

COMMON GASTROINTESTINAL PROBLEMS IN PEDIATRIC PATIENTS

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GASTROESOPHAGEAL REFLUX

What is gastroesophageal reflux?

Gastroesophageal reflux is the bringing up of stomach contents or acid into the esophagus (the swallowing tube). Almost everyone refluxes at some point during the day especially after meals. What distinguishes normal reflux from pathologic or abnormal reflux is how often reflux occurs and if it causes symptoms or damage to the esophagus. Reflux is being increasingly recognized in children and adolescents. Although the symptoms in teenagers may be similar to those seen in adults, the symptoms in infants and younger children may differ enough so that they are not recognized as being due to reflux.

Is it normal if my infant spits up?

Almost all infants reflux or regurgitate a portion of their feeding at one time or another. What distinguishes normal regurgitation from abnormal regurgitation is how often the reflux occurs, if it is associated with discomfort, and if it results in other complications. These complications include poor weight gain known as “failure to thrive”, breathing difficulties such as infrequent breaths or apnea, asthma symptoms such as wheezing, or a hoarse voice or cry. Other complications of reflux are aspiration, which is when the refluxed stomach contents reach the lungs, pneumonia due to aspiration, or inflammation of the esophagus called esophagitis. Spitting up blood or material that looks like old “coffee grounds” is rarely seen and requires evaluation by a physician.

Reflux symptoms in infants tend to get better as they get older, usually by 12 to 15 months. This is because as infants get older their stomach is able to empty quicker and their esophagus lengthens, therefore there is less material in the stomach to regurgitate. Infants who reflux or regurgitate will not necessarily have problems with reflux as they get older or as adults.

Is vomiting in my baby always due to gastroesophageal reflux?

There are a number of reasons, other than reflux, that a baby may vomit. Babies may be allergic to the milk or soy protein that they are getting in their formula and this can result in irritability, vomiting, poor weight gain and blood in the bowel movements. This is treated with a change to a specialized formula where the proteins are broken down to make them less allergenic (allergy causing). Babies can be born with problems where the



intestine is not formed or positioned properly or is blocked. These types of problems are usually found in the immediate newborn period but can present later in some infants. A combination of x-rays and or endoscopy (looking at the lining of the stomach and upper intestines and/or colon with a long tube with a video camera at the tip) is usually helpful to make this diagnosis.

Between 4-8 weeks of age infants can develop a condition known as pyloric stenosis. This results in significant and forceful vomiting and is usually associated with poor weight gain and possibly weight loss. Parents of infants with this problem describe their child's vomiting as projectile. Pyloric stenosis is currently treated with surgery. There are other non-gastrointestinal causes of vomiting in infants and young children including hormonal problems, kidney problems and problems with increased pressure on the brain. These are unusual conditions but patients should be tested for these problems if their physician feels that their symptoms are not typical or they are not responding to medications.

What are the symptoms of reflux in older children and adolescents?

Reflux symptoms in children are variable. Children may be unable to communicate typical heartburn symptoms. They may complain of generalized stomachaches, frequently around the area of the belly button and on occasion may complain of chest pain. Often children will report a feeling that they need to throw up and on occasion will describe that they get a taste in their mouth as if they have thrown up. Other children will report that they feel that the food is coming back up and that they then re-swallow it. Occasionally they will report a feeling that food is not going down correctly or feels like it is getting stuck. Some patients may complain of asthma symptoms such as cough or wheezing that are worsened by reflux. Even though children may not relate reflux symptoms to eating, obtaining a dietary history for foods and medicines that trigger reflux is important.

How is the diagnosis of reflux made?

Reflux is usually diagnosed based on symptoms and physical examination. X-rays are generally not helpful in diagnosing abnormal reflux although they are often used to exclude other problems that may mimic reflux. Performing an upper intestinal endoscopy with biopsies can be helpful to determine if inflammation of the esophagus is present. The test currently considered most helpful in making the diagnosis of acid reflux is a pH probe. This probe is a small tube inserted through the nose into the esophagus that continuously measures how often acid is being regurgitated into the esophagus. There are normal expected values for children and adults.

What are treatment choices for children and adolescents with gastroesophageal reflux?



There are many medications available to treat gastroesophageal reflux. Many of these medications have been used successfully to treat children. Dosages of medication must be modified for a child's weight. Also they require monitoring to reduce possible long-term side effects. Diet is an important part of reflux management and children and teenagers with reflux should avoid the products listed below. Medications such as aspirin, ibuprofen and alcohol based products should be avoided if possible in children with reflux. Rarely a surgical procedure called a fundoplication (or wrap) is required for severe reflux. This procedure is usually reserved for patients with severe symptoms or complications of reflux that do not respond to standard medications and dietary treatment.

