# Constipation
## in infants and children

**Many events may precipitate functional constipation in children. Informed parental involvement is essential for its successful management.**

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Constipation is one of the most common gastrointestinal complaints in childhood, affecting almost one in six children and being responsible for about 5% of GP consultations and about one-quarter of paediatric gastroenterology outpatient visits. Despite its frequent occurrence in childhood, it is poorly understood by parents, and often inappropriately managed.

Increasing parents' understanding of constipation is an essential component of its management in children. Most children presenting with the condition have functional constipation related to withholding-behaviour. It is important to identify the few children who have a distinct underlying organic disorder and to differentiate this pathology from functional constipation. Furthermore, constipation needs to be distinguished from a normal bowel habit.

### Constipation versus normal bowel frequency

Constipation is defined as delay or difficulty in defaecation over a period of longer than two weeks.[1] It is important, however, to see this definition in the context of what is accepted as normal in children because there is a great variation in the frequency of bowel motions throughout childhood:

- breastfed infants – from 10 motions each day to one every 10 days, averaging 2.9 per day for the first three months of life[2]
- bottle-fed infants – average of two motions each day over the first few months of life
- 12-month-old infants – average of 1.9 motions each day
- 3-year-old children – average of one motion each day, but a range of three to 14 per week.

The nature of the stools is also important, and should be clearly and accurately documented. What one parent means by saying 'my child is constipated' can be quite different to what another parent means.[3]

### Functional constipation

Most children seen with an altered bowel habit have a functional basis for their constipation, and do not have any underlying pathological problems.[1,4] The model of pathogenesis of functional (also known as reservoir) constipation

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**IN SUMMARY**

- One of the commonest gastrointestinal complaints in childhood, constipation affects almost one in six children.
- Most children presenting with constipation have functional or reservoir constipation related to withholding-behaviour, and not a pathological disorder.
- Careful history and examination should detect any underlying pathological causes.
- Management of functional constipation in children involves education, disimpaction, maintenance and ongoing review.
- Educating the parent about constipation encourages long term compliance. Education messages should be repeated at every visit.

begins with a stimulus or event that leads to painful bowel motions and then to stool withholding. This event may be a period of relative dehydration, such as following a viral illness or after a prolonged trip. A change in feeding patterns, such the introduction of solids or changing the formula milk, may also provoke events. Occasionally an anal fissure may be a primary event, but it may also be a secondary (and aggravating) event.

Regardless of the nature of the initial event, these stimuli lead to hard stools that are painful to pass, making the child resist doing so.[5] The holding of stool commonly involves voluntary contraction of the muscles of defaecation, often associated with unusual postures. The compliant rectum becomes increasingly distended and normal muscle tone and activity diminishes, leading to lessening of the sensation or urge to pass motions and faecal impaction. The increasingly large amounts of stool in the stretched rectum may lead to stool leakage, indicated by soiling on underclothes. Some constipated children present with apparent diarrhoea (overflow incontinence) due to this leakage. Encopresis, also termed functional nonretentive faecal soiling, will not be considered in detail in this article although it is referred to briefly under the heading 'Difficult to manage constipation'.

Functional constipation can almost always be distinguished from an organic cause of abnormal bowel habit by history and examination findings.

## Constipation due to organic causes

Possible pathological causes of altered bowel habit are listed in Table 1. However, they are uncommon causes of constipation in children, although they should always be considered and excluded. Warning signs that may indicate an underlying pathological disorder are listed in Table 2.

## Evaluation of constipation
### History

An accurate history should begin with a detailed description of the child's bowel habit, particularly the frequency of bowel motions, the nature of the stools and any associated symptoms. Past history should include the time to passage of meconium (most children who pass motions in the first 24 hours of life do not have Hirschsprung's disease, a condition that generally leads to delayed passage of meconium), previous problems with passing



Figure 1. Abdominal x-ray of a 10-year-old child showing a large amount of faeces throughout the colon, particularly in the rectum and sigmoid.

