Intestinal obstruction

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Abstract

Intestinal obstruction is a common surgical emergency, accounting for up to 20% of admissions with acute abdominal pain. Of these, 80% will have small bowel obstruction, the most common cause being adhesions. Colorectal cancer is the most common cause of large bowel obstruction. The cardinal features of obstruction are abdominal pain, vomiting, distension and absolute constipation. Initial management comprises adequate fluid resuscitation, decompression with a nasogastric tube and early identification of strangulation (signs of which may include tachycardia, tenderness, fever and leucocytosis) requiring operative intervention. Appropriate use of contrast imaging can differentiate between patients that are likely to settle conservatively and those that will require surgery.

Keywords Adhesional obstruction; colorectal cancer; intestinal obstruction; large bowel obstruction; paralytic ileus; pseudo-obstruction; small bowel obstruction

Classification

Intestinal obstruction may be divided into mechanical (dynamic) and non-mechanical (adynamic) causes.

Mechanical (dynamic) obstruction

In mechanical obstruction there is a physical obstruction of the bowel lumen associated with increased peristalsis in an attempt to overcome the blockage. Causes of mechanical obstruction include adhesions, hernias, tumours, volvulus and strictures. Although these causes can be classified as luminal, within the bowel wall or outside the bowel wall it is probably more helpful to consider which are the common presentations for each site of obstruction (small bowel or large bowel) (Table 1).

Non-mechanical (adynamic) obstruction

In adynamic obstruction there is reduced or absent peristalsis due to a disturbance of the neuromuscular transmission of the parasympathetic innervation to the bowel. Adynamic obstruction can be sub-classified into paralytic ileus, which affects the small and large bowel and colonic pseudo-obstruction.

Mechanical obstruction

Small bowel obstruction

Adhesions: adhesions commonly form after abdominal surgery and are the result of the normal wound healing process. They are the leading cause of small bowel obstruction in the developed world. The propensity for adhesion formation varies according to the extent of the surgery and individual patient response. The natural history of adhesions is also very idiosyncratic. Some patients may form extremely dense adhesions but not develop any complications, whereas others may suffer early and/or repeated problems. It is estimated that the lifetime risk of developing adhesional small bowel obstruction may vary between 1% and 10% following open appendicectomy or cholecystectomy, up to 25% following major colonic resection.

Hernias: it is mandatory to examine for the presence of hernias in all patients presenting with intestinal obstruction. Inguinal

Causes of mechanical obstruction

Small bowel	Large bowel
Adhesions	**Colorectal cancer**
Congenital bands Acquired (post-surgery/inflammation)	
Hernias	**Hernias**
Inguinal Femoral Incisional Paraumbilical Internal	
Tumours	**Volvulus**
Neuro-endocrine (carcinoid) Lymphoma Hamartomatous (Peutz–Jegher's) Gastro-intestinal stromal tumour (GIST)	Sigmoid Caecal
Strictures/inflammatory	**Strictures/inflammatory**
Crohn's disease Postoperative (anastomotic/constriction ring) Peptic ulcer disease Post-radiotherapy Vasculitis Non-steroidal related	Diverticular disease Ischaemic colitis Crohn's disease
Rarer causes	**Rarer causes**
Gallstone ileus Intussusception Extrinsic masses Foreign bodies Bezoars (hair, indigestible plant material – seeds, stones, pith) Parasites	Faecal impaction Intussusception Extrinsic masses

Table 1

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hernias are the most common cause of small bowel obstruction in the developing world, and are more common than femoral hernias in both women and men. However, femoral hernias are more commonly found in women. Careful examination of the femoral canal to actively exclude a femoral hernia is necessary, as they are usually small and rarely obviously declare themselves unless strangulation has occurred.

Groin hernias can more rarely cause large bowel obstruction, usually of the caecum or sigmoid colon (sliding hernias). Similarly it is not unusual for a large paraumbilical hernia to contain the transverse colon, which is a trap for the unwary. Whilst hernias, if present, are often the cause of intestinal obstruction, this is not necessarily the case and they may become symptomatic because they contain obstructed loops of bowel due to another cause.

Laparoscopic surgery and incidence of small bowel obstruction: potential benefits of laparoscopic surgery may include a decrease in adhesion formation (and hence episodes of adhesional obstruction) and a reduction in the incidence of incisional hernias.

