

IN BRIEF

- Cervical lymph node enlargement is most commonly caused by infection. Neoplasms (local or systemic) may also be responsible.
- Peptic ulceration (related to infection with *Helicobacter pylori*) is a contra-indication to non-steroidal anti-inflammatory drugs. Care is also needed with steroid therapy which can lead to peptic ulcer bleeding.
- Anaemia may occur secondary to blood loss from a gastrointestinal cause.
- Vomiting after GA may occur in some gastric disorders leading to an inhalation pneumonitis. Gastric reflux may produce dental erosion.
- Dysphagia (difficulty swallowing) is a symptom which should always be taken seriously.

General medicine and surgery for dental practitioners

Part 3: Gastrointestinal system

M. Greenwood¹ and J. G. Meechan²

Diseases of the gastrointestinal (GI) system can be relevant to the dental surgeon for several reasons. The mouth may display signs of the disease itself, for example the cobblestone mucosa, facial or labial swelling of Crohn's disease, or the osteomata of Gardner's syndrome. These are well covered elsewhere and not discussed further here. The sequelae of GI disease, for example gastric reflux producing dental erosion, iron deficiency anaemia and treatment such as corticosteroid therapy may all have a bearing on management and choice of anaesthesia.

GENERAL MEDICINE AND SURGERY FOR DENTAL PRACTITIONERS:

1. Cardiovascular system
2. Respiratory system
- 3. Gastrointestinal system**
4. Neurological disorders
5. Liver disease
6. The endocrine system
7. Renal disorders
8. Musculoskeletal system
9. Haematology and patients with bleeding problems
10. The paediatric patient

RELEVANT POINTS IN THE HISTORY

Lethargy, dyspnoea and angina may all occur secondary to anaemia from a gastro-intestinal cause, but cardio-respiratory causes should also be borne in mind. The cause of an anaemia should always be investigated. The possibility of blood loss from the GI tract should be considered. Weight loss may be caused by reduced nutritional intake secondary to anorexia, nausea or vomiting. There may be loss of protein from diseased bowel eg in ulcerative colitis. Cancer of the GI tract is the most significant potential cause of weight loss. The quantity and time course of the weight loss are both important. Enquiry with regard to appetite and any changes should also be made.

'Heartburn' or 'indigestion' are vague terms often used by patients and may be used to describe upper abdominal pain, gastro-oesophageal regurgitation, anorexia, nausea and vomiting. Oesophageal reflux or 'heartburn' causes epigastric pain ie abdominal pain around the lower end of the sternum, which radiates to the back and is worse on stooping and drinking hot drinks. It can have implications for general anaesthesia (see later) and can be a cause of dental erosion¹ especially on the palatal/lingual surfaces of the teeth² caused by the acidity of the gastric fluid. Factors promoting gastro-oesophageal reflux are shown in Table 1.

Dysphagia, or difficulty in swallowing, is a

symptom which should always be taken seriously. Plummer-Vinson Syndrome is the name given to dysphagia associated with webs of tissue in the pharynx and upper oesophagus. Other components of the syndrome include glossitis, iron deficiency anaemia and koilonychia (spoon-shaped fingernails suggesting iron deficiency but may also occur in ischaemic heart disease). A patient with koilonychia is shown in Figure 1. Some other causes of dysphagia are listed in Table 2.

Vomiting may be due to extra-intestinal causes such as meningitis, migraine or as a result of drug therapy eg morphine. In children, vomiting can be a sign of infection of various body systems. Nausea or vomiting in the morning may be seen in pregnancy, alcoholism and anxiety. Haematemesis, or vomiting of blood, may arise from bleeding oesophageal varices. The relevance to dentistry is mainly related to the fact

Table 1: Factors promoting gastro-oesophageal Reflux

- Hiatus hernia
- Pregnancy
- Obesity
- Cigarettes
- Alcohol
- Fatty food

¹Lecturer, ²Senior Lecturer, Department of Oral and Maxillofacial Surgery, The Dental School, Framlington Place, Newcastle upon Tyne NE2 4BW
Correspondence to: M. Greenwood
E-mail: beryl.leggatt@ncl.ac.uk

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Fig. 1 Koilonychia (spoon-shaped fingernails) in iron deficiency anaemia

that these varices may occur secondary to chronic liver disease with its attendant possible implications for blood clotting and drug metabolism due to hepatic impairment.