## Table 1. Pathological causes of childhood constipation

**Anatomical malformations**
Imperforate anus
Anal stenosis

**Metabolic conditions**
Hypothyroidism
Hypercalcaemia
Hypokalaemia

**Gastrointestinal disorders**
Coeliac disease

**Spinal abnormalities**
Tethered spinal cord
Spina bifida occulta

**Neuromuscular conditions**
Hirschsprung's disease

**Other situations**
Drugs (such as antidepressants and antacids)
Lead poisoning

motions and difficulties during feed transition times. Toilet training, another event that might precipitate problems, should also be asked about.

Previous medications, current management and any previous assessments should be reviewed, and the child's psychosocial background assessed, looking for significant changes or disarray in the home setting or previous trauma. Interactions with peers, progress at school and patterns of toileting at school may also be relevant. Some children are

reluctant to use school toilets because of concerns such as smell, lack of toilet paper or doors that do not shut securely, while others resist the urge to defaecate when they are busy playing.

Other symptoms should be asked about, such as fever, weight loss, rectal bleeding, nausea or vomiting, changes in appetite and abdominal pain. General systems review includes feeding history, dietary history, past medical problems, previous abdominal surgery, developmental history and history of atopic or allergic conditions.

### Physical examination

A full physical examination must be undertaken, with particular reference to the gastrointestinal system. Examination of the perineal and perianal regions should conclude with a rectal examination. Although it may be uncomfortable, a rectal examination should be routine in the initial assessment of a child with an altered bowel habit, its aims being to determine the nature and volume of stool present within the rectum and to assess the anal tone and reflex responses.

Additional examination should include the lower back and spine (to rule out spinal anomalies) and lower limb tone and reflexes (to exclude neuropathic abnormalities).

### Other investigations

If there are warning signs that there may be a pathological cause, then appropriate investigations should be undertaken. If functional constipation is diagnosed, no specific tests are required. In particular, an abdominal x-ray is not routinely required because clinical assessment should determine the presence and degree of faecal loading. Occasionally, however, an x-ray is necessary if assessment is impossible or confusing (Figure 1).

### Management of constipation

After taking a history and examining a child presenting with constipation it

should be possible to exclude an underlying organic disorder. Management then follows the steps described below and listed in Table 3, namely education, disimpaction, maintenance and ongoing review with referral if necessary. Attention to dietary fibre and fluid intakes and toileting routines are part of this overall management.

### Education

Educating the parents, and the child when possible, about constipation is an essential component of its initial management. It is necessary to explain carefully why constipation has developed, using diagrams, appropriate descriptions and text. The importance of this cannot be overstated, and the education principles need repeating or reinforcing at each subsequent visit. Parents must also be reassured that their child's problem is very common (a fact that many are relieved to hear) and that management can be expected to be successful.

### Disimpaction

Most children with functional constipation will benefit from disimpaction. Infants and children with small amounts of retained stool or a short history of problems may not require it. Uncontrolled studies have determined that oral medications for disimpaction are as effective as rectal medications.[6] Manual disimpaction is rarely required. Rectal medications include phosphate (Fleet Ready-to-use Enema, Travad Phosphate Enema), saline, liquid paraffin and Microlax enemas (Table 4).

Oral therapies, however, are much less invasive, and parents can easily administer some of them at home. They include the stool softening agents high-dose liquid paraffin (including Parachoc, which is 50% paraffin) and polyethylene glycol (see below), or combinations of the two.[7] Liquid paraffin should not be used in infants less than 12 months of age or in children who have an increased risk of

aspiration because its inhalation may result in lipoid pneumonia.[8] High doses of the stool softeners lactulose and sorbitol may also be effective for disimpaction but have not been studied in controlled settings in children and are not recommended for this use. Parents and patients should be warned about the loose and frequent bowel motions that will result from use of these medications, and advised to plan carefully their time of administration.