Foods to avoid if you have reflux

Spicy, acidic or tomato based foods
Fatty foods
Citrus products including citrus juices
Apple juice (apples are fine)
Caffeinated drinks- cola, tea, coffee, hot chocolate
Chocolate and licorice

LACTOSE INTOLERANCE

What is Lactose Intolerance?

Lactose is the sugar found in milk and dairy products such as cheese and yogurt. After eating dairy products that contain this sugar, lactase a digestive enzyme of the small intestine, helps to breakdown this complex sugar into two simple sugars. Normally lactase breaks down lactose into two components, glucose and galactose. These simple sugars are then absorbed in the small intestine and ultimately reach the blood stream where they act as nutrients. The enzyme lactase is located in the lining of the small intestine known as the intestinal villi.

Lactose is also the sugar found in breast milk and standard infant formulas. Therefore almost all babies are able to digest and absorb this sugar and it serves as their primary dietary sugar.

What are other sources of lactose?

In addition to milk and dairy products such as ice cream, yogurt and cheese, lactose can be found in bread and baked goods, processed breakfast cereals, instant potatoes, some soups and non-kosher lunch meats, candies, dressings and mixes for pancakes and biscuits.

Who gets lactose intolerance?



Rarely babies may be born with a deficiency or absence of the enzyme lactase. This condition is very rare and is known as primary lactase deficiency. Babies inherit this condition by getting one gene that causes this problem from each of their parents, even though both parents may be lactose tolerant. Babies who lack this enzyme may have severe feeding problems with diarrhea, vomiting and poor growth starting in early infancy. These babies require a specialized formula with another type of sugar such as sucrose (present in table sugar), which they are able to digest. The majority of infants who have feeding problems however are not lactose intolerant.

A cause of temporary lactose intolerance in infants and young children is infection. Older infants and young children will commonly be infected by a virus known as rotavirus. Most children will have had at least one episode of this type of infection by the age of five years, with the majority of cases occurring before two years of age. The symptoms of rotavirus infection include vomiting, diarrhea (frequent watery stools), and fever. This type of viral infection commonly causes damage to the lining of the small intestine. Because this is where the enzyme lactase is located, rotavirus infection often results in lactose intolerance. This type of lactose intolerance is transient or temporary, however, and when the lining of the intestine returns to normal within three to four weeks, the lactose intolerance usually goes away. Another type of infection that causes temporary lactose intolerance is giardia infection. Giardia is a parasite that is found in well water and fresh water from lakes and streams and also causes damage to the surface of the small intestine resulting in temporary lactose intolerance. Treatment of the giardia with antibiotics will resolve the lactose intolerance.

Many individuals acquire lactose intolerance as they get older. It is estimated that approximately one half of adults in the United States have acquired lactase deficiency. This condition is due to a normal decline in the amount of the enzyme lactase present in the small intestine as we age. Although lactose is an important part of the diet in infants and young children it represents only 10% of the carbohydrate (sugar) intake in adults. However, individuals who are lactose intolerant may not be able to tolerate even small amounts of this sugar in their diet.

Lactose intolerance occurs more frequently in certain families. One of the most important factors affecting the rate of developing lactose intolerance is an individual's ethnic background. Approximately 15% of adult Caucasians, and 85% of adult African Americans in the United States are lactose intolerant. The rate of lactose intolerance is also very high in individuals of Asian descent, Hispanic descent, Native Americans and Jewish individuals.

What are the symptoms of lactose intolerance?

The symptoms of lactose intolerance can start during childhood or adolescence and tend to get worse with age. The severity of symptoms is usually proportional to the amount of the milk sugar ingested with more symptoms following a meal with higher milk sugar content. The symptoms of lactose intolerance are abdominal distension and pain, excess



burping, loud bowel sounds, excess gas and diarrhea following ingestion of lactose. An individual who is lactose intolerant may have very watery and explosive bowel movements. Individuals who are lactose intolerant may feel a sense of urgency with bowel movements. This means that they feel that they have to get to the bathroom immediately or they will have an accident. If someone who is lactose intolerant does not eat lactose they will not have the symptoms noted above.

Although eating lactose containing products will result in discomfort for someone who is lactose intolerant, they will not be harmed by eating lactose. There are no long term concerns for someone who is lactose intolerant of developing more serious intestinal disease because of this. The only exception to this would be for babies who are born with primary lactase deficiency or children with secondary lactase deficiency as discussed above. These children may have poor growth as a result of chronic diarrhea and malnutrition if they are not switched to a lactose free diet or supplemented with the lactase enzyme (commercially available).

