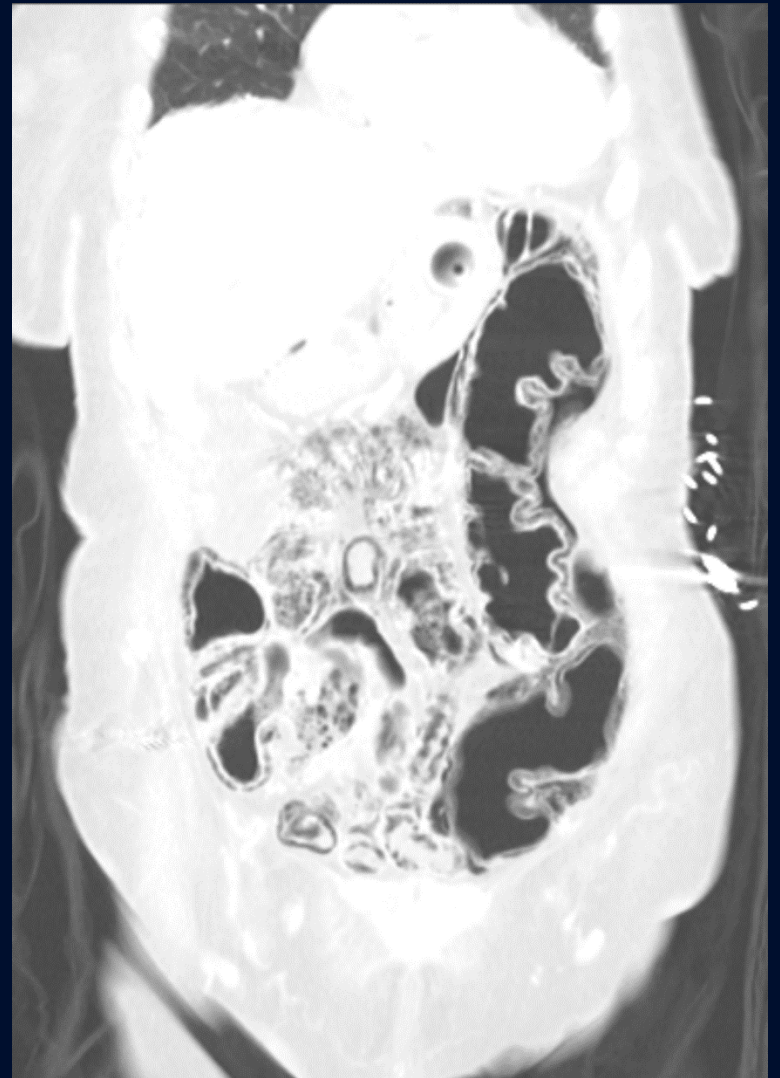
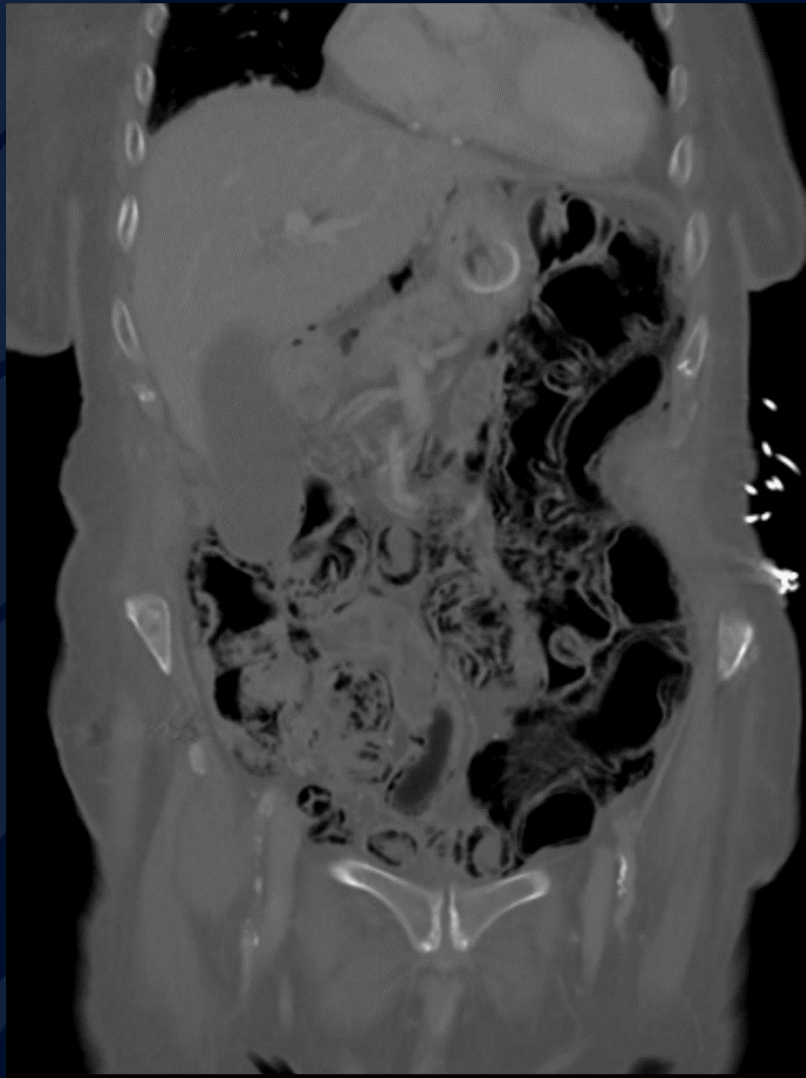


