CHAPTER 72. GASTROINTESTINAL BLEEDING

HIGH-YIELD FACTS

- Pulse rate and quality can help determine the presence of a significant gastrointestinal (GI) bleed.
- Examination of the posterior pharynx in patients with hematemesis may reveal a posterior nosebleed as the cause.
- Cefdinir and Rifampin can cause red stools and be mistaken for a GI bleed.
- The Apt-Downey test can differentiate swallowed maternal blood from neonatal GI bleeding.
- Vascular malformations are a rare but serious cause of both upper and lower GI bleeding.
- The ligament of Treitz is the anatomic separation between upper and lower GI bleeding.
- Melena indicates proximal bleeding, while hematochezia is seen with bleeding from the distal colon and rectum.

A GENERAL APPROACH TO GASTROINTESTINAL BLEEDING

Gastrointestinal (GI) bleeding is a common and anxiety-provoking experience for both parents and children. Although the exact incidence of gastrointestinal bleeding in children is unknown, hematemesis and hematochezia are common emergency department complaints. In healthy children, most gastrointestinal bleeding is minor and self-limited, but occasionally the bleeding can be severe and even life-threatening.

As with any chief complaint, initial assessment must focus on rapid assessment and stabilization. Although most children with gastrointestinal bleeding will be clinically stable, rarely a child with a massive gastrointestinal bleed may present critically ill. A child's airway can be jeopardized by profuse bleeding with aspiration of blood, or decreased mental status from blood loss. If the airway is compromised or the child is at risk for aspiration, endotracheal intubation should be quickly performed. A nasogastric tube may be required to keep the stomach decompressed and to minimize vomiting. Assessment of a child's circulation is critical, and if there is any concern about excessive or continued blood loss, two large-bore IVs should be immediately placed. Pulse rate and quality and capillary refill time and blood pressure should be rapidly assessed to determine the need for fluid resuscitation. Fluids should be given as crystalloid boluses, but if blood loss is severe, repletion with blood products including packed red blood cells and fresh frozen plasma may be required.

Once stability of a child's airway, breathing, and circulation has been confirmed, further history and physical examination can be obtained. Asking about the color, timing, and volume of bleeding is essential, although it is often difficult for parents and children to accurately assess the volume of
blood loss. Associated symptoms such as abdominal pain, preceding vomiting, fever, and stool patterns are also helpful. Some patients have a history of conditions such as coagulopathy, liver, or bowel disease known to put them at risk for gastrointestinal bleeding. In addition, medications such as NSAIDs, corticosteroids, or anticoagulants are known to increase the risk for bleeding.

Although the source of gastrointestinal bleeding is often difficult to visualize, certain physical examination findings can assist in the diagnosis. Vital signs, particularly pulse rate and quality, are essential in determining if a patient has experienced a hemodynamically significant bleed, and other assessments of circulation such as capillary refill and skin color are also helpful adjuncts. Examination of the nose and pharynx may reveal a bleeding source. Signs of liver disease, such as jaundice, hepatosplenomegaly, or ascites, may be evident, and a careful abdominal examination is essential. In patients with a lower gastrointestinal bleed, a careful rectal and anal examination may reveal a benign diagnosis such as anal fissure or hemorrhoids.

In patients with small or resolved gastrointestinal bleeding, minimal diagnostic testing may be required. If there is any question about the presence of blood in vomit or stool, a guaiac test may be performed. Patients with any significant bleed may require a measurement of hematocrit to assess for anemia, keeping in mind this may not reflect anemia if blood loss is acute, and serial measurements may be required. A platelet count should also be performed. Assessment of liver and kidney function may be required in some patients as well as tests of coagulation such as prothrombin time and partial thromboplastin time. Performing a type and screen is also essential if there is excessive or continued blood loss.

