1

# Diagnostic Approach to Constipation in Children

Kathleen H. McGrath[1] and Patrina Caldwell[2]
[1]*The Royal Children's Hospital, Melbourne*
[2]*University of Sydney, The Children's Hospital at Westmead, Sydney*
*Australia*

## 1. Introduction

Constipation is a common paediatric problem. It is relevant to the practice of both general paediatricians and paediatric gastroenterologists and accounts for 3% and 25% of outpatient visits respectively (Levine, 1975; Taitz et al., 1986). International prevalence rates range from 0.7% to 29.6% which is similar for males and females (van den Berg et al., 2006). The broad range of reported prevalence is related to differing criteria for defining constipation but may also reflect genuine differences between ethnic populations and socioeconomic influences.

The diagnosis of constipation is historically a subjective and symptom-based approach. It relies on good clinical history taking and physical examination, in particular to exclude an underlying organic aetiology. In order to objectify the classification of this entity and allow for comparison of data between studies (e.g. prevalence rates, treatment outcomes), a number of diagnostic classifications have been proposed. This chapter will discuss the origin of these various classifications, their application and role within paediatric clinical practice and research. It will also provide a suggested clinical approach to the diagnosis of constipation in children, including the problems that may be encountered.

## 2. Importance of the appropriate diagnosis of constipation in children

Symptoms of childhood constipation may vary from mild and short-lived to severe and chronic. It can affect children in all age groups from infants to adolescents and can extend into adulthood.

Constipation is associated with a wide range of consequences for the individual child. These include physical pain and discomfort, psychological distress (primarily related to faecal incontinence) and an increased risk of urinary dysfunction. It can also impact on quality of life, family dynamics and socialisation through missed days of school and work (Belsey et al., 2010). In some children, a delayed or missed diagnosis can result in progression towards a significant chronic health problem with physical, psychological and social implications.

### 2.1 Impact on the child: Physical discomfort associated with constipation

Constipation is associated with varying degrees of physical discomfort for children. The onset of constipation is often related to experience(s) of painful defaecation. This may be caused by the presence of an anal fissure, perianal infection or perianal inflammation due to

cow's milk protein intolerance or other underlying medical conditions. Once children experience discomfort, they commonly associate the process of defaecation with pain and actively attempt to avoid it. This may manifest as toilet refusal or stool withholding behaviours where there is voluntary contraction of the external anal sphincter with the urge to defaecate.

Repetitive withholding behaviours result in further constipation as the brain begins to ignore the signals that would usually alert the child to the need to defaecate (Weaver & Dobson, 2007). This results in stools that are hard, large and difficult to pass which can lead to further experiences of pain and the development of perianal tears, perpetuating the cycle of painful defaecation, stool withholding and worsening constipation.

Constipation is one of the most frequent causes for abdominal pain in children presenting to their medical practitioner or the emergency department. One study found that acute or chronic constipation accounted for 48% of children with acute abdominal pain presenting to a large academic paediatric primary care population (Loening-Baucke & Swidsinski, 2007).

Ongoing chronic constipation results in stool impaction, distension of the rectum and sigmoid colon and rectal insensitivity. Stool impaction can cause abdominal pain which may vary from mild to severe in nature. Children with constipation may also experience systemic symptoms including loss of appetite, nausea, vomiting and weight loss.

### 2.2 Impact on the child: Chronic constipation and quality of life

Constipation can affect a child's physical and mental wellbeing and impact on their overall quality of life. Section 2.1 described the common physical manifestations of constipation including pain.

Studies have further assessed the impact of chronic constipation on a child's emotional status. One Australian study assessed a cohort of children with slow transit constipation (confirmed on radioisotope study) and compared them with a group of healthy children with normal bowel patterns. The study found that children with constipation reported a significantly lower quality of life (assessed by questionnaires addressing domains of physical, emotional, social and school functioning) compared with the non-constipated children. In addition, the parents of these children reported a significantly lower quality of life for their child than the child's self-reporting using the same scoring system (Clarke et al, 2008). Constipation not only affects the individual child's quality of life, but may impact on their relationship with parents and / or siblings and the family dynamics as a whole.

Another study compared children with constipation to groups of children with inflammatory bowel disease, gastro-oesophageal reflux disease or normal health. They found that children with constipation reported a significantly lower quality of life (assessed by self and parental reporting) compared with both healthy children and children with inflammatory bowel disease or gastro-oesophageal reflux disease (Youssef et al., 2005). This was a pertinent finding considering that inflammatory bowel disease is traditionally accepted by physicians and the general population as being a more serious condition than constipation.

A recent systematic review by Belsey and colleagues demonstrated that impaired quality of life is a consistent finding in children and adults with chronic constipation. They found that the quality of life in children with chronic constipation was comparable to those of children

with other chronic conditions traditionally regarded as being more serious, including cardiac and rheumatologic diseases (Belsey et al., 2010).

The diagnosis of chronic constipation in children should be taken seriously as its impact on quality of life may be far greater than initially anticipated. It should be considered a public health issue for primary physicians, paediatricians and paediatric gastroenterologists. Further studies are needed to specifically assess the impact of this condition on quality of life when it lasts from childhood into adulthood.

### 2.3 Impact on the child: Faecal incontinence and psychological distress

Faecal incontinence refers to the passage of stools in an inappropriate place (Benninga et al., 2005). It occurs in 1-3% of children and can affect up to 8% of adults (Catto-Smith, 2005). Faecal incontinence is a frequent accompanying symptom of childhood constipation. Studies show that it is present in up to 84% of children with constipation (Vooskijl et al., 2004). In around 80% of cases of faecal incontinence, it is involuntary and occurs in the setting of chronic constipation (constipation-associated faecal incontinence) (Joinson et al., 2006). Less commonly faecal incontinence can be voluntary (non-retentive faecal incontinence) and may be related to emotional disturbance with no evidence of constipation being present.