Patient is 83 yo female with history of oral metastatic squamous cell carcinoma with nausea and vomiting. Physical exam was benign with no signs of peritonitis.

Elena G. Violari M.D.

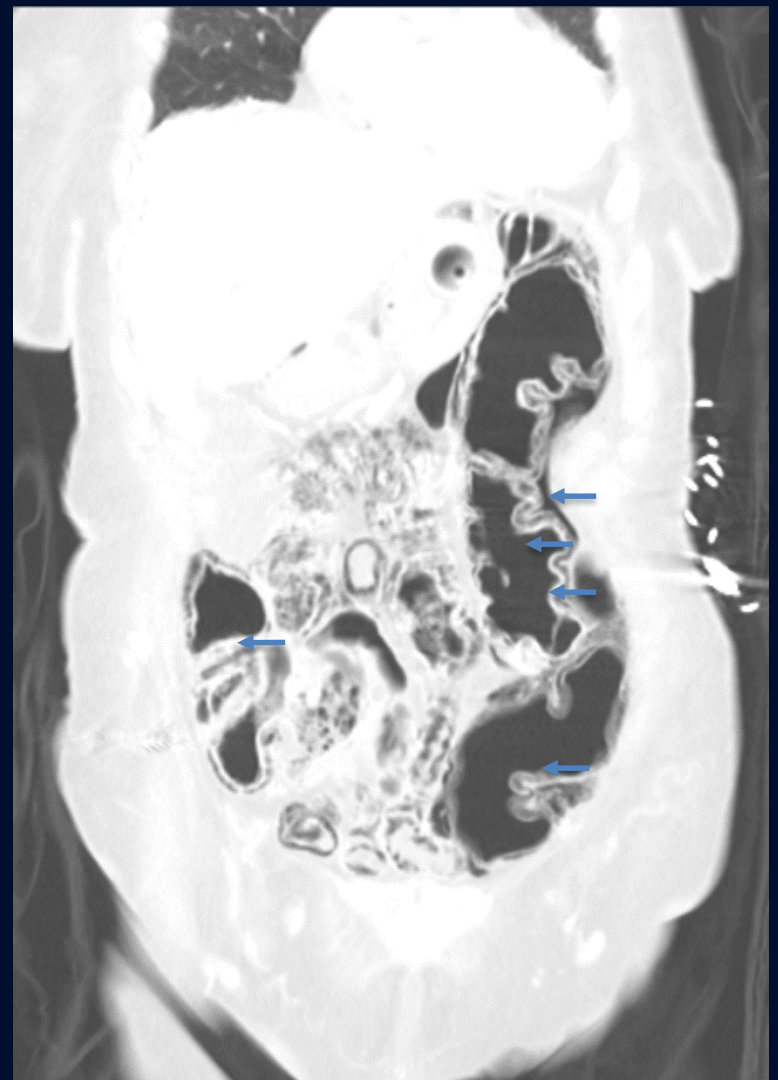
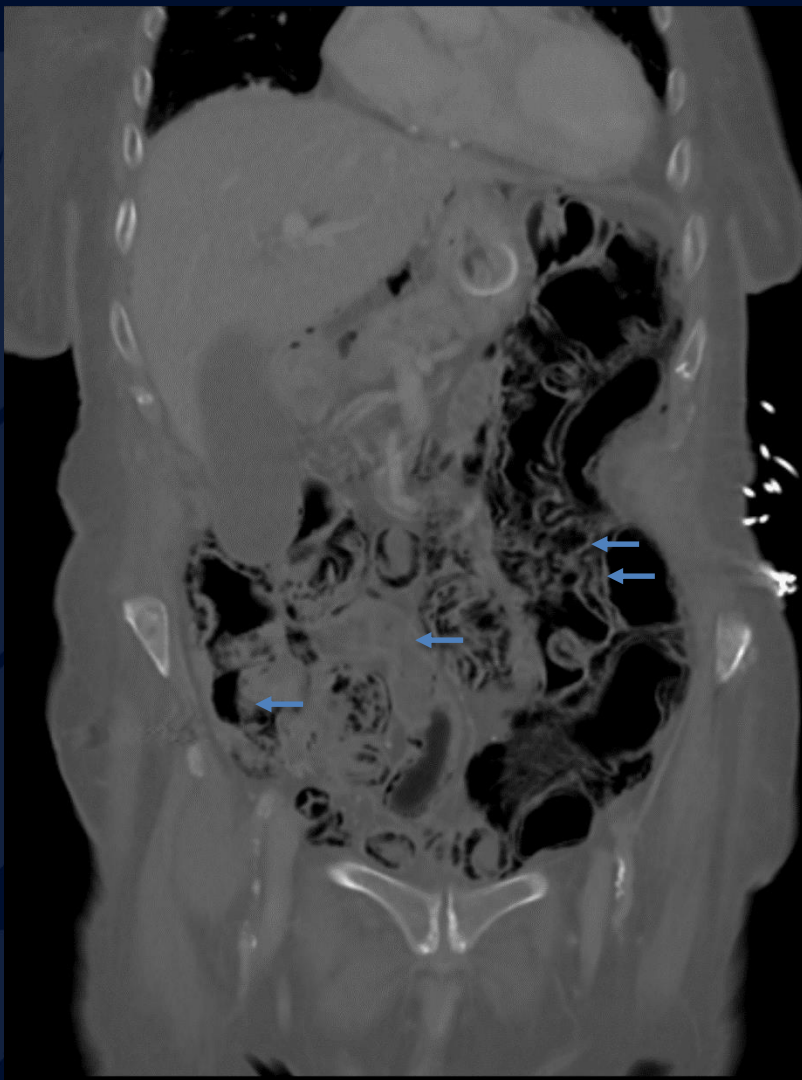