Polyethylene glycol therapies are nonabsorbable osmotic agents and are effective and generally safe at relieving faecal impaction.[9] Glycoprep, a commonly used agent, combines polyethylene glycol polymers (macrogol 3350) in an electrolyte solution (Colonlytely, Glycoprep-C and Movicol are alternative formulations that contain macrogol 3350). The electrolytes replace those lost in the stools, thereby reducing the risk of electrolyte imbalance. These solutions need to be given in large volumes (1 to 2.5 L), and nasogastric tube administration in hospital is usually required. These agents should be used with caution in children with renal impairment or cardiac abnormalities.

Picolax, a proprietary combination of the stimulant laxative sodium picosulfate with the osmotic laxative magnesium citrate (formed in solution from magnesium carbonate and citric acid), is equally effective to Glycoprep but used in much smaller volumes. Children may be given up to 120 mL of Picolax, followed by plentiful drinks of any fluid of choice. Picolax can usually be administered at home because of the smaller volume required.

## Maintenance phase

After disimpaction it is important to maintain soft motions that are easy to pass without discomfort, to ensure that retention does not recur. This phase retrains the rectum, allowing resumption of the normal function of this organ and related muscles and the return of the urge to defaecate.

Maintenance therapy is multidimensional. Treatment should follow similar principles in all children but should be individualised. The duration of symptoms, the child's age and the degree of compliance often determine the length of treatment. Clear and precise written instructions are helpful to the family.

### Stool softening agents

Softening agents are the mainstays of the maintenance phase of managing childhood constipation. Simple softening agents include fruit juices such as prune, apple and pear. These juices contain carbohydrates that increase the water content of the stools, thus increasing stool frequency. Usually, however, stool softening medications are required (Table 4).

The medications recommended in children are lactulose (Actilax, Duphalac, Genlac, Lac-Dol), liquid paraffin or Parachoc and, occasionally, sorbitol (Sorbilax). Liquid paraffin has lubricant and softening effects, while lactulose and sorbitol soften stools by an osmotic effect. These three agents have been used extensively in children for long periods of time, and are not associated with detrimental effects upon the bowel. Lactulose, a nonabsorbable carbohydrate, may cause abdominal cramps and excessive flatus, but is usually tolerated well. Sorbitol may have similar effects. Paraffin may cause leakage of oil onto undergarments (which is usually a sign of sufficient dose), and caution should be exercised with its use in those at risk of aspiration.

The initial dose of the chosen agent should be based on the child's weight, with the aim of inducing one or two soft, easily passed motions each day, without any straining or discomfort. This aim should be stated clearly and repeatedly to the parents. It is best to begin with a large dose of stool softener, and then decrease it to achieve the required stool frequency (see the box on page 28). Using softening agents in this

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### Table 4. Medications frequently used to treat childhood constipation

**Disimpaction phase**
- Rectal medications
  - phosphate (Fleet Ready-to-use Enema, Travad Phosphate Enema)
  - saline
  - liquid paraffin
  - Microlax
- Oral medications (stool softeners)
  - liquid paraffin or Parachoc (which is 50% paraffin), also has lubricant properties
  - polyethylene glycol (Colonlytely, Glycoprep, Glycoprep-C, Movicol)
  - sodium picosulfate with magnesium citrate (Picolax)

**Maintenance phase**
- Osmotic stool softeners
  - lactulose (Actilax, Duphalac, Genlac, Lac-Dol), 1 to 3 mL of formulation per kg per day
  - liquid paraffin or Parachoc, 1 to 3 mL of paraffin per kg per day
  - sorbitol (Sorbilax), 1 to 3 mL of formulation per kg per day

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### Table 5. Medications used sparingly to treat childhood constipation*

**Bowel stimulants**
Senna
Bisacodyl

**Bulking agents**
Bran
Frangula
Isphagula
Methylcellulose
Psyllium
Sterculia

**Other agents**
Magnesium sulfate
Magnesium hydroxide

* These agents are generally not used in infants.

manner encourages compliance and ensures that there is no recurrence of stool retention in the days after disimpaction. The opposite approach, i.e. beginning with a low dose and increasing it every few days to achieve regular motions, frequently leads to parental discouragement and poor compliance. There is also an increased risk of early recurrence of retention until a sufficiently high dosage is reached.