Patients presenting with hematemesis may require gastric lavage. Although ineffective for hemostasis, placement of a nasogastric tube with instillation of room temperature saline and suctioning of gastric secretions may be helpful in assessing if bleeding is continuing. Gastric lavage can be helpful in determining if blood is upper gastrointestinal in origin, but cannot rule out continued bleeding, particularly if bleeding is duodenal in origin. Placement of a nasogastric tube may also help decompress the stomach and reduce further vomiting.

Patients with recurrent, continued, or massive gastrointestinal bleeding may require endoscopy. Both upper and lower endoscopies can identify the source of bleeding and may be therapeutic as well. Thermal coagulation, sclerotherapy, banding, and excision may all be performed through the endoscope.

It is important to also keep in mind that although gastrointestinal bleeding is extremely anxiety-provoking, all that is red is not necessarily a gastrointestinal bleed. Ingestion of red food dyes, medications such as cefdinir or rifampin, and foods such as beets or blueberries can all color the vomitus and stool. Bismuth salicylate, iron, and spinach can also turn stools very dark and be mistaken for melena. False positive guaiac tests may be seen if patients have ingested red meat or peroxidase-containing fruits and vegetables such as cauliflower, broccoli, turnips, or radishes. Newborns may present with either hematemesis or melena secondary to ingested maternal blood, and the source of the bleeding can be distinguished with the Apt–Downey test in which adult hemoglobin turns brown in an alkaline environment. In addition, sources outside the gastrointestinal tract such as epistaxis, hemoptysis, hematuria, or menstrual blood commonly result in the appearance of an upper or lower gastrointestinal bleed.
UPPER GASTROINTESTINAL BLEEDING

Upper gastrointestinal bleeding is classically defined as occurring proximal to the ligament of Treitz, and causes vary by age (Table 72–1). Although hematemesis is always upper gastrointestinal in origin, up to 75% of lower gastrointestinal bleeding is actually upper in origin, presenting as melena or even bright red rectal bleeding if bleeding is brisk and transit time is rapid. Upper gastrointestinal bleeding also carries a higher mortality rate compared to lower gastrointestinal bleeding.² Upper gastrointestinal bleeding can originate in the esophagus, stomach, or duodenum.

| Table 72-1. Causes of Upper Gastrointestinal Bleeding (by Age) |
|-----------------|-----------------|-----------------|
| Age             | Small Volume    | Large Volume    |
| Newborn         | Gastritis       | Ingested maternal blood |
|                 | Stress ulcers   | Vitamin K deficiency |
|                 | Esophagitis     | A-V malformation |
|                 |                 | Bleeding disorders/DIC |
| Infant          | Gastritis       | Peptic ulcer disease |
|                 | Esophagitis     | A-V malformation |
|                 | Mallory–Weiss tear |               |
| Child           | Gastritis       | Esophageal varices |
|                 | Esophagitis     | Peptic ulcer disease |
|                 | Foreign body    | A-V malformation |
|                 | Mallory–Weiss tear |               |

Esophagus

Inflammatory disorders of the esophagus can result in irritation of the mucosa and subsequent bleeding. Gastroesophageal reflux is the most common cause of esophageal inflammation and may present with regurgitation, abdominal or chest pain, cough, and food refusal.³ (See Chapter 73 for a detailed review of gastroesophageal reflux.) Esophageal infections from Candida, cytomegalovirus, and herpes also occur, more commonly in immunocompromised children, although they can occur in otherwise healthy children as well. These patients typically present with severe chest or abdominal pain, fever, dysphagia, and odynophagia, and if bleeding occurs, it is typically small in volume. Many patients with reflux esophagitis can be treated empirically with acid suppression, but children with infections of the esophagus often require further evaluation and possibly inpatient treatment depending on the severity of their symptoms. Patients with severe or persistent symptoms may require endoscopy.