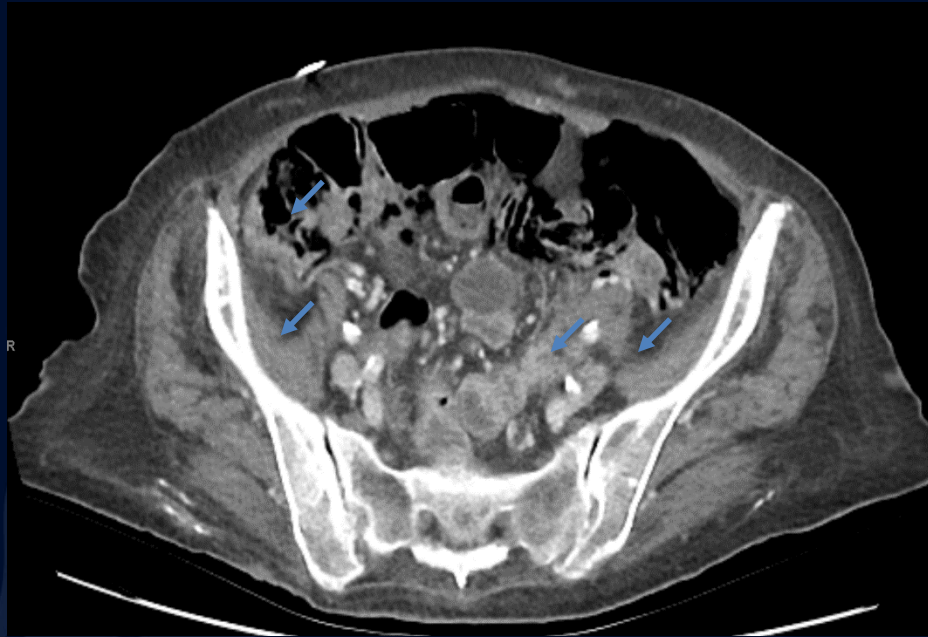
A large, stylized oak leaf graphic in a dark blue color, positioned on the left side of the slide. It features detailed vein patterns and a lobed edge.

?

# Benign Pneumatosis Intestinalis



Pneumatosis involving a long segment distal ileum. Extensive pneumatosis involving the ascending colon, transverse colon, and descending colon with sparing of the rectosigmoid colon.



Pneumoperitoneum is probably a reflection of ruptured blebs from the colonic or small bowel wall.

# Benign Pneumatosis Intestinalis

## Definition:

Primary pneumatosis intestinalis is a benign idiopathic condition in which multiple gas-filled cystic lesions are seen in the gastrointestinal tract wall. The changes are usually seen initially on radiography or CT with CT being the more sensitive test.