What causes the symptoms of lactose intolerance?

Because lactose is not digested properly in the small intestine in individuals who are lactose intolerant, it passes whole into the large intestine or colon. Upon reaching the colon it is broken down by the normal colon bacteria. This breakdown results in the production of carbon dioxide and hydrogen gases and short chain fatty acids. The carbon dioxide and short chain fatty acids produced in the colon result in the symptoms of lactose intolerance. The hydrogen is absorbed and ultimately excreted in the breath as described below.

How is lactose intolerance diagnosed?

Lactose intolerance is diagnosed by a simple test called a breath hydrogen test. After a period of fasting from midnight the night before the test, an individual drinks a specified amount of the milk sugar as a syrup. In adults this corresponds to the amount of milk sugar in a quart of milk. They then breathe into a test bag every fifteen minutes for approximately two hours. The breath that they exhale into the bag is analyzed to determine its hydrogen content. During the course of the test individuals who are lactose intolerant will have an increase in the amount of hydrogen that they exhale. If the values for hydrogen increase above a certain value the diagnosis of lactose intolerance is made. Patients who are lactose intolerant may also develop their typical symptoms during the test.

What can be done to treat or manage lactose intolerance?

The best treatment of the symptoms of lactose intolerance is a combination of dietary modification and taking a supplement to aid in digestion of lactose. Individuals who are lactose intolerant should meet with a dietician to review the sources of lactose in their diet. Some reduction in the daily lactose consumption is usually required. When an



individual is going to be eating a food that contains lactose they should take a commercially available non prescription lactase supplement at the time of lactose ingestion. This type of supplement can be taken throughout the day whenever lactose is ingested. Some individuals will be less lactose intolerant and therefore will be able to tolerate comparatively larger amounts of lactose. Alternatives to milk for lactose intolerant individuals include products such as soy milk. If an individual is restricting their milk/ dairy intake it is important to ensure adequate supplementation of calcium in the diet. This is especially important for pediatric patients and women.

Recommended daily calcium intakes

1-3 years of age	500 mg
4-8 years of age	800 mg
9-24 years of age	1300 mg
Age 25 and above	800-1000 mg
Pregnant and nursing women	1200 mg

Is it possible to become temporarily lactose intolerant?

There are several conditions in older children, adolescents and adults that can cause temporary lactose intolerance. The lactose intolerance usually resolves with treatment. These diseases include acute diarrhea due to an infection, celiac sprue which is an intolerance to wheat products, Crohn's disease of the small intestine discussed below, and other causes of malnutrition.

INFLAMMATORY BOWEL DISEASE

What is inflammatory bowel disease?

Inflammatory bowel disease refers to a chronic (long term/ lifelong) inflammation or irritation of the stomach, small intestine and/or colon (large bowel). Inflammatory bowel disease should not be confused with irritable bowel syndrome which is discussed elsewhere in the web book. There are two types or categories of inflammatory bowel disease, Ulcerative Colitis and Crohn's disease. Patients can have either type but not both. Occasionally one type of inflammatory bowel disease is diagnosed and with further testing or time the disease may be re-diagnosed as the other type.

What is the difference between Ulcerative colitis and Crohn's disease?

Ulcerative colitis and Crohn's disease differ primarily in the portions of the bowel that they each involve and also the layers of the bowel wall that are involved. Ulcerative colitis involves only the large bowel. It can involve a part of the large bowel only or the entire large bowel but it does not have "skip" areas. Skip areas are areas of the intestine



that are normal with abnormal areas on either side of them. Ulcerative colitis only involves the innermost layer of the bowel (the lining of the bowel) known as the mucosa. It does not involve deeper layers of the bowel. Crohn's disease on the other hand can involve any area of the gastrointestinal tract from the mouth to the rectum (the last portion of the colon) and the anus. Crohn's disease involves not only the lining of the bowel, but can and usually does involve the deeper layers of the bowel. Even though Crohn's disease can involve any portion of the gastrointestinal tract it typically does not involve every portion of the gastrointestinal tract. The most common sites of involvement are the end of the small intestine known as the terminal ileum, involved in up to 80% of patients, involvement in the colon in approximately 50% of patients, with approximately 5% of patients having disease in their stomach or first part of the small intestine known as the duodenum.

How common is ulcerative colitis and Crohn's disease in pediatric patients?

