

# Chapter 36

## Approach to Mesenteric Ischemia in the ICU



### 36.1 Introduction

Acute mesenteric ischemia (AMI), characterized by reduced blood flow to the intestines, can lead to intestinal necrosis and sepsis if untreated. AMI is a high-mortality emergency, particularly when diagnosis and intervention are delayed. This chapter provides a step-by-step approach to managing AMI in the ICU, addressing the early identification of symptoms, diagnostic steps, and specific management pathways based on patient presentation [1] [Ref: Algorithm 36.1].

### 36.2 Initial Assessment

- **Presenting Symptoms:** Key symptoms include severe, disproportionate abdominal pain, nausea, vomiting, and sometimes bloody stools. Recognizing this classic pain-to-findings discrepancy is critical for early suspicion of AMI.
- **Risk Factors:** Advanced age, cardiac history (particularly atrial fibrillation), prior embolic events, and hypercoagulability are common risk factors in AMI patients. Recent hypotensive episodes and vasopressor use are risk factors for non-occlusive mesenteric ischemia. Identifying these factors early can help stratify patients for immediate investigation and intervention [2].

### 36.2.1 Clinical Evaluation

- **Physical Examination:** Assess for abdominal tenderness and peritoneal signs. Symptoms out of proportion to examination findings should heighten suspicion of acute mesenteric ischemia.

Vitals and Laboratory Work:

- **Vitals:** Monitor for hypotension and tachycardia, which may indicate a compromised cardiovascular state.
- **Laboratory Markers:** Include lactate (a marker for tissue hypoxia – serial lactate monitoring), D-dimer, arterial blood gases (to detect metabolic acidosis), and complete blood count. Emerging markers such as neutrophil-to-lymphocyte ratio (NLR), mean platelet volume (MPV), and red cell distribution width (RDW) may support early diagnosis and enhance specificity [3].

### 36.2.2 Imaging and Diagnosis

- **CT Angiography (CTA):** As the first-line imaging modality, CTA confirms diagnosis, assesses bowel viability, and identifies specific signs such as mesenteric vessel filling defects, bowel wall thickening, pneumatosis intestinalis, and portal venous gas. This imaging step is essential for diagnosing AMI and differentiating types of acute mesenteric ischemia. CTA has >90% sensitivity and specificity to diagnose AMI – *gold standard*.

**Differential Diagnosis:** The CTA findings and clinical context guide differentiation into:

- **Arterial Occlusion:** Often from embolic or thrombotic events, requiring immediate attention.
- **Venous Thrombosis:** Characterized by mesenteric vein occlusion, commonly managed with anticoagulation.
- **Nonocclusive Mesenteric Ischemia (NOMI):** Linked to low-flow states and typically managed with vasodilators [4].

## 36.3 Predictors of Mortality in AMI

- **Significant Predictors:** Mortality is higher in patients with advanced age, chronic renal disease, patient dependency, arrhythmias, cardiac failure, hypotension, and delayed surgery. Elevated lactate levels and the need for inotropes correlate with poor prognosis, while timely anticoagulation and revascularization improve survival.

- **Risk Stratification:** Developing a risk stratification model based on these predictors can help in early identification of high-risk patients and prompt more aggressive monitoring and intervention.

## 36.4 Management Pathway

No Peritoneal Signs (Early Detection):

- **Anticoagulation:** Begin systemic anticoagulation, especially in cases with high suspicion of ischemia without bowel necrosis.
- **Consider Endovascular Therapy:** For embolic or thrombotic obstructions, consider thrombolysis or angioplasty as endovascular options, which are associated with lower short-term mortality compared to open surgery.

Peritoneal Signs Present (Suspected Bowel Infarction):

- **Surgical Intervention:** Immediate laparotomy is required for suspected bowel necrosis.
- **Intraoperative Endovascular Support (Hybrid Technique):** In settings with endovascular capabilities, a hybrid approach can offer faster reperfusion and facilitate direct assessment of bowel viability, potentially reducing the need for repeat surgeries [5].

### 36.4.1 *Type-Specific Management*

- **Arterial Occlusion:** Treat with endovascular approaches like angioplasty and thrombolysis for revascularization. Open surgery is necessary when bowel necrosis is suspected.
- **Venous Thrombosis:** Manage primarily with systemic anticoagulation to dissolve clots and restore blood flow, reducing further ischemic damage. Long-term anticoagulation is typically required to prevent recurrence.
- **Nonocclusive Mesenteric Ischemia (NOMI):** NOMI requires vasodilators (e.g., intra-arterial papaverine) and management of the underlying low-flow state (e.g., treating hypotension) to restore mesenteric perfusion.

