Bowel Ischaemia

Bowel ischaemia has been classified into three main types:[1]

- Acute mesenteric ischaemia
- Chronic mesenteric ischaemia
- Ischaemic colitis (colonic ischaemia)

Acute mesenteric ischaemia

This is an umbrella term covering a number of conditions, including acute mesenteric arterial embolus and thrombus, mesenteric venous thrombus and non-occlusive mesenteric ischaemia (NOMI). They all have the features of impaired blood transfusion to the intestine, bacterial translocation (the passage of intestinal bacteria to normally sterile tissue) and systemic inflammatory response.

Epidemiology

This is chiefly a disease of people aged over 50, although younger people with risk factors for mesenteric venous thrombosis (MVT) - eg, atrial fibrillation (AF) - can be affected. The overall prevalence is 0.1% of all hospital admissions.[2]

Predisposing factors[2]

- Conditions causing arterial emboli - eg, mural thrombus following myocardial infarction, auricular thrombus associated with mitral stenosis and AF, septic emboli from valvular endocarditis, fragments of proximal aortic thrombus, arterial catheterisation dislodging bits of plaque.
- Conditions causing arterial thrombosis - atherosclerosis (most common), aortic aneurysm or dissection, arteritis, decreased cardiac output (eg, from myocardial infarction or chronic heart failure), dehydration.
- NOMI - hypotension, vasopressive drugs, ergotamines, cocaine, digitalis.
- MVT can be caused by:
  - Hypercoagulability disorders (eg, protein C and S deficiency).
  - Tumour causing venous compression or hypercoagulability.
  - Infection - usually intra-abdominal such as appendicitis, diverticulitis, or abscess, venous congestion from cirrhosis (portal hypertension).
  - Venous trauma from accidents or surgery, especially portocaval surgery, pancreatitis, decompression sickness.

Presentation[2]

The presentation of the various types is similar, with moderate-to-severe colicky or constant and poorly localised pain. A striking feature is that the physical findings are out of proportion to the degree of pain and, in the early stages, there may be minimal or no tenderness and no signs of peritonitis. In the later stages typical symptoms of peritonism develop, with rebound guarding and tenderness. A mass is sometimes palpable. Examination may reveal associated causes (eg, AF).

Investigations[2]

- There are no specific laboratory tests. A raised white cell count and the presence of metabolic acidosis may be helpful.
- Plain abdominal X-ray may be required to rule out other causes and may show small bowel obstruction, ileus and thickened bowel wall in the later stages. CT scan may show gas in various ectopic places such as bowel wall (pneumatosis intestinalis) or portal vein, bowel wall and/or mesenteric oedema, thumbprinting, streaking of mesentery and solid organ infarction.
- Angiography is the gold standard and shows arterial blockage due to emboli or thrombus.
- Multidetector computerised tomography (MDCT) with intravenous contrast enhancement is the specific investigation of choice if superior mesenteric artery occlusion is suspected.[3]
- Ultrasound or MRI scan may also be contributory.
- Electrocardiogram may show atrial fibrillation or infarction.
- Echocardiogram may be needed to show the cause of an embolism or valvular pathology.
- Intraoperative fluorescein administration may be required to highlight those areas of bowel that need resection.

Differential diagnosis[2]

- Other causes of an acute abdomen
- Abdominal aortic aneurysm
- Biliary disease
- Chronic mesenteric ischaemia
- Diverticulitis
- Ectopic pregnancy
- Helicobacter pylori infection
- Multisystem organ failure of sepsis
- Myocardial infarction
- Pneumonia
- Pneumothorax
- Acute intermittent porphyria
Management

Medical care

- Initial resuscitation with intravenous fluids and oxygen should be carried out.
- Medical options include papaverine (to relieve vasospasm) or thrombolytics infused through an angiogram catheter, and heparin for MVT.

Surgical care

- Surgical options include:
  - Angioplasty to the superior mesenteric artery
  - Embolectomy
  - Aortomesenteric bypass and resection of bowel if gangrene develops

Prognosis

Even in the best hands, the outcome is poor. If the diagnosis is missed, the mortality rate is 90%. With treatment, the mortality rate is still 50-80%. Survivors of extensive bowel surgery face a lifetime of disability.

Chronic mesenteric ischaemia (intestinal angina)

This is a chronic atherosclerotic disease of the vessels supplying the intestine. Usually all three major mesenteric arteries are involved.

There are no definitive epidemiological data but the condition is reported to be rare. However, autopsy reports suggest that many cases of chronic abdominal pain are likely to be due to chronic mesenteric ischaemia but are not reported as such. The average age of presentation is 60.

Predisposing factors

This is generally caused by factors predisposing to atherosclerosis - eg, smoking, hypertension, diabetes mellitus and hyperlipidaemia.

Presentation

The presentation of the various types is similar, with moderate-to-severe colicky or constant and poorly localised pain. The history is typically one of weight loss, postprandial pain ('intestinal angina') and a fear of eating. There is usually a history of cardiovascular disease such as myocardial infarction or cerebral vascular disease. Other nonspecific symptoms may include nausea, vomiting, or bowel irregularity.

Examination may show vague abdominal tenderness disproportionate to the severity of the pain, an abdominal bruit and signs of generalised cardiovascular disease.

Differential diagnosis

- Acute mesenteric ischaemia
- Other causes of an acute abdomen
- Causes of dyspepsia
- Diverticulitis
- Gastric cancer
- Chronic pancreatitis
- Chronic pyelonephritis

Investigations

- Laboratory tests such as FBC, LFTs and U&E may reflect malnutrition or dehydration.
- CXR should be carried out to exclude pneumonia, and cardiac scanning to exclude comorbidity.
- Arteriography is the gold standard investigation to show the site of arterial blockage or stenosis.
- Mesenteric duplex ultrasonography is a non-invasive method of demonstrating arterial blood flow but is more affected by extraneous factors such as obesity or respiratory movements.