Functional constipation and stool withholding behaviours lead to impaction of faeces in the rectum, distension of the rectum and sigmoid colon and rectal insensitivity which may result in faecal incontinence. Due to rectal insensitivity, children may not be aware of this happening. Risk factors for faecal incontinence are listed in Table 1.

Faecal incontinence is associated with behavioural and emotional problems in children. A recent population study of over 8000 children found significantly higher rates of behavioural and emotional problems in children with faecal incontinence compared to those without. In addition they noted that these problems were significantly greater in children who soiled frequently compared with those who soiled only occasionally (less than once per week) (Joinson et al., 2006).

Children may be embarrassed by their faecal incontinence, associated body odour and differences from their peers. This is particularly the case for school-aged children who may

| **Risk factor** | **Other related factors** |
|---|---|
| Chronic constipation | Low dietary fibre and fluid intake |
| | Cow's milk protein intolerance |
| | Poor toilet posture and incomplete evacuation |
| | Medical conditions (hypothyroidism, hypercalcaemia, hypokalaemia) |
| | Medications |
| Toilet refusal | Previous painful defaecation |
| | Commencement of school |
| Psychological factors | Autistic spectrum disorders |
| | Attention deficit hyperactivity disorder |
| | Significant emotional life events |

Table 1. Risk factors for faecal incontinence (modified from Ho & Caldwell, 2008).

experience teasing or bullying and social isolation. Constant focus on the child's bowel habits from the parents may distress the child and cause conflict within the home between family members. Parents may wrongly 'blame' the child for being 'lazy' and punish them unnecessarily, causing further emotional distress. The child's degree of distress and low self-esteem may affect their behaviour and cause them to become withdrawn or alternatively 'act up'. There may be considerable negative implications on their learning and performance at school. Further consequences may include missed days of school and work for parents, leading to societal costs on a wider scale.

### 2.4 Impact on the child: Urinary dysfunction

Epidemiological studies have identified an association between constipation and certain urological conditions. These include urinary incontinence, vesicoureteric reflux and urinary tract infections (McGrath & Caldwell, 2008; Loening-Baucke, 1997; O'Regan et al., 1985, 1986). Loening-Baucke assessed 234 children with chronic constipation and found that 29% had daytime urinary incontinence and 11% had a urinary tract infection. A more recent Australian study found a prevalence of constipation of 36.1% in a population of children with nocturnal enuresis (McGrath & Caldwell, 2008), which is higher than reported international prevalence rates of 0.7% to 29.6% in the normal population.

With successful treatment of constipation, many of these urinary symptoms will resolve. In one study, successful treatment of constipation after 12 months resulted in resolution of daytime urinary incontinence in 89% and urinary tract infection in all patients with normal urinary tract anatomy (Loening-Baucke, 1997).

### 2.5 Impact on the child: Outcome of late or missed diagnosis

A timely diagnosis of constipation can help to prevent or minimise many of the complications outlined above. If constipation is identified early, management can be initiated in the form of education, toileting programs, dietary modification, behavioural therapy and laxatives. Successful intervention to 'keep the rectum empty' will avoid progression to stool impaction, rectal distension and insensitivity and the onset of faecal incontinence. In addition, the early identification and management of constipation has been shown to result in better treatment response and outcomes (Van Ginkel et al., 2003). This was particularly the case when children were referred for management of constipation under the age of 2 years (Loening-Baucke, 1993).

Missed or delayed diagnosis of constipation can increase the risk of both physical and psychological complications, making the problem more difficult to manage later on. Where urinary dysfunction exists in the context of chronic constipation, a missed diagnosis of constipation may result in treatment failure. An accurate diagnosis of constipation is paramount for provision of optimal patient care and quality of life.

## 3. The use of diagnostic criteria in childhood constipation

### 3.1 Definitions and Historical overview

The term 'constipation' derives from the Latin 'constipare' meaning to crowd together. The accepted understanding of constipation describes a constellation of different symptoms

related to difficult passage of stool. These may include infrequent passage of stool, firm stool consistency, straining and painful defaecation, retentive posturing and faecal incontinence. The subjective nature of these symptoms has historically made defining and diagnosing constipation a challenge and there is no consensus on the definition for 'constipation'. This has limited the ability of researchers to accurately compare different clinical studies in this field and accounts in part for the wide range of reported international prevalence.

In an attempt to standardise the definition of constipation and the related disorders of gastrointestinal motility, diagnostic criteria were created. Generally, these separate functional constipation from that secondary to medical illnesses and medications. They are outlined below and summarised in Table 2.

Early attempts to formalise a definition of constipation included the Iowa classic criteria. This classification was used by some groups in clinical research for the last two decades but its application in clinical practice was sporadic and the mainstream diagnosis of constipation remained largely subjective.

In 1989, a group of investigators met in Rome to form a consensus opinion to assist in the diagnosis of functional gastrointestinal disorders (FGID). Initially the group focussed on the adult population. In 1997, at a consensus conference, the Rome I Criteria were discussed with relation to childhood, forming the Paediatric Rome II Criteria (published in 1999). Also in 1997, the Bristol Stool Chart was published as an aid for classification of stool by appearance and consistency (Lewis & Heaton, 1997) (see Figure 1). Interpretation of these illustrations was extrapolated to help assist in the diagnosis of constipation (Table 2).

