

Diabetes and the gastrointestinal tract

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Abstract

The range of gastrointestinal complications of diabetes extends from the mouth to the anus. In some cases the resulting conditions are familiar – such as gastro-oesophageal reflux and constipation – and the relevance of the diabetes is little more than that these conditions are seen more frequently in diabetic patients than in the general population. Indeed, the range of treatments and their effectiveness are the same in both groups irrespective of the presence of diabetes. But there are two unusual gastrointestinal complications that are peculiar to diabetes: gastroparesis and diabetic diarrhoea. The management of patients with these problems can be extremely challenging; apart from the sheer unpleasantness of chronic vomiting and diarrhoea to the point of incontinence, fluid depletion and loss of diabetic control may necessitate hospital admission. Both vomiting and diarrhoea can be intractable, and the disappointing response of both conditions to the existing range of treatments is often frustrating for patient and physician. Much of the difficulty stems from the fact that their aetiology is poorly understood. The skills involved in looking after such patients extend far beyond the prescribing manual.

Keywords Botulinum toxin; candidiasis; constipation; diabetes mellitus; diabetic diarrhoea; electrical gastric stimulation; gastro-oesophageal reflux; gastroparesis; serotonin antagonists

Introduction

Although the gastrointestinal complications of diabetes mellitus (Figure 1) are clearly not as life threatening as those that affect some other systems, their consequences for a patient's quality of life can be profound. It is naïve to conclude that most of the more serious gastrointestinal complications of diabetes are simply a result of autonomic neuropathy. The correlation between severity of symptoms and degree of autonomic dysfunction is often poor. The control of the enteric nervous system is complex and the neurohumoral interactions extend beyond the sympathetic–parasympathetic system. A rational approach to diagnosis and therapy of the disturbances of the gut in diabetes would require much more understanding of its neurophysiology than has yet been revealed. Treatment is largely empirical and not always satisfactory – as this review will demonstrate.

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What's new?

- Rigorous attention to diet and judicious use of prokinetic drugs remain the cornerstone of treatment for most patients with gastroparesis
- Botulinum toxin injection to the pylorus is no longer recommended in refractory gastroparesis
- Electrical gastric stimulation ('gastric pacing') may rapidly improve symptoms in severe otherwise unresponsive gastroparesis
- Treating diabetic diarrhoea remains challenging but serotonin receptors and ghrelin receptors appear promising targets for future therapeutic intervention

Oesophageal problems

The classical symptoms of gastro-oesophageal reflux – heartburn and regurgitation – are more common in patients with diabetes than in the population at large. There is no difference in the prevalence of risk factors for reflux, such as hiatal hernia or reduced lower oesophageal sphincter function; the major defect in diabetes is that oesophageal peristalsis is impaired. At least in part, this is the result of neuropathy in the motor rather than the autonomic system, which leads to less effective clearance of refluxed acid from the oesophagus.^{1,2} Fortunately, diabetic patients with gastro-oesophageal reflux respond well to proton pump inhibitors (and other conventional treatments).

Dysphagia due to impaired peristalsis is unusual but patients with diabetes, especially when glucose control is poor, are prone to odynophagia as a result of candida infection. Absence of oral thrush does not preclude fungal oesophagitis as only half of all patients with candida in the oesophagus have signs of infection in the mouth. The diagnosis is obvious at endoscopy, where creamy plaques on a reddish base are characteristic (Figure 2). Treatment with oral anti-fungal agents, such as fluconazole, is very effective and does not need to await mycological confirmation.

Diabetic gastroparesis

Acute hyperglycaemia itself can lead to short-term inhibition of gastric emptying in both diabetic and healthy subjects, but diabetic gastroparesis usually occurs in the setting of long-standing diabetes where there is evidence of end-organ damage, such as neuropathy, retinopathy and nephropathy.^{3,4} The associated unreliability of gastric emptying may complicate the management of the blood glucose. In addition, the recurring symptoms can have a deleterious effect on fluid balance and nutrition, as well as on the bioavailability of oral hypoglycaemic agents, which can result in multiple hospital admissions.

The pathogenesis of diabetic gastroparesis is not well understood, but is related to abnormalities in both neuronal and humoral mechanisms. It is generally accepted that chronic hyperglycaemia contributes to neuropathic changes and dysfunctional innervation of the stomach. The resultant alterations in gastric myo-electrical function result in gastric dilatation, reduced peristalsis and delayed gastric emptying. Apart

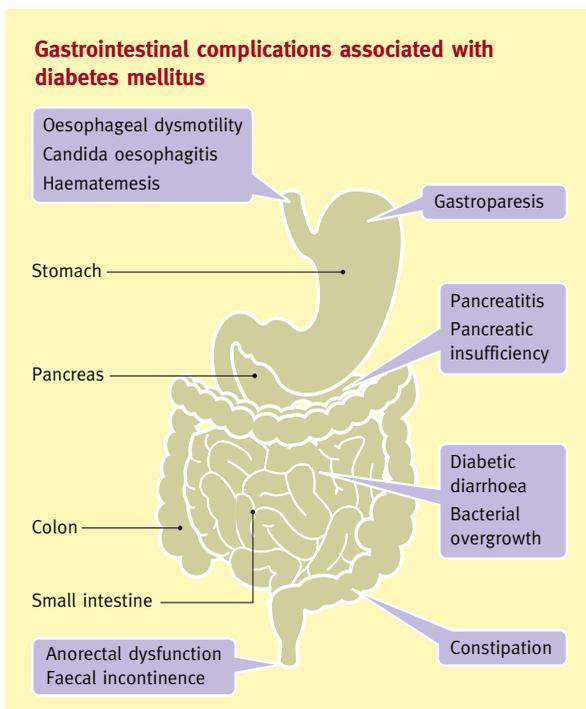


Figure 1

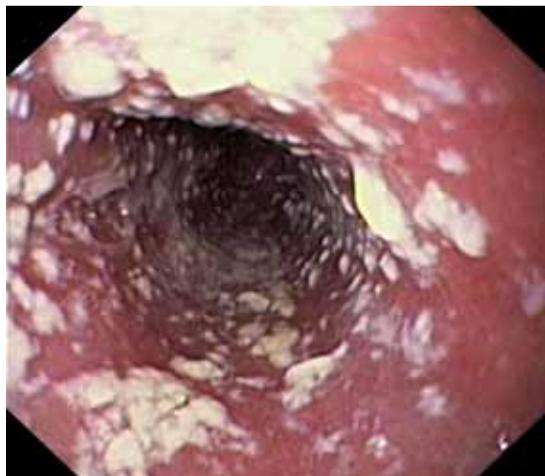


Figure 2 Candida oesophagitis seen at upper gastrointestinal endoscopy.

from disordered control of gastric motor function, it is clear that hyperglycaemia *per se* prolongs gastric emptying.

Symptoms of gastroparesis include post-prandial fullness, bloating and epigastric discomfort (though rarely pain). Early satiety, nausea and vomiting are frequent and the vomitus may contain food eaten many hours earlier. The severity of symptoms does not always correlate with the degree of gastroparesis.⁵ Whereas a succussion splash can be demonstrated in severe disease, physical examination is often unhelpful. Although some patients are predisposed to the formation of gastric bezoars from

indigestible food, many patients who have diabetes with measurable abnormalities of gastric emptying are asymptomatic.

The diagnosis of impaired gastric emptying is often apparent clinically but a dilated stomach may be seen on plain abdominal radiography. It is essential to consider other causes of delayed gastric emptying. A history of duodenal ulceration may suggest pyloric stenosis, whereas pain, anaemia and weight loss may indicate a distal gastric neoplasm. Upper gastrointestinal endoscopy is mandatory to exclude an anatomical cause for gastric outlet obstruction. A substantial gastric residue may be present despite prolonged fasting. There is an appreciable risk of aspiration during endoscopy, which is best performed after a prolonged (possibly 24-hour fast), so it may be safest to admit the patient to hospital for a day or so before endoscopy to allow IV fluids to be given. Other causes of gastroparesis (that may be more readily treatable) must be considered and excluded, and an accurate drug history is essential (Table 1).

Impaired gastric emptying may be seen with a barium meal examination but the value of this investigation in modern clinical practice is negligible. The most relevant investigation of gastric motor function that is widely available is radionuclide scintigraphy. Liquids and solids have differential rates of gastric emptying, and protocols for assessing emptying of the stomach vary between centres.⁶ Data from radiolabelling of solid (as opposed to liquid) meals would seem likely to be helpful in clinical practice since, in diabetic gastroparesis, the impairment of emptying tends to be worse for solids. This technique might seem likely to offer valuable information but in practice its role is seriously limited by the lack of correlation between symptom severity and gastric emptying of the radiolabelled meal.

