

Making the Diagnosis

Physical Exam

Classically, the severity of abdominal pain is out of proportion to the physical findings. Although can anticipate abdominal pain, there may not be peritoneal signs unless there is necrotic gut with adjacent inflammation. Dehydration and third spacing may lead to mental confusion, tachycardia, tachypnea, and circulatory collapse.

Laboratories

The most **common laboratory abnormalities** are 1) hemoconcentration, 2) leukocytosis, 3) high anion gap, and 4) lactic acidosis. Can also see less frequently 5) high serum amylase, 6) elevated lactic dehydrogenase, 7) elevated creatine phosphokinase, 8) hyperkalemia, and 9) hyperphosphatemia

High levels of amylase, lactate, aspart aminotransferase, and creatine phosphokinase are frequently observed but are neither sufficiently sensitive nor specific to be diagnostic in isolation. Hyperkalemia and hyperphosphatemia suggest bowel infarct.

D-lactate has a pooled sensitivity for AMI 90% (CI 67-99%) and a pooled specificity of 40% (CI 29-51%). **L-lactate** has a pooled sensitivity 86% (CI 73-94%) and pooled specificity of 44% (CI 32-55%). **D-dimer** has a pooled sensitivity of 96% (CI 89-99%) and a pooled specificity of 40% (CI 33-47%) – *Cudnick, Acad Emer Med, 2013*

Imaging

Findings on a **plain film** are non-specific and tend to be normal in 25% of cases. Characteristic abnormalities including thumbprinting and bowel wall thickening appear in less than 40% of patients at presentation. Used to rule out competing dx.

Traditional **abdominal CT** imaging had poor sensitivity and specificity for the diagnosis of most types of acute mesenteric ischemia (with the **notable exception of mesenteric venous thrombosis**), although dynamic contrast-enhanced improved sensitivity to 64% and specificity to 92% -- *Oldenburg, Arch IM, 2004*

Now, **CTA** is often the **first line test for acute and chronic mesenteric ischemia**. Studies of **newer technology CT** suggest **better diagnostic accuracy for AMI** with a pooled sensitivity of 94% and a pooled specificity of 95% (+LR 17.5 and -LR 0.09)-- *Cudnick, Acad Emer Med, 2013; Oliva, Abd Imaging, 2013 (ACR Appropriateness Criteria)*

Dynamic Contrast enhanced CT is the test of choice in suspected MVT and is reasonable for chronic mesenteric ischemia.

Angiography is test of choice if high suspicion for AMI and no perforation

Endoscopy has been used to diagnosis **ischemic colitis** but is not useful when ischemia of the small bowel is suspected.

Color duplex scanning may be done when **chronic mesenteric ischemia** is suspected in proximal vasculature because blood flow can be measured in the visceral arteries and it is relatively inexpensive compared to other methods – *Chang, Ann Vas Surg, 2003*

Magnetic resonance angiography has also been proposed for diagnosis of **chronic mesenteric ischemia**. It has high Sn and Sp (100% and 95%) for stenosis at the origins of celiac axis and SMA but limited value for distal arterial stenosis and non-occlusive dz.

Presentation and Diagnosis of Mesenteric Ischemia: Illness Scripts

Background and Prevalence of Disease

Mesenteric ischemia comprises a group of pathophysiologic processes that have a common end-point of bowel necrosis.

Mesenteric ischemia is a rarely encountered disease and likely underdiagnosed. As a result, it can be difficult to correctly and rapidly identify. Estimated prevalence of acute mesenteric ischemia is 1 in 1,000 hospital admissions (annual incidence of 0.09% to 0.2% per patient year) – *Cudnik, Acad Emer Med, 2013; Evennett, World J Surg, 2009*