Management

Medical care

As a sole option, this should be considered only in patients who are a very poor surgical risk, as there is a very high incidence of complications such as malnutrition, sepsis infarction and perforation. Nitrate therapy may afford short-term relief and the patient should be anticoagulated. Once the decision to operate has been taken, intra-arterial papaverine should be administered to reduce vasospasm.

Surgical care

Options include:

- Transaortic endarterectomy of the coeliac or superior mesenteric artery.
- Retrograde bypass from the external iliac artery.
• Anterograde bypass, which provides the best orientation of the graft to the aorta.
• Providing there is no bowel infarction, the tendency is to opt for less invasive procedures such as angioplasty and stenting rather than open surgical repair. [9]

**Ischaemic colitis**[10]

This is caused by a compromise of the blood circulation supplying the colon. Marginal branches of the middle colic (superior mesenteric territory) and left colic (inferior mesenteric territory) arteries supply the transverse and descending segments of the colon and, with an arterial and lymphatic watershed existing near to the splenic flexure, supported by an additional vascular arcade, this part of the colon is at risk. Also, blood flow may be impaired by colonic distension with ischaemic colitis occurring within the segment of intestine immediately proximal to an obstruction (stercoral ulceration) or pseudo-obstruction. Ischaemic colitis may also be caused by venous occlusion.

Ischaemic colitis was first described in 1966 and, although no definitive demographic data exist, the incidence has been steadily increasing since it was first recognised. Many mild cases may go unreported. Because the most common cause is atheroma of the mesenteric vessels it is mainly a disease of the elderly and is rare before the age of 60. The average age for diagnosis is 70. The incidence is likely to increase with the increasing age of the population.

The condition is, however, by no means unknown in younger age groups, due to non-cardiovascular causes such as cocaine abuse.

**Predisposing factors**[10]

- **Thrombosis:**
  - Inferior mesenteric artery thrombosis

- **Emboli:**
  - Mesenteric arterial emboli
  - Cholesterol emboli

- Decreased cardiac output or arrhythmias.
- Shock (sepsis, haemorrhage, hypovolaemia).
- Trauma.
- Strangulated hernia or volvulus.
- **Drugs:**
  - Digitalis
  - Oestrogens
  - Antihypertensive drugs
  - Cocaine and methamfetamine
  - Vasopressin
  - Phenylephrine
  - Pseudoephedrine
  - Immunosuppressive agents
  - Psychotropic agents

- **Surgery:**
  - Cardiac bypass
  - Aortic dissection and repair
  - Aortoiliac reconstruction
  - Colectomy with inferior mesenteric artery ligation
  - Gynaecological operations

- **Vasculitis:**
  - Systemic lupus erythematosus
  - Polyarteritis nodosa (hepatitis B, hepatitis C)
  - Thromboangiitis obliterans
  - Rheumatoid vasculitis
  - Sickle cell disease

- **Disorders of coagulation:**
  - Protein C deficiency
  - Protein S deficiency
  - Paroxysmal nocturnal haemoglobinuria
  - Activated protein C resistance
  - Antithrombin III deficiency

- Long-distance running.
- Colonoscopy or barium enema.
- Idiopathic.

**Presentation**[10]
The condition may be difficult to diagnose, with nonspecific symptoms of an 'acute abdomen', such as acute-onset abdominal pain. The pain is most frequently located in the left iliac fossa. Nausea and vomiting often occur and, in the later stages, loose motion containing dark blood. Marked tenderness may be found in the left iliac fossa.

The diagnosis may be one of exclusion and should always be borne in mind in patients presenting with abdominal pain of indeterminate cause. In younger patients it is often associated with taking the contraceptive pill, cocaine or methamphetamine abuse, the use of pseudoephedrine, sickle cell disease and inherited coagulopathies.

**Investigations**
- The presence of metabolic acidosis may be a clue.
- Colonoscopy may show blue, swollen mucosa not showing contact bleeding and sparing the rectum.
- Plain abdominal X-ray may show abnormal segment outlined with gas. However, the findings may be nonspecific for 12-18 hours after onset.
- Barium enema shows ‘thumb printing’ in the early phase that may last for several days. The mucosa may then return to normal or progress to ulceration with similar appearance to segmental ulcerative colitis or Crohn's disease. It may either resolve spontaneously or progress to narrowing of the intestine +/- sacculation of the antimesenteric border.
- Other modalities occasionally used include CT scan, MRI scan and angiography.

**Differential diagnosis**
- Dysentery.
- Acute diverticular disease of the colon.
- Acute inflammatory bowel disease.
- Perforation of a hollow viscus or pancreatitis causing left-sided peritonitis.

**Management**

**Medical care**
- In many cases, the ischaemia resolves once the cause of the hypoperfusion has been alleviated. Bowel rest and supportive care are often helpful.
- Antibiotics are often given but their benefits are unproven.

**Surgical care**
- Rarely, fulminant ischaemic colitis develops, with perforation or gangrene and this requires immediate surgery.
- A chronic condition can develop (chronic segmental colitis) which may require segmental colectomy.
- A stricture may also occur, which may require surgical treatment although, if the symptoms are not too severe, it is worth adopting a 'wait and see' approach, as spontaneous resolution may occur with 12-24 months.

**Further reading & references**


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