

A 7-day-old girl with DiGeorge syndrome in the neonatal intensive care unit has poor feeding and bloody stools. She has been hospitalized since her birth at 38 weeks gestation, awaiting adequate weight gain prior to surgery for truncus arteriosus. She has been taking oral formula and now weighs 2.75 kg (6 lb 1 oz). Her temperature is 36.7 C (98 F), blood pressure is 60/30 mm Hg, pulse is 164/min, and respirations are 30/min. Pulse oximetry is 82% on room air. Physical examination shows a lethargic, cyanotic neonate with abdominal distension and decreased bowel sounds. Bright red blood is visible in her stool. A nasogastric tube is placed for decompression. **Abdominal x-ray** is obtained. What is the most likely diagnosis in this patient?

- ☐ A. *Clostridium difficile* colitis
- ☐ B. Intussusception
- ☐ C. Malrotation with midgut volvulus
- ☐ D. Milk protein-induced enterocolitis
- ☐ E. Necrotizing enterocolitis

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- ☐

A. *Clostridium difficile* colitis [1%]
- ☐

B. Intussusception [10%]
- ☐

C. Malrotation with midgut volvulus [23%]
- ☐

D. Milk protein-induced enterocolitis [3%]
- ☒

E. Necrotizing enterocolitis [63%]

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Explanation:

User Id:

Necrotizing enterocolitis	
Risk factors	<ul style="list-style-type: none">• Prematurity• Very low birth weight (<1.5 kg)• Reduced mesenteric perfusion (hypotension, congenital heart disease)• Enteral feeding (formula > breast milk)
Clinical features	<ul style="list-style-type: none">• Systemic: Vital sign instability, lethargy• Gastrointestinal: Vomiting, bloody stools, abdominal distension/tenderness
	<ul style="list-style-type: none">• Pneumatosis intestinalis

Explanation:

User Id: [REDACTED]

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X-ray findings	<ul style="list-style-type: none"> • Pneumatosis intestinalis • Portal venous gas • Pneumoperitoneum
Treatment	<ul style="list-style-type: none"> • Supportive care <ul style="list-style-type: none"> • Bowel rest • Parenteral hydration/nutrition • Broad-spectrum intravenous antibiotics • +/- Surgery
Complications	<ul style="list-style-type: none"> • Septic shock • Intestinal strictures • Short bowel syndrome • Death (up to 40%)

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Necrotizing enterocolitis (NEC) is a leading cause of death in the neonatal intensive care unit. Although >85% of affected infants are **premature** and/or have **very low birth weight**, term infants with **reduced mesenteric perfusion** from **congenital heart**

Necrotizing enterocolitis (NEC) is a leading cause of death in the neonatal intensive care unit. Although >85% of affected infants are **premature** and/or have **very low birth weight**, term infants with **reduced mesenteric perfusion** from **congenital heart disease** and/or **hypotension** are also at risk for intestinal ischemia and infarction. The most commonly affected sites are the terminal ileum and colon, although the entire gastrointestinal tract can be affected in severe cases. Affected term infants tend to experience the disease at a younger age than preterm infants, possibly due to earlier initiation of **enteral feeding**. Commercial formulas and human milk serve as substrates for bacterial proliferation in the gut. The poorly perfused intestinal tract may have reduced ability to completely digest and absorb nutrients, leading to bacterial fermentation, excessive mucosal inflammation, and translocation of bacteria and gas into the bowel wall.

Classic features of NEC include feeding intolerance, increasing abdominal girth, bloody stools, and vomiting. These symptoms are usually preceded by nonspecific lethargy and vital sign instability. The pathognomonic radiologic finding is **pneumatosis intestinalis**, which represents extravasation of bowel gas into the damaged bowel wall. Because of potential seeding of intestinal bacteria, empiric **broad-spectrum antibiotics** should be started immediately given the serious risk of lethal **septic shock**. Severe bowel wall damage can result in perforation and **pneumoperitoneum** and requires surgical intervention. Depending on the severity and length of bowel injury, patients are also at risk for **strictures**, **short bowel syndrome**, and death.

(Choice A) *Clostridium difficile* colitis can cause abdominal distension and bloody stools. Although neonates frequently are colonized with *C difficile*, symptomatic disease is rare in the first year of life, possibly due to an absence of intestinal receptors to the bacterial toxins.

(Choice B) Intussusception can cause bloody stools but is uncommon in the neonate. It also can give the appearance of a "target sign" on x-ray or ultrasound (2 concentric radiolucent circles of telescoped bowel), but not the intramural air seen in this patient.

(Choice C) Malrotation with midgut volvulus typically presents as vomiting and abdominal pain in neonates age <1 month. However, x-ray usually shows a gasless abdomen due to obstruction involving the duodenum.