A current or past history of peptic ulcer may be of relevance, particularly when non-steroidal anti-inflammatory drugs (NSAIDs) are being considered. These ulcers are common, affecting around 10% of the world population.³ Men are affected twice as much as women. The incidence is declining in developed countries; this may be caused by dietary changes.⁴ Peptic ulcers may affect the lower oesophagus, stomach and duodenum. The pendulum has swung away from surgery for these conditions since the advent of effective drug therapy. *Helicobacter pylori* (a micro-aerophilic Gram negative bacterium) can be identified in the gastric antral mucosa in 90% of cases of duodenal ulcers and in the body or antral mucosa of about 60% of cases of gastric ulcer and is a common aetiological factor in peptic ulcer disease. Triple therapy regimens are used for treatment eg a proton pump inhibitor such as omeprazole, a broad spectrum antibiotic eg amoxicillin and metronidazole when *H.pylori* is involved (see later).



Fig. 2 A patient with Crohn's disease and consequent marked labial swelling



Fig. 3 Recurrent oral ulceration in Crohn's disease

Table 2 Possible causes of dysphagia

Oral causes

- Stomatitis
- Aphthous ulcers
- Herpetic infection
- Oral malignancy
- Xerostomia
- Tonsillitis
- Pharyngitis
- Infections involving fascial spaces of neck

Obstruction in oesophageal wall

- Oesophagitis
- Carcinoma of oesophagus
- Pharyngeal pouch
- Oesophageal web – Plummer-Vinson Syndrome (Iron deficiency, post-cricoid web)

External compression of oesophagus

- Enlarged neighbouring lymph nodes
- Left atrial dilatation in mitral stenosis

Disorders of neuromuscular function

- Myasthenia gravis
- Muscular dystrophy
- Stroke
- Achalasia (failure of oesophageal peristalsis and failure of relaxation of lower oesophageal sphincter)

Other

- Foreign body
- Scleroderma
- Benign stricture secondary to gastro-oesophageal reflux
- Globus hystericus (psychogenic)

The term **inflammatory bowel disease** includes ulcerative colitis, Crohn's disease (Figs 2, 3) and an indeterminate type. Factors which impact on dental practice include the possibility of anaemia secondary to chronic bleeding and corticosteroid therapy in these patients. Extra-intestinal manifestations of inflammatory bowel disease may occur and are listed in Table 3.

A history of **GI surgery** may give clues to nutritional deficiencies which may be present eg iron, vitamin B₁₂ or folate deficiency post gastric surgery. Recurrent oral ulceration and glossitis may ensue.

Pancreatic disease is of relevance in a thorough history since consequent malabsorption of vitamin K may lead to a bleeding tendency. There is also a possibility of diabetes mellitus or a diabetic tendency. Excessive alcohol intake can be a cause of acute pancreatitis and a thorough social history may uncover this information. Other causes of acute pancreatitis include gallstones and some viral infections eg HIV and mumps. Chronic pancreatitis is of a similar aetiology to acute pancreatitis. Endocrine and exocrine function both deteriorate. In both types of pancreatitis, abdominal pain is severe.

Table 3 Extra-intestinal manifestations of inflammatory bowel disease

- Aphthous stomatitis

- Hepatic

- Fatty change
- Amyloidosis
- Gallstones

- Skin

- Erythema nodosum
- Pyoderma gangrenosum

- Arthritis

- Finger clubbing

- Eye lesions eg conjunctivitis

- Vasculitis

- Cardiovascular disease

- Broncho-pulmonary disease

**Fig. 4 Peutz-Jegher's syndrome**

inflammatory bowel disease. The skin lesions are painful, erythematous nodular lesions on the anterior shin in erythema nodosum. Bluish edged ulcers occur on the back, thigh and buttocks in pyoderma gangrenosum. The skin disease associated with coeliac disease is dermatitis herpetiformis and comprises an itchy papulovesicular rash mainly on the trunk and upper limbs. IgA deposits at the epithelium basement membrane zone help to establish the diagnosis. There may also be papillary tip micro-abscess formation. There may be intra-oral lesions which may be erosive or vesicular and resemble pemphigoid. Treatment is usually with dapsone. Aphthous ulcers may occur.