Both ulcerative colitis and Crohn's disease are relatively uncommon problems in both children and adults. The incidence or number of new cases occurring each year appears to be increasing more for Crohn's disease than for ulcerative colitis. In a group of approximately 100,000 children age 15 years or younger, it is estimated that approximately 2 or 3 of them will develop Crohn's disease each year. However in a group of 100,000 children age 15-19, the rate of developing Crohn's disease increases to 16 new cases per year. The chance of developing ulcerative colitis in childhood and adolescence is less than the chance of developing Crohn's disease, with an incidence of 2 to 10 new cases per 100,000 population per year. The teenage years are one of the most likely times for inflammatory bowel disease to be diagnosed. The other most common time is between 30-40 years of age.

Both ulcerative colitis and Crohn's disease are more common in certain families. In large studies it has been shown that if someone has either ulcerative colitis or Crohn's and all of their close family members (parents, grandparents, brothers, sisters and children) are followed for a period of thirty years there is a one in three chance of another family member developing either ulcerative colitis or Crohn's disease. If the original family member has ulcerative colitis the relative is likely to develop ulcerative colitis and if they have Crohn's disease the relative is likely to develop Crohn's. Neither ulcerative colitis nor Crohn's disease are contagious, which means that you cannot catch it from your family member. The reason for family members being more likely to develop these diseases is probably due to inheriting a gene that makes an individual more susceptible to develop this type of inflammation of the bowel. In addition to being more common in certain families, both ulcerative colitis and Crohn's disease are more common in certain ethnic groups, especially Jewish individuals of eastern European descent.

What are the symptoms of Ulcerative Colitis in children and teenagers?

The most common symptoms of ulcerative colitis in children and teenagers are diarrhea, blood in the bowel movements and pain in the abdomen. Patients with this condition may



have pain prior to a bowel movement that improves after a bowel movement, and frequent bowel movements up to 10 times per day or more. Patients may also feel that they need to have a bowel movement immediately or they are going to have an accident. Having bowel movements at night is not uncommon in patients with ulcerative colitis, especially when the colon is more inflamed. Other symptoms in children can include anemia (a low blood count), weight loss and poor growth, although the later two are more common with longstanding disease and more likely to occur with Crohn's disease.

What are the symptoms of Crohn's disease in children and teenagers?

The symptoms of Crohn's disease may be subtler than those of ulcerative colitis or may be dramatic. Abdominal pain, diarrhea and weight loss are the most common symptoms occurring in 65-75% of patients. Poor growth is also common and a very important sign of pediatric Crohn's disease. A child who is usually amongst the tallest in their class who becomes amongst the smallest, especially around the time of puberty may have Crohn's disease. The average time between the first symptoms of Crohn's disease and the diagnosis of Crohn's disease may be up to a year in some studies, due to the subtle first symptoms of Crohn's disease. Fatigue or being tired due to anemia is common as is blood in the bowel movements, although less common than in ulcerative colitis. Up to 25% of patients will have disease around their bottom or anus; this may go unrecognized in a teenager who is uncomfortable discussing bowel issues with their parents or doctors. This includes extra folds of skin, which may become inflamed and can be painful, drainage of pus from small openings in the skin known as fistulas and fissures or cracks in the skin around the anus that may be painful.

How is the diagnosis made of ulcerative colitis or Crohn's disease?

After a careful history and physical examination your doctor can order blood work to screen for ulcerative colitis or Crohn's disease. Blood work that would be abnormal in these conditions can include a blood count demonstrating anemia, especially if the iron level is low, an increased white blood cell count which may indicate inflammation or infection, an increased platelet count (the part of the blood that is responsible for helping blood clot), decreased blood levels of proteins such as albumin and an elevated sedimentation rate, a nonspecific marker of inflammation. There are new additional blood tests available that detect certain antibodies found more commonly in patients with inflammatory bowel disease. However testing positive or negative for these antibodies does not establish or rule out the diagnosis of inflammatory bowel disease and therefore expert interpretation of these blood tests is required.

An x-ray called an upper GI with small bowel follow through can be obtained to look for irregularity in the small intestine. This is particularly helpful in pediatric patients, as the terminal ileum, which is the end of the small intestine, is the site most commonly abnormal in children with Crohn's disease.



Endoscopy with biopsy (taking samples of tissue) also known as performing a scope test is the definitive way to diagnose inflammatory bowel disease and also to determine how much of the colon is involved. Endoscopy can also be performed of the stomach and first part of the small intestine in patients suspected of having Crohn’s disease. Medications are given during the procedure to sedate the patient and increase the comfort of the procedure.

What does my gastroenterologist mean when he talks about “extra intestinal manifestations” of Crohn’s disease or ulcerative colitis?

