Intestinal obstruction

Introduction

Adult intestinal obstruction is a common surgical emergency to confront the surgical trainee. Rapid diagnosis of the condition and institution of basic management skills are essential to reduce the considerable morbidity and mortality associated with the condition.

Classification

Obstruction can occur in either the small or large bowel and is either mechanical (where the passage of intestinal contents is prevented by a luminal occlusion) or adynamic (where smooth muscle contraction in the intestinal wall ceases diffusely; termed paralytic ileus in the small bowel and pseudo-obstruction or Ogilvie's syndrome in the large bowel). The presence (strangulation) or absence (simple) of impairment of the blood supply to the bowel wall completes the classification.

Aetiology

Mechanical small bowel obstruction is the most common type of intestinal obstruction, with adhesions accounting for up to 80% of cases (*Table 1* lists other causes). Carcinoma and diverticulitis account for the majority of causes of large bowel obstruction (*Table 1*). Paralytic ileus is a common sequela of intra-abdominal operations, but can also occur as a result of intraperitoneal sepsis, abdominal trauma, retroperitoneal haemorrhage, spinal fractures or renal failure. Pseudo-obstruction results from an imbalance in the autonomic regulation of colonic motor function, such that there is excessive sympathetic stimulation or parasympathetic suppression, and can be caused by a wide array of metabolic, endocrine and neurological disorders.

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Pathophysiology

The proximal small bowel has a predominantly secretory function, while the distal small bowel has a predominantly absorptive role. Small bowel obstruction therefore results in considerable disruption of the normal two-way flux of fluid and salts. As the large bowel plays a smaller role in fluid absorption, lesser degrees of fluid and electrolyte abnormalitites are seen in large bowel obstruction.

Mechanical small bowel obstruction

The intraluminal pressure above an obstruction increases markedly as a result of a combination of continued secretion of biliary, pancreatic and gastrointestinal digestive juices, lack of fluid reabsorption and gas accumulation from both air swallowing and increased bacterial fermentation. Bacterial multiplication occurs in the proximal lumen, resulting in the fluid changing to a turbid biliary fluid, and then to a brown or black colour. With a continued increase in intraluminal pressure impairment of venous outflow and capillary engorgement results, eventually leading to arterial compromise, at which point strangulation occurs. Bacteria pass through the damaged bowel wall into the peritoneal cavity and peritonitis results. 'Closed loop' obstructions, in which a segment of bowel is isolated by closure of both ends, such as when small bowel becomes entrapped in a hernia or volvulus, are much more prone to progress to ischaemia and subsequent perforation.

The loss of fluid and electrolytes into the intestinal lumen results in marked depletion of the extracellular fluid. Considerable loss of sodium, potassium and chloride ions occurs, resulting in retention of bicarbonate ions and acid-base changes. Limited compensation occurs as urinary salt and water excretion is reduced.

Table 1. Mechanical causes of adult intestinal obstruction

Small bowel	Luminal	Foreign body
		Gall-stones
		Bezoars
		Parasites
	Intrinsic	Inflammation (tuberculosis or Crohn's)
		Tumour
	Extrinsic	Adhesions
		Inflammatory mass
		Tumour
		Intussusception
		Congenital band
		Hernia
Large bowel	Carcinoma	
	Diverticulitis	
	Volvulus	
	Intussusception	
	Inflammatory strictures	
	Hernia	

Mechanical large bowel obstruction

The effect of an obstruction of the large bowel is to a large extent influenced by the competency of the ileocaecal valve. An incompetent valve allows partial relief of colonic pressure by allowing reflux of colonic contents into the ileum. However, a competent valve results in a closed loop obstruction forming, which worsens as the ileum empties gas and fluid into colon. Distension is maximal in the caecum, with the risk of ischaemic necrosis and hence perforation greatest after the caecal diameter exceeds 15 cm.

Clinical features

There are four cardinal features of intestinal obstruction: pain, vomiting, constipation and abdominal distension. The abdominal pain experienced is initially of a visceral nature, and hence difficult to localize, before developing into a sharp, well-localized pain as the serosa becomes inflamed. Pain is felt centrally in small bowel obstruction and in the lower abdomen in large bowel obstruction, but may be absent in adynamic obstruction.

Vomiting appears early in high small bowel obstruction, late in a low small bowel obstruction and may be delayed or absent in large bowel obstruction. The vomitus is initially clear but then becomes discoloured and eventually faeculent (dark, foul-smelling stagnant lower small bowel and caecal contents).

Bowel movements may be normal in the initial period of an obstruction or in a high small bowel obstruction. Complete obstruction will result in the absence of both flatus and faeces (absolute constipation). Abdominal distension becomes more prominent as the level of obstruction becomes lower, becoming most pronounced in large bowel obstruction.

Examination may demonstrate evidence of dehydration (dry furred tongue, sunken dull eyes, foetor and reduced skin turgor) or even hypovolaemic shock (cold, clammy extremities, tachycardia and hypotension). Inspection of the abdomen may reveal distension, which may be asymmetric as a result of bulging in the right iliac fossa in a large bowel obstruction with a competent ileocaecal valve. Note should be taken of any swellings at the hernial orifices and of the presence of scars.

Palpation of an abdominal mass suggests the presence of a carcinoma or an inflamed or strangulated bowel. The presence of peritonitis (as indicated by guarding or rigidity) indicates that gangrene or perforation is present or imminent, with tenderness in the right iliac fossa suggestive of impending caecal perforation. Percussion of the abdomen may demonstrate a tympanic gas-filled bowel. Bowel sounds will be initially hyperactive before becoming high-pitched and tinkling but are absent in generalized peritonitis or paralytic ileus. A digital rectal examination should always be performed and may demonstrate important features such as blood, impacted faeces or a rectal tumour.

Investigations

Haematological investigations may demonstrate a raised white cell count (present in both simple and strangulation obstruction), electrolyte disturbances and uraemia (if dehydrated). Metabolic acidosis may be evident on arterial blood gas analysis.

An erect chest X-ray may demonstrate sub-diaphragmatic air if visceral perforation has occurred. A supine abdominal X-ray is mandatory, even though radiological signs may be minimal or even absent in the early stages of intestinal obstruction or if the bowel is filled with fluid rather than gas (as is often seen in closed loop obstructions). Distended loops of small or large bowel will normally be present. Particular features that may be present include an isolated (sentinel) loop of bowel in an internal hernia, 'thumb-printing' and loss of mucosal pattern with ischaemic bowel or gas in the biliary tree in gallstone ileus. A characteristic 'kidney bean' sign is seen with colonic volvulus.

Further investigations may include rigid sigmoidoscopy (if there is a clinical suspicion of a rectal carcinoma or sigmoid volvulus), contrast X-ray studies (for example a gastrograffin enema for a suspected pseudo-obstruction) or a computed tomography (CT) scan (*Figure 1*).

Management

General

Patients will require analgesia, normally in the form of opiates. The adage that analgesia should be withheld for fear of masking abdominal signs is incorrect. A nasogastric tube should be inserted and placed on continuous siphon suction ('free drainage'), with regular intermittent aspiration. This relieves vomiting, reduces the risk of pulmonary aspiration and reduces the contribution of swallowed air to any abdominal distension.

Intravenous fluid therapy is required to correct dehydration; requirements will vary considerably depending on the level and duration of obstruction. Fluid replacement is monitored by the patient's vital signs (pulse and blood pressure), fluid balance charts and by a urinary catheter with hourly monitoring of output. Additional monitoring with a central venous line may be needed in the debilitated or elderly.

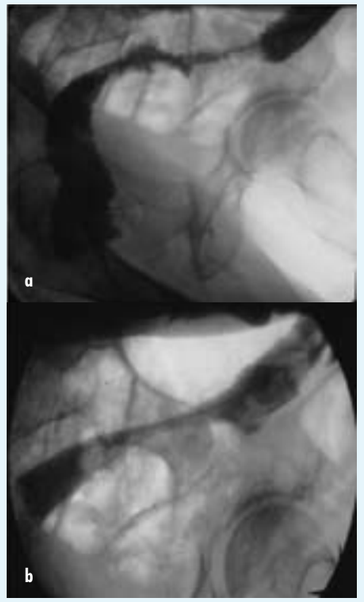
Figure 1. Axial computed tomography scan of a patient with adhesive small bowel obstruction. Note the numerous distended loops of small bowel.

Definitive management

Operative correction is required for most forms of intestinal obstruction. Surgery is always indicated if there is evidence of strangulation or a closed loop obstruction. Simple adhesive small bowel obstruction may be treated initially by non-operative measures for 24–48 hours, with surgery reserved for failure of conservative management. A sigmoid volvulus can often be managed by a flatus tube passed via a rigid sigmoidoscope.

Increasingly in patients with obstructing colonic carcinomas, endoscopic stenting is used if there is no evidence of peritonitis. This allows initial decompression before treatment of the obstructing lesion on an urgent rather than emergent basis (*Figure 2*).

Figure 2. a. Gastrograffin enema demonstrating incomplete obstruction from a colorectal carcinoma. b. The same patient following radiologically-guided insertion of an expandable metallic stent.



Adynamic obstruction

Correction of any underlying electrolyte abnormalities will normally ensure resolution. Direct stimulation of smooth muscle with the parasympathomimetic agent neostigmine is used in acute colonic pseudo-obstruction that fails to respond to initial therapy, with colonoscopic decompression used if colonic distension persists. Occasionally colonic resection or caecostomy formation is required if failure to respond persists or if there is perforation or peritonitis.

Conclusions

Intestinal obstruction is a serious condition with a high mortality if not identified and recognized rapidly. Recognition of the condition allows simple measures to be instituted before definitive management. Close cooperation of the surgeon with radiology colleagues is essential as imaging techniques are rapidly assuming a central role in the investigation and management of intestinal obstruction. BJHM

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KEY POINTS

- Intestinal obstruction in adults is a common surgical emergency.
- Patients often exhibit profound disturbances in fluid and electrolyte physiology.
- Although a myriad of causes have been described, initial treatment is standardized.
- Definitive treatment normally involves surgery.
- Radiology is assuming an increasingly important role in both investigation and definitive management.

Damage to flexible ureteroscopes: an audit of a leading manufacturer

The* British Journal of Hospital Medicine *is pleased to be publishing some abstracts from the Royal Society of Medicine's Young Fellows' Audit Project Prize for 2004–5. This is the winning abstract by Dr David Burling – the runners up will be published in future issues. For information about entering this year's prize, please contact young.fellows@rsm.ac.uk

Abstract

Objective

To define the costs associated with damage to flexible ureteroscopes, and formulate guidelines to minimize these costs.

Methods

In cooperation with one of the main suppliers of flexible ureteroscopes in the UK, the authors analysed sales and repair figures as well as possible causes of damage to the instruments, and calculated cost figures for maintenance of the instrument as opposed to repair and replacement costs.

Results

All damages to 35 flexible ureteroscopes were handling-induced and therefore did not fall under the manufacturer's warranty. Of these, 28% were damaged by misfiring of the laser inside the instrument. All other damages (72%), mainly crushing and stripping of the patient tube, were likely to have occurred during out-of-surgery handling, washing and disinfection. A total of 17 (49%) were not repaired and consequently taken out off service because of the extensive costs involved, and 18 (51%) were repaired at an average cost of U$10 833.

Discussion

Most damage is caused by incorrect handling by support staff and not to laser damage as previously thought.

Conclusion

Training on handling of these fragile instruments for support staff and laser courses for surgeons would result in significant cost savings. BJHM

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