Coeliac disease is a permanent intolerance to gluten leading to intestinal villous atrophy and GI malabsorption. The villous atrophy reverses when taking a gluten free diet. The disease may be complicated by anaemia and GI lymphoma.

Pseudomembranous colitis can be caused by many antibiotics particularly clindamycin and lincomycin and results from proliferation of toxigenic *Clostridium difficile*. It is characterised by painful diarrhoea with mucus passage and is treated with oral vancomycin or metronidazole.

A summary of relevant points in the history is given in Table 4.

Table 4 Relevant points in the history

- General enquiry eg lethargy, anaemia, weight loss, appetite
- Dyspepsia, reflux
- Dysphagia
- Vomiting, haematemesis
- Peptic ulcer (current/past)
- Inflammatory bowel disease
- History of GI surgery
- Pancreatic disease
- Congenital disorders

Oral signs

GI disorders can produce vitamin deficiencies that produce oral ulceration

EXAMINATION

Oral lesions as a manifestation of GI disease are well discussed elsewhere and are not considered further here. It is worth remembering that cervical lymph node enlargement is an important sign not to be ignored. Possible causes include infection and neoplasia (primary or secondary).

Pallor can be a very subjective way of trying to assess for anaemia. The mucosa at the reflection in the inferior fornix of the eye is the best

Pancreatic cancer frequently involves the head of the pancreas and local invasion leads to biliary obstruction, diabetes mellitus and pancreatitis. Thrombophlebitis migrans (peripheral vein thrombosis) is a common complication. Pancreatic cancer has the worst prognosis of any cancer in general terms and treatment is usually surgical and palliative.

The patient may give a history of jaundice or may actually be jaundiced. Jaundice may be 'pre-hepatic' eg haemolysis, hepatic eg hepatitis (see the paper on liver disorders, Part 5 in this series) or obstructive due to either gallstones or cancer of the head of the pancreas. Patients with obstructive jaundice give a history of generalised itching and passing dark urine and pale stools. The relevance of obstructive jaundice is discussed later.

Congenital disorders of relevance can occur. Familial Polyposis has an incidence of 1 in 24,000 and is autosomal dominant. People with the condition have rectal and colonic polyps, and a variant is Gardner's syndrome which also includes bony osteomata and soft tissue tumours eg epidermal cysts. The colonic polyps are premalignant and careful follow up of these patients is needed. Subtotal colectomy with fulguration of rectal polyps may be carried out in order to prevent malignancy. Peutz-Jegher's Syndrome is an autosomal dominant condition comprising intestinal polyps and pigmented freckles periorally extending on to the oral mucosa (Fig. 4). The gastric and duodenal polyps have a predisposition to become malignant.

Some skin disorders may occur as part of a wider picture of GI disease. Erythema nodosum and pyoderma gangrenosum can occur in



Fig. 5 A jaundiced patient with yellow sclera

site for examination. The patient may readily become dyspnoeic secondary to anaemia but this should be considered with an open mind because, as mentioned earlier, cardio-respiratory conditions are more likely to present in this manner.

A patient may be jaundiced for 'extra-hepatic' reasons such as gallstones, cancer of the bile ducts or cancer of the head of pancreas. The sclera is a good site for examining for the yellow tint of jaundice (Fig. 5).

Examination of the hands may reveal spoon-shaped fingernails or koilonychia (Fig. 1). The fingers may be clubbed. Gastro-intestinal causes of clubbing include inflammatory bowel disease (especially Crohn's), cirrhosis, malabsorption and GI lymphoma.

An enlarged lymph node in the left supraclavicular fossa (Virchow's Node, Troisier's Sign) can be a sign of stomach cancer. Anaemia or obstructive jaundice may complicate treatment.