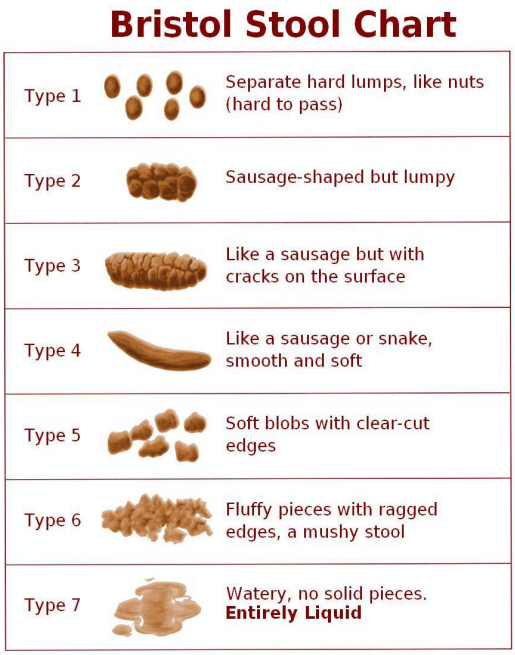



Fig. 1. Bristol stool chart (Lewis and Heaton, 1997).

**Bristol stool** chart (see Fig. 1.)
Constipation indicated by Types 1 and 2
(Types 4 > 3 being the 'ideal stools' and Types 5 to 7 tending towards diarrhoea)
(Lewis & Heaton, 1997)

**Classic Iowa criteria**
Paediatric constipation = at least 2 of the following criteria:
- Defecation frequency <3 times per week
- Two or more encopresis episodes per week
- Periodic passage of very large amounts of stool once every 7 to 30 days (the criterion of a large amount of stool is satisfied if it is estimated to be twice the standard amount of stool, shown in a clay model, or is stools are so large that they clog the toilet).

Solitary encopresis = in a child older than 4 years of age:
- Two or more encopresis episodes per week
- Defecation frequency ≥3 times per week

No passage of very large amounts of stool
(Loening-Baucke, 1990, as cited in Benninga et al., 2004)

**Rome II criteria**
Functional constipation: In infants and preschool children (from 1 month to 6 years), at least 2 weeks of
- Scybalous, pebble-like, hard stools in a majority of stools, or
- Firm stools 2 or fewer times/week, and
- No evidence of structural, endocrine, or metabolic disease

Functional faecal retention: From infancy to 16 years old, a history of at least 12 weeks of
- Passage of large-diameter stools at intervals <2 times/week, and
- Retentive posturing, avoiding defecation by purposefully contracting the pelvic floor. As pelvic floor muscles fatigue, the child uses the gluteal muscles, squeezing the buttocks together.

Functional non-retentive faecal soiling: Once a week or more for the preceding 12 weeks, in a child over age 4 years, a history of defaecation
- In places and at times inappropriate to the social context
- In the absence of structural or inflammatory disease, and

In the absence of signs of faecal retention.
(Rasquin-Weber et al., 1999)

**Working group report of the first world congress of Paediatric Gastroenterology, Hepatology, and Nutrition**
Constipation is a symptom defined by the occurrence of any of the following, independent of stool frequency:
- Passage of hard, scybalous, pebble-like or cylindrical cracked stools
- Straining or painful defecation

- Passage of large stools that may clog the toilet

Or stool frequency less than 3 per week, unless the child is breast fed.
(Hyams et al., 2002)

**PACCT criteria**
Chronic constipation: Occurrence of 2 or more of the following characteristics during the preceding 8 weeks:

- Fewer than 3 bowel movements per week
- More than 1 episode of faecal incontinence/week
- Large stools in the rectum or palpable on abdominal examination
- Passage of large-diameter stools that may obstruct the toilet
- Display of retentive posturing and withholding behaviours
- Painful defecation

Faecal incontinence: Passage of stools in an inappropriate place

- *Organic faecal incontinence*: faecal incontinence resulting from organic disease
- *Functional faecal incontinence*: nonorganic disease that can be subdivided into:
  - Constipation-associated faecal incontinence: functional faecal incontinence associated with the presence of constipation
  - Non-retentive (non-constipation-associated) faecal incontinence: passage of stools in an inappropriate place, occurring in children with a mental age of 4 years and older, with no evidence of constipation based on history and/or examination

(Benninga et al., 2005)

**Rome III criteria**
Functional constipation: Must include 1 month of at least 2 of the following in infants up to 4 years of age:

- Two or fewer defecations per week
- At least 1 episode per week of incontinence after the acquisition of toileting skills
- History of excessive stool retention
- History of painful or hard bowel movements
- Presence of a large faecal mass in the rectum
- History of large-diameter stools that may obstruct the toilet

(Hyman et al., 2006)

Functional constipation: Must include 2 or more of the following in a child with a developmental age of at least 4 years with insufficient criteria for diagnosis of irritable bowel syndrome:

- Two or fewer defecations in the toilet per week
- At least 1 episode of faecal incontinence per week
- History of retentive posturing or excessive volitional stool retention
- History of painful or hard bowel movements
- Presence of a large faecal mass in the rectum
- History of large-diameter stools that may obstruct the toilet

Criteria must be fulfilled at least once per week for at least 2 months before diagnosis
(Rasquin et al., 2006)

| |
|---|
| Non-retentive faecal incontinence: Must include all of the following in a child with a developmental age of at least 4 years:<br>• Defecation into places inappropriate to the social context at least once per month<br>• No evidence of an inflammatory, anatomic, metabolic or neoplastic process that<br>• explains the subject's symptoms<br>No evidence of faecal retention. |

Table 2. Different classification for childhood constipation.

Some paediatric gastroenterologists and paediatricians found the symptom based Paediatric Rome II Criteria to be too restrictive (see section 3.2). In light of this, a group of experts (paediatric gastroenterologists and paediatricians) gathered in Paris in 2004 to redefine working definitions in gastrointestinal motility (The Paris Consensus on Childhood Constipation Terminology (PACCT) Group). The definition of functional constipation described by PACCT was published in its own right in 2005.