### Other agents

Stimulant medications such as senna and bisacodyl are not generally required in the management of children with constipation, and are definitely contraindicated in infancy (Table 5). Occasionally, a very short period of use of senna is helpful in the initial phase of treatment (for two to four days only), but such agents should never be used on an ongoing basis.

Bulking agents such as bran, frangula, isphagula, methylcellulose, psyllium and sterculia are also not generally required in children. Magnesium sulfate and magnesium hydroxide should only be used sparingly because they may lead to electrolyte changes. Infants are particularly susceptible to magnesium poisoning.

### Dietary fibre and fluid

An appropriate diet is required for good gastrointestinal health in general, and for maintenance of bowel habit more specifically. Children should be encouraged to have a healthy diet containing appropriate ratios of all essential food groups. It is essential to check that fluid and fibre intakes are adequate.

Ample fluid, in particular water, should be provided throughout the day. Parents should be guided as to a reasonable volume that their child should drink each day, based upon the child's weight and usual fluid intake. An easy way of helping a child to increase his or her fluid intake is to suggest that the parents set aside a volume of water in the fridge each morning for the child. The child is then asked to drink this water throughout the day, emptying it by the end of the day. This provides a goal for the child and a simple monitoring of intake for the parent. The child can be given a sipper bottle of water taken from this volume for drinking while away from home, such as at school.

Review of the child's present diet may reveal a significantly low fibre intake. A lack of fruit and vegetables in the diet is common and easily remedied. Parents should be guided as to the amounts of the various fibre-rich foods that their child should be eating (see the box on page 30).[10] It is important that feeding does not become a focus of interactions between the child and the parents as forceful introduction of fibre-rich food elements is rarely successful.

Fibre supplements are not usually required in children because the aim is to optimise dietary fibre rather than advising excessive intake. Fibre intake is much less important in infants, and changes are not generally required in this age group.

Sometimes increasing both water and fibre intakes may be enough to improve a child's bowel function. In most cases, however, increasing the fibre and fluid contents of the diet should be seen as part of the overall package for improving the child's bowel habits. The test of the

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## Case history: Functional constipation in a 4-year-old child

### Presentation and history

A 4-year-old girl presented with a nine-month history of increasing difficulty with passage of stools. The symptoms had begun following a lower respiratory tract infection necessitating admission to her local hospital. In the weeks following this illness, her bowel habit changed from one easily passed motion each day to harder motions passed every two or three days. The motions were described as small, hard lumps that were passed after 15 to 20 minutes of pushing and discomfort. Occasionally there were small streaks of bright red blood on the outside of motions. The girl was otherwise well, with no past history of note. She had an unremarkable neonatal history (including passage of meconium on day one) and had always grown along the 25th percentile for both height and weight. There was no family history of note.

### Examination

Examination revealed a well girl in no distress and weighing 15 kg. The abdomen was soft, with no distension or tenderness. There was no organomegaly, but there were easily palpable faecal lumps in the left lower quadrant. A healed anal fissure was seen on perianal inspection. Rectal examination revealed normal anal tone and a large rectum with hard, dry stool present. The lower back and lower limb neurology were normal. There were no other features of note.

### Diagnosis

A diagnosis of functional constipation was reached.

