



20
18

Dynamic Practice Guidelines for Emergency General Surgery

Committee on Acute Care Surgery, Canadian Association of General Surgeons

11

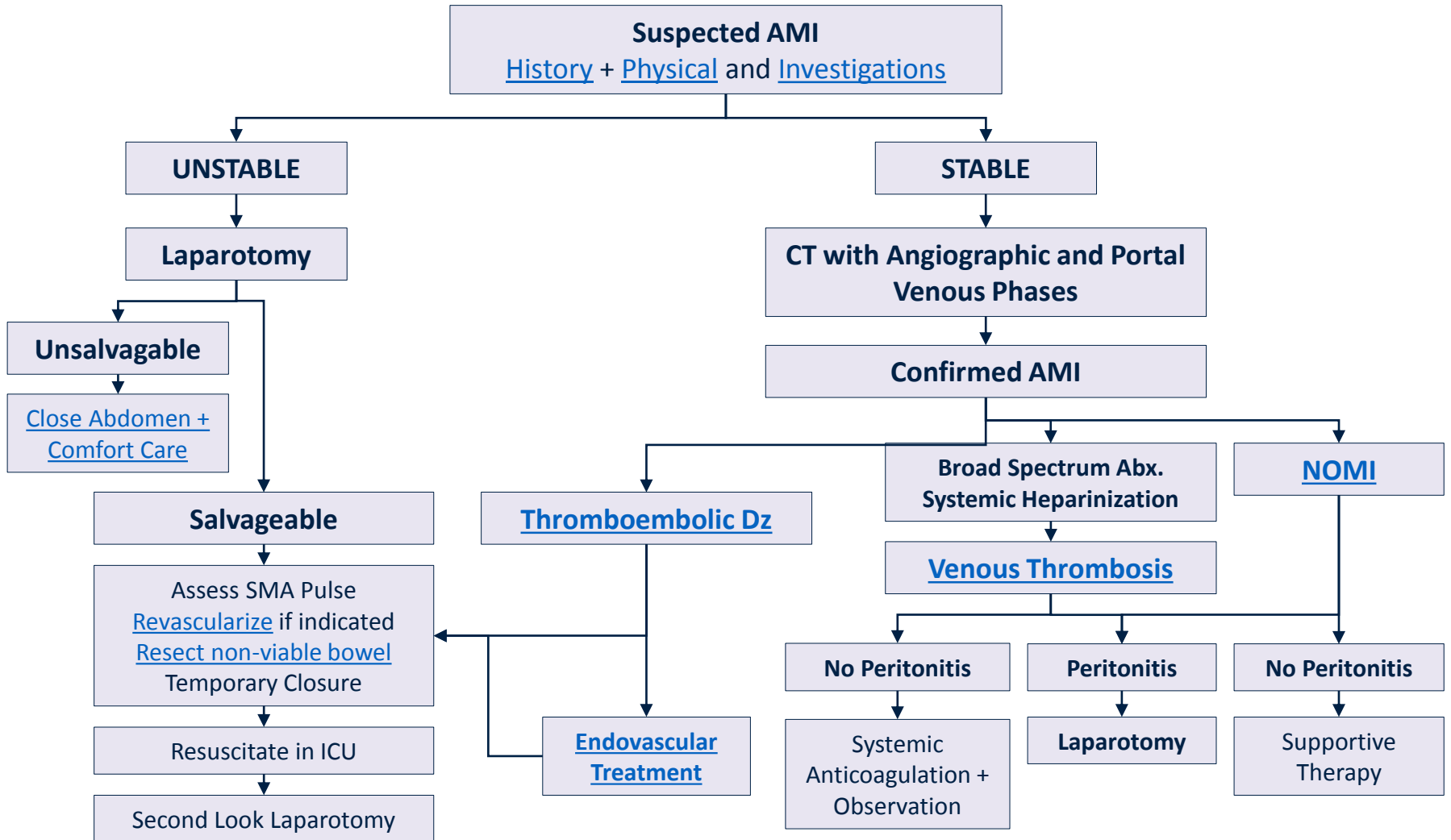
ACUTE MESENTERIC ISCHEMIA

Dynamic Practice Guidelines for Emergency General Surgery

Bonny Tsang MD

Committee on Acute Care Surgery, Canadian Association of General Surgeons

ACUTE MESENTERIC ISCHEMIA



Background:

- Acute mesenteric ischemia (AMI) is a surgical emergency
- AMI remains an uncommon disease and accounts for 1 in 1000 hospitalizations
- Commonly affects the elderly with median age 74 years
- Patients often have multiple underlying comorbidities with limited physiologic reserve
- Can be a fatal disease if treatment is delayed
- Despite improvements in critical care, mortality from AMI remains at 50-80%
- SMA is the most often affected artery
- Due to collateralization, occlusion of the celiac artery or the IMA is usually tolerated