PACCT also recommended discontinuation of the terms 'encopresis' and 'soiling' and replacement by the term 'faecal incontinence'. Soiling was a term that had often been used mutually with encopresis but was felt by the PACCT group to be too broad with possible negative connotations of dirtiness and blame in some cultures. Likewise, the term encopresis was used widely with variable degrees of interpretation and understanding. Some clinicians used this term to refer to intentional passage of stool in a socially inappropriate place (often associated with a psychological disorder). It was thought that discontinuing these two terms in favour of the more strictly defined 'faecal incontinence' would lead to more agreement in understanding and a greater capacity to properly compare different clinical studies. Faecal incontinence was defined as passage of stools in an inappropriate place. For the purposes of this chapter, we will use the term 'faecal incontinence' in place of 'encopresis' or 'soiling', including where studies were published prior to PACCT in 2005.

PACCT was further used to assist in the development of the Rome III Criteria (published in 2006). The Rome III Criteria addressed previously perceived problems such as age restriction (infants versus children / adolescents) and retentive posturing as a component symptom which will be discussed in more detail in Section 3.2.

### 3.2 Comparison and contrast of diagnostic classifications for constipation

There continues to be varying opinions on the benefits and limitations of the different diagnostic classifications for constipation. The intention behind their derivation was to 'objectify' the ability to diagnose constipation, to allow for comparison between clinical research studies and to aid in the identification of this common paediatric problem in clinical practice. Table 3 summarises the various differences and similarities between the criteria of the classification systems. Below, we have provided a more detailed description of the comparison and contrast between these classifications.

In order to be useful, a diagnostic classification must be shown to be reliable, valid and applicable for a range of relevant population groups. There were a few early attempts to validate the Rome II criteria for functional gastrointestinal disorders. Some studies found the Rome II criteria were helpful for diagnosing functional gastrointestinal disorders in

childhood however these studies were conducted in a tertiary setting, and may not be generalisable (Miele et al., 2004; Caplan et al., 2005).

| Classification | Frequency of stools | Faecal incontinence | Large stool size- rectal or abdominal exam | Large stool size- toilet | Stool withholding / Retention | Painful Defaecation | Stool Consistency |
|---|---|---|---|---|---|---|---|
| Iowa criteria | √ | √ | - | √ | - | - | - |
| Rome II | √ | - | - | - | - | - | √ |
| Working group | √ | - | - | √ | - | √ | √ |
| PACCT | √ | √ | √ | √ | √ | √ | - |
| Rome III | √ | √ | √ | √ | √ | √ | √ |

Table 3. Comparison of criteria of different classifications for childhood constipation

Since their origin, the Rome II criteria have been widely criticised for being too restrictive. Studies have compared the diagnosis of constipation by the Rome II criteria with other classification systems. One study compared the Rome II criteria with the classic Iowa criteria in identification of constipation in 198 otherwise healthy children referred to a tertiary centre for defaecation disorders. They found the prevalence of constipation was 69% by the Rome II criteria and 74% by the classic Iowa criteria (Voskijl et al., 2004). These results suggest that some children may be missed by the Rome II criteria. A similar study from Turkey assessing children referred to general paediatric or paediatric gastroenterology units for constipation found a prevalence of 72.5% by the Iowa criteria compared with 63.7% by the Rome II criteria (Aydogdu et al., 2009).

One of the main aspects of the Rome II criteria which has restricted its capacity for identification of constipation in children is its exclusion of faecal incontinence as a criterion. Faecal incontinence is common and may affect up to 84% of constipated children (Vooskijl et al., 2004). Exclusion of this relatively frequent symptom may lead to under diagnosis. This was illustrated in the study by Voskijl et al comparing the Rome II diagnostic criteria with the classic Iowa criteria. 16% of children diagnosed with constipation by the classic Iowa criteria did not fulfil the Rome II criteria. These children had low defaecation frequency in combination with encopresis and / or faecal retention (Voskijl et al., 2004). Faecal incontinence is not part of the Rome II criteria. This was considered in creation of the PACCT and Rome III criteria in 2004 and 2006 respectively, with inclusion of 'faecal incontinence more than once per week' as a component criterion for these classifications.

Another group assessed the prevalence of functional defaecation disorders (including constipation) according to PACCT versus Rome II criteria and attempted to compare their clinical validity (Boccia et al., 2007). They found that 53 of 126 (42.1%) of children defined as constipated by PACCT criteria were not recognised by the Rome II criteria, and one child was diagnosed as constipated by Rome II criteria and not PACCT. Many of the children missed by Rome II criteria were excluded purely on the basis of its age restrictions (i.e. not

between 1 month and 6 years). This criterion excludes all children greater than 6 years old with constipation regardless of whether they fulfil the other symptom criteria. This stringency is likely to fail to diagnose constipation in older children and supports previous opinion that the Rome II criteria are too restrictive.

In 2005, the PACCT criteria attempted to provide an expert consensus on working definitions in childhood defaecation disorders. The two most pertinent changes were the unification of 'Rome II functional constipation' and 'functional faecal retention' to 'chronic constipation' and the replacement of the terms 'soiling' and 'encopresis' with 'faecal incontinence'. Stool withholding behaviours or retentive posturing was also included as a new criterion although some physicians feel these behaviours may be difficult for parents to recognise in their child.

The Rome III criteria are really an extension of the PACCT criteria but with different duration requirements for different age groups (symptoms for at least 1 month in infants/ children under 4 years old and for at least 2 months in children older than 4 years). With regard to symptom duration, the reduced requirement from symptoms of 3 months duration to 1 month (in infants / toddlers) and to 2 months in children greater than 4 years old/ adolescents was one of the pertinent changes from Rome II to Rome III. This was particularly important in light of recognition that earlier identification of constipation and treatment intervention is associated with a better treatment response and outcome.