DRUGS USED IN GI DISEASE

Antacids

These are used in ulcer and non-ulcer dyspepsia and in reflux oesophagitis. They are usually aluminium and magnesium containing compounds or alginates. These preparations interfere with the absorption of many drugs including fluoride, ketoconazole, metronidazole and tetracycline.⁵ Aluminium hydroxide increases the excretion of aspirin and can reduce the plasma concentration of the analgesic to non-therapeutic levels.⁶ It has been shown that maintaining antacids in the mouth for a period before swallowing can counteract reductions in oral pH produced by acidic materials and it has been suggested that this might help counteract the erosion produced by gastro-intestinal reflux.⁷

Drugs altering gut motility eg antispasmodics

These are used in non-ulcer dyspepsia, irritable bowel syndrome and diverticular disease eg hyoscine, mebeverine (anti-muscarinic) tend to decrease motility. Anti-muscarinics produce dry mouth and hyoscine reduces the absorption of the antifungal drug ketoconazole. Drugs such as metoclopramide and domperidone increase motility. The anti-muscarinic drug propantheline bromide delays the absorption of paracetamol.⁸

Ulcer healing drugs

As mentioned earlier, when *Helicobacter pylori* (a microaerophilic Gram negative bacterium) is involved, triple therapy regimens are used for treatment eg a proton pump inhibitor such as omeprazole and a broad spectrum antibiotic eg amoxycillin together with metronidazole, usually for 1 or 2 weeks. *H. pylori* may now be tested for serologically. The use of broad spectrum antibiotics may lead to oral Candidal infections which require treatment with anti-fungal medication. H₂ receptor antagonists eg cimetidine, ranitidine may be used eg for NSAID induced ulceration. Such drugs may (rarely) cause blood disorders such as thrombocytopaenia, agranulocytosis and aplastic anaemia. These haematological problems may interfere with healing after oral surgical procedures. Benzodiazepine metabolism may be decreased, but this is rarely clinically significant. Warfarin and lignocaine metabolism can also be affected. Plasma levels of the long-acting local anaesthetic bupivacaine (which may be used to reduce post-operative pain in third molar surgery) are increased by cimetidine.⁹

Proton pump inhibitors eg omeprazole, lansoprazole

These block the proton pump of the parietal cell. Side effects include erythema multiforme, stomatitis and dry mouth. Omeprazole increases the anticoagulant effect of warfarin but this is usually unimportant clinically.¹⁰ Omeprazole inhibits the metabolism of diazepam and increases the sedative effect of the latter drug.¹¹

Drugs used in inflammatory bowel disease

For the acute condition, topical steroids may be given as enemas. In more extensive situations, oral corticosteroids may be prescribed, leading to intravenous steroids in the most severe cases. Sulphasalazine (a combination of sulphapyridine and 5-amino salicylic acid) may be given. Similar alternatives include mesalazine and olsalazine. Azathioprine is used in resistant cases.

Pancreatic supplements

These may be used in cystic fibrosis and chronic pancreatitis. Pancreatin ('Creon') is inactivated by gastric acid and is therefore best taken with food. It can irritate the oral mucosa if held in the mouth. Pancreatin assists in the digestion of starch, fat and protein.

EFFECTS OF GASTROINTESTINAL DISEASE ON LOCAL ANAESTHESIA, SEDATION, GENERAL ANAESTHESIA AND MANAGEMENT IN DENTAL PRACTICE

The principal features of the GI system which may have a bearing on general anaesthesia include obesity, anaemia, reflux/vomiting and the effects of drug therapy.

In the case of obesity, this is not always simply related to diet since physiological and genetic factors are also involved. It is significant in

Drugs and disease

Some drugs used to treat GI disease can decrease the efficacy of antimicrobials and analgesics

that careful consideration needs to be given to the choice of anaesthesia, and may preclude general anaesthesia on a day case basis. To ensure effective assessment and communication between healthcare professionals, the Body Mass Index (BMI) is used. This is the weight in kilograms divided by the height in metres (squared) ie

$$\text{BMI} = \frac{\text{weight}}{(\text{height})^2}$$

Grade 1 is a BMI of 25-30, Grade 2 is 30-40, Grade 3 is more than 40.

After appropriate investigation as to the cause and nature of any anaemia, patients who have developed an iron deficiency anaemia and are awaiting surgery should be treated with oral iron supplements. Blood transfusion would only rarely be indicated in this context. Transfusion less than 48 hours before surgery should be avoided as the oxygen carrying capacity of stored blood is poor.

Certain groups of patients are at risk of aspiration of stomach contents on induction of anaesthesia. These include patients with a history suggestive of hiatus hernia, all non-fasted patients, pregnant patients (stomach emptying is slowed and the cardiac sphincter relaxed). Aspiration is likely to lead to a pneumonitis (Mendelson's Syndrome).