ACUTE MESENTERIC ISCHEMIA

[Return to CPG](#)

ETIOLOGY

- Arterial embolus (34%)
- Arterial thrombus (34%)
- Non occlusive mesenteric ischemia NOMI (19%)
- Venous thrombosis (13%)

RISK FACTORS

Embolic

- Source of emboli is cardiac
- Recent MI, atrial fibrillation, valvular pathology, ventricular aneurysm

Thrombotic

- Predominantly due to atherosclerotic disease
- Less commonly from hypercoagulability, inflammatory disease

NOMI

- Low flow states from shock, post-cardiac surgery, use of vasoactive medications, digitalis, anti-hypertensive medications
-

RISK FACTORS

Box 1

Causes of MVT

Hypercoagulable states

- Antithrombin III deficiency
- Protein C/S deficiency
- Factor V Leiden
- Prothrombin 20210A gene
- Malignancy
- Polycythemia vera
- Oral contraceptives

Direct injury or inflammation

- Major abdominal surgery
- Blunt trauma
- Pancreatitis
- Inflammatory bowel disease
- Cholecystitis

Venous stasis

- Budd-Chiari
- Cirrhosis
- Postsplenectomy

Data from Morasch MD, Ebaugh JL, Chiou AC, et al. Mesenteric venous thrombosis: a changing clinical entity. J Vasc Surg 2001;34:680-4.

Table demonstrates known risk Factors for Venous Thrombosis.

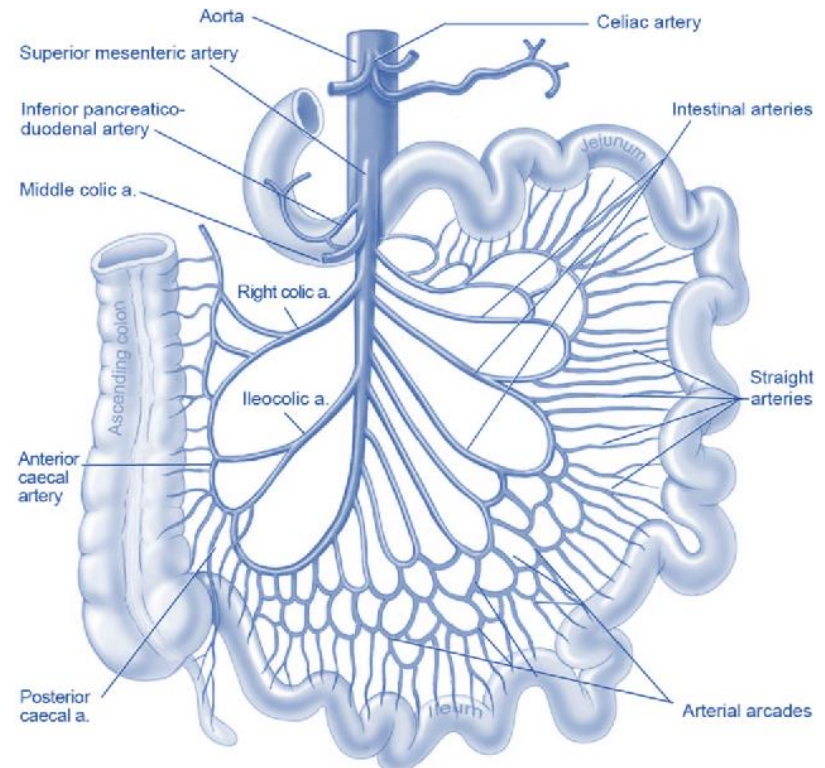
ANATOMICAL CONSIDERATIONS

SMA supplies the midgut

- Distal duodenum, entire small bowel, right colon and transverse colon to the splenic flexure.

Site of occlusion

- Embolic
 - Usually at take-off of middle colic artery in proximal SMA
- Thrombotic
 - Usually at the origin of SMA where there is a heavy burden of atherosclerosis



PATHOPHYSIOLOGY

1 Decreased perfusion to the small bowel leading to mucosal ischemia.

Mucosal ischemia causes a breakdown of the **2** mucosal barrier permitting bacterial translocation.

3 The translocation of bacteria causes the release of cytokine release and subsequent systemic inflammatory response.

Along with the etiology of the vascular insult, **4** there is further progression of the vasoconstriction, vasospasm, and ischemia.

5 As the ischemia worsens, it spreads affecting the bowel wall transmurally.

Transmural ischemia further leads to bowel **6** necrosis, and devastating complications including perforation and peritonitis.