There are some studies comparing the Rome III and PACCT classifications. Many of these studies were conducted in populations of children referred to tertiary centres and so their results may not be generalisable to children in the community. One study from Sri Lanka which may be more applicable to children in the community compared Rome III and PACCT criteria for diagnosing constipation among school children aged 10-16 years old. They performed a cross-sectional survey in 5 classes randomly selected from a semi-urban school using a validated, self administered questionnaire with guidance from research assistants. The prevalence of constipation was 10.7% by both the Rome III and PACCT criteria suggesting a level of agreement between the classifications (Rajindrajith et al., 2009).

One criticism of PACCT has been the exclusion of 'scybalous, pebble-like stools' as a criterion for constipation. Some groups have shown that a high percentage of constipated children report this symptom and advocate for its inclusion in future diagnostic criteria (Boccia et al., 2007; Maffei & Morais, 2005). The Rome III classification does not directly refer to this condition but does have 'history of painful or hard bowel movements' as one of its criteria which may incorporate this criterion. Similarly, straining that is not accompanied by pain has been suggested for inclusion in future classifications in light of its relatively frequent reporting in constipated children. One recent study in Sri Lanka identified straining in 75% of children with constipation (as defined by both the PACCT and Rome III criteria) (Rajindrajith et al., 2009).

Another criticism of PACCT has been that 'large faecal mass in the rectum' (a criteria only ascertained by physical examination or an abdominal radiograph) may be difficult to assess in large community surveys (without the involvement of an assessing clinician) (Maffei and Morais, 2005). There is a strong need to address the applicability and validity of the Rome III diagnostic classification for constipation in both primary care and community settings.

Some of the above concerns were addressed by the 'Boston working group' in their definition of constipation in children (Hyams et al, 2002) (see Table 2). This is another

diagnostic classification which takes into account that not all constipated children may have infrequent defaecation. It also accounts for the known variation in stool consistency amongst breastfed infants and wide variant of the norm.

The evolution of these diagnostic classifications reflects the complexities of trying to create a system that can be easily understood, reliable, applicable to children in both hospital and community settings and validated by evidence based processes.

## 4. Challenges associated with the diagnosis of constipation in the paediatric population

The traditional diagnostic approach centres on a thorough history, detailed examination and the use of relevant supporting investigations. This can be challenging in paediatrics requiring utilisation of the 'art' of medicine to take a history from both child and parents, and willingness to modify the examination of the child depending on age and cooperation.

As current definitions of constipation are largely symptom based, the reporting of these symptoms is influenced by an individual's perception of 'the norm'. Studies have shown that parents and children may have different insight into a child's symptoms (Caplan et al., 2005), which may pose a further challenge for clinicians.

### 4.1 Different insight from parents, clinicians and children

Constipation can be difficult for parents to recognise and they may under-report this condition in their child. There is a difference between parental and clinician recognition of constipation.

One study found that parents tended to under-report constipation in their children (sensitivity 23%) but were good at recognising when their child was not constipated (specificity 90%) (McGrath & Caldwell, 2008). Although parents were able to identify individual symptoms of constipation during history taking, they were poor at recognising that these symptoms signified constipation. Table 4 outlines the recognition of different symptoms of constipation by parents in this cohort. Parents were more likely to report constipation with infrequent defecation and presence of faecal incontinence. There was no significant association between parental reporting of constipation and hard consistency of stools and the presence of straining during defaecation.

Clinicians should carefully question parents and children about individual symptoms of constipation rather than relying on parents to recognise that their child is constipated. Other influential factors that must be addressed in history-taking include whether the child is toilet trained, the ease of toilet training, how 'involved' the parents are in their child's bowel hygiene (i.e. do they still require assistance after defaecation with wiping / redressing) and whether the reporting parent is the primary carer for the child (how much time do they spend attending to the child's daily needs). The use of a stool diary may be of value in improving the reliability of recall of this information.

Despite carefully worded questions during history taking, symptoms of constipation may still be missed secondary to parental misunderstanding. Faecal incontinence may be mistaken by parents as 'poor wiping technique by the child' rather than as a manifestation

of underlying constipation. In addition, obstipation (severe persistent constipation) with overflow may present with the passage of soft stools which can be mistaken as diarrhoea or even normal bowel actions.

Parental under-reporting or misunderstanding of symptoms may affect the diagnosis of constipation. Recognition of this common condition may also be affected by unreliable history being given by the child. One study compared reporting of duration of symptoms by child versus parent (supported by dates of medical record documentation or relevant investigations). Children tended to under-report symptom duration (with reports of less than 12 weeks compared with duration of greater than 12 weeks according to parental reporting and documentation). This study also showed a significant disparity between parental and child estimates regarding the frequency of the child's stool symptoms (Schurman et al., 2005). Another study supported similar findings with a low concordance identified between the diagnoses of functional constipation made by parents versus children (Caplan et al., 2005).

| Parameters of bowel function as assessed by clinician | Parental reporting of constipation N (%) | Parental reporting of no constipation N (%) | $\chi^2$ p value |
|---|---|---|---|
| **Soiling (in last 6 months)** | | | |
| **No** | 14 (35.9) | 130 (56.5) | 0.02* |
| **Yes** | 25 (64.1) | 100 (43.5) | |
| **Frequency of defecation** | | | |
| **≥ Daily** | 16 (41) | 140 (60.6) | |
| **A few times per week** | 21 (53.8) | 88 (38.1) | 0.03* |
| **< Weekly** | 2 (5.1) | 3 (1.3) | |
| **Straining** | | | |
| **No** | 13 (33.3) | 99 (42.9) | 0.3 |
| **Yes** | 26 (66.7) | 132 (57.1) | |
| **Consistency of stools** | | | |
| **Soft** | 2 (5.1) | 9 (3.9) | |
| **Normal** | 25 (64.1) | 171 (74.3) | 0.4 |
| **Hard** | 12 (30.8) | 50 (21.7) | |

* Statistically significant result (P<0.05)

Table 4. Parental reporting of constipation compared with individual parameters of bowel function assessed by clinician (used with permission from McGrath & Caldwell, 2008).