Patients who suffer from reflux of gastrointestinal contents are at risk of erosion of dental hard tissue. This is particularly the case on the palatal and lingual surfaces. In addition such patients may not be entirely comfortable in the fully supine position and this should be borne in mind during treatment in the dental chair.

Patients with pancreatic disease eg pancreatitis, pancreatic cancer, may have a bleeding tendency due to vitamin K malabsorption (pancreatitis) or biliary obstruction (cancer, especially if there are hepatic metastases). Diabetes mellitus may complicate either pancreatitis or pancreatic cancer as mentioned earlier.

When the patient gives a history suggesting obstructive jaundice, the main risk in safe dental management relates to the risk of excessive bleeding again resulting from vitamin K malabsorption. When possible, surgery should be deferred. If delay is not possible, treatment in hospital with vitamin K supplementation is advised.

Patients with obstructive jaundice are particularly prone to develop renal failure after general anaesthesia (the Hepato-Renal Syndrome). It is thought that this may be due to the toxic effect of bilirubin on the kidney. If at all possible GA should be avoided in these patients. In emergencies (which would be very rare in dentistry) management of these patients depends on maintaining good hydration imme-

dately prior to the GA and using the osmotic diuretic mannitol.

Drug interactions of relevance to dental practice were mentioned above. In addition to drug interactions the prescription of drugs for the treatment of oro-dental conditions may be influenced by the underlying disease. For example the use of non-steroidal anti-inflammatory drugs such as aspirin is contra-indicated in individuals with peptic ulceration. Similarly, the prescription of systemic steroids should be avoided in patients with peptic ulcers as this may lead to perforation leading to pain and blood loss.

The side effects of long-term steroid therapy are discussed in the paper discussing the respiratory system. The longer the patient is on steroid therapy and the higher the dose, the greater the risk of complications. Although steroids are used in GI disease, the duration is usually limited, with maintenance being achieved via other medications.

GI conditions may contra-indicate the use of some analgesics dentists may prescribe

SUMMARY

As with many other conditions, disorders of the GI tract impact on dentistry. Some conditions lead to dental disease, drugs used in the management of GI disease can produce oro-facial signs and symptoms and the prescription of drugs to treat dental conditions is influenced by some underlying disorders.

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1. Jarvinen V, Meurman J H, Hyvarinen H, Rytomaa I, Murtomaa H. Dental erosion and upper gastrointestinal disorders. *Oral Surg* 1988; **65**: 298-303.
2. Bartlett D W, Evans D F, Anggiansah A, Smith B G. A study of the association between gastro-oesophageal reflux and palatal dental erosion. *Br Dent J* 1996; **181**: 125-131.
3. Lam S K. Aetiological factors of peptic ulcer: perspectives of epidemiological observations this century. *J Gastroenterol Hepatol* 1994; **9**: S93-S98.
4. Hollander D, Tarnawski A. Dietary essential fatty acids and the decline in peptic ulcer disease – a hypothesis. *Gut* 1986; **27**: 239-242.
5. Michel J C, Sayer R J, Kirby W M M. Effect of food and antacids on blood levels of Aureomycin and Terramycin. *J Lab Clin Med* 1950; **36**: 632.
6. Shastri R A. Effect of antacids on salicylate kinetics. *Int J Clin Pharmacol Ther* 1985; **23**: 480-484.
7. Meurman J H, Kuittinen T, Kangas M, Tuisku T. Buffering effects of antacids in the mouth - a new treatment of dental erosion? *Scand J Dent Res* 1988; **96**: 412-417.
8. Nimmo J, Heading R C, Tothill P, Prescott L F. Pharmacological modification of gastric emptying: effects of propantheline and metoclopramide on paracetamol absorption. *Br Med J* 1973; **1**: 587.
9. Noble D W, Smith K J, Dundas C R. Effects of H-2 antagonists on the elimination of bupivacaine. *Br J Anaesth* 1987; **59**: 735-737.
10. Unge P, Svedberg L-E, Nordgren A, Blom H, Andersson T, Lagerstrom P-O, Idstrom J-P. A study of the interaction of omeprazole and warfarin in anticoagulated patients. *Br J Clