Functional Constipation: A Radiologist’s Perspective

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The causes of constipation in childhood are many and varied. However, the radiologic evaluation of the constipated child is limited. Plain films of the abdomen and barium enema are the radiologic examinations of choice in childhood constipation. Expensive cross-sectional imaging, such as computerized tomography or magnetic resonance imaging studies, plays no part in the workup. The role of radiology is limited to the exclusion of an obstructive lesion as the cause of constipation. Neither plain films nor a barium enema can distinguish among the many non-obstructive causes of constipation.

An abdominal film should be the first radiologic study performed in a constipated child. This is done to exclude an obstruction of the gastrointestinal (GI) tract and to thus rule out or identify a surgically treatable disease. A GI obstruction most often presents as disproportionate bowel dilation on plain films. Unfortunately, an ileus will also cause bowel dilation and may be difficult to distinguish from an obstruction. If the plain films suggest an obstruction, or if there is strong clinical suspicion of an obstruction, an upper GI study or a barium enema should be performed: the choice depends on the location of the suspected point of obstruction. It is not necessary to perform a barium enema in non-obstructive constipation because this is usually treated medically.

In the neonatal period, common causes of upper GI obstruction include duodenal atresia, annular pancreas, and malrotation. If one of these diagnoses is suspected, an upper GI study should be performed. In older infants, pyloric stenosis should also be considered. Ultrasound is the study of choice to diagnose pyloric stenosis. Common causes of lower GI obstruction in the neonatal period include distal small bowel atresia, meconium ileus, and Hirschsprung’s disease. Barium enema is the study of choice for these lesions. In young children, incarcerated hernia (usually diagnosed clinically) and intussusception (treated by air or barium enema) also need to be considered.

In the older child who is constipated, barium enema can be used to distinguish a missed Hirschsprung’s disease from functional (non-obstructive) constipation. Extended follow-up films can be obtained after a barium enema to evaluate how much barium is evacuated over time. However, in general, a barium enema is a good way to evaluate anatomy but a poor test of colonic function.

Hirschsprung’s disease is caused by an absence of the ganglion cells in the myenteric plexus of the colon. Embryonic development of these ganglion cells begins proximally and proceeds distally to the anus. An interruption of this process produces a continuous segment of agan-
glionic bowel distally. The aganglionic segment is hypertonic and resists distention. The obstruction this causes can be partial or complete. Symptoms are present at birth in 80% of these children and are usually well developed by 6 months of age. On physical examination, the rectal vault is empty. Encopresis (overflow leakage of liquid stool around impacted feces) is rare.

In contrast, the symptoms of functional constipation usually are not present at birth. The child often has emotional problems. On physical examination, the rectal vault is full of feces and encopresis is common. Unfortunately, there is some overlap in the clinical findings of Hirschsprung’s disease and functional constipation, making for some uncertainty as to the true diagnosis. In these cases, a barium enema should be performed.

On barium enema, Hirschsprung’s disease is recognized by a transition from the normally innervated, dilated proximal colon to a small caliber, aganglionic distal segment. The most common location for the transition zone is the rectosigmoid junction (Fig. 1). Total colonic Hirschsprung’s disease is rare and difficult to diagnose by barium enema because there is no transition zone. The aganglionic segment may show mucosal irregularity or “sawtooth” contractions, especially in the very young child.

By contrast, functional constipation shows dilation of the rectum all the way to the anus on barium enema. In the lateral projection, the dilated rectum is often seen as a bulge caudal and posterior to the anus, depressing the muscles of the pelvic sling. Gross fecal residue is observed and there may be difficulty filling the colon with barium proximal to the mass of impacted feces (Fig. 2). Once a dilated, stool-filled rectum is identified and the absence of a transition zone is proven, the barium enema can be discontinued. Instilling a large amount of barium proximal to the fecal mass could lead to inspissation of retained barium and worsening of the impaction. If, after a barium enema, any doubt remains as to whether the patient has Hirschsprung’s disease, a rectal biopsy should be considered.

Another point that must be made is that no bowel preparation should be given before the enema. The bowel preparation could empty the stool-filled rectal vault and thus could alter the typical barium enema findings of functional constipation. Also, some physicians feel that a digital rectal examination should not be performed immediately before the barium enema because
the examiner could inadvertently distend the aganglionic segment with his or her digit, thus altering the typical appearance of Hirschsprung’s disease on barium enema.

In summary, the radiologic workup of childhood constipation involves plain films of the abdomen and barium enema. The goal is to exclude obstruction. Plain films and barium enema are unable to distinguish among the various causes of non-obstructive constipation.

**BIBLIOGRAPHY**