Lacerations of esophageal mucosa (Mallory Weiss tears) can occur in patients with repeated retching, vomiting, or paroxysmal cough.⁴ These lesions typically occur at the gastroesophageal
junction or in the cardia of the stomach. Abdominal pain is typically minimal.\(^5\) Most bleeding from Mallory Weiss tears is self-limited and relatively small in volume,\(^6\) and most patients can be successfully treated with anti-emetics and acid suppression.\(^7\)

Children with known liver disease or portal hypertension are at risk for esophageal varices, coagulopathy, and subsequent significant gastrointestinal bleeding (Fig. 72–1). Even otherwise healthy children can have undiagnosed extrahepatic portal hypertension and develop bleeding varices. Variceal bleeding can present with bleeding ranging from minimal to life-threatening and carries with it a mortality rate of up to 8%.\(^8\) These patients may require red cell or platelet transfusions and correction of coagulation defects with fresh frozen plasma or vitamin K. Fortunately, variceal bleeding is self-limited in up to 50% of patients.\(^4\) Endoscopy is particularly important in patients with variceal bleeding as it offers not only a diagnosis but also allows therapeutic sclerotherapy or banding. If endoscopy is not feasible, medical therapy with intravenous vasopressin or somatostatin can be effective in controlling variceal bleeding.\(^7,8\)

**Figure 72-1.**

![Image](https://www.accessmedicine.com.libproxy.lib.unc.edu/content/32769915)

*Source: Strange GR, Ahrens WR, Schafermeyer RW, Wiebe RA; Pediatric Emergency Medicine, 3rd Edition; http://www.accessemergencymedicine.com

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Multiple oozing esophageal varices seen, extending to gastroesophageal junction in a child with portal hypertension. (Photo courtesy of Dr. Brian Riedel, Pediatric Gastroenterology, Vanderbilt University Medical Center.)
Gastritis and peptic ulcer disease are common etiologies for upper gastrointestinal bleeding (Fig. 72–2). Medications such as NSAIDs, corticosteroids, and iron are known to increase the risk for gastric and duodenal inflammation. Infection with *Helicobacter pylori* is a common cause of gastric and duodenal ulcers in healthy children. Critically ill children are particularly at risk for development of “stress gastritis,” and prophylaxis with acid-suppressing drugs is essential. Patients with gastritis or ulcers often present with epigastric or left upper quadrant abdominal pain, which is relieved by eating. Hematemesis can occur and is usually self-limited, although it can be massive and even life-threatening, particularly if ulceration and perforation occur. Although the gold standard for the diagnosis of *H. pylori* infection is endoscopy with biopsy, noninvasive testing for *H. pylori* fecal antigen testing is a reliable, highly sensitive test and may be feasible in the emergency department. Gastritis and peptic ulcers can be treated with acid suppression and close follow-up provided the bleeding is minimal and has stopped. Antimicrobial therapy should be included if infection with *H. pylori* is a factor. Endoscopy may be required for severe or persistent symptoms.

**Figure 72-2.**

Deep crater peptic ulcer seen in the fundus of the stomach on endoscopy. (Photo courtesy of Dr. Brian Riedel, Pediatric Gastroenterology, Vanderbilt University Medical Center.)

Vascular malformations are a rare but important cause of gastrointestinal bleeding and can be present anywhere along the gastrointestinal tract. They typically present with painless, massive,
and recurrent hemorrhage in the absence of other symptoms. Endoscopy is valuable for lesions in the upper gastrointestinal tract or colon and allows for therapeutic interventions. Some vascular lesions are visible on CT scan or MRI.12 For persistent bleeding (at least 0.1 mL/min), a radioisotope-labeled red cell scan may be diagnostic. Although difficult to perform in children, angiography may assist the diagnosis if bleeding is brisk (1–2 mL/min),5 and treatment may be possible by embolization. An important lesion occurring in the upper gastrointestinal tract is the Dieulafoy malformation. These bleeding submucosal vessels occur in the stomach without overlying ulceration. They can result in massive bleeding and may retract, making them difficult to identify on endoscopy.2

Although ingestion of foreign bodies is a common event in pediatrics, rarely this can result in upper gastrointestinal bleeding. Young children in particular may not provide a history of ingestion; thus, a high level of suspicion is required in patients with a history of choking, unexplained coughing, dysphagia, or food refusal. Some objects may be visible on plain film, but most patients with suspected ingested foreign body and gastrointestinal bleeding will require further investigations including CT scan or endoscopy for diagnosis. (See Chapter 74 for a detailed discussion of gastrointestinal foreign bodies.)