Treatment of diabetic gastroparesis is often a challenge. Selection of therapy is likely to depend on the frequency and severity of symptoms, the impact on diabetic control, the patient's state of nutrition, and the degree to which the condition interferes with their daily activities. Optimization of blood glucose with close control throughout the day and night is the cornerstone of treatment.⁷ Even mild elevation of blood glucose is associated with altered antroduodenal motility and impaired gastric emptying. The range of subsequent treatment options includes dietary modification, pharmacotherapy and, ultimately, more invasive approaches where the condition proves refractory (Figure 3).

Foods high in lipids are known to reduce gastric emptying, so frequent small, low-fat meals are appropriate. Advising the patient to spread their daily food intake between four or five evenly spaced and evenly balanced meals is often helpful. Given that the rate of emptying of liquids in diabetic gastroparesis is usually less abnormal than that of solids, liquidized foods are worth a trial where solids are not tolerated. If neither solid nor liquid foods can be taken in sufficient quantity, enteral nutrients can be used to supplement standard meals.

While close attention to diabetic control and diet are essential, they are unlikely to be sufficient especially when symptoms are severe. Several drugs have prokinetic activity. The dopamine receptor antagonists, metoclopramide and domperidone, locally increase released acetylcholine at the myenteric plexus. Both drugs accelerate gastric emptying and improve symptoms of gastroparesis – at least in the short term. However, their efficacy over the longer term is less certain and there are issues of safety

Causes of impaired gastric emptying

Central nervous system disorders	<ul style="list-style-type: none"> • Demyelinating diseases • Parkinsonism • Brainstem vascular disease or neoplasia • Acute physiological stress <i>e.g.</i> intensive care state • Spinal cord lesions including trauma, tumours & vascular disease
Autonomic neuropathies	<ul style="list-style-type: none"> • Diabetes mellitus • Amyloidosis • Paraneoplastic • Primary autonomic neuropathy
Metabolic disturbance	<ul style="list-style-type: none"> • Acute hyperglycaemia • Hypokalaemia • Hypothyroidism • Porphyrria
Drugs	<ul style="list-style-type: none"> • Opioids • Anticholinergics • Nicotine • Levodopa • β-adrenoceptor agonists
Infiltrative conditions	<ul style="list-style-type: none"> • Systemic sclerosis • Amyloidosis
Others	<ul style="list-style-type: none"> • Post-vagotomy • Post-operative ileus • Radiation-induced • Idiopathic pseudo-obstruction • Myotonic dystrophy

Table 1

with their use (particularly the risks of dystonias with metoclopramide⁸ and of cardiac arrhythmias with domperidone⁹). In addition, their efficacy over time may fall because of receptor down-regulation and consequent tachyphylaxis. The macrolide antibiotic, erythromycin, has agonist effects at motilin receptors by molecular mimicry, which explains the frequent gastrointestinal intolerance that occurs when it is used for treating infection. This unwanted effect has been turned to the advantage of patients with gastroparesis. Although erythromycin tablets are effective, there may be advantages to trying the suspension as it has greater bioavailability.¹⁰ Intravenous administration seems even more effective although much less practical. Short-term benefits are established but sustained benefit is less certain. As with the dopamine antagonists, there are concerns about tachyphylaxis.

Several management options may be considered in those patients who fail adequately to respond to dietary and pharmacological therapy. Intra-pyloric injection of botulinum toxin at gastroscopy may decrease pylorospasm associated with gastroparesis, enabling some symptomatic improvement that may last for several months.¹¹ However, the evidence is based on uncontrolled studies; randomized trials have failed to confirm its effectiveness and current guidelines no longer recommend its use in the treatment of this condition.⁴