These studies and discrepancies between parent and child reporting highlight certain issues specific to the paediatric consultation. At the various ages and stages of childhood development, who (parent or child) is the most appropriate history-giver? There is no easy answer to this but there needs to be a balance of input from the parent and child, and children's opinions should always be sought in the process of the consultation.

### 4.2 Treating physicians not familiar with diagnostic criteria

Despite the common nature of constipation in paediatric practice, recent evidence suggests that there is a degree of variability in the diagnosis of constipation between clinicians at

different levels of health care. At a tertiary level, one study demonstrated low inter-rater reliability for diagnosis of constipation by different Paediatric Gastroenterologists (Saps & Di Lorenzo, 2004).

Because of the limitations in defining constipation, it is difficult to ascertain the true prevalence of this problem in different primary health care settings. However, it is a common problem in the primary care setting and the family doctor is often the one who initiates preliminary diagnosis and management. This is particularly the case in settings where a primary carer referral is required prior to seeing a paediatrician or paediatric specialist. Unfortunately some primary care physicians are not aware of current diagnostic classifications and clinical guidelines for managing constipation in children. One study in the USA found that the majority of primary care physicians (67-86%) in West Virginia were not familiar with the published clinical guidelines for constipation in children (Whitlock-Morales et al., 2007).

Further research is needed to assess the understanding of constipation and its management by primary care physicians and the burden of this condition on their clinical practice. Appropriate clinical updates and education should be provided to primary care physicians as early diagnosis and management is associated with better treatment outcomes.

## 5. Suggestions for clinical practice: general approach to the diagnosis of constipation in children

### 5.1 Clinical history-taking

A thorough medical history (taken from the parent and child) is paramount in the diagnosis of constipation in children. It helps to identify the problem, quantify its severity and any complications present and recognise any 'red flags' suggestive of an underlying organic condition (see Table 5).

Parents should be asked about passage of meconium in the newborn period as a delay may indicate underlying Hirschsprung's disease, anorectal malformations including imperforate anus or cystic fibrosis. If cystic fibrosis is suspected, one should clarify whether newborn screening testing has taken place and if not, arrange for appropriate investigations to take place. Details should be sought about the onset of the problem including any associated changes in health status, diet or medications at that particular time.

Certain childhood milestones can be associated with the temporal onset of constipation. These include changes in feeding patterns (e.g. wean from breast milk to cow's milk-based formula or to solid foods) and time of toilet training and details of these milestones should be requested. Enquires should be made about any association between the onset of constipation and the commencement of school. Children may 'put off' defecation when they first start school in order to prioritise play or because they find the school toilet environment unfamiliar or unpleasant. These children may exhibit withholding behaviours or retentive posturing (squeezing legs or buttocks together or often appearing 'fidgety').

Information should be sought about previous treatment strategies used including response to treatment. Questions should be asked directly about stool frequency, consistency (with utilisation of the Bristol Stool Chart as a visual aid), size (e.g. whether they obstruct the toilet bowel), shape (are the stools scybalous or pebble-like), straining during bowel movements

(both painful and non-painful), feeling of incomplete bowel emptying or any retentive posturing. Details of associated anorectal pain and episodes of rectal bleeding, mucous in stool or faecal incontinence should be sought. In addition, systemic symptoms should be addressed including abdominal pain, anorexia, fever, nausea, vomiting and weight loss.

| **Infants and toddlers** | **Adolescents** |
|---|---|
| Unknown | Unknown |
| Structural problems: | Slow transit constipation |
| • Anal fissures | Metabolic, systemic problems: |
| • Anorectal malformations | • Diabetes mellitus |
| Dietary, behavioural problems: | • Hypothyroidism |
| • Breast feeding to bottle feeding | • Hypercalcaemia |
| • Stool withholding behaviour | Toxicity |
| • Cow's milk protein allergy | • Drugs (opiates, antidepressants, anticholinergics) |
| Metabolic, systemic problems: | • Lead poisoning |
| • Coeliac disease | Neoplasia |
| • Cystic fibrosis | Sexual abuse |
| Neuroenteric problems: | Psychological problems: |
| • Intestinal pseudo-obstruction | • Anorexia nervosa |
| • Hirschsprung's disease | • Depression |
| • Neuronal intestinal dysplasia | |
| Spinal cord problems / spina bifida | |

Table 5. Organic aetiology of constipation (modified from Benninga et al., 2004).

A dietary and activity history should be determined including fluid intake. Questions should be asked about details of the social environment and any life events of note (e.g. birth of a new sibling, parental separation or family death). Suspected misunderstandings or cultural beliefs related to bowel habits should be explored (such as the belief that faecal incontinence with constipation is from poor wiping technique or voluntary). A history of toileting routines should be sought including whether the child uses a potty or an adult toilet and whether foot support is used.

A strong family history of constipation may be of relevance and the presence of any relatives with possible related conditions such as hypothyroidism or coeliac disease should be clarified. It is important to carefully ask about social circumstances and family dynamics. In particular, one should always ensure there are no concerns about child abuse. It is necessary to exclude any underlying organic aetiology by asking about abdominal distension, ano-sacral malformations, scoliosis, lower limb deformities or neuromuscular signs. In light of its association, urinary dysfunction should be addressed. Details should be asked about daytime and night time incontinence, dysuria, urinary frequency or offensive smelling urine.

### 5.2 Physical examination

A complete physical and neurologic examination is necessary, focussing on the abdomen, the sacral region (assessing for signs of underlying spinal abnormalities such as skin

discolouration, naevi, sinuses, hairy patch or central pit) and the perineum (for the presence of anal fissures and to exclude anal malformations). Anal fissures are commonly associated with painful defaecation and may lead to stool withholding behaviours, chronic constipation, stool impaction and eventually faecal incontinence.