**LOWER GASTROINTESTINAL BLEEDING**

Lower gastrointestinal bleeding can occur anywhere from the ligament of Treitz to the anus and varies by age (Table 72–2). Although lower gastrointestinal bleeding is a common complaint, encompassing 0.3% of pediatric emergency department visits, most causes are relatively benign and self-limited.1 The actual bleeding source, however, can occasionally be difficult to identify. Lower gastrointestinal bleeding can present as melena or hematochezia. Melena typically indicates a more proximal source and occurs when blood has been present in the gastrointestinal tract for a prolonged period of time, resulting in breakdown of hemoglobin.13 Small volume hematochezia is typically from the distal colon or anus, although large volume rectal bleeding can result from lesions any place along the gastrointestinal tract if bleeding is brisk. Lower gastrointestinal bleeding can occur in the small intestine, colon, rectum, or anus.

| Table 72-2. Causes of Lower Gastrointestinal Bleeding (by Age) |
|---|---|---|
| **Age** | **Small Volume** | **Large Volume** |
| Newborn | NEC | Ingested maternal blood |
| | Anal fissure | DIC |
| | Volvulus | AVM |
| | Duplication | |
| Infant | Allergic colitis | Meckel's diverticulum |
| | Enterocolitis | AVM |
| | Nodular lymphoid hyperplasia | |
| | Duplication | |
| | Intussusception | |
Intestine

A common cause of lower gastrointestinal bleeding is infectious enterocolitis. Enterocolitis occurs among children of all ages and can result in abdominal pain, fever, and bloody stools. Common pathogens implicated in bloody diarrhea include *Salmonella*, *Shigella*, *Campylobacter jejuni*, *Yersinia enterocolitica*, *Escherichia coli*, *Clostridium difficile*, and *Entamoeba histolytica*. Although most enterocolitis is self-limited, rare complications such as hemolytic uremic syndrome can occur; thus, children with infectious enterocolitis and bloody diarrhea may require additional testing and close follow-up. Diagnosis is commonly made by stool culture or antigen testing. Many infections in otherwise healthy children do not require treatment, and in some cases, treatment with antimicrobials may worsen the clinical course. Treatment with appropriate antimicrobials is recommended, however, for patients with documented *Shigella*, *Campylobacter*, *C. difficile*, and *E. histolytica*. Antimotility agents should generally be avoided.

Necrotizing enterocolitis (NEC) is a rare but serious cause of lower gastrointestinal bleeding in young infants. Although most often seen in the newborn intensive care unit, occasionally neonates may present to the emergency department. These infants often have a history of prematurity, significant anoxic stress at birth, or cyanotic congenital heart disease. Infants with NEC typically appear ill, with lethargy, abdominal distension, vomiting, and bloody stools. Abdominal radiographs reveal distended loops of bowel and pneumatosis intestinalis. Treatment involves appropriate resuscitation, bowel rest, broad-spectrum antimicrobials, and early surgical consultation.

Children with Hirschprung's disease can develop toxic megacolon and present acutely ill with abdominal distension, fever, explosive diarrhea, hematochezia, and abdominal pain. Toxic megacolon can be the presentation of Hirschprung's disease, but can also occur after surgical resection of the aganglionic segment, particularly in children with longer segment disease or Down syndrome. Intestinal dilatation with air–fluid levels is often seen on plain abdominal x-ray, often with an intestinal cutoff sign (abrupt cutoff of intestinal distension at the pelvic brim, Fig. 72–3). Treatment involves bowel decompression, hydration, and broad-spectrum antibiotics.

Figure 72-3.
Intestinal cutoff sign seen in a child with toxic megacolon. This child had previously undergone resection of his aganglionic colon segment. Note the massive intestinal distension. (Photo courtesy of Dr. Thomas J. Abramo, Pediatric Emergency Medicine, Vanderbilt University Medical Center.)

Obstructive disorders of the intestine can also lead to lower gastrointestinal bleeding. Although typically small in volume, the bleeding associated with obstruction is typically secondary to tissue ischemia. The most common cause of bleeding from obstruction is intussusception. Intussusception most commonly occurs in children younger than 2 years. These children typically present with intermittent colicky abdominal pain and vomiting, although some children present with only generalized illness and malaise. Intussusception can occur anywhere within the bowel, but most commonly at the ileocecal junction. A sausage-shaped abdominal mass may be palpated in the right lower quadrant or anywhere along the ascending or transverse colon, depending on the extent of bowel telescoping. Bleeding from an intussusception is described as "currant-jelly," and occurs late in the course, after bowel ischemia has occurred. Abdominal radiographs may show a "target sign" or paucity of bowel gas in the right lower quadrant, but may also be normal. Ultrasound is a common modality to diagnose intussusception. Air-contrast enema can be both diagnostic and therapeutic for intussusception, but complications such as failure to reduce the intussusception or bowel perforation can occur, and surgical consultation may be warranted.


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Volvulus can also present with rectal bleeding from bowel ischemia. It is most common in neonates and typically presents with bilious vomiting, abdominal distension, and feeding problems. Abdominal radiographs may reveal a paucity of gas in the abdomen with a "double bubble sign," with foci of gas seen in the stomach and duodenum. An upper gastrointestinal contrast study is the diagnostic study of choice. Appropriate resuscitation, antimicrobials, and emergent surgical reduction of the volvulus are critical to preserve bowel viability. Duplication of the bowel can also result in bowel ischemia and bleeding from intussusception, volvulus, or expansion of the duplication.

Otherwise asymptomatic bleeding of the small intestine can be due to lesions such as a Meckel's diverticulum or juvenile polyp. Meckel's diverticulum occurs when the omphalomesenteric duct is incompletely obliterated early in fetal life. Two percent of the population has this 2-in long diverticulum within 2 ft. of the ileocecum.\textsuperscript{1}\textsuperscript{,19} If the diverticulum contains ectopic gastric mucosa, ulceration and massive bleeding can occur. Patients typically present before age 2 and are well-appearing with painless rectal bleeding. A radionuclide scan with technetium-99 m pertechnate is diagnostic.\textsuperscript{1} This radioisotope binds preferentially to gastric mucosa. Treatment involves surgical consultation and resection. Meckel's diverticulum can also act as a lead point for intussusception.\textsuperscript{19} Duplications of the small intestine can also contain ectopic gastric mucosa. Juvenile polyps are a common cause of gastrointestinal bleeding outside the neonatal period. Bleeding is typically painless, recurrent, and small in amount. Most polyps in children are solitary, benign, and occur within the left colon, often in the rectosigmoid region.\textsuperscript{13} Diagnosis is typically made on endoscopy, which may also allow for excision if the polyp is small (Fig. 72–4).

\textbf{Figure 72-4.}
A 0.7-cm pedunculated polyp was identified in the sigmoid colon of a child presenting with painless rectal bleeding. (Photo courtesy of Dr. Brian Riedel, Pediatric Gastroenterology, Vanderbilt University Medical Center.)