Sequential approach to management of diabetic gastroparesis

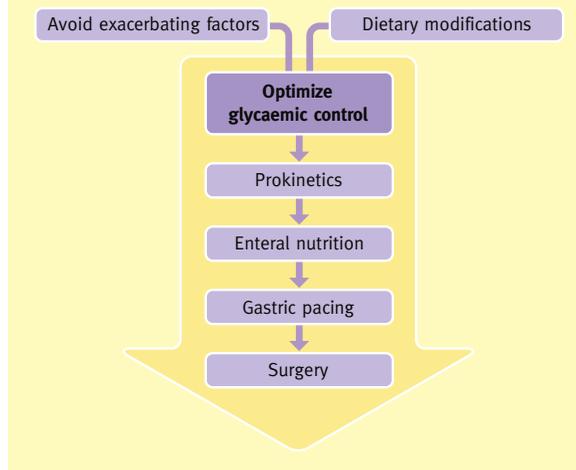


Figure 3

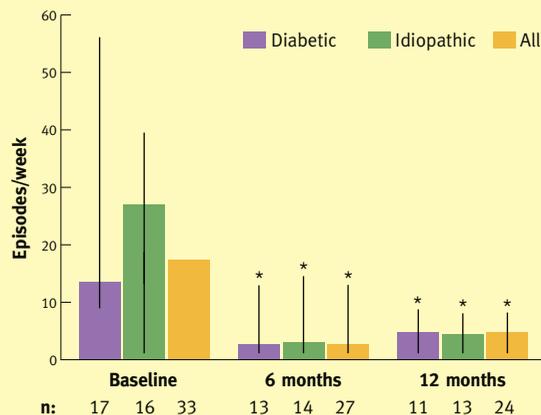
In diabetic gastroparesis where the neurohumoral control of gastric emptying is disordered, gastric electrical stimulation might seem to offer a real benefit.⁸ These devices are inserted surgically to deliver high-frequency, low-energy electrical nerve stimulation to the stomach. Although the technique has become known as ‘gastric pacing’ and has proved successful in clinical practice, it does not lead to accelerated gastric emptying. The mechanism for its effectiveness remains uncertain but it probably enhances gastric accommodation and reduces sensitivity to gastric distension.¹² The impressive symptomatic response seen in a multi-centre trial is shown in Figure 4,¹³ and its value has been confirmed through meta-analysis,¹⁴ although careful case selection is important as the treatment is very expensive.

Attempts have been made to stabilize the situation where vomiting is seemingly intractable and delivery of adequate nutrition difficult. The use of a feeding jejunostomy – either via the naso-enteral route or sited percutaneously – is most helpful in re-establishing symptom control in the short term, especially where a period of in-hospital treatment has failed to control intractable vomiting.¹⁵ However, it is unlikely to be acceptable to the patient as a long-term solution and, as with many of the treatments discussed, there is a paucity of comparative clinical trials to guide patient selection. Surgery is very definitely a last resort. Various gastric drainage procedures such as Polya gastrectomy and gastro-jejunostomy have been tried – usually in desperation and with inconsistent results^{16,17} – and such measures (if they are to be used at all) should be restricted to specialized centres.

Diabetic diarrhoea

Chronic diarrhoea is a complication most commonly associated with advanced insulin-dependent disease. It is characteristically intermittent, watery, tends to occur at night as well as during the day and may be associated with faecal incontinence in a third of patients. Significantly, the condition is painless; if abdominal pain is present, other diagnoses should be considered.

Weekly vomiting frequency (median and interquartile range) at baseline, and changes at 6 and 12 months after the start of gastric electrical stimulation



* <0.05 vs baseline.

Adapted from Abell T, McCallum R, Hocking M, et al. Gastric electrical stimulation for medically refractory gastroparesis. *Gastroenterology* 2003; **125**: 421-8.

Figure 4

The clinical picture is often sufficiently typical for a confident clinical diagnosis to be made, and there are no diagnostic investigations. However, other causes of chronic diarrhoea, including bacterial overgrowth of the small bowel due to delayed transit, are seen more commonly in the diabetic population (Table 2), and the possibility that diarrhoea might be an adverse effect of medication should not be forgotten. Additional differential diagnoses range from such relatively common conditions as inflammatory bowel disease to more uncommon ones, such as carcinoid syndrome or VIPoma.

The cause of diabetic diarrhoea remains unclear. There is no consistent pattern of gut dysmotility: some patients seem to have prolonged gut transit with associated small bowel bacterial overgrowth while others have accelerated transit. The best that can be said is that the diarrhoea is multi-factorial, resulting from autonomic neuropathy, which affects gut transit, together with impaired net fluid absorption, possibly related to impaired adrenergic input. Since adrenergic nerves normally stimulate

Causes of persistent diarrhoea in patients with diabetes

- Medications, e.g. metformin, acarbose, miglitol
- Rapid intestinal transit
- Bacterial overgrowth
- Artificial sweeteners, e.g. sorbitol & mannitol
- Coeliac disease
- Pancreatic insufficiency
- Islet cell tumours
- Other causes of non-diabetic diarrhoea

Table 2

intestinal reabsorption of fluids and electrolytes, decreased intestinal reabsorption, rather than intestinal dysmotility *per se*, may be the dominant mechanism underlying diabetic diarrhoea.