CLINICAL PRESENTATION: KEYS TO HISTORY



- Key to timely diagnosis is *high index of suspicion* in elderly patients with risk factors
 - Non-specific abdominal pain
 - Periumbilical region progressing to diffuse pain
 - Nausea and vomiting
 - Pain out of proportion to clinical exam
-

CLINICAL PRESENTATION: HISTORY BY ETIOLOGY



Embolic

- Acute and sudden onset of pain, may be associated with atrial fibrillation

Thrombotic

- More gradual progression of pain
- May have history of chronic mesenteric ischemia (post-prandial pain, weight loss, fear of food, malnutrition)

NOMI

- Critically ill patients with abdominal distension, pain, clinical deterioration, worsening metabolic acidosis

Venous

- Gradual/insidious presentation of abdominal pain, nausea, vomiting, diarrhea (bloody)
-

ACUTE MESENTERIC ISCHEMIA

[Return to CPG](#)

CLINICAL PRESENTATION: PHYSICAL EXAM



- Initially patient may have minimal abdominal tenderness
 - As AMI progresses, patient will develop peritonitis from perforation, sepsis, shock and multi-organ failure
-

DIAGNOSTICS/ INVESTIGATIONS



Blood work

- Presently no reliable marker for early diagnosis of AMI
- Leukocytosis, metabolic acidosis often present
- Lactate of ≥ 2.7 mmol/L portends an increased ICU mortality rate

Abdominal X-rays

- Early: bowel wall thickening “thumb printing”
- Late: pneumatosis intestinalis, portal venous gas, free air

CTA and portal venous phase

- Prompt CTA and PV phase is key to diagnosis of AMI and should be performed based on clinical suspicion, even in setting of renal dysfunction
- Allows for assessment of etiology, anatomy, atherosclerotic burden, bowel pathology
- Largely replaced angiography

OPERATIVE MANAGEMENT

THROMBOEMBOLIC DISEASE



Goals of Laparotomy

- Restore blood flow to bowel
 - Assess viability of small bowel and resect infarcted small bowel
 - Preserve as much length of small bowel as possible and leave bowel with questionable viability in situ
 - Temporary closure of abdomen

 - Continue resuscitation of patient
 - Second look laparotomy 24-48hours to reassess small bowel viability, and to establish GI continuity (anastomosis or creation of ostomy) when patient is stabilized
-

OPERATIVE MANAGEMENT

REVASCULARIZATION



- Embolic disease
 - Revascularization is accomplished by SMA embolectomy via transverse arteriotomy in proximal SMA
 - Thrombotic disease
 - Due to heavy burden of atherosclerotic disease, flow is reestablished with bypass procedures
-

OPERATIVE MANAGEMENT

SMALL BOWEL VIABILITY



- Methods described to assess viability:
 - Colour of bowel, presence of peristalsis, palpation of pulse in mesentery, Doppler pulse at anti-mesenteric border, fluorescein and Woods' lamp
- Intraoperative methods to determine viability are neither sensitive nor specific
- When in doubt, avoid resection of questionable bowel in first OR and plan for second look laparotomy to reassess bowel
 - Up to 50% of patients will need additional bowel resection at second look laparotomy

OPERATIVE MANAGEMENT

ENDOVASCULAR APPROACH



- Steady increase in use of endovascular approach for revascularization with on-demand laparotomy in patients with suspected bowel compromise
- Evidence of improved survival and shorter length of stay in selected patients who underwent endovascular surgery
- Role of endovascular approach is currently limited to stable patients with no peritonitis and in centers with expertise

OPERATIVE MANAGEMENT

POST-OPERATIVE COURSE



- Continue therapeutic anticoagulation
- Nutrition support
 - Enteral therapy should be started when clinical status allows as it promotes mucosal integrity and intestinal adaptation after resection
- Workup for cause of AMI
 - Echocardiogram to rule out cardiac emboli
 - Hypercoagulable workup

MANAGEMENT



VENOUS DISEASE

- Most patient with mesenteric venous thrombosis can be managed non-operatively
 - Systemic anticoagulation
 - Serial examinations
 - Nutrition support
 - Workup for hypercoagulable states
- Patients with clinical deterioration and/or peritonitis warrants exploration for small bowel necrosis or perforation
- There is limited evidence for surgical thrombectomy or catheter-directed thrombectomy

ACUTE MESENTERIC ISCHEMIA

[Return to CPG](#)

MANAGEMENT



NON-OCCLUSIVE MESENTERIC ISCHEMIA

- Supportive treatment
 - Improve cardiac output, stop anti-hypertensive medications, broad-spectrum antibiotics, nutritional support
 - Pharmacologic treatment
 - Limited evidence for vasodilators such as papaverine
-

MASSIVE BOWEL INFARCTION



- Preoperative meeting with patient and family is important to discuss limitations of surgical therapy in event of catastrophic infarction of entire small bowel
 - Elderly patients with comorbidities are unlikely to survive massive small bowel resection
 - Surgeon should close abdomen and provide palliative care
 - The option of massive small bowel resection, bowel rehabilitation with nutrition support, and small bowel transplant may be a consideration for young patients
-