

BOWEL OBSTRUCTION



“The Meeting of Alexander and Diogenes”, marble, Pierre Puget, 1692, Louvre Museum Paris.

“...Thereupon many statesmen and philosophers came to Alexander with their congratulations, and he expected that Diogenes of Sinope, who was tarrying in Corinth, would do likewise. But since that philosopher took not the slightest notice of Alexander... Alexander went in person to see him...”

Plutarch, “Life of Alexander”, First Century, A.D.

In 336 B.C a great league of the Greek city-states met their northern Macedonian kinsmen and endorsed a plan for a titanic enterprise - no less than an attack on the greatest power on Earth, the Persian Empire of Darius III. The leader of this great quest was to be the most famous and most inspiring soldier of the day. His name was Alexander. He was just 25 years of age, but would lead the best trained and most disciplined army the world had yet seen. Plutarch relates that, many famous statesmen and philosophers fell over themselves to meet and to be associated with the inspiring and charismatic young general, who had been given the task of righting an old humiliation- a terrifying Persian attack by Xerxes on the Greek homelands, many generations previously. Alexander basked in the attention and adulation of the Greek world. He was not however entirely satisfied! Something was amiss! Why had not Diogenes of Sinope also come to congratulate him? Diogenes was then second only to Alexander himself as the most famous person in the Western world. He was the most noted “Cynic” philosopher of the day, an extreme ascetic, he denounced all worldly goods, even his own society preferring to live in a great earthen jar and sleeping on hay. He would denounce all humanity's hypocrisy and greed. He would walk the streets during the day preaching his views carrying a lighted lamp in “order to find a single honest man”. Alexander, like many others were intrigued and fascinated by this notorious learned philosopher. In short he was somewhat peeved that the greatest celebrity of the day had ignored him. Alexander decided that if Diogenes would not come to him, he, Alexander general of all the armies of Macedonia and Greece, would go to Diogenes!

The meeting to come between the two great men, was liable to be intriguing - if not positively explosive! A great retinue gathered around Alexander eager to witness an historical event! One can sense the anticipation in the ancient accounts of Plutarch and others. One can also imagine the scene! Alexander was led to Diogenes surrounded by the most powerful men of the day, Cassander, Ptolemy, Seleucid, Antigonus, Lysimachus, Antipater. Alexander found Diogenes sunning himself naked except for a loin cloth and lying outside his great clay jar. Diogenes, irritated by having his meditations disturbed by the raucous noise and laughter of Alexander's retinue looked up to see the general's silhouette against the bright sunlight, but he said nothing and ignored him. Alexander for the first time in his life, became confused and embarrassed in front of the vast host that had surrounded them.

“Diogenes, do you know who I am?”

...No reply...

“Diogenes, I am Alexander of Macedon!”

...still no response!

Then in desperation he exclaimed ... "Diogenes, tell me ; is there anything at all I can do for you, name it, and it will be done!"

At last this provoked a response from the great philosopher....

"Yes" came the famous answer, "stand to the side, you are blocking my sun!"

There was stunned but muted gasps from the onlookers. Alexander at first was not sure that he had heard Diogenes correctly. The moment was tense in the extreme, the slightest nod from Alexander to one of his generals, would have had Diogenes instantly put to death. Alexander's generals fidgeted, unwilling to create bad will among their Greek kinsmen by laying a hand on their revered philosopher, yet they would have obeyed Alexander's order to do so in an instant! Some looked at Alexander in silence, awaiting his response - with hands resting uneasily on the hilts of their swords. Alexander had to think of something and think of something quickly. The Greek alliance was fragile, his mission too great to test it, but his reputation and honour and credibility now all hung in the balance. He brilliantly defused the situation - he suddenly burst out into unrestrained laughter, and exclaimed loudly....

"If I were not Alexander, then I would be Diogenes!"