Inflammatory disorders of the intestine are also a common cause of lower gastrointestinal bleeding. Infants most commonly have milk protein allergic colitis. These infants are well-appearing, but present with a history of bloody stools and occasionally vomiting or failure to thrive. Cow milk and soy milk are the most commonly implicated allergens, although in a significant number of infants the allergen is unknown. Diagnostic testing is difficult, and most infants are diagnosed clinically and treated empirically by exclusion of any known allergens from the infant's or breast-feeding mother's diet. Even with dietary modification, however, bloody stools can persist for weeks.

Inflammatory bowel disease including ulcerative colitis and Crohn's disease commonly results in rectal bleeding (Fig. 72–5). Most common in adolescents, inflammatory bowel disease often mimics other causes of colitis, causing crampy abdominal pain, frequent bloody stools, tenesmus, and weight loss. While ulcerative colitis typically only involves the colon, Crohn's disease can involve any portion of the gastrointestinal tract. Laboratory evaluation may reveal anemia, thrombocytosis, and elevated ESR. Colonoscopy with biopsy is required for diagnosis in most
cases. Therapy involves anti-inflammatory and immunosuppressive medication and occasionally surgical intervention.

**Figure 72-5.**

Edema, friability, and ulceration of colon seen on endoscopy in a child with ulcerative colitis. (Photo courtesy of Dr. Brian Riedel, Pediatric Gastroenterology, Vanderbilt University Medical Center.)

Henoch–Schönlein Purpura (HSP) is a common immune-mediated vasculitis, which can involve the entire gastrointestinal tract. Children with HSP often have gastrointestinal manifestations including abdominal pain, vomiting, and bloody stools or melena. Most commonly, bleeding is due to mucosal hemorrhage, but intussusception is also common among children with HSP. Diagnosis of HSP is made clinically, which can offer a challenge as gastrointestinal manifestations can precede the pathognomonic purpuric skin changes. Although there is no current consensus on treatment, administration of corticosteroids may ameliorate some gastrointestinal symptoms in HSP.

Colonic lymphonodular hyperplasia from protein allergy or infection can result in asymptomatic, small volume bleeding. More common in infants and young children, these inflammatory patches may result in flecks or small amounts of blood mixed in the stool of otherwise asymptomatic children. Lymphonodular hyperplasia is typically diagnosed on colonoscopy and does not require any specific treatment (Fig. 72-6).
Diffuse lymphnodular hyperplasia is seen in this child undergoing colonoscopy for rectal bleeding. (Photo courtesy of Dr. Brian Riedel, Pediatric Gastroenterology, Vanderbilt University Medical Center.)

Rectum/Anus

Benign lesions of the rectum and anus can also cause apparent lower gastrointestinal bleeding. The most common cause of rectal bleeding in infants is an anal fissure. These infants typically pass a painful, hard stool with bright red blood seen on the surface of the stool. Hemorrhoids are uncommon in young children but can occur in constipated adolescents. They result in painful defecation, often with the blood on the outside of the stool. Diagnosis is made on physical examination, and treatment involves dietary modifications or medications to soften the stool. Young children with constipation are also predisposed to rectal prolapse, which may result in scant rectal bleeding (Fig. 72–7). The prolapsed segment often self-reduces, and the diagnosis is made on history and physical examination alone. If a child presents with rectal prolapse, firm constant pressure will typically result in reduction, otherwise surgical consultation is necessary. Softening the stool will minimize recurrence. Trauma from sexual abuse may also present as rectal bleeding (see Chapter 145 for more details) (Fig. 72–7).

Figure 72-7.
Rectal prolapse was seen on examination of this child presenting with rectal pain and bleeding. (Photo courtesy of Dr. Thomas J. Abramo, Pediatric Emergency Medicine, Vanderbilt University Medical Center.)

CONCLUSIONS

Gastrointestinal bleeding is a common complaint in the pediatric emergency department and may result in considerable anxiety for families but is only rarely associated with significant morbidity or mortality. Although the etiology can sometimes be challenging to identify, close attention to the volume, timing, and color of the bleeding as well as other associated signs and symptoms will often point to a diagnosis.

REFERENCES