## Epidemiology:

Primary pneumatosis intestinalis is rare and was shown to comprise 15% of cases of all intestinalis pneumatosis (See Ref).

## Clinical Presentation:

This condition is usually asymptomatic and presents as an incidental finding on medical imaging.



# Benign Pneumatosis Intestinalis

## **Pathology:**

Multiple gas-filled cysts are seen in the mucosa and submucosa of the small and large bowel.

## **Differential Diagnosis:**

Ischemic bowel: Gas in the ischemic bowel wall has a linear or bubble-like pattern, in contrast to the PPI gas pattern, which is circular

## **Causes of secondary pneumatosis intestinalis:**

- Post-instrumentation of the bowel e.g. endoscopy, surgery
- COPD, ventilated patients
- Drugs such as steroids, chemotherapy (e.g. bevacizumab)
- Pseudo-pneumatosis: intraluminal gas trapped between feces and the bowel wall.

## **Mnemonic (Chips):**

- C: Chronic obstructive pulmonary disease
- I: Ischemia
- P: Pneumatosis cystoides intestinalis
- S: Scleroderma/steroids

# Benign Pneumatosis Intestinalis

## Radiographic Features:

Gas tracks along the bowel wall, appearing as either linear, which are usually submucosal, or rounded cystic “bubbly” collections, which are usually subserosal. Where they join, they may outline the circumferential margin of the bowel, creating rings.

Gas in the bowel wall is most easily identified with CT and plain radiography, but ultrasound and MRI can be useful in pediatric patients where there is a desire to avoid radiation.

## **Other imaging findings include:**

- Dilated bowel
- Bowel wall thickening
- Abnormal bowel wall enhancement,
- Portal venous gas,
- Pneumoperitoneum
- Atherosclerosis
- Ascites

# Pneumatosis Intestinalis

## APPENDIX I. Causes of Pneumatosis Intestinalis in the Adult: Benign and Life-Threatening Causes and Associations

### A. Benign causes

- Pulmonary
  - Asthma
  - Bronchitis
  - Emphysema
  - Pulmonary fibrosis
  - Positive end-expiratory pressure (PEEP)
  - Cystic fibrosis
- Systemic disease
  - Scleroderma
  - Systemic lupus
  - AIDS
- Intestinal causes
  - Pyloric stenosis
  - Intestinal pseudoobstruction
  - Enteritis
  - Peptic ulcers
  - Bowel obstruction
  - Adynamic ileus
  - Inflammatory bowel disease
  - Ulcerative colitis
  - Crohn's disease
  - Leukemia
  - Perforated jejunal diverticulum
  - Whipple's disease
  - Intestinal parasites
  - Collagen vascular disease (especially scleroderma)
  - Diverticulitis
- Iatrogenic
  - Barium enema
  - Jejunioleal bypass
  - Jejunostomy tubes
  - Postsurgical anastomosis
  - Endoscopy

### Medications

- Corticosteroids
- Chemotherapeutic agents
- Lactulose
- Sorbitol
- Voglibose

### Organ transplantation

- Bone marrow
- Kidney
- Liver
- Cardiac
- Lung
- Graft versus host

### Primary pneumatosis

- Idiopathic (up to 15% of cases and usually involves the colon)
- Pneumatosis cystoides intestinalis

### B. Life-threatening causes

- Intestinal ischemia
- Mesenteric vascular disease
- Intestinal obstruction (especially strangulation)
- Enteritis
- Colitis
- Ingestion of corrosive agents
- Toxic megacolon
- Trauma
- Organ transplantation (especially bone marrow transplants)
- Collagen vascular disease

Note—A number of causes and associations occur under both benign and life-threatening categories.

# Benign Pneumatosis Intestinalis

- There are many benign and life-threatening causes of pneumatosis intestinalis. The imaging appearance of both may look very similar.
- Therefore, correlation with clinical history, physical examination, and laboratory test results is the best indicator of whether pneumatosis intestinalis is due to a benign or life-threatening cause.
- Pneumatosis cystoides intestinalis is one subset of pneumatosis intestinalis that is almost always benign.
- In cases of pneumatosis intestinalis associated with suspected bowel ischemia, the additional detection of hepatic portal or portomesenteric venous gas increases the likelihood of transmural bowel infarction.

# References

- 1. Braumann C, Menenakos C, Jacobi CA. Pneumatosis intestinalis-a pitfall for surgeons?. Scand J Surg. 2005;94 (1): 47-50.
- 2. Ho LM, Paulson EK, Thompson WM. Pneumatosis intestinalis in the adult: benign to life-threatening causes. AJR Am J Roentgenol. 2007;188 (6): 1604-13.