Although the stomach, small intestine and colon are the areas of the body that are most commonly involved with inflammatory bowel disease, patients can develop symptoms outside of the GI tract that are due to their inflammatory bowel disease. How severe the symptoms are may in some cases be related to how severe the bowel disease is or may be independent of the bowel symptoms. These symptoms are generally not due to medications administered for the bowel disease. The table below indicates some of the most common extraintestinal manifestations of inflammatory bowel disease.

Symptom	Crohn’s disease	Ulcerative colitis
Joint swelling or pain/arthritis	yes	yes
Skin rashes	yes	yes
Mouth sores	yes	no
Inflammation of the eye	yes	yes, but less common
Clotting problems	yes	yes
Kidney stones	yes	no
Abnormal liver function tests	yes	yes
Inflammation of the pancreas	yes	uncommon except with meds
Bone disease	yes	yes, but less common
Anemia	yes	yes

What are the treatment options for Ulcerative colitis and Crohn’s disease?

There are a variety of medications available to treat both ulcerative colitis and Crohn’s disease. Important pediatric considerations for medical therapy include long term side effects of the medications especially with regards to growth, bone disease such as osteoporosis (decreased calcium in the bone), development of cataracts in the eyes from medications such as steroids and a small risk of developing certain types of cancer with some medications or as a result of having chronic inflammatory bowel disease over a long period of time.



Medications used for pediatric patients with inflammatory bowel disease include the following:

Types	How it is given
Aminosalicylate or 5-ASA products	by mouth, as a suppository or an enema
Steroids	by mouth, in the vein, or as an enema
Immunosuppressants (Imuran, 6-MP)	by mouth
Immunosuppressants (Methotrexate)	by mouth or by injection
Immunosuppressants (Cyclosporine)	by mouth or in the vein
Antibiotics	by mouth, in the vein
Immune-modulators (Infliximab)	in the vein

There are a variety of nutritional options also available for patients with Crohn's disease and it has been shown that disease activity appears to decrease if patients are able to significantly increase their caloric intake through the use of standard or specialized diets. Supplementation with folic acid, calcium and Vitamin D in patients with decreased bone calcium is also helpful in patients with inflammatory bowel disease.

Can surgery cure ulcerative colitis or Crohn's disease?

Surgery is curative for ulcerative colitis, but not for Crohn's disease. Surgery is usually performed for disease that does not get better despite medications, if severe medication side effects develop or for other complications of the underlying inflammatory bowel disease. Children undergoing removal of their colon for ulcerative colitis can have a pouch fashioned of small intestine that serves as a reservoir for stool and takes the place of the rectum. Children undergoing surgery for Crohn's disease generally do so for development of a specific complication of their disease or their medication. Because Crohn's disease always comes back following surgery patients are usually continued on maintenance medications following surgery to cut down how quickly or how severely the disease comes back. Also the amount of bowel removed is limited in patients with Crohn's disease in order to prevent additional problems with absorption of nutrients after surgery. Patients still require regular follow up with their pediatric gastroenterologist or their gastroenterologist after surgery for either ulcerative colitis or Crohn's disease.

DIARRHEA

Diarrhea is a very common problem in children younger than age five. In developing or non-industrialized countries, multiple episodes of diarrhea can lead to serious problems such as malnutrition (poor nutrition). In the United States and Canada, young children have an average of two episodes of diarrhea per year.



What is acute diarrhea?

Acute diarrhea often called acute gastroenteritis by physicians is when stools are softer and more frequent than normal, (usually more than three bowel movements each day for less than 3 weeks total). Diarrhea may be due to infections with bacteria, viruses or parasites. Diarrhea is more common in children attending day care and is usually due to a virus. While cases of diarrhea due to infection are usually mild and go away on their own, it is important to avoid becoming dehydrated from loss of body fluid in diarrheal stools.

What is dehydration and how can I tell if my child is starting to develop this?

Dehydration is when someone is unable to take in sufficient fluid orally to meet their daily requirements and compensate for losses in their stools. Physicians can determine if someone is dehydrated and how severely they are dehydrated by examining them. Parents can watch for signs of dehydration by checking how often their child is passing urine, determining if they are able to cry with tears, or have dry lips. Figuring out how much a child is urinating may be difficult if an infant is in diapers, and the urine is mixed with loose bowel movements. Children often become fussy with decreased energy level.

What testing should my child have if they are having diarrhea?

Diarrhea due to acute infection (acute gastroenteritis) usually does not require tests. In some cases doctors will order blood tests to determine if a child is dehydrated. Collection of stool samples (stool cultures) can be done to identify the specific cause of the diarrhea in some children, especially if they have blood in stools. Stool cultures can take from 2 to 5 days before a result is available. Stool studies can also be done to look for parasites including giardia.

