a randomized controlled trial performed in 93 formula-fed infants suffering from constipation for more than 2 weeks, symptoms of constipation

significantly improve with Novalac IT vs. strengthened formula after 4 and 8 of feeding¹⁴. **Significantly more infants were symptom-free at 8 weeks with Novalac IT** vs. strengthened formula (89.1% vs. 54.1%, $p < 0.001$)¹⁴.

- The high levels of lactose and magnesium in Novalac IT increases stool water content and improves symptoms of constipation in term-born, formula-fed infants^{14,15}.
- In a recently published randomized controlled study, the effectiveness of Novalac IT formula was compared to Similac Comfort formula in 285 infants suffering from constipation according to Rome IV criteria, after 30 days of feeding¹⁶. The use of medications influencing intestinal motility was not allowed unless necessary for infants' wellbeing.

Stool consistency and stool frequency were significantly improved after day 7 ($p < 0.001$) and day 29 ($p < 0.001$). In addition, Novalac IT significantly increases the % of complete responders by day 7 ($p < 0.001$) and by day 29 ($p < 0.001$). Moreover, Novalac IT significantly reduces pain during defecation as of day 3 ($p < 0.001$). A significantly higher number of very satisfied parents was found with Novalac IT compared to Similac Comfort at day 7 (32% vs. 5%, $p < 0.0001$) and at day 29 (81% vs. 10%, $p < 0.0001$).

In conclusion, feeding constipated infants with **Novalac IT significantly improved stool consistency and increased stool frequency** compared to Similac Comfort 1 over 7 days of treatment. These differences were maintained over 30 days of treatment.

Recommendations

If you don't treat constipation within 3 months after symptoms, the chance of having symptoms later is very high: after 3 years of follow-up, almost half of the children still have symptoms of constipation.

If you start with a beneficial therapy, after 3 years more than 80% of the children never have symptoms again. "Wait and see" policy should be avoided!

In infants suffering from functional defecation disorders:

- **Breastfeeding** is the first choice in infants.
- **Diagnostic tools** are only necessary in refractory patients.
- **Start a beneficial therapy** such as for example an adapted, clinically proven efficient formula.
- **Oral laxatives** must be started if the dietary treatment fails.

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