

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

Clinical presentation

History

There are four cardinal features of intestinal obstruction:

- abdominal pain
- vomiting
- distension
- absolute constipation.

The order and degree to which these are manifest is related to the level of obstruction.

Abdominal pain: colicky pain is usually the first feature of intestinal obstruction. In small bowel obstruction it is often of sudden onset and severe. Pain becoming constant or localized suggests impending bowel compromise from ischaemia and/or perforation.

Vomiting: with proximal obstruction there is short interval between the onset of pain and vomiting. In colonic obstruction, vomiting may be late or even absent. The nature of the vomitus also gives a clue as to the level of obstruction. Undigested stomach contents without bile may imply gastric outlet obstruction. Bilious vomit is seen in patients with high small bowel obstruction, becoming more faeculent as the site of the obstruction moves more distally. Often nausea or hiccoughs precede the onset of vomiting.

Distension: the more distal the obstruction, the longer the episode and the greater the degree of abdominal distension.

Absolute constipation: this is the failure to pass stool or flatus. It occurs earlier in distal (large bowel) obstruction.

A thorough history should be taken, encompassing all of the above points. A change in bowel habit, bleeding per rectum (PR) and weight loss are obvious red-flag symptoms. A detailed past surgical history is important, as is a family history of inflammatory bowel disease or colorectal cancer. The lifetime risk of dying from colorectal cancer is 1:20. However, patients with more than one first-degree relative affected and onset below the age of 60 increase this risk significantly.

Examination

This should include an assessment of the cardiovascular status (capillary refill time, pulse, blood pressure), other signs of SIRS (temperature, respiratory rate) and evidence of general health. Abdominal examination should elicit any masses, signs of local peritonism or general peritonitis and fully evaluate hernial orifices and scars for potential incisional hernias. Bowel sounds are usually hyperactive and ‘tinkling’ in mechanical obstruction (and visible peristalsis may be seen) whilst being reduced or absent in adynamic obstruction. A digital rectal examination should be performed.

Investigations

Blood tests: basic investigations should include a full blood count (a microcytic anaemia may be seen in colorectal cancer, whilst a leucocytosis may suggest ischaemia or perforation), urea and electrolytes (U&Es) to ascertain renal function and degree of dehydration, amylase to rule out pancreatitis (as in any acute abdominal presentation, although amylase can be raised in cases

of obstruction and/or perforation), group and save and arterial (ABG) or venous blood gas (lactate and negative base excess indicate degree of dehydration, may suggest ischaemia and are part of the Surviving Sepsis Campaign care bundle as they are a useful adjunct to assessing the severity of illness and subsequent response to resuscitation).

Plain films (Figures 1–3): a plain supine abdominal X-ray is performed to look for signs of obstruction, showing dilated gas-



Figure 1 Plain abdominal X-ray showing distal small bowel obstruction due to a band adhesion following previous appendectomy.



Figure 2 Plain abdominal X-ray showing large bowel obstruction with a cut-off at the splenic flexure due to an obstructing cancer.

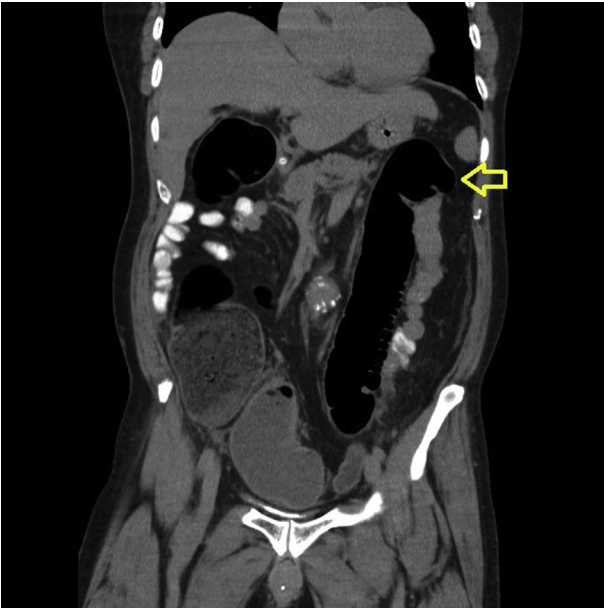


Figure 3 Large bowel obstruction in the same patient as [Figure 2](#) demonstrated on a subsequent CT scan.