The rectal digital examination is no longer performed as a routine part of examination although some clinicians still employ its use. The clinical benefit of performing this procedure (to assess anal sphincter tone and confirm faecal impaction) must be weighed against the physical and psychological discomfort for the child.

### 5.3 Role of Investigations

A careful history and detailed examination is all that is required for the diagnosis of most children with functional constipation. In certain situations, there may be a role for investigations including abdominal radiography, blood tests for thyroid disease, coeliac disease or hypercalcaemia, anorectal manometry and colonic transit studies; however this is not discussed further in this chapter.

## 6. Conclusion

Constipation is a common childhood problem. It affects children of all ages and is relevant to both primary and tertiary care settings. Early identification and treatment of constipation in children is paramount. It has been associated with better response to treatment and overall outcome. Children will experience less associated complications including physical discomfort, impaired quality of life, faecal incontinence and urinary dysfunction.

A number of different symptom based classifications have been created in an attempt to objectify the diagnosis of constipation and allow for better comparison between studies. These classifications have been compared and contrasted but further studies are needed in order to validate their use and encourage widespread acceptance and application.

The diagnosis of constipation in children can be challenging. Parents, children and clinicians may have different opinions on symptoms and may misdiagnose or under-diagnose this condition. Recognition can be optimised by the use of a thorough history and detailed physical examination. In most children, investigations are not required for diagnosis but they may be indicated in some cases of chronic constipation or constipation that is refractory to treatment.

## 7. References

Aydogdu, S., Cakir, M., Yuksekkaya, H., Arikan, C., Tumgor, G., Baran, M., & Yagci, R. (2009). Chronic constipation in Turkish children: clinical findings and applicability of classification criteria. *The Turkish Journal of Pediatrics*, Vol. 51, pp. 146-153.

Belsey, J., Greenfield, S., Candy, D., & Geraint, M. (2010). Systematic review: impact of constipation on quality of life in adults and children. *Alimentary Pharmacology and Therapeutics*, Vol. 31, No. 9, pp. 938-949.

Benninga, M., Candy, D.C., Catto-Smith, A.G., Clayden, G., Loening-Baucke, V., Di Lorenzo, C., Nurko, S., & Staiano, A. (2005). The Paris Consensus on Childhood Constipation Terminology (PACCT) Group. *Journal of Pediatric Gastroenterology and Nutrition*, Vol. 40, pp. 273-275.

Boccia, G., Manguso, F., Coccorullo, P., Masi, P., Pensabene, L. & Staiano, A. (2007). Functional Defecation Disorders in Children: PACCT Criteria Versus Rome II Criteria. *Journal of Pediatrics,* Vol. 151, pp. 394-398.

Caplan, A., Walker, L. & Rasquin, A. (2005). Validation of the Pediatric Rome II Criteria for Functional Gastrointestinal Disorders Using the Questionnaire on Pediatric Gastrointestinal Symptoms. *Journal of Pediatric Gastroenterology and Nutrition,* Vol. 41, pp. 305-316.

Catto-Smith, A. (2005). Constipation and toileting issues in children. *Medical Journal of Australia,* Vol. 182, pp. Med J Aust 2005. 182:242-246.

Clarke, M.C., Chow, C.S., Chase, J.W., Gibb, S., Hutson, J.M., & Southwell, B.R. (2008). Quality of life in children with slow transit constipation. *Journal of Pediatric Surgery,* Vol. 43, No. 2, pp. 320-324.

Ho, T. & Caldwell, P. (2008). Management of childhood faecal incontinence. *Medicine Today,* Vol. 9, No. 10, pp. 50-56.

Hyams, J., Colletti, R., Faure, C., Gabriel-Martinez, E., Maffei, H.V., Morais, M.B., Hock, Q.S., & Vandenplas, Y. (2002). Functional gastrointestinal disorders: Working Group Report of the First World Congress of Pediatric Gastroenterology, Hepatology and Nutrition. *Journal of Pediatric Gastroenterology and Nutrition*, Vol. 35, Supp. 2, pp. S110-117.

Hyman, P., Milla, P., Benninga, M., Davidson, G., Fleisher, D. & Taminiau, J. (2006). Childhood Functional Gastrointestinal Disorders: Neonate / Toddler. *Gastroenterology,* Vol. 130, pp. 1519-1526.

Joinson, C., Heron, J., Butler, U., & von Gontard, A. (2006). Psychological differences between children with and without soiling problems (ALSPAC study). *Pediatrics,* Vol. 117, No. 5, pp. 1575–1584.

Levine, M.D. (1975). Children with encopresis: a descriptive analysis. *Pediatrics,* Vol. 56, pp. 412-416.

Lewis, S.J. & Heaton, K.W. (1997). Stool Form Scale as a Useful Guide to Intestinal Transit Time. *Scandinavian Journal of Gastroenterology,* Vol. 32, No. 9, pp. 920-924.

Loening- Baucke, V. (1990). Modulation of abnormal defaecation dynamics by biofeedback treatment in chronically constipated children with encopresis. *Journal of Pediatrics,* Vol. 116, pp. 214-222.

Loening-Baucke, V. (1993). Constipation in early childhood: patient characteristics, treatment, and long-term follow-up. *Gut,* Vol. 34, pp. 1400-1404.

Loening-Baucke, V. (1997). Urinary incontinence and urinary tract infection and their resolution with treatment of chronic constipation of childhood. *Pediatrics,* Vol. 100, No. 2, pp. 228-232.

Loening-Baucke, V. (2004). Functional faecal retention with encopresis in childhood. *Journal of Pediatric Gastroenterology and Nutrition*, Vol. 38, pp. 79-84.

Loening-Baucke, V. & Swidsinski, A. (2007). Constipation as a cause of Acute Abdominal Pain in Children. *Journal of Pediatrics,* Vol. 151, pp. 666-669.

McGrath, K.H., Caldwell, P.H.Y., & Jones, M.P. (2008). The frequency of constipation in children with nocturnal enuresis: a comparison with parental reporting. *Journal of Paediatrics and Child Health,* Vol. 44, pp. 19-27.

Miele, E., Simeone, D., Marino, A., Greco, L., Auricchio, R., Novek, S.J., & Staiano, A. (2004). Functional gastrointestinal disorders in children: an Italian prospective survey. *Pediatrics*, Vol. 114, pp. 73-78.

O'Regan, S., & Yazbeck, S. (1985). Constipation: a cause of enuresis, urinary tract infection and vesico-ureteric reflux in children. *Medical Hypotheses,* Vol. 17, pp. 409-413.

O'Regan, S., Yazbeck, S., Hamberger, B., & Schick, E. (1986). Constipation: a commonly unrecognised cause of enuresis. *American Journal of Diseases in Children,* Vol. 140, pp. 260-261.

Rajindrajith, S., Devanarayana, N., Mettananda, S., Perera, P., Jasmin, S., Karunarathna, U., Adhihetty, D., & Goonewardena, R. (2009). Constipation and functional faecal retention in a group of school children in a district in Sri Lanka. *Sri Lanka Journal of Child Health,* Vol. 38, pp. 60-64.

Rasquin, A., Di Lorenzo, C., Forbes, D., Guiraldes, E., Hyams, J., Staiano, A., & Walker, L. (2006). Childhood Functional Gastrointestinal Disorders: Child / Adolescent. *Gastroenterology,* Vol. 130, pp. 1527-1537.

Rasquin-Weber, A., Hyman, P., Cucchiara, S., Fleisher, D., Hyams, J., Milla, P., Staiano, A. (1999). Childhood functional gastrointestinal disorders. *Gut*, Vol. 45, Supp. 2, pp. 1160-1168.

Saps, M., & Di Lorenzo, C. (2004). Inter-rater reliability of the Rome criteria in children. *Journal of Pediatric Gastroenterology and Nutrition,* Vol. 39, Supp. 1, p S36.

Schurman, J.V., Friesen, C.A., Danda, C.E., Andre, L., Welchert, E., Lavenbarg, T., Cockin, J.T. & Hyman, P.E. (2005). Diagnosing Functional Abdominal Pain with the Rome II Criteria: Parent, Child and Clinician Agreement. *Journal of Pediatric Gastroenterology and Nutrition,* Vol. 41, pp. 291-295.

Taitz, L.S., Water, J.K.H., Urwin, O.M., & Molner, D. (1986). Factors associated with outcome in management of defecation disorders. *Archives of Disease in Childhood,* Vol. 61, pp. 472-477.

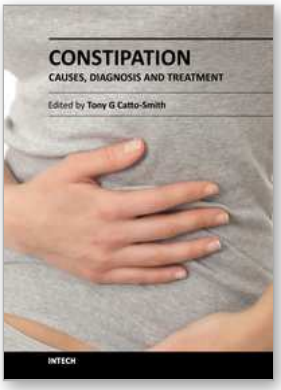
van den Berg, M.M., Benninga, M.A., & Di Lorenzo, C. (2006). Epidemiology of childhood constipation: a systematic review. *American Journal of Gastroenterology,* Vol. 101, pp. 2401-2409.

Van Ginkel, R., Reitsma, J.B., Buller, H.A., van Wijk, M.P., Taminiau, J.A., & Benninga, M.A. (2003). Childhood constipation: longitudinal follow-up beyond puberty. *Gastroenterology,* Vol. 125, pp. 357-363.

Weaver, A. & Dobson, P. (2007). An overview of faecal incontinence in children. *Nursing Times*, Vol. 103, No. 47, pp. 40-42.

Whitlock-Morales, A., McKeand, C., DiFilippo, M. & Elitsur, Y. (2007). Diagnosis and treatment of constipation in children: a survey of primary care physicians in West Virginia. *West Virginia Medical Journal,* Vol. 103, No. 4, pp. 14-16.

Youssef, N.N., Langseder, A.L., Verga, B.J., Mones, R.L., & Rosh, J.R. (2005). Chronic childhood constipation is associated with impaired quality of life: a case controlled study. *Journal of Pediatric Gastroenterology and Nutrition,* Vol. 41, No. 1, pp. 56-60.




**Constipation - Causes, Diagnosis and Treatment**
Edited by Dr. Anthony Catto-Smith

ISBN 978-953-51-0237-3
Hard cover, 172 pages
**Publisher** InTech
**Published online** 07, March, 2012
**Published in print edition** March, 2012

Constipation is common in both adults and children. Estimates would suggest a median prevalence of around 12-16% in the general population. While regarded as a minor nuisance in some cases, its consequences can be severe, with a substantial impact on quality of life. Secondary faecal soiling has a profound psychological effect at all ages. This book provides contributions from authors with a range of backgrounds which clarify the pathogenesis, diagnosis, and therapy of constipation for the general population and also for certain high risk groups.

**How to reference**
In order to correctly reference this scholarly work, feel free to copy and paste the following:

Kathleen H. McGrath and Patrina Caldwell (2012). Diagnostic Approach to Constipation in Children, Constipation - Causes, Diagnosis and Treatment, Dr. Anthony Catto-Smith (Ed.), ISBN: 978-953-51-0237-3, InTech, Available from: http://www.intechopen.com/books/constipation-causes-diagnosis-and-treatment/diagnostic-approach-to-constipation-in-children

INTECH
open science | open minds

**InTech Europe**
University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

**InTech China**
Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821