### Management

After an education session for the patient and her parents, she was managed with initial disimpaction (Picolax), followed by regular lactulose (40 mL once daily). Changes to her diet were suggested, and a toileting regimen to be followed was described in detail. At review four weeks later, she had had a good response to disimpaction (four loose watery motions over an afternoon) and soft motions were being passed once or twice daily with ongoing lactulose (now decreased to 20 mL daily). A good toileting routine had been established: she was now in the habit of sitting after both the breakfast and evening meals, but had only recently begun to pass a motion at these times. Management was ongoing.

dietary changes is that symptoms do not recur after other treatment modalities have been discontinued.

### Toileting routines

Establishing good toilet habits is part of the overall management of constipation.[11] This behavioural approach utilises the 'gastrocolic reflex' by establishing toileting after meals at least twice daily (after the breakfast and evening meals). At these times the child is asked to sit on the toilet for 10 to 15 minutes. A footrest is recommended, and the child should be encouraged to relax by reading a book or listening to a tape. Each sitting is rewarded with a sticker or other suitable token, and the passing of a motion while on the toilet is acknowledged by an additional reward. The reward stickers may be placed on a calendar that can then be used as a diary to document improvements and as a basis for further positive reinforcement. Alternatively, a separate diary of toileting and bowel motions can be kept to record progress.

When outlining the rationale for this part of the management program to parents, it is important to reinforce and relate to the education messages provided earlier. Also make sure that the parents understand the reasons for suggesting this approach and that successful program completion is possible in the home setting. Clearly, this program requires a degree of cohesion and organisation within the family; when this is not available, the success of the management may be compromised. Sometimes, additional behavioural techniques are required, involving a psychologist or similar appropriately trained professional.

### Follow up and ongoing review

Regular phone contact between the parents and the GP (or his or her delegate) can help while the family is getting used to the management program. The first clinical review should be two to four weeks after starting treatment, and should assess the response to therapy, making use of any diaries of toileting and stooling events. Clinical reappraisal should include an abdominal examination to determine the success of treatment. At the same time, reinforce the education principles described at initial assessment, making sure the program is understood and answering any questions. The child should also be given clear and repeated acknowledgement of all successes and improvements.

Ongoing review should include regular clinical reassessment, the frequency depending on the individual child. As the child resumes a more normal stool habit with treatment, and as rectal sensation returns, the need for stool softening treatment diminishes. This medication can

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## Dietary sources of fibre

Parents should be guided as to the amounts of the various fibre-rich foods that their child should be eating to obtain an adequate fibre intake. These amounts are based on the fibre requirement of the individual child and the fibre contents of the foods eaten. Fibre requirements may be calculated using the formula: 'number of grams of fibre required each day = age in years + 5'.

Listed below are some common fibre-rich foods with the fibre content per standard serve.*

| Food item | Standard serve | Fibre content (g) |
| --- | --- | --- |
| **Bread** | | |
| White | 1 slice | 0.4 |
| Hi-fibre | 1 slice | 0.8 |
| Brown | 1 slice | 1.0 |
| Wholemeal | 1 slice | 1.6 |
| **Cereals** | | |
| All Bran | 1 bowl | 9.8 |
| Cornflakes | 1 bowl | 0.4 |
| Porridge | 1 bowl | 0.3 |
| Weetbix | 1 bowl | 3.9 |
| Rice Krispies | 1 bowl | 0.3 |
| **Fruit** | | |
| Apple | 200 g | 3.6 |
| Apricot | 100 g | 1.7 |
| Banana | 100 g | 1.1 |
| Grapes | 100 g | 0.7 |
| Peach | 100 g | 1.5 |
| Prunes | 100 g | 5.7 |
| Raisins | 100 g | 2.0 |
| Strawberries | 100 g | 1.1 |
| **Vegetables** | | |
| Baked beans | 100 g | 3.7 |
| Broccoli | 100 g | 2.6 |
| Carrots | 100 g | 2.4 |
| Potato (mashed) | 100 g | 1.1 |
| Potato (chips) | 100 g | 2.2 |
| Pumpkin | 100 g | 1.0 |

* Adapted from Norgine Dietary Fibre Guide, Norgine Pty Ltd, Pymble, NSW.[11]

slowly be weaned, but always ensuring that regular, soft motions are maintained. Eventually, presuming continued satisfactory progress, the stool softening regimen can be stopped. At this time continued attention to the other management components (dietary factors and regular passing of motions) is essential to prevent recurrences. Parents must be warned that recurrences are, unfortunately, common. Advise them that events such as long trips, viral infections or changes in routines (e.g. beginning school), may precipitate stool retention and return of symptoms.