Having excluded other causes of diarrhoea (for which there is often a more satisfactory range of treatments), finding a successful therapy for the patient with diabetic diarrhoea can be a real challenge. Unlike gastroparesis, there is no compelling evidence that tightening control of the blood glucose has a specific benefit. Some authorities suggest that bulking agents are helpful but this is also not supported by evidence. Individual patients may note that specific foods seem to aggravate the diarrhoea, so trial exclusion diets, supervised if possible by dietitians, should be encouraged. There are no objective tests that will identify whether specific foods might aggravate symptoms.

It is appropriate to start with conventional anti-diarrhoeal drugs such as loperamide, diphenoxylate with atropine (Lomotil®) or codeine phosphate. Be prepared to increase the dosage of loperamide to the maximum recommended.

Establishing the diagnosis of small bowel bacterial overgrowth can be difficult. Hydrogen breath tests can be helpful but the diagnosis is best made by microbiological analysis of jejunal aspirates. As these tests are not widely available, it is entirely reasonable to suggest an empirical trial of broad-spectrum antibiotics such as co-amoxiclav.

In refractory cases, a trial of clonidine (the α -adrenoceptor agonist) has been recommended. The rationale is that enhanced α_2 -mediated fluid and electrolyte uptake increases fluid reabsorption. Furthermore it increases colonic compliance and reduces rectal perception, which may diminish the sensation of urgency. Yet, as is seen so often in therapy of GI complications in diabetes, the early promise of benefit for clonidine in case studies¹⁸ has not been confirmed in placebo-controlled trials.¹⁹ In practice, the drug may induce orthostatic hypotension, particularly in those patients with impaired autonomic cardiovascular responses as a consequence of autonomic dysfunction. Other medications that have been tried include the somatostatin analogue, octreotide,²⁰ and the 5-HT₃ receptor antagonist, ramosetron, which has been shown to prolong colonic transit, inhibit small bowel secretion and decrease colonic compliance.²¹

Large bowel disorders

In diabetic clinics, constipation is seen more frequently than diarrhoea. As with constipation in the general population, there is a female preponderance but the condition is rarely severe. The aetiology is not well understood and is likely to be multi-factorial, but does appear to be associated with reduced function of the gastrointestinal pacemaker – the interstitial cells of Cajal.

As with diarrhoea, the evidence that tight glycaemic control improves symptoms is slight. Conventional treatments for constipation are usually effective. If response is poor, the possibility of underlying anorectal dysfunction should be considered, and patients with refractory constipation or faecal incontinence should be referred for anorectal physiological studies. Where drug therapy has failed, biofeedback is a viable option.

Looking forward

It is perhaps axiomatic to state that prevention of diabetic complications before they arise would be preferable to trying to find a

successful treatment once they are fully developed. It also has to be said that the existing pharmacological options for diabetic gastroparesis and diabetic diarrhoea – particularly when symptoms are severe – are limited in both range and effectiveness. Some new drugs currently in development, such as those that influence 5-HT₄ receptors, neuronal nitric oxide synthase and, most recently, ghrelin receptor agonists, look promising but real progress in finding effective treatment is unlikely until we have a much better degree of understanding of gut pathophysiology in diabetes. ♦

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Gastroenterology in the elderly

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Abstract

Gastrointestinal disorders represent the third most common cause of general practice consultations by patients older than 65 years in Western society. There are few changes within the gastrointestinal tract that occur inevitably as part of ageing. However, with increasing age, the incidence of both benign and malignant gastrointestinal disease rises. Although gastrointestinal disorders do not show particular characteristics in the elderly, when compared with younger adults, they may present with more severe symptoms due to co-morbidities and polypharmacy. Adverse reactions to non-steroidal anti-inflammatory drugs are more common in people aged over 65, and are a leading cause of hospitalization in this age group. Dysphagia and constipation are also more common, as is diverticular disease. Inflammatory bowel disease appears to show a second peak of onset between ages 60 and 80, and mesenteric intestinal ischaemia is largely confined to the elderly population. This article will review the reasons for these differences, where these are known, and consider aspects of diagnosis and management that are particularly relevant in elderly patients.