After this Greek and Macedonian alike, all joined in the tremendous "joke!". Diogenes went back to sleep, no doubt secretly relieved, though not letting on about that to the onlookers, and Alexander walked away also relieved at having avoided an A-grade "no-win situation". He was a brilliant leader of men in more ways than in simply the art of war!

Many historians have assumed the story of the meeting of Diogenes and Alexander as apocryphal. But his greatest modern biographer Peter Green is not so sure. He points out that the story was very widely reported in antiquity, with no less than 22 known independent source for the story. He writes, "Modern scholars, for reasons not entirely clear to me, regard it as fiction, seemingly on the grounds that it is designed to illustrate character. Why such anecdotes should always be automatically taken as unhistorical is hard to see, even simply on the law of averages, one would expect some of them to have a basis in fact". He sums up the anecdote thus, "This (response) showed shrewd precipitance. Both men shared (and surely recognized in each other) the same quality of stubborn and alienated intransigence. But whereas Diogenes had withdrawn from the world, Alexander was bent on subjugating it: they represented the active and passive forms of an identical phenomenon. It is not surprising in the circumstances that the encounter should have been so abrasive".

The famous story of the meeting of Alexander the Great and Diogenes of Sinope is the quintessential story of the proverbial "irresistible force", that comes up against the "immovable object"! The laws of physics in our world do not allow for this situation - something has to give! We see this in our patients who present with obstruction of the bowel, the irresistible force coming up against an immovable object! Like Alexander, we must act wisely to defuse this situation, before something gives!

BOWEL OBSTRUCTION

Introduction

Bowel obstruction is a common presentation to the ED

Initial investigation is usually by plain erect and supine abdominal radiographs, *but CT scanning is diagnostically more sensitive and more specific, as well as giving more information on the possible cause, and is being increasingly utilized for suspected bowel obstruction.*

Initial management in the ED will primarily consist of IV fluid resuscitation, and analgesia, and surgical referral.

Some cases of bowel obstruction may be managed conservatively

Actual or suspected cases of bowel strangulation constitutes a true surgical emergency, and requires urgent operation. Unfortunately, there is *no* reliable sign or symptom that absolutely differentiates patients with strangulation or impending strangulation from those in whom surgery will not be necessary. This presents the major challenge in treating patients with bowel obstruction.

Pathophysiology

Terminology:

Dynamic ileus: (intestinal obstruction)

- Here there is a *mechanical obstruction*, which if complete and prolonged can become a paralytic ileus.

Adynamic ileus: (paralytic ileus or ileus)

- Here there is inadequate or absent *muscular tone* of the intestine, leading to dilated bowel.

Pseudo-obstruction:

- This is also associated with abnormal neuromuscular activity, but generally refers to some more chronic process.

Bowel obstruction classification

Bowel obstructions are generally described as:

- Large bowel or small bowel
- Complete or partial

- Simple or strangulated.

Causes of mechanical obstruction:

The most common causes of **small bowel** obstruction are:

1. Adhesions (up to 75 % of cases)
 - This can be within 4 weeks of operation, or many decades following.
2. External herniations:
 - Inguinal, femoral, umbilical or incisional.
3. Neoplasms

Other causes are rarer, but may include

4. Strictures
5. Diverticulitis
6. Internal herniations
7. Foreign bodies / bezoars.

The most common causes of **large bowel** obstruction are:

1. Neoplasm
2. Diverticulitis
3. Volvulus:
 - Caecal or sigmoid.

Other causes are rarer:

4. Herniations (external or internal)
5. IBD
6. Strictures
7. Faecal impaction
8. Extra-intestinal tumours
9. Adhesions (rare cause in large bowel obstruction).

Intussusception, volvulus and congenital lesions are more common in children.

Causes of dynamic ileus:

1. Trauma (including post operative)
2. Inflammation (peritonitis, pancreatitis and appendicitis)
3. Electrolyte disturbances (mainly hypokalaemia)
4. Drugs (opiates and anticholinergics)
5. Hypothermia
6. Ischaemia
7. Severe hypothyroidism
8. Prolonged mechanical obstruction.

Complications

1. Volume depletion from:
 - Vomiting
 - Third space volume losses:
 - ♥ Fluid loss into a paralytic gut
 - ♥ With worsening oedema of the intestine, there is also a transudative loss of fluid into the peritoneal cavity.
2. Electrolyte disturbances:
 - Hypokalaemia
 - Hyponatraemia or hypernatraemia
 - Acid / base disturbances:
 - ♥ Metabolic alkalosis with protracted *upper* GIT losses
 - ♥ With more severe fluid loss, a lactic acidosis will follow.
3. Strangulation of bowel with:
 - Generalized septicaemia/ septic shock.

- Perforation with peritonitis/ septic shock.
4. Closed loop obstruction:
- A closed-loop obstruction occurs when a segment of intestine is obstructed in two locations, creating a segment with no proximal or distal outlet.
 - If undetected, closed-loop obstruction can rapidly progress to strangulation. In this setting, there may only be a short segment of intestine that is distended, making the diagnosis difficult because of *minimal abdominal distension*.

Clinical Assessment

Important points of history:

1. Abdominal pain.
 - Initially and typically pain is colicky in nature.
 - If pain is **constant and severe**, then perforation, peritonitis or gut ischaemia must be considered.
2. Vomiting:
 - Vomiting occurs more commonly and earlier in small bowel obstruction, compared to large bowel obstruction.

The more proximal the obstruction (jejunum versus ileum), the earlier the onset of vomiting.

Bilious vomiting is suggestive of proximal obstruction.
 - Vomiting tends to occur later in large bowel obstruction and if “faeculent” also suggests a more distal obstruction.
3. Constipation/ non-passage of flatus.
 - A *late* feature.

Note also that patients may or may not complain initially of constipation and inability to pass flatus since the colon requires 12 to 24 hours to empty after the onset of bowel obstruction. As a result, flatus and even passage of bowel contents may continue after onset of symptoms.
4. Note any past history of abdominal/ pelvic surgery, or any previous GIT disease, such as IBD.

Important signs on examination:

1. Vital signs:
 - Look for signs of dehydration
 - Tachycardia/ Tachypnoea
 - Looks for signs of circulatory compromise, hypotension, poor peripheral perfusion.
 - Fever:
 - ♥ This may indicate perforation, intra-abdominal collections, severe pancreatitis or septicæmia.
2. Abdominal scarring:
 - Look for abdominal scarring. This may suggest adhesions as the cause of the obstruction.
3. Abdominal distention:
 - Abdominal distention may be seen, but its absence does not rule out bowel obstruction.
 - This is more common with more distal obstructions. Distension of the abdomen is somewhat less with more distal obstructions, because the proximal intestine acts as a reservoir as it dilates.
 - Distension is typically associated with a hyper-tympanic percussion note.
4. Abdominal tenderness:
 - Some degree is usually seen.
 - If there is frank rebound tenderness or rigidity, peritonitis (either localized or generalized) should be suspected.
5. Hernias:
 - Signs of incarcerated/strangulated external hernias should always be specifically looked for.
6. Bowel sounds:
 - Bowel sounds may initially be increased, but with increasing time and severity of obstruction they become less frequent and eventually become silent.

Features suggestive of strangulation:

Unfortunately, there is *no* reliable sign or symptom that absolutely differentiates patients with strangulation or impending strangulation from those in whom surgery will not be necessary. This presents the major challenge in treating patients with bowel obstruction.

Consider the possibility of strangulation in cases of the following:

- Fever
- Circulatory compromise
- Biochemical abnormalities:
 - ♥ Metabolic acidosis/ elevated lactate levels
 - ♥ Elevated WCC / elevated CRP.
- Abdominal guarding/ rigidity.
- Constant (as opposed to colicky) and severe intractable pain.
- Oedema/ inflammatory changes seen in association with external hernias.