If treatment is unsuccessful or inadequate, clinical assessment should be repeated to make sure that the diagnosis is correct. Referral to a paediatric gastroenterology unit should be considered when there is treatment failure, or earlier if an underlying disorder is suspected.

## Constipation in infancy

Constipation in infants less than 12 months of age usually follows dietary changes, such as weaning from breast to bottle feeds or the introduction of solids. The principles of management are the same as for older children but certain points should be highlighted.

Simple stool softening measures can often be used with success, such as adding nonabsorbable carbohydrate foods like prune, apple or pear juices to the diet. Stool softening therapy should follow if responses are inadequate, preferably using lactulose. Liquid paraffin should not be used in this age group because of the risk of aspiration in infants. Enemas should not be used because of the increased risk of trauma in these small children. Glycerol suppositories may be used cautiously for disimpaction. However, disimpaction is required less frequently in infants than in older children.

## Other considerations
### Cow's milk intolerance
Some infants with complaints of constipation may have a component of cow's milk protein intolerance (CMPI).[12] Although most infants with CMPI will present with symptoms such as vomiting, diarrhoea, failure to thrive or anaemia, a number may become constipated. The mechanisms involved in this relationship are as yet undetermined. Among the proposed hypotheses is one suggestion that CMPI in children leads to altered gastrointestinal motility. A trial of a cow's milk exclusion diet may be warranted if there are features suggestive of CMPI or a strong family history.

### Anal fissures
Anal fissures are often seen in children or infants presenting with constipation. Usually a fissure develops after the passage of a dry, hard stool. Occasionally though, a fissure will be the initiating factor for stool retention. It is important to identify the presence of a fissure and to treat it. If left untreated, the success of the overall management plan may be threatened.

Appropriate therapy is topical anaesthetic ointment twice daily for one to two weeks. Examples include 1% lignocaine ointment or combined therapies such as Xyloproct (lignocaine, hydocortisone, aluminium acetate and zinc oxide).

### Changes in bowel flora
Various investigators have shown that oral antibiotics may improve the symptoms of constipation in adults and children with chronic symptoms resistant to standard therapies.[13] The mechanism behind these observations is unclear, but may relate to changes in colonic flora during antibiotic therapy such that substances that impair colonic motility are no longer produced. Further study is required to understand these processes before this type of therapy can be adopted routinely in children.

### Difficult to manage constipation
Children with both constipation and encopresis and those with encopresis alone generally require a multidisciplinary approach combining more complicated psychological techniques (such as biofeedback) with medical therapy.[14] These conditions are often chronic and resistant to therapy, and early referral to an appropriate unit is suggested.

Constipation can also be difficult to manage in developmentally delayed children. These children often have problems with passing motions, inadequate diets frequently being the cause.[15] The principles of management described above should be followed, particularly optimisation of the child's diet. Rectally administered therapies are required more often than in other children with constipation, especially in the disimpaction phase of management. Liquid paraffin should be used with caution in those at risk of direct aspiration. Compliance is often an issue in these patients.

## Conclusion
Constipation is a common complaint in children and infants, and requires a careful and considered approach. It is vital to consider and exclude an underlying disorder, although such conditions are uncommon. Appropriate management of functional constipation in children requires the use of several inter-related aspects, namely education, disimpaction, maintenance and ongoing review, with referral if there is poor response to treatment, unusual features or concerns about underlying disorders.　MT

*A list of references is available on request to the editorial office.*

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