Keywords Chronic motility disorders; functional bowel disorders in the elderly; gastrointestinal disorders in the elderly; irritable bowel syndrome; mesenteric ischaemia; obscure GI bleeding; polypharmacy; upper GI bleeding

Upper gastrointestinal diseases

The prevalence of upper gastrointestinal (GI) disease increases in people aged 65 and over. Conditions such as gastro-oesophageal reflux disease, peptic ulcer and gastric cancer become more common with advancing age. Older individuals also tend to have a high burden of co-morbid factors, including *Helicobacter pylori* infection, and use of medication such as non-steroidal anti-inflammatory drugs (NSAIDs), bisphosphonates and corticosteroids.¹

Unfortunately, in elderly patients with these disorders the symptoms may be mild or atypical, resulting in delayed diagnosis. The practitioner needs to maintain a high degree of clinical suspicion when presented with GI symptoms in this group of patients.

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Upper GI bleeding

Acute upper GI bleeding is a common and potentially life-threatening medical emergency. It is associated with higher rates of hospitalization, morbidity and mortality in the elderly, largely because of multiple co-morbidities. Age is also an independent risk factor for death from upper gastrointestinal bleeding, as are *H. pylori* infection, the use of NSAIDs and anticoagulation.

These patients require prompt risk assessment and resuscitation, followed by early endoscopy and endotherapy for haemostasis. Continued severe bleeding is an indication for radiological intervention or surgery in suitable patients.

Drug-induced GI disorders

Medical drug use increases with age and the elderly are at increased risk of adverse drug reactions. Multiple morbidities and polypharmacy are common in individuals during old age. Gastrointestinal symptoms resulting from either prescription medication or over-the-counter drugs are frequently encountered in geriatric practice, but often mistaken for a symptom of intrinsic organic disease, leading to over-investigation and over-treatment.²

NSAIDs (non-steroidal anti-inflammatory drugs)

Oral NSAIDs remain the most frequently prescribed medication in the UK for musculoskeletal disorders, such as osteoarthritis and chronic backache. Gastrointestinal manifestations, notably ulcers and bleeding, are the most common and life-threatening adverse effects associated with NSAIDs.

In the elderly NSAID-induced adverse effects have become a leading cause of hospitalization with increase in mortality from gastrointestinal ulceration more than fourfold. Up to half of NSAID induced gastroduodenal mucosal lesions may be asymptomatic.^{3,4}

Proton pump inhibitors (PPI) and cyclo-oxygenase 2-selective NSAIDs may be used to mitigate against the adverse effects of conventional NSAIDs. Topical NSAIDs, with their reduced systemic absorption, may present a viable option for patients at increased risk of serious NSAID-related adverse events.⁵

Opioids

Pain is a common complaint in the elderly and opioids are useful agents for the management of both acute and chronic pain. Opioids are known to cause a variety of adverse GI effects, particularly constipation and these adverse effects can be particularly problematic for elderly patients.

Antibiotics

Physiological changes in the gut microflora of the elderly appear to manifest as proliferation of potentially pathogenic species at the expense of 'healthy' bacteria (lactobacilli and bifid bacterium). This altered balance has the potential to augment the risk of antibiotic-related adverse GI effects, including that of *Clostridium difficile* infection – although the latter can also appear as a sporadic illness with increased frequency in users of PPI therapy. *C difficile* infection can be severe in the elderly, and carries a high risk of recurrence and mortality.⁶

Chronic GI motility disorder

Normal ageing is associated with various changes in GI motility but the clinical significance of such changes remains unclear. Large numbers of enteric neurones (the component of the autonomic nervous system that regulates GI motility) may be lost with age, but the GI tract remains surprisingly functional.

A major compounding factor in the interpretation of motor phenomena throughout the GI tract in this age group is the frequent co-existence of neurological, endocrinological and other diseases, which may be independently associated with defective motility. Furthermore, certain drugs commonly prescribed in the elderly can affect GI tract motility, including anticholinergics, antidepressants, opioid analgesics and calcium antagonists.