Figure 4 Plain abdominal X-ray showing an ileus (note dilated loops of small and large bowel with no cut-off).

filled loops of bowel with a cut-off. Evaluating whether it is small or large bowel obstruction based on the transverse bands across the bowel is prone to error (the valvulae conniventes in small bowel go all the way across whereas the haustra in the large bowel do not, but this depends on the projection of the film). Making an assessment based on the distribution of the distended bowel is a better way of differentiating the level of obstruction (small bowel loops are located centrally, whereas the large bowel is seen peripherally in the typical pattern). It is important to realize that dilated small bowel loops may reflect large bowel obstruction with an incompetent ileo-caecal valve (20–30% of patients), so always check that there is not distended colon beyond these.

In paralytic ileus there is global dilatation of small and large bowel without any cut-off ([Figure 4](#)). In pseudo-obstruction there is often dilatation of the colon down to the recto-sigmoid junction, but the cut-off may be around the splenic flexure as this is the transition point between the vagal and pelvic splanchnic parasympathetic innervation.

An erect chest X-ray should be performed if there is any abdominal tenderness to exclude perforation.

Contrast imaging: plain films may confirm intestinal obstruction in 60% of cases. If the bowel is predominantly fluid-filled or there is a closed loop obstruction then the classic features may not be apparent.

CT: CT scanning can identify 95% of cases of intestinal obstruction, as well as providing further information regarding the level of obstruction and the potential aetiology. Water-soluble oral contrast should be administered as it makes the test more valuable. Often the patients cannot tolerate oral contrast without placement of a nasogastric tube (NGT) and decompression of the stomach. Contrast can then be given via the NGT. Intravenous contrast can also be given, provided that renal function is adequate (eGFR > 40).

Further imaging in large bowel obstruction is recommended, as it can be difficult to differentiate mechanical from adynamic obstruction (studies confirmed mechanical obstruction in only 60–63% of suspected cases based on plain films). Historically this was done with single-contrast water-soluble contrast enema, but CT ± oral and/or rectal contrast can add important information with regards to local extent of disease and distant metastases that may influence management.

Gastrografin small bowel follow through (SBFT): early implementation of gastrografin SBFT has been shown to increase diagnostic accuracy in small bowel obstruction, decrease time to operative intervention in patients with complete obstruction (cases in which contrast fails to reach the colon within 24 hours) and may be therapeutic – reducing the time to resolution of partial adhesive small bowel obstruction.

Management of intestinal obstruction

Regardless of the underlying cause, there are some basic principles that should be followed in the management of all patients with bowel obstruction. These can be summarized as ‘drip and suck’, which is the foundation of conservative management. Adequate analgesia (usually intravenous opiates) and anti-emetics (not prokinetic) should be administered.

Fluid resuscitation

Patients require adequate fluid resuscitation and electrolyte replacement. Results of the U&Es and ABG should guide the rate of fluid replacement and similarly patients should have a urinary catheter and hourly measurement of urine output (>0.5 ml/kg). Oliguria is a normal part of the stress response and as a marker of end-organ perfusion has to be put in context with other signs. Early consultation with the critical care unit for patients with pre-existing cardiac or renal disease is advisable, as these may benefit from more invasive monitoring.

The Guidelines on Intravenous Fluid Therapy in Adult Surgical Patients (GIFTASUP) suggest that *'excessive losses from gastric aspiration/vomiting should be treated with an appropriate crystalloid solution, which includes an appropriate potassium supplementation. Hypochloreaemia is an indication for the use of normal saline. Losses from diarrhoea/ileus/obstruction should be replaced volume for volume with Hartmann's solution'*.

Acute kidney injury (AKI) is common in patients presenting with intestinal obstruction. It is a rapid reduction in kidney function (creatinine 1.5x baseline) and is associated with a significant increase in morbidity and mortality. Drug chart review should identify and stop any potentially nephrotoxic drugs.

Decompression

Patients should be kept 'nil by mouth' but allowed sips of clear fluid for comfort. Attention needs to be paid to oral hygiene. Placement of an NGT relieves nausea and/or vomiting. The NGT may be left on free drainage or may require regular aspiration. Measurement of the NGT losses will guide fluid replacement. Decompression of the proximal bowel may allow the obstruction to settle by conservative means.

Management of small bowel obstruction

Treatment of small bowel obstruction will depend on the cause. If it is likely to be adhesional obstruction and the patient is well, then a period of conservative management is appropriate. This can be continued for 48–72 hours in the expectation that the majority of cases will resolve. As discussed previously, early contrast imaging may expedite the decision-making process for those patients that will require surgery due to complete obstruction, and potentially be therapeutic in patients with partial obstruction.