(Choice D) Milk protein-induced enterocolitis usually presents as blood-tinged stools in an otherwise healthy infant age 2-8 weeks after sensitization to milk protein. This diagnosis is less likely based on the patient's age, cardiac comorbidity, and severity of illness.

Educational objective:

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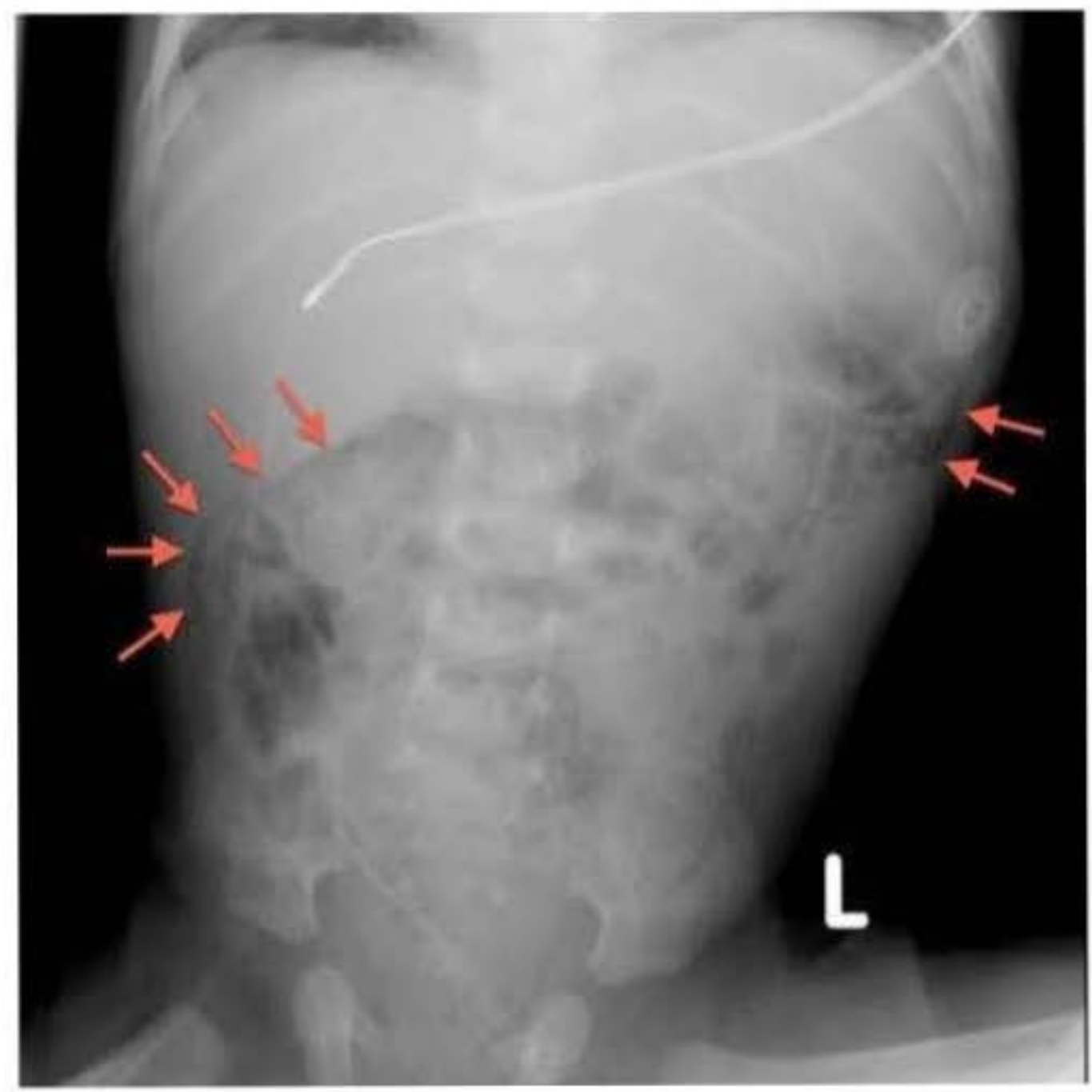
Necrotizing enterocolitis should be suspected in a newborn with feeding intolerance, abdominal distension, and bloody stools. Risk factors include prematurity, hypotension, and congenital heart disease. The hallmark x-ray finding is pneumatosis intestinalis.

References:

1. [A clinical perspective of necrotizing enterocolitis: past, present, and future.](#)
2. [Necrotizing enterocolitis in neonates with congenital heart disease: risk factors and outcomes.](#)
3. [Short- and long-term outcomes of necrotizing enterocolitis in infants with congenital heart disease.](#)
4. [Necrotizing enterocolitis in term neonates: data from a multihospital health-care system.](#)

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