

A 2-year-old boy is brought to the emergency department for bleeding after his parents discovered a substantial amount of maroon-colored stool in his diaper. The boy has been eating and drinking well but feels more tired than usual. His temperature is 37 C (98.6 F), blood pressure is 85/50 mm Hg, pulse is 130/min, and respirations are 20/min. His weight has been tracking along the 50th percentile. Examination shows a pale, cooperative boy. The abdomen is soft, nondistended, nontender, and without masses. There are no anal fissures or hemorrhoids. A fecal occult blood test is positive. Laboratory results are as follows:

Leukocytes	8,000/ μ L
Hemoglobin	9 g/dL
Hematocrit	27%
Platelets	320,000/ μ L

Which of the following is the best modality to confirm the diagnosis?

- ☐ A. Abdominal computed tomography scan
- ☐ B. Abdominal ultrasonography
- ☒ C. Air enema
- ☐ D. Bacterial stool culture
- ☐ E. Colonoscopy
- ☐ F. Elimination of cow's milk from diet
- ☐ G. Superior mesenteric arteriography
- ☐ H. Technetium-99m pertechnetate scan

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Which of the following is the best modality to confirm the diagnosis?

- ☐ A. Abdominal computed tomography scan [5%]

☐ B. Abdominal ultrasonography [8%]

☐ C. Air enema [6%]

☐ D. Bacterial stool culture [2%]

☐ E. Colonoscopy [6%]

☐ F. Elimination of cow's milk from diet [6%]

☐ G. Superior mesenteric arteriography [1%]

☒ H. Technetium-99m pertechnetate scan [67%]

Proceed to Next Item

Explanation:

User Id:

Meckel's diverticulum	
	Rule of 2s <ul style="list-style-type: none">• 2% prevalence

Explanation:

User Id: [REDACTED]

Meckel's diverticulum	
Epidemiology	Rule of 2s <ul style="list-style-type: none"> • 2% prevalence • 2:1 male-to-female ratio • 2% are symptomatic at age 2 • Located within 2 feet of the ileocecal valve
Clinical presentation	<ul style="list-style-type: none"> • Asymptomatic incidental finding • Painless hematochezia • Intussusception • Intestinal obstruction • Volvulus
Diagnosis	Technetium-99m pertechnetate scan
Treatment	Surgery for symptomatic patients

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Gastrointestinal bleeding is divided into upper and lower bleeding by the ligament of Treitz. Melena (black, tarry stools) usually originates from the stomach or proximal small bowel tract; hematochezia (bright red stools) usually comes from the distal small bowel or colon. The differential diagnosis of hematochezia in early toddlerhood includes hemorrhoids, infectious colitis, intussusception, Meckel's diverticulum, and inflammatory bowel disease.

Meckel's diverticulum is the most common congenital small-intestine anomaly that results from incomplete obliteration of the fetal **vitelline (omphalomesenteric) duct**. Most (~85%) diverticula contain **heterotopic gastric tissue** and less commonly contain pancreatic tissue. The diverticulum is an asymptomatic, incidental finding in most patients. Only 2% of diverticula become symptomatic, with **painless hematochezia** being the most common presentation. Ectopic gastric tissue secretes hydrochloric acid, causing mucosal ulceration of surrounding small bowel. The bleeding is often substantial and causes severe anemia or hemorrhagic shock.

The best diagnostic test is a **technetium-99m pertechnetate scan** (eg, "Meckel's scan"). The patient receives a tiny amount of intravenous technetium-99m and a gamma

Treatment	Surgery for symptomatic patients
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The best diagnostic test is a **technetium-99m pertechnetate scan** (eg, "Meckel's scan"). The patient receives a tiny amount of intravenous technetium-99m, and a gamma camera highlights gastric mucosa and ectopic gastric tissue. Scintigraphy is noninvasive, highly sensitive (>85%) and specific (>95%), and emits little radiation. Although the bleeding usually resolves spontaneously, **surgical resection** is necessary to prevent further bleeding or other complications such as intussusception or complete obstruction.

(Choice A) Computed tomography scans cannot reliably differentiate the diverticulum from other loops of bowel.

(Choices B and C) Meckel's diverticulum is a potential lead point for intussusception that classically presents as severe, intermittent abdominal pain with or without hematochezia. Workup of intussusception consists of **abdominal ultrasonography** followed by diagnostic and therapeutic air enema. This patient has no pain, making intussusception unlikely. These tests are also not useful in evaluating gastrointestinal hemorrhage.

(Choice D) Stool cultures can identify the offending pathogen in bacterial colitis. This diagnosis is unlikely as bloody diarrhea usually occurs with crampy abdominal pain, malaise, and fever.

(Choice E) Colonoscopy is helpful for evaluation of inflammatory bowel disease and colon cancer, but these conditions usually present with additional symptoms (eg, abdominal pain, weight loss). Colonoscopy can potentially identify diverticula but

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(Choice E) Colonoscopy is helpful for evaluation of inflammatory bowel disease and colon cancer, but these conditions usually present with additional symptoms (eg, abdominal pain, weight loss). Colonoscopy can potentially identify diverticula but requires sedation and carries risk of perforation.

(Choice F) Milk protein allergy can cause painless rectal bleeding that resolves with elimination of dietary cow's milk. The condition is virtually exclusive to infants and resolves by age 1, making dietary modifications unnecessary in this patient.

(Choice G) Superior mesenteric arteriography may be useful in localizing a Meckel's diverticulum if active contrast extravasation from the vitelline artery feeding the diverticulum can be seen. This test is more invasive, less reliable, and exposes the child to ionizing radiation.

Educational objective:

Painless hematochezia in a young toddler is most likely due to Meckel's diverticulum. The outpouching usually contains gastric mucosa that is best diagnosed by technetium-99m pertechnetate scanning.

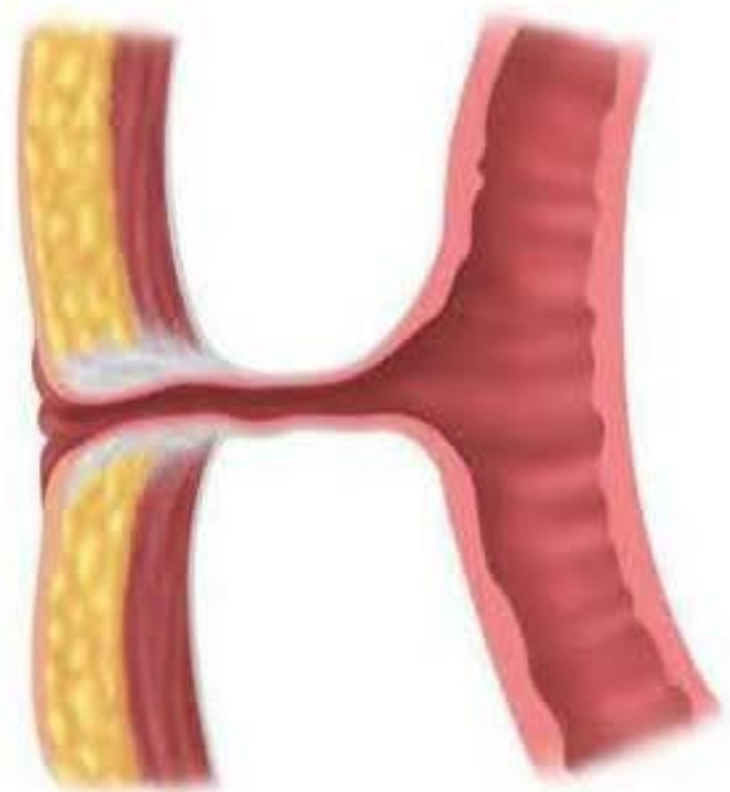
References:

1. [Meckel's scan in children: a review of 183 cases referred to two paediatric surgery specialist centres over 18 years.](#)
2. [Imaging manifestations of Meckel's diverticulum.](#)
3. [Meckel diverticulum: the Mayo Clinic experience with 1476 patients \(1950-2002\).](#)

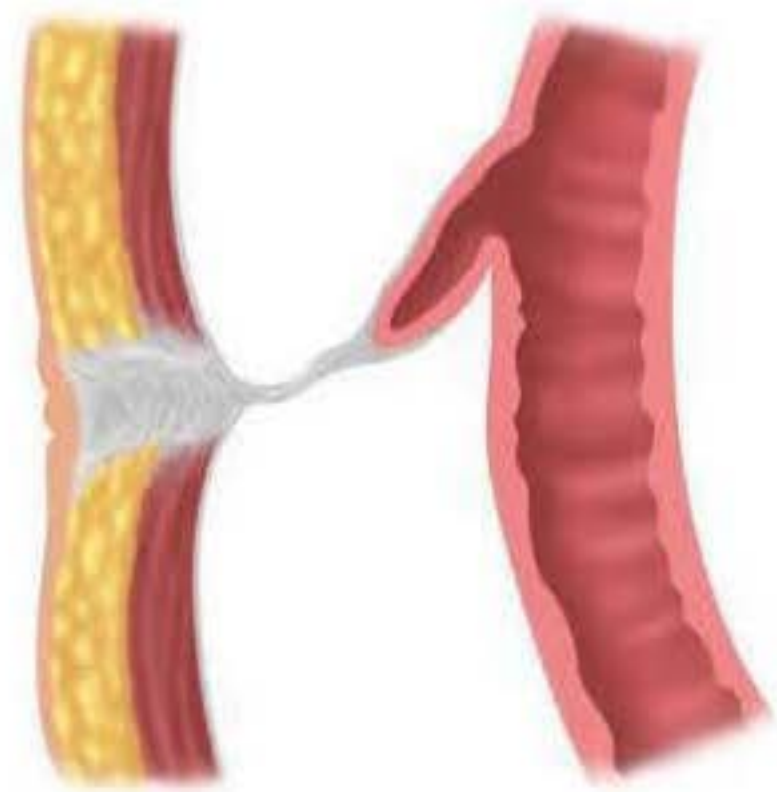
Media Exhibit

duct abnormalities

Vitelline duct abnormalities



Persistent vitelline duct



Meckel diverticulum

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Media Exhibit

intussusception