### **36.4.2 *Bowel Viability Assessment***

- **Resection and Second-Look Surgery:** During surgery, remove necrotic bowel segments. If viability remains uncertain, schedule a second-look laparotomy within 24–48 h. This approach helps address evolving ischemia and minimizes risks of severe complications. Fluorescence imaging with indocyanine green (ICG) is emerging for intraoperative assessment.

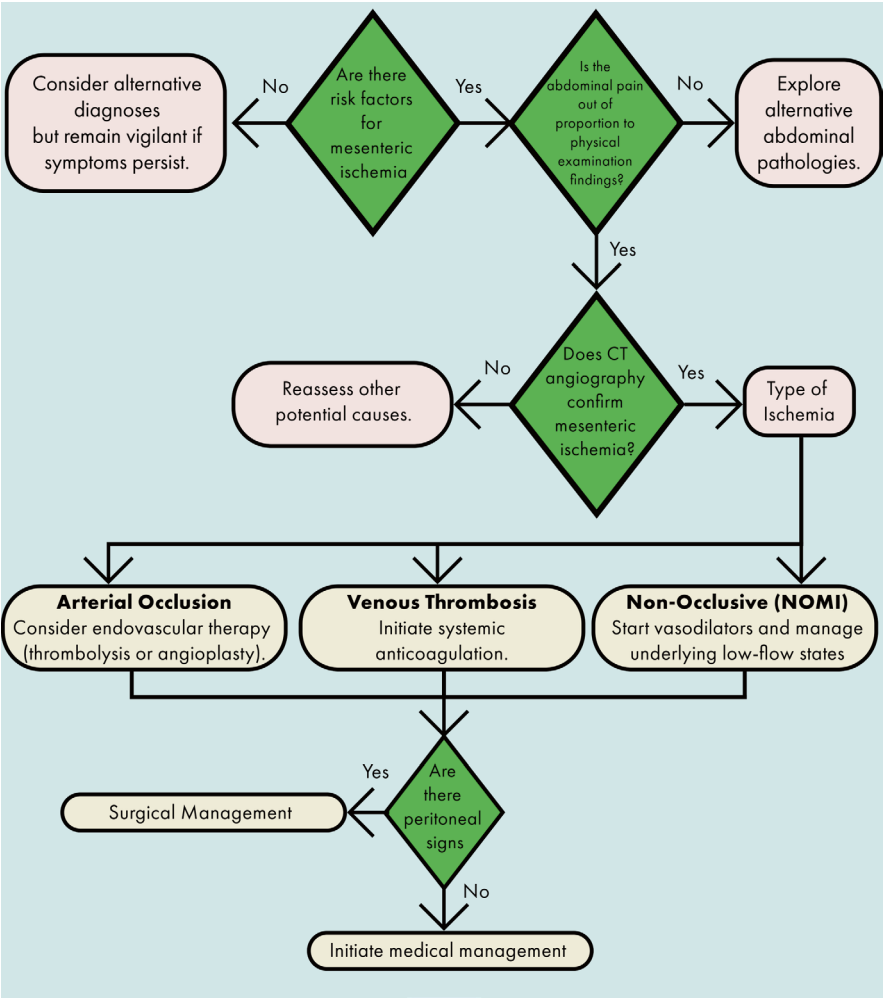
### **36.4.3 *Postoperative and Follow-Up Care***

- **Monitor for Reperfusion Injury:** Postoperatively, assess for reperfusion injury, indicated by metabolic acidosis, rising lactate levels, and multi-organ dysfunction.
- **Long-Term Follow-Up:** Chronic mesenteric ischemia cases may require periodic imaging due to recurrence risk. For patients with extensive resections, nutritional support may be essential, especially in cases of short bowel syndrome [6].

## **36.5 Conclusion**

Managing Acute mesenteric ischemia in the ICU requires a structured, evidence-based approach that addresses early symptom identification, diagnostic imaging, and targeted therapeutic strategies based on ischemia type. Clinicians should utilize a combination of risk stratification, laboratory markers, CTA imaging, and tailored endovascular or surgical intervention to improve patient outcomes. Continuous postoperative monitoring, especially for reperfusion injury and recurrence, is essential for ensuring long-term success in managing acute mesenteric ischemia. Early recognition and rapid, coordinated intervention remain the most critical determinants of survival in AMI.

Algorithm 36.1: Approach to acute mesenteric ischemia in the ICU



## Bibliography

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