Dysphagia

Elderly individuals frequently suffer from oropharyngeal muscle dysmotility with dysphagia. Reduction in oesophageal peristalsis and low oesophageal sphincter pressure are also more common in the elderly, leading to dysphagia and gastro-oesophageal reflux disease. Although achalasia is generally an uncommon condition, it needs to be considered in the differential diagnosis. The combination of dysphagia and weight loss should prompt consideration not only of cancer but of an underlying neurological cause, such as motor neurone disease with bulbar involvement or Parkinson's disease.

Constipation

Constipation is one of the GI disorders most frequently encountered in clinical practice in Western society. It is more common in females and its prevalence increases with age. Abnormalities in innervation of the colon may play a significant role in changes in colonic motility, leading to delayed colonic transit in the elderly.

Evaluation of constipation begins with a detailed medical history and anorectal examination. Key self-management strategies include exercise, dietary modification and use of different laxatives to regularize the bowel habit, as appropriate. Simple bulking laxatives or stool softeners are usually effective and may need to be continued long-term.^{7,8}

Iron deficiency anaemia

This topic will be discussed elsewhere in detail, so our comments are limited to some specific issues relevant to the older patient. Iron deficiency is the most common cause of anaemia worldwide and could be the first indicator of a more serious underlying condition.

Iron deficiency anaemia in the Western world, rather than being due to dietary factors, is more often a clue to occult upper and lower gastrointestinal lesions in the elderly.

Functional iron deficiency, which may occur in this age group secondary to acute or chronic inflammatory conditions, is diagnosed when the transferrin saturation is less than 20% in the presence of a normal or raised serum ferritin.

GI causes of iron deficiency, including atrophic gastritis, *H. pylori*-related gastritis and coeliac disease, should be considered in patients with otherwise unexplained iron deficiency. Several studies have shown that approximately 15–20% of patients with newly diagnosed coeliac disease are over the age of 65.⁹

The major cause of iron deficiency in elderly patients is blood loss, either overt or covert ('obscure'). Overt blood loss is by definition obvious manifesting as haematemesis, melaena, epistaxis or haematuria. It should prompt appropriate investigation, often with endoscopy or colonoscopy in the first instance.

Obscure GI bleeding

Obscure bleeding is defined as bleeding from the gastrointestinal tract that persists or recurs without an obvious cause after an upper GI endoscopy and colonoscopy (Table 1). This is notoriously difficult to diagnose. The evaluation of obscure GI bleeding includes a judicious search for the source of the bleed. This should be guided by the clinical history, and often the first-line investigation is a CT scan of the abdomen and pelvis. Capsule endoscopy should be reserved for patients where there is recurrent or transfusion-dependent anaemia. Additional investigations may, according to clinical indication, include push or balloon enteroscopy, angiography and intra-operative enteroscopy. In 15–20% of patients the underlying cause may remain undiagnosed but such patients can be reassured provided serious pathology has been excluded.¹⁰

Diverticular disease

Diverticular disease is very common in the elderly. It is present in 65% of 65 year-olds, and is asymptomatic in 80–85% of those affected. The remaining 15–20% may develop symptomatic diverticular disease, usually manifest as non-specific abdominal pain and intermittent rectal bleeding. A small minority, up to 5%, may develop complications that include diverticulitis, bleeding, obstruction, abscess formation and, rarely, fistulas. The sigmoid colon is involved in 90% of patients.¹¹

Investigations – A plain radiograph is warranted in patients with suspected perforation. A CT scan is useful to evaluate diverticulitis with abscess or to exclude a collection. If indicated, a colonoscopy is perfectly safe in diverticular disease.

Treatment – In symptomatic uncomplicated diverticular disease the goal of treatment should be alleviation of symptoms and

Aetiology of obscure gastrointestinal bleeding¹²

Upper GI lesion	Lower GI lesion	
Cameron's erosions	Angiodysplasia	
Peptic ulcer	Neoplasm	
Fundal varices		
Angiodysplasia		
Dieulafoy's lesion		
Gastric antral vascular ectasia		
Small intestinal bleeding	Uncommon causes	
Tumours	Haemobilia	
Angiodysplasia	Haemosuccus pancreaticus	
NSAID-induced enteropathy	(Source of bleeding within pancreatic duct)	
Coeliac disease	Aorto-enteric fistula	
Dieulafoy's lesion		
Crohn's disease		
Meckel's diverticulum		
(consider in patients aged under 40)		

Table 1

prevention of recurrent attacks. Several therapies have been proposed with variable success, including high fibre diet \pm fibre supplementation, spasmolytics, probiotics, antibiotics and 5-ASA.