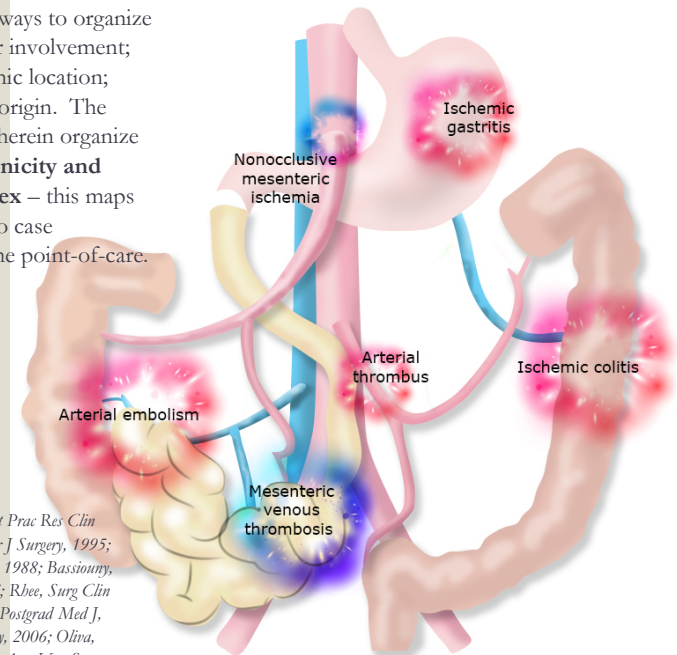
The estimated mortality rate ranges from 50% to 100% depending upon the etiology

In general, 4 general groups of intestinal ischemia exist:

- **Colonic ischemia (typically chronic; most common encountered)**
- **Acute mesenteric ischemia (more commonly an inpatient issue)**
- **Chronic mesenteric ischemia (more commonly an outpatient issue)**
- **Mesenteric venous thrombosis (least common encountered)**

An Organizational Framework

There are several ways to organize content – vascular involvement; chronicity; anatomic location; pathophysiologic origin. The scripts presented herein organize according to **chronicity and symptom complex** – this maps more effectively to case presentations at the point-of-care.



References -- *Lock, Best Prac Res Clin Gast, 2001; Bradbury, Br J Surgery, 1995; Suges-Serra, Br J Surgery, 1988; Bassiouny, Surg Clin N Amer, 1997; Rhee, Surg Clin N Amer, 1997; Upponi, Postgrad Med J, 2013; Quentin, Endoscopy, 2006; Oliva, Abd Imag, 2013; Chang, Ann Vas Surg, 2003; Cudnik, Acad Emer Med, 2013; Oldenburg, Arch Int Med, 2004; Evennett, World J Surg, 2009*

A Spectrum of Pathophysiology and Presentations

Acute Mesenteric Ischemia

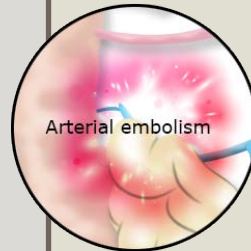
A potentially fatal vascular emergency with an overall mortality of 60% to 80%. Virtually all variants share a common clinical feature: **severe abdominal pain and minimal clinical findings**.

Arterial Embolism

The **most frequent cause of acute mesenteric ischemia**. Accounts for **45-50% of cases of AMI**. Most emboli originate from **cardiac source** and tend to lodge in the superior mesenteric artery.

Risk factors for development of mural thrombus include atrial tachyarrhythmias, myocardial infarction or protracted ischemia, endocarditis, cardiomyopathies, or valvular disease.

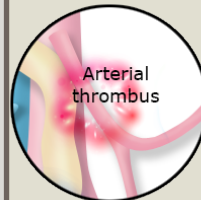
Clinical presentation is characterized by the onset of severe abdominal pain associated with urgent diarrhea, which may become bloody. May also see nausea and vomiting.



Arterial Thrombosis

Second most common cause of acute mesenteric ischemia. Accounts for 25-30% of AMI. Tends to occur in the setting of severe **atherosclerotic disease** with the most common site near origin of SMA.

Clinical presentation can be similar to arterial embolism or may present subacutely. Patients may endorse a prodromal symptom complex of postprandial pain, nausea, and weight loss.

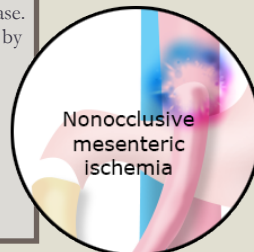


Nonocclusive Mesenteric Ischemia

An estimated 20% of patients with mesenteric ischemia have nonocclusive disease. The pathophysiologic root cause is less understood but thought to be mediated by **low flow states** such as low cardiac output, sepsis, SIRS with hypotension. Watershed areas of circulation are more vulnerable.

Risk factors include cardiac ischemia, heart failure, cardiopulmonary bypass, hepatic disease, or major surgery.

Clinical presentation is characterized by a more gradual onset and a more protracted clinical course.

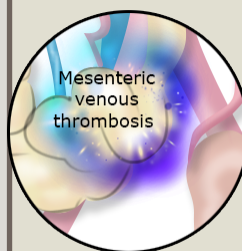


Mesenteric Venous Thrombosis

The **least common** cause of acute mesenteric ischemia. Accounts for 5-1% of cases of AMI. Most related to **primary clotting disorders**. Only an estimated 10% are idiopathic.

Usually segmental and affecting the upper small bowel. Thrombi usually **originate in the venous arcades**. Involvement of the inferior mesenteric vein and large bowel is uncommon.

Clinical presentation is typically diffuse, non-specific abdominal pain associated with anorexia and diarrhea. There is a more gradual onset and protracted clinical course. Pts may have fever, abdominal distention, and hemocult-positive stools.



Chronic Mesenteric Ischemia

Generally associated with chronic progressive disease and rarely acutely fatal. It is a gradually developing circulation-insufficiency event that occurs over months. It tends to be most common in older females.

Nonocclusive Mesenteric Ischemia

Chronic mesenteric ischemia presenting as **intestinal angina** is due to gradual stenosis, usually secondary to atherosclerotic disease of the arterial supply, to the viscera.

Risk factors include age, other signs of peripheral vascular disease, and a smoking history.

Clinical presentation is characterized insidious and progressive post-prandial pain, debilitating abdominal discomfort, weight loss, and food fear. Pain is usually 1-3 hours of dull, gnawing abdominal pain beginning shortly after eating. In general, the presentation is not an acute one and the disease is rarely acutely fatal.

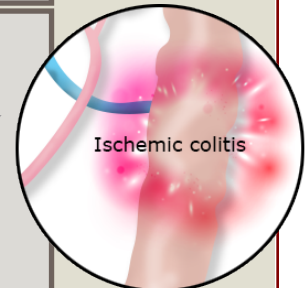


Ischemic Colitis

Colon ischemia is the most common form of intestinal ischemia. It is mainly non-occlusive ischemia involving some portions of splenic flexure, descending colon, or sigmoid colon. It is a disease of the elderly and typically occurs in low-flow and hypercoagulable states.

Risk factors include advanced age, severe atherosclerotic disease, transient interruptions in blood pressure, recent surgery.

Clinical presentation is characterized by sudden LLQ pain, an urge to defecate, followed by the passage of red to maroon stool within one day.

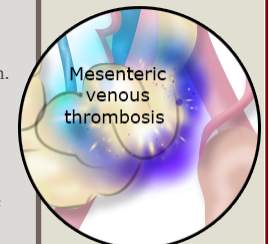


Mesenteric Venous Thrombosis

Mesenteric venous thrombosis can present as subacute or chronic. It is associated with hypercoagulable states. Involvement of large bowel uncommon.

Risk factors include hypercoagulability, pancreatitis, liver disease, sickle cell disease, and paroxysmal nocturnal hemoglobinuria.

Clinical presentation is characterized by chronic pain out of proportion to exam. If the portal or splenic veins are involved in chronic MVT there may be bleeding from gastroesophageal varices.



Ischemic Gastritis

Gastric involvement in patients with intestinal ischemia is often under recognized.

Risk factors include other signs of peripheral vascular disease, diabetes. It is more common in women.

Clinical presentation is characterized by chronic abdominal pain, exacerbation by meals, weight loss, vomiting, gastroparesis, diarrhea, constipation. Endoscopy may show ulcers in atypical locations such as along the greater curvature, antrum or posterior wall. They are often multiple and