What can I do to treat my child's diarrhea and dehydration?

Children with mild dehydration can be treated outside of the hospital with special oral rehydration solutions (ORS) that can be purchased at the pharmacy or grocery store. Oral rehydration solutions are the best way to rehydrate a child who is able to drink and is not vomiting. Although other drinks such as juices, colas and sports drinks are frequently used, they are not a good substitute for ORS, and can actually worsen the diarrhea. Patients with more severe diarrhea, vomiting and dehydration may require intravenous fluids (fluids given through a vein in the arm) in the hospital.

In a child who is otherwise healthy, it is very important to start feeding them their regular diet as soon as possible. Breast fed infants should be nursed normally during episodes of acute gastroenteritis. Formula fed infants can continue their regular diet and older children should be re-introduced to their regular diet as soon as possible. Older children may avoid dairy initially and try a bland diet consisting of bananas, apple sauce, rice, and toast. Careful hand washing should be practiced by all family members especially after diaper changes. Rarely, antibiotics are prescribed for children with specific bacterial or



parasitic illnesses, although in most cases antibiotics do not change how long the diarrhea lasts or its severity. While oral rehydration solutions can prevent dehydration, they do not decrease the number of stools or how long the diarrhea lasts. Medicines which slow down bowel movements are not recommended in children with acute diarrhea.

When diarrhea lasts longer than three weeks it is considered to be chronic. There are many causes of chronic diarrhea. Usually chronic diarrhea is due to a disease that causes inflammation of the bowel, but diarrhea may also be due to other causes such as malabsorption of nutrients. Common causes of chronic diarrhea are shown below:

- Diarrhea following infection (post infectious diarrhea)
- Chronic nonspecific diarrhea
- Celiac disease (wheat intolerance)
- Inflammatory bowel disease (ulcerative colitis and Crohn's disease)
- Lactose intolerance
- Irritable bowel syndrome
- Diarrhea after antibiotic use (antibiotic associated colitis)
- Food allergies

The diagnosis of these conditions usually requires confirmatory tests. Chronic non-specific diarrhea is seen in toddlers and is usually dietary in origin, such as from drinking too much juice. It resolves by simply limiting the amount of juice intake. Celiac disease is mostly seen in Caucasian children and usually presents with chronic symptoms including diarrhea, poor weight gain, decreased energy, and abdominal distension. A child can be screened for this condition by a blood test. Inflammatory bowel disease is discussed above. Irritable bowel syndrome is a common cause of diarrhea in teenagers, although many patients will present with abdominal pain and diarrhea that alternates with constipation. Irritable bowel syndrome and diarrhea are discussed elsewhere in this web-book. Antibiotic associated diarrhea is seen after antibiotic use and is thought to be due to an imbalance between the 'good and bad' bacteria in the intestine. One such bacterium is called clostridium difficile, which can be tested for in stool samples. Establishing the exact cause of chronic diarrhea may require several different tests, some of which are listed below:

Common tests for chronic diarrhea

- Blood tests
- Stool tests
- X-ray studies
- Endoscopy with biopsy (EGD)
- Colonoscopy with biopsy
- Lactose breath hydrogen test

Colonoscopy is usually indicated when stool studies have not identified an infection and diarrhea persists. It is most useful in distinguishing acute inflammation of the colon that



gets better on its own, known as acute self limited colitis, from chronic inflammation of the bowel known as chronic colitis. Colonoscopy does not usually help to find the cause of diarrhea due to infection with the exception of diarrhea that follows antibiotic use. Colonoscopy is invaluable in making the diagnosis of inflammatory bowel disease and figuring out what portion of the colon is involved with the inflammation. Your physician can assist you in choosing the best treatment after determining the cause of your child's diarrhea.

CONSTIPATION

What is constipation?

Constipation is defined as infrequent bowel movements, hard bowel movements, and difficulty in passing bowel movements or painful bowel movements. It is a very common problem but not always easy to treat. Children may not complain of this problem to their parents. Parents may be reluctant to talk about this problem with their family members or physicians. It is one of the most frequent reasons that children are sent to see a pediatric gastroenterologist.

What is considered a normal bowel pattern?

Infants

The first bowel movement usually occurs within 36 hours after birth in term babies (babies born within two weeks of their expected due date). Regular or normal bowel movements can vary significantly among children, especially among infants. Breast fed infants usually have more frequent bowel movements than formula fed babies.

Children

Most children have from 3 bowel movements per day to 3 per week.

What causes constipation?

Any change in a child's normal routine including a change in diet, a change in activity level or a different bathroom can cause constipation. Although it can start without any clear cause, there are certain times when a child is more likely to become constipated:

- When solid foods are introduced as an infant
- During toilet training
- At the start of school
- Birth of a sibling
- Parents separating or divorcing
- Move to a new place

Whenever bowel movements become hard, passing them becomes a painful and unpleasant experience. The child then usually tries to avoid passing bowel movements by



holding it. This may eventually lead to larger, harder stools that worsen the situation. The children may cross their legs, stand on toes, or squeeze their buttocks together to try to avoid passing a bowel movement. Many times parents misinterpret these behaviors as straining to pass stools when in reality the children are trying not to have a bowel movement. These behaviors are called retentive withholding.

Who is likely to develop chronic constipation?

It is slightly more common in boys than girls. About 25-50% of children with constipation will have a family member with similar problems. Children whose development is delayed and those born with problems affecting the anus or rectum are more likely to suffer from chronic constipation, as do those with attention deficit disorder.

What happens when my child is constipated?

Constipation may be associated with stomachaches or pain in other parts of the abdomen. Constipation can result in tears of the anus called anal fissures. These cause blood in the bowel movements. Because stools may be painful to pass over an anal tear, children who have these tears may develop withholding behavior as described above. Withholding can result in chronic constipation, soiling of the underwear with stool and even difficulty walking. Soiling is usually an indication of rectal impaction with stool. It often occurs when the child is relaxed such as in a warm bathtub or sleeping and is not withholding. Soft, 'clay-like' stool then leaks around the ball of impacted stool in the rectum. Children who are withholding their bowel movements often have a decreased appetite and activity level.

Is my child's constipation a sign that they have another disease?

In over 90% of children, constipation is not associated with other diseases. There are however certain 'red flags' or worrisome characteristics that should alert the physician that another underlying disease should be considered and tested for. Diseases that can have constipation as one of their symptoms include:

Hirschsprung's disease - a condition where the nerves of the large intestine (colon) are not properly formed at birth

Thyroid problems- usually underactive thyroid

Celiac disease- a severe wheat intolerance

Lead poisoning

Hormonal problems that cause abnormal blood calcium levels

Constipation can also be a side effect of a medicine that the child is taking for another condition.



When should my child see a specialist about their constipation?

If constipation does not go away or does not get better after the treatment that your pediatrician prescribes, seeing a pediatric gastroenterologist can be helpful. These specialists will obtain a detailed history and perform a physical examination to distinguish constipation that is due to withholding behavior or from constipation due to an underlying disease. While most children do not need any tests, your physician is the best judge to decide which test if any is necessary and to provide the most information about the cause of your child's constipation.

What types of tests might my child have to determine what is causing their constipation?

Your doctor may suggest one or more of the following special tests for constipation:

Plain x-ray of the abdomen (also known as a KUB)

This is a single or set of x-rays that can give your physician a rough idea if there is a lot of stool present. It may also indicate if the colon is dilated. This type of x-ray is also obtained prior to a barium enema which is described below.

Anorectal manometry or motility test

This test determines if the nerves and muscles responsible for passing a bowel movement are working together. It is performed by inserting a very small balloon at the end of a catheter into the rectum and blowing up the balloon. The response to inflating the balloon determines if the nerves and muscles are working together properly. This test is used to diagnose Hirschsprung's disease. Normal relaxation of the anal muscles, known as the anal sphincter, after inflation of the balloon means that a patient does not have Hirschsprung's disease.

Barium enema

This is an x-ray test where barium or another type of contrast is inserted via a catheter into the rectum and x-rays of the abdomen are taken. The test may or may not require a special bowel preparation to clean out the bowel before the test. This test is used to diagnose a blockage in the intestine or an area that may be narrowed or abnormal. It is also used in the diagnosis of Hirschsprung's disease. This test is being used less frequently to diagnose Hirschsprung's disease than it has been in previous years because of the availability of other simpler types of tests such as anorectal manometry that is described above.



Rectal biopsy

This is a test where a small (pinch) biopsy is performed from the lining of the rectum to determine if normal nerve cells are present in its walls. The sample of tissue that is obtained is examined under the microscope. This test is being used less frequently than it has been in previous years because of the availability of anorectal manometry testing.

Transit study or marker study

This test is performed to determine if the reason for constipation is due to slow movement throughout the colon or just in the last part of the colon known as the rectum. Plastic markers, which can be seen on x-ray, are swallowed and then several x-rays are performed over the next 4-7 days to determine how long it takes them to pass through the GI tract. Patients with normal motility pass the majority (>80%) of the markers within 5 days. If the markers are not passed but are found to remain throughout the colon, this suggests slowing of the entire colon. If the markers do not pass and are clustered in the rectum, this may indicate a problem in the rectum only.

Colonoscopy

This is a scope test. This test is usually not indicated for the evaluation of routine constipation in children. This test may be helpful if children have blood in their bowel movements not due to a fissure or straining or for placing a colonic manometry catheter (see below).

Colonic manometry

This is a specialized test done in children who have continued problems with intractable constipation despite adequate medical therapy. It involves placing a catheter at the time of colonoscopy to determine whether there are normal contractions in all parts of the colon. The test requires a period of prolonged monitoring of the contractions of the colon after placement of the catheter. This test is used to establish the diagnosis of colonic pseudo-obstruction in children, a very rare condition.

How is constipation treated in children?

The best way to treat constipation is a combination of education, behavioral modification, dietary modification and non-habit forming medications. If there is an impaction of stool, which means a very large amount of stool in the rectum, it needs to be evacuated first either by an enema or by a medication given by mouth. Patients are then started on a maintenance medication for a few months to soften the stools, and a program of bowel



retraining is started. The child is advised to sit on the potty after every major meal for 5-10 minutes and try to have a bowel movement. Positive reinforcement (reward) is provided if the child has a stool in the potty. Behavioral modification may be needed in some patients. Some children, especially boys, tend to get so involved in sports or playing video games that they ignore the 'urge' to have a bowel movement. Postponing the event makes things worse in the long run. The goal of treatment is to make having a bowel movement pain free for the child by softening the stools. Consistency in treatment is crucial for success.

Dietary and lifestyle changes may be helpful in improving a patient's symptoms. Increasing dietary fiber over 1 to 2 weeks is often helpful, by increasing bulk that then stimulates colon contractions. This strategy may take a while to work and should not be tried in children with severe constipation as it may make it worse. High fiber foods include:

Bran

Fresh fruits: apricots, apples, pears, melons

Fresh vegetables: asparagus, beans, broccoli, carrots, beets, cauliflower, other greens

Whole wheat products: cereals, breads, and pasta.

Fiber supplements are available if parents find their children will not eat more fiber in their diet. There is little information to recommend one product over another. A patient may have to try several before finding one that is acceptable and that they are willing to take regularly. Fiber supplements are given two times a day and must be taken with a sufficient amount of water. Some patients may notice increased passage of gas while on fiber supplements. Increasing a patient's physical activity is also helpful to promote regular bowel movements.

What types of medications are used in children?

If constipation does not get better with dietary and behavior modifications, stool softeners are indicated. The two most common stool softeners used in children are Miralax and lactulose.

Miralax (polyethylene glycol) has become the most widely used medication for treating constipation in children. It is a white powder that can be dissolved in juice or water and does not get absorbed. It is tasteless, safe and non-habit forming. They have soft, more frequent stools on this medication.

Lactulose is a laxative that is made of a sugar that is not absorbed by the intestine. It works by pulling water into the bowel movements that helps to keep them soft. Because it is not absorbed, lactulose is not associated with side effects except for increased gassiness and diarrhea if the dose of the medicine is too high. Lactulose is not a stimulant and therefore the bowel does not become dependent on it.



Milk of Magnesia is a mild stimulant laxative that may be used at bedtime in children with mild constipation. It is available over the counter without a prescription. The major limiting factor in its use in children is its taste, even though it is now available in different flavors.

Mineral oil, which is given mixed with juice or milk, acts as a lubricant to allow bowel movements to pass easier. This type of medication is particularly useful in toddlers who withhold their bowel movements. Older children may have leakage of the oil in their underwear that may not be acceptable. This problem usually goes away with decreasing the dose of mineral oil. Mineral oil should not be given to children with neurologic problems who are at high risk for aspiration. Flavored forms of mineral oil are also available.

Stimulant laxatives, such as senna or bisacodyl (dulcolax), that cause the colon to have strong contractions, are not popular with pediatricians due to the concerns that they may damage the intestinal nerves, if given over prolonged periods.

Is surgery ever performed for treatment of constipation?

Surgery is rarely needed for constipation. The exception to this is Hirschsprung's disease, which is treated with surgical removal of the portion of the bowel where there are no normal nerves. Also, there are rare cases when children develop a dilated and floppy colon that has no normal contractions, a condition called pseudo-obstruction. These children also may benefit from removing the affected colon surgically. Recently special surgical procedures, such as cecostomy (opening between the bowel and skin which allows drainage of stool), have been devised to help children with spinal cord abnormalities that have severe problems with constipation.