Patients with features of strangulation (ischaemia) should be operated on after adequate resuscitation. Signs of strangulation include:

- tachycardia,
- tenderness (localized peritonism)
- fever
- leucocytosis.

Other indications for operation include generalized peritonitis, evidence of perforation or an irreducible hernia.

Relative indications for surgery include obstruction in the 'virgin' abdomen, a failure to improve, or a clear transition point on imaging indicating complete obstruction.

A prolonged trial of conservative management may be considered in patients likely to have a 'hostile' abdomen (recent major surgery or complex past intra-abdominal surgery ± known dense adhesions) in which the risks of causing injury to the bowel at operation are significant. Inadvertent enterotomy may result in enterocutaneous fistulae, wound breakdown and laparotomy and become a significant management challenge requiring lengthy multi-disciplinary inpatient treatment. Total parenteral nutrition (TPN) may be indicated in these patients to allow complete bowel rest and await potential resolution of obstruction, as long as they remain otherwise well.

Operative management of small bowel obstruction: if the obstruction is due to a femoral or inguinal hernia then these should be repaired locally and the bowel within the sac inspected

to make sure that it is viable. The decision to repair the hernia with a synthetic or biological mesh, or to avoid mesh altogether depends on the degree of necrosis or contamination at operation, as mesh infection may result.

For other causes of small bowel obstruction, including incisional hernias, the abdomen is usually entered via a midline approach. If there has been previous surgery then it is better to try and enter through virgin territory in order to avoid adhesions to the posterior abdominal wall scar. Obstructed bowel is often fragile and must be handled with great care.

At laparotomy a transition point is sought between dilated and collapsed bowel. This may be beneath a band adhesion, or through an internal hernia (e.g. a mesenteric window from a previous bowel resection). The band is divided or the hernia reduced and the defect repaired. Tumours should be resected, or bypassed if this is not possible. A gallstone or other foreign body should be retrieved via a transverse enterotomy. In gallstone ileus, no attempt should be made to perform a cholecystectomy as there will be a fistula between the gallbladder and duodenum that would be difficult to repair.

Following relief of the obstruction, if there is concern regarding the viability of the bowel then it should be wrapped in warm packs for five minutes. If the bowel has not recovered after this time, then a small bowel resection should be performed. Signs of viable bowel include:

- pink colouration
- visible peristalsis
- serosal surface 'sheen'
- mesenteric arcade pulsation.

Often there is a constriction ring around the bowel in the case of a band adhesion. The danger is that this heals by fibrosis and causes a significant post-operative stricture. The risk/benefit of a resection in this case is determined by the circumferential extent of the constriction.

For approaches other than via a midline laparotomy, bowel resection may still be feasible. The 'high' pre-peritoneal approach that should be used in emergency femoral hernia repair usually affords good access to the peritoneal cavity. Similarly in inguinal hernia repairs bowel resection may be possible through the posterior wall of the hernia, but there should be a low threshold for performing a lower midline laparotomy.

Following small bowel resection, an anastomosis should be performed as long as the patient is stable (not requiring inotropic support), not nutritionally deplete (albumin levels are a poor surrogate marker for this), not on major immunosuppressive therapy and likely to survive the consequences of an anastomotic leak. Otherwise, consideration should be given either to performing a 'damage-control' laparotomy – stapling off both ends of the bowel and coming back for a re-look laparotomy in 24–48 hours, or to exteriorizing the ends of the bowel as a double-barrelled stoma. A proximal small bowel resection may give rise to a high-output stoma, but this may be better than the consequences of a leak.

Small bowel stents: recent developments have also led to the option of stenting the proximal small bowel in cases of malignant obstruction where surgical intervention is not possible. This may be the case where the patient is very co-morbid and deemed unlikely to survive operative intervention, or if there are local

factors, such as previous surgery or radiotherapy, resulting in a hostile abdomen not amenable to surgical intervention. Potential complications include perforation or stent migration, however symptomatic control can be very good and lead to an improved quality of life in palliative patients.

Management of large bowel obstruction

Operative management of obstructing colorectal lesions: usually definitive surgery is required. If there is an incompetent ileo-caecal valve (20–30%) then the colon can decompress into the small bowel and surgery is not as urgent as in cases with a competent valve, when there is a form of ‘closed loop’ obstruction. This can lead to distension and ischaemia of the colon, resulting in perforation (usually of the caecum, as this is the thinnest walled). Right sided caecal tenderness in a patient with large bowel obstruction is therefore a sign of impending ischaemia and perforation, necessitating prompt intervention. If there is significant serosal tearing of the caecum at laparotomy for a left-sided obstruction, then sub-total colectomy may need to be considered.