Investigations

Blood tests:

The following should be considered:

1. FBE
 - May show mild leukocytosis.

This may increase suspicion for strangulation, perforation, abscess or other inflammatory process.
2. U&Es / glucose
3. Serum lactate
 - This may give additional information as to how unwell a patient is.
4. Serum lipase
 - Should be done to help rule out pancreatitis.

5. ABGs

- These may show metabolic alkalosis (with protracted vomiting due to upper GIT fluid losses).

OR

- A metabolic acidosis if the patient is significantly volume depleted or has an ischaemic gut, especially with mesenteric ischaemia.

Plain Radiology:

AXR (erect and supine):

Plain AXR is useful as a screen of bowel obstruction, but cannot definitively exclude this!

Plain films may not diagnose low-grade obstructions.

They will rarely establish the cause of obstruction.

Features include:

- The presence of dilated loops of bowel with multiple air-fluid levels on the erect abdominal x-rays is suggestive of bowel obstruction.

Up to six fluid levels is (arbitrarily) considered to be within normal limits. Greater than 6 cm diameter of large bowel is generally considered to be abnormal, though this has to also be taken within the overall clinical context.

If the patient cannot be placed into an upright position, *a left lateral decubitus* abdominal film can reveal the presence of free air and/or air-fluid levels.

- Dilated bowel in the absence of any fluid levels is not generally diagnostic (could be normal, early obstruction or early ileus)
- A dilated single loop of colon in the left lower abdomen is suggestive of sigmoid volvulus, whilst in the right lower abdomen it is suggestive of a caecal volvulus. Elsewhere a closed loop small bowel obstruction is implied.
- The presence of air in the colon or rectum makes the diagnosis of complete obstruction *less likely*, particularly if symptoms have been present for *more than* 24 hours

CXR:

- An erect chest x-ray should be checked looking for free gas and hence perforation.

Enteroclysis imaging:

This refers to administration of water or contrast material into the duodenum followed by fluoroscopy studies to determine the presence of a complete versus incomplete **small bowel obstruction**. It may be considered in patients with less acute or more “low grade” symptoms.

However, these kinds of small bowel studies are inferior to CT in the detection of closed-loop obstruction or ischaemia, and rarely offer any indication of the aetiology of the obstruction. As a result, most radiologists now recommend CT as the first study after plain films in difficult-to-diagnose bowel obstructions, to be followed by a small bowel series only if the scan is not diagnostic.

Abdominal CT

This being increasingly performed in cases of actual or suspected bowel obstruction.

It is far more sensitive and specific than plain radiography and can often establish the actual cause of an obstruction.

Advantages include:

- Far greater sensitivity and specificity than plain radiography.
- Can establish the *level* of the lesion, large bowel, versus small bowel, and localization to proximal, middle, or distal segment involvement.
- Delineation of underlying *causative pathology*, including:
 - ♥ Infective/ inflammatory lesions
 - ♥ Malignant lesions
 - ♥ Occult internal herniations.
- Differentiating mechanical obstructions from paralytic ileus or pseudo-obstructions.
- The detection of ischaemic (hence strangulated) gut, far earlier than plain films, (signs here are *very* late).

The addition of oral and/ or IV contrast material have increase the diagnostic yield of the scan, however in urgent cases, or those unable to take oral contrast, or who have a significant contra-indication to IV contrast, can still have a scan without contrast.

Water-soluble Gastrografin, unlike barium does not cause a chemical peritonitis. Barium should **not** be used if perforation is suspected.

Abdominal CT angiogram

This is used in the diagnosis of **mesenteric ischaemia**.

Management

1. Assess and manage any immediate resuscitation issues.
 - Commence IV therapy with crystalloids.
2. Nil by mouth.
3. Nasogastric tube:
 - If the patient has a distended abdomen or protracted vomiting then a nasogastric tube should be inserted.
4. Electrolyte disorders:
 - In particular correct hypokalaemia as necessary.
5. Analgesia:
 - Titrated opioid analgesia as clinically indicated.
 - Hyoscine (Buscopan) is often given for intestinal “colic” pain, but is best **avoided** in cases of bowel obstruction (and especially in cases of megacolon).
 - **Note that if a patient is requiring ongoing / frequent doses opioid, this may indicate an ischaemic gut with impending perforation, or may in fact indicate that perforation has occurred with consequent peritonitis. A surgical opinion must be more urgently sought in these cases.**
6. Anti-emetic:
 - Prochlorperazine or Ondansetron /granisetron are probably the best anti-emetics to use.
 - Metoclopramide (Maxolon) is best avoided in cases of obstruction.
7. Antibiotics:
 - Antibiotics to cover against gram-negative and anaerobic organisms should be given if the patient is unwell, and strangulation or perforation is suspected.
8. Surgery:

- Many cases of small bowel obstruction will be able to be treated conservatively.
- Some cases of small bowel obstruction will require operative intervention, in particular for **suspected strangulated bowel, ischaemic bowel or if perforation has occurred.**

Large bowel obstructions will more commonly require surgical intervention.

A non-strangulating sigmoid volvulus can be temporarily decompressed by a rectal tube passed through a sigmoidoscope.

- For paralytic ileus and pseudo obstruction treatment focuses on diagnosing and treating the underlying cause.

Disposition:

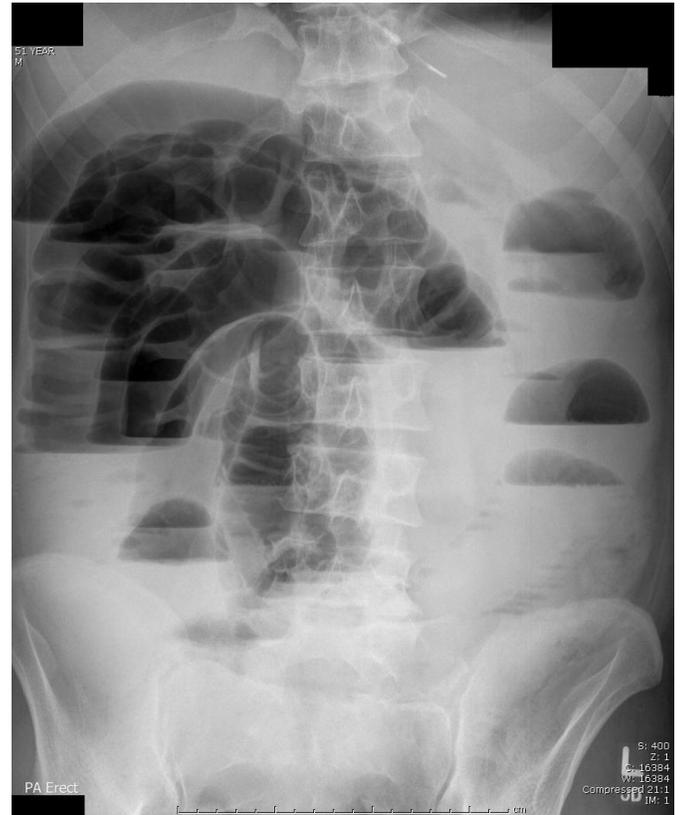
All cases of bowel obstruction will require admission and referral to the surgical unit.

Actual or suspected cases of bowel strangulation constitutes a true surgical emergency, and requires urgent operation. Mortality will be directly related to the delay in definitive treatment in these cases.

Radiological features distinguishing the normal small and large bowel

Feature	Small Bowel	Large Bowel
Normal size	Up to approx 3 cm	Up to approx 6 cm Caecum up to approx 9 cm ; (> 10 cm implies high risk of perforation).
Position	Central abdomen	Circumferential - the large bowel tends to frame the small bowel
Mucosal folds	Valvulae conniventes Tightly stacked (coiled-spring appearance) in proximal jejunum Much sparser in distal ileum	Haustral folds; thicker and do not completely traverse the bowel In between the haustra are spaces known as plicae semilunaris
Faecal matter	Not normally seen	May be visualized

Radiographic Signs of Bowel Obstruction:



Typical appearance of a mechanical bowel obstruction in a 52 year old male. There are dilated loops of bowel on the supine film and multiple air-fluid levels on the erect film. At laparotomy an adenocarcinoma of the descending colon was found, and a hemicolectomy was performed.

The “Gas in the rectum” fallacy:

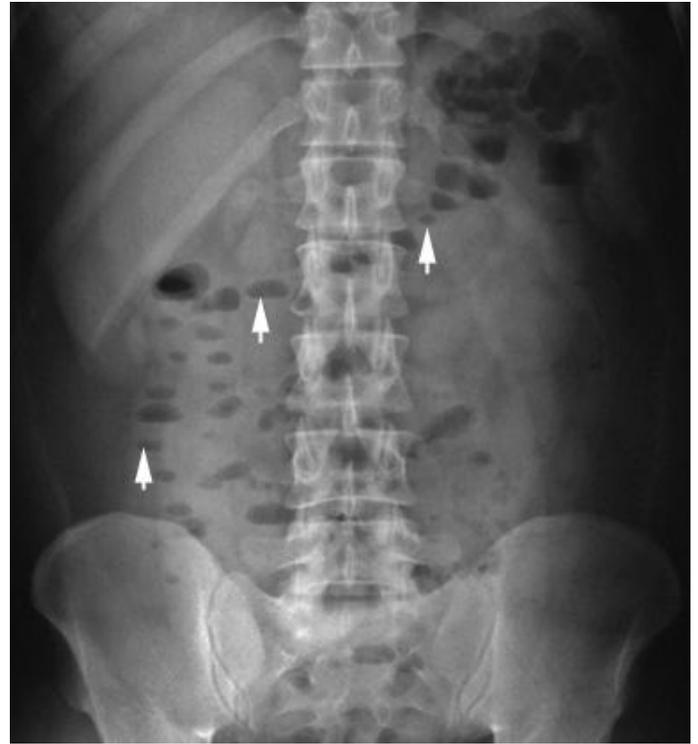
The presence of gas in the rectum is widely supposed to be a useful indicator to exclude bowel obstruction.

The reasoning is that if the bowel is obstructed, there should be no passage of gas to the rectum.

This (supposed) sign however is unreliable!

*The bowel is often **partially** obstructed, allowing the passage of some bowel contents past the level of the partial obstruction. Additionally, the large bowel produces its own gas through normal bacterial fermentation processes. Even in cases of complete obstruction, gas in the rectum may **persist** for several days. Gas in the rectum does not exclude a bowel obstruction!*

[The String of Pearls Sign:](#)



Above left: The curvi-linear train of air bubbles visualized on this erect AXR demonstrates the “string of pearls sign”. This sign is considered to be diagnostic of obstruction (as opposed to ileus. It is caused by small bubbles of air trapped in the valvulae of the small bowel.

Above right: The string of pearls sign seen in association with a large bowel obstruction has a different appearance. Here the gas bubbles are relatively larger and have flat inferior margins.

[Fluid levels:](#)

Fluid levels in the abdomen are seen in **normal** patients commonly in the stomach, often in the small bowel (up to 6 according to some literature) but no usually in the colon distal to the hepatic flexure

[Ileus:](#)

The appearance of generalized dynamic ileus on plain film typically shows both the large and small bowel extensively and uniformly air filled but not greatly dilated.

The clinical context must also be taken into account.



"Diogenes", oil on canvas, John William Waterhouse, 1882, Art Gallery of New South Wales Sydney.

References

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