Inflammatory bowel disease (IBD)

Some studies suggest that IBD displays a bimodal age distribution at presentation with a possible second peak between 60 and 80 years. The symptoms in the elderly may not differ greatly from those in the younger adult age group, but are more likely to raise suspicion of diverticular disease, ischaemic colitis or bowel cancer.¹³

Patients with elderly onset IBD are more likely to present evidence of co-morbidities and polypharmacy than those diagnosed at a younger age, with likely implications for therapeutic decision making. The treatment of IBD in the elderly is generally similar to that in younger adults, but the therapeutic approach in the elderly should be 'start low, go slow'. Although, the indications for anti-tumour necrosis factor α (TNF α) agents in the elderly are generally similar to those for younger patients, lower response rates and a higher incidence of adverse events have been reported in the elderly. Adherence to the entire work-up before starting biologic treatment administration is very important. The safety profile of conventional immune modulators and biological therapy is acceptable for their routine use in suitable patients, but more data are required on the safe use of these drugs specifically in the elderly population. Failure of medical treatment for IBD is the most common indication for surgery in patients aged over 60 years, as for their younger counterparts.¹⁴

Mesenteric intestinal ischaemia

Acute mesenteric ischaemia refers to the sudden onset of small intestinal hypoperfusion. The pathogenesis is occlusive or non-occlusive obstruction of the arterial blood supply, or obstruction of venous outflow. Colonic ischaemia is more common but generally much less serious – usually resolving spontaneously within a few days.

Occlusive arterial obstruction may be due to acute embolism or thrombosis, and most commonly affects the superior mesenteric artery. Venous thrombosis results from obstruction of the intestinal venous outflow tract, including the superior and inferior mesenteric veins, splenic vein or portal vein. Non-occlusive mesenteric ischaemia is the result of a low-flow state and is most commonly seen with low cardiac output or the use of vasopressors.

Acute insufficiency of mesenteric arterial blood flow accounts for 60–70% of cases of mesenteric ischaemia; where it causes small bowel ischaemia, the mortality rate exceeds 60%. For patients with acute symptoms rapid diagnosis is imperative since the clinical consequences can be catastrophic, including sepsis, intestinal infarction and death. The diagnosis depends upon a high degree of clinical suspicion, especially in patients with risk factors, such as atrial fibrillation, heart failure, peripheral vascular disease or a history of hypercoagulability. Most patients show signs of peritonism with a raised plasma lactate. Multi-detector CT angiography without oral contrast is the initial imaging modality of choice for evaluating haemodynamically stable patients with acute abdominal pain and clinical features suggestive of acute mesenteric ischaemia. However, mesenteric arteriography remains the gold standard diagnostic study for

acute arterial ischaemia, and should be performed in patients in whom a high degree of clinical suspicion remains after a negative CT angiogram. Urgent surgical review should also be sought.

The initial management of patients with acute intestinal ischaemia includes aggressive haemodynamic monitoring and support, correction of metabolic acidosis, initiation of broad-spectrum antibiotics and placement of a nasogastric tube for gastric decompression. Once these steps have been taken, the goal is to restore intestinal blood flow as rapidly as possible.¹⁵

Chronic mesenteric ischaemia usually develops in patients with mesenteric atherosclerosis. These patients complain of recurrent post-prandial abdominal pain, which is due to their inability to augment intestinal blood flow to meet the demand of digestion. These patients may develop 'food fear' and lose a considerable amount of weight. A high index of clinical suspicion is crucial to making this diagnosis.

The 'watershed areas' at the junctions of the supply territories of the major intestinal arteries – the splenic flexure (superior mesenteric artery) and rectosigmoid junction (inferior mesenteric artery) – are most susceptible to ischaemia.

The diagnosis of chronic mesenteric ischaemia is supported by the imaging demonstration of high-grade stenosis in mesenteric arteries. Physical findings, apart from weight loss, are usually minimal. Abdominal examination may reveal an aortic bruit in approximately 50% of patients. Therapeutic options for patients with symptoms thought to be attributable to chronic mesenteric ischaemia include surgical reconstruction and percutaneous transluminal angioplasty, with or without placement of a stent.¹⁶ ◆

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