Right-sided and transverse colonic lesions can be treated by right or extended right hemicolectomy (Figure 5). A primary anastomosis should have a low leak rate, but if there is concern due to patient factors as listed previously, the ends should be exteriorized, preferably as a ‘double-barrelled’ stoma as this is easier to reverse.

Leak rates following primary anastomosis for left sided lesions are higher, and different strategies may be employed. A Hartmann’s procedure with end colostomy and oversew of the rectal stump (or mucus fistula) is the safest option, but requires major surgery to restore intestinal continuity in the future, and even this operation may require a defunctioning loop ileostomy. A proportion of patients following a Hartmann’s procedure will never be fit enough to undergo reversal.

A primary anastomosis ± on-table lavage ± a defunctioning loop stoma is often favoured by colorectal surgeons, and the overall morbidity and mortality of a one-stage procedure may be

less overall than the two- or three-stage strategy, although the consequences of a leak may be high.

In rectal cancers, access to the pelvis may be extremely poor in the obstructed patient, or the tumour may be ‘fixed’ with the risk of leaving residual tumour behind. It is appropriate in these cases to simply perform a defunctioning loop stoma and wait for the obstruction to settle, or for the patient to undergo full staging and perhaps pre-operative chemo-radiotherapy in order to downstage locally advanced cancers.

Stenting: Colonic stenting (Figure 6) may be used to palliate colonic obstruction in cases where there is significant metastatic disease, or a patient is unfit for surgery. However, it is increasingly now being used as a ‘bridge to surgery’ in patients with left-sided obstruction. This may convert an emergency open operation, resulting in an end colostomy, in to an elective, possibly laparoscopic operation, with a primary anastomosis ± a defunctioning stoma. Mid to low rectal tumours are usually not suitable for stenting as it results in severe tenesmus.

Stenting is not without complications, and perforation rates very considerably, increasing the operative morbidity and risk of tumour dissemination. Availability of interventional radiology limits access to stenting in many units and resulting numbers are low. Provisional results of the multi-centre, randomized controlled ColoRectal Stenting Trial (CReST) have recently been reported and demonstrate that in patients fit enough to undergo surgery, stenting as a bridge to surgery reduced stoma formation without a detrimental effect on one-year survival. Postoperative mortality, length of hospital stay, critical care usage and quality of life did not differ.

Volvulus

Sigmoid volvulus gives rise to the characteristic ‘coffee bean’ sign on plain abdominal films (Figure 7), with the distended



Figure 5 CT showing large bowel obstruction with a cut-off in the mid-transverse colon due to a stricturing cancer.



Figure 6 Plain abdominal X-ray showing a colonic stent in-situ to palliate a sigmoid cancer.



Figure 7 Plain abdominal X-ray showing a sigmoid volvulus.

limbs of sigmoid colon rising out of the pelvis and abutting each other. Rigid sigmoidoscopy can be diagnostic and therapeutic; as the point of rotation is reached it suddenly opens up with dramatic release of flatus and liquid stool. A flatus tube can then be left in situ for 48 hours. Endoscopic decompression may be required.

Between 70% and 90% of cases resolve without the need for further intervention, but the recurrence rate is high. Emergency surgery is required if there is evidence of ischaemia and elective sigmoid colectomy may be appropriate for repeated episodes. Sigmoidopexy or percutaneous endoscopic colostomy (PEC) using a percutaneous endoscopic gastrostomy tube has been

advocated in frail patients and is endorsed by NICE, but there is limited evidence in the literature regarding long-term efficacy.

Intussusception (Figure 8): in children, intussusception is usually due to infection or enlarged Peyer’s patches, is ileo-colic and can be reduced using air or contrast enemas, without the need for surgery in most instances. However, in adult patients the cause is often pathological, and more commonly ileo-ileal than ileo-colic or colo-colic. Tumours account for up to 69% of cases and therefore resection of the affected bowel is required. Associations include Peutz–Jegher’s syndrome, familial adenomatous polyposis coli and cystic fibrosis.

Laparoscopic management of intestinal obstruction

Patients that are expected to have simple band adhesions as a cause for small bowel obstruction (e.g. previous open appendectomy) (Figure 9) may undergo laparoscopic adhesiolysis in experienced hands. Gaining entry into the peritoneal cavity has to be done extremely cautiously in the presence of distended bowel, as it is very easy to create an enterotomy that may result in disastrous consequences. The collapsed terminal ileum is identified and the bowel traced proximally with atraumatic graspers until the site of obstruction is reached.

Creation of defunctioning stomas in large bowel obstruction and colonic resection can also potentially be undertaken laparoscopically, though the caveat regarding iatrogenic bowel injury is even more relevant.

Management of adynamic obstruction

The main emphasis of treatment is to address the underlying cause (e.g. infection, renal failure, anti-motility drugs or electrolyte disturbance). Colonic pseudo-obstruction can result in perforation and again, it is the caecum that is most vulnerable. Right iliac fossa tenderness should therefore be a warning of impending complications and lead to prompt intervention. Options include endoscopic decompression, which can be

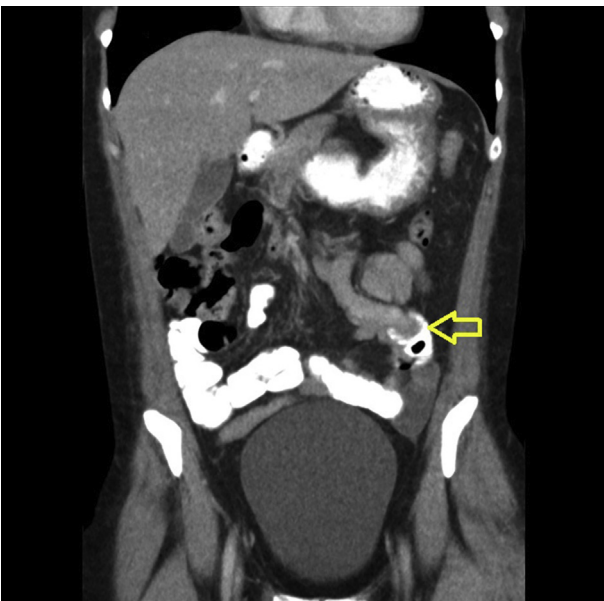


Figure 8 CT showing small bowel obstruction due to intussusception.

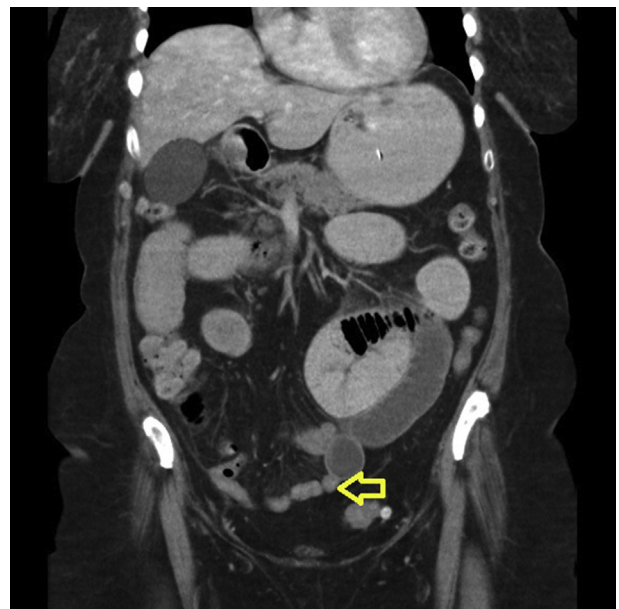


Figure 9 CT showing distal small bowel obstruction with an abrupt cut-off due to a band adhesion.

technically difficult, administration of anticholinesterase drugs (e.g. neostigmine) usually within a critical care setting, or operative intervention such as defunctioning stoma.

Mortality and the high-risk surgical patient

Patients presenting with intestinal obstruction are often frail and elderly. Small bowel obstruction with strangulation and large bowel obstruction can lead to mortality rates of 20–30%. Recent guidelines have been published on the ‘higher risk general surgical patient’, which encompasses this group. Key recommendations include:

- Prompt review of emergency surgical admissions by senior surgeons
- Every patient should their predicted mortality calculated (POSSUM score)
- High-risk patients (predicted mortality >5%) require active consultant input
- Patients undergoing surgery with a predicted mortality over 10% should have a consultant surgeon and consultant anaesthetist present
- Patients with a predicted mortality over 10% should be admitted to critical care
- National audit should be undertaken ◆

FURTHER READING

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