Large bowel obstruction

Cancer: in contrast to the small bowel, where epithelial tumours are rarer (probably due to the higher spontaneous rate of apoptosis), colorectal adenocarcinoma is the commonest cause of large bowel obstruction, accounting for up to 60% of cases.

Diverticular disease: diverticular stricture (usually affecting the sigmoid colon) is a common benign cause of large bowel obstruction.

Volvulus: sigmoid volvulus usually occurs in the elderly and/or infirm and reflects underlying colonic inertia leading to a redundant sigmoid colon that is then able to twist on its mesentery and obstruct. A proportion of patients may present in a similar fashion but simply have an atonic colon, which is incapable of overcoming the resting sphincter tone.

Caecal volvulus is rarer and is seen more commonly in younger patients, as it usually reflects incomplete rotation of the midgut, leaving the right colon inadequately fixed to the posterior abdominal wall.

Non-mechanical obstruction

Paralytic ileus

This affects the whole bowel and is a normal consequence of abdominal surgery. Small bowel function usually recovers first, followed by the stomach and then colonic activity. It normally resolves after 3 days, but may persist and is exacerbated by electrolyte disturbances, particularly hypokalaemia. Intra-abdominal sepsis, haematoma and retroperitoneal disease (e.g. pancreatitis) may also lead to ileus.

The concept of 'enhanced recovery after surgery' (ERAS) has gained widespread acceptance over the last few years. ERAS comprises a multi-modal approach to the pre-, peri- and post-operative care of patients undergoing abdominal surgery and aims to minimize the surgical stress response. ERAS challenges 'traditional' principles of management, which may have prolonged ileus. Goal-directed fluid therapy minimizes the indiscriminate use of fluids and results in less bowel wall oedema and a faster return to function. Combining this with regional anaesthesia, avoidance of opiates, early mobilization, reduction of insulin resistance from carbohydrate loading and the protection of gut mucosal integrity through early feeding has resulted in dramatically reduced lengths of stay following both open and laparoscopic surgery.

Colonic pseudo-obstruction

This was originally described by Ogilvie in patients with retroperitoneal malignant infiltration. Patients present with similar features to those of mechanical large bowel obstruction, but no mechanical cause is found on subsequent imaging (water-soluble contrast enema or CT with rectal contrast) or endoscopic evaluation.

There are several conditions that are strongly associated with the development of pseudo-obstruction, which has a precipitating cause in 80% of cases. These include medically unwell patients (chest infection, myocardial infarction, renal failure), Parkinson's disease, neuroleptics, trauma, patients that have recently undergone major orthopaedic surgery (spinal, pelvic, hip replacement), opiates and metabolic disturbances (e.g. hypokalaemia).

Pathophysiology of intestinal obstruction

The bowel becomes dilated proximal to the site of obstruction and fluid is sequestered due to impaired reabsorption. Major fluid shifts can occur, as up to 10 litres of fluid can be secreted into the bowel per day. This is compounded by reduced oral intake and vomiting. There is loss of intra-vascular volume and electrolyte depletion. This can progress to hypovolaemic shock.

In mechanical obstruction, there is increased peristaltic activity initially in an attempt to overcome the blockage, leading to colicky abdominal pain. Eventually the intestinal smooth muscle becomes fatigued and peristalsis stops. Distal to the obstruction, the bowel empties (initially often giving rise to diarrhoea), before becoming collapsed. In adynamic obstruction there is abdominal discomfort due to the distension rather than colicky pain and reduced or absent peristaltic activity.

Microvascular changes can result in loss of mucosal integrity and translocation of bacteria into the bloodstream, leading to development of the systemic inflammatory response syndrome (SIRS).

With progressive distension of the bowel wall, venous return can become impeded leading to further congestion, loss of fluid into the bowel lumen and leakage of serosal fluid into the abdomen causing ascites.

Further venous engorgement compromises arterial inflow into the capillary bed, resulting in intestinal ischaemia (strangulation). This can ultimately lead to bowel wall necrosis and perforation. Strangulation can occur in the absence of obstruction in a tight-necked hernia (e.g. femoral) if only one wall of the bowel is involved and the lumen remains patent (Richter's hernia).

With a 'closed loop' obstruction, two limbs of the bowel are obstructed (e.g. a loop of bowel trapped under a band adhesion, through an internal hernia or volvulus). This leads to a rapid increase in distension and intraluminal pressure, with early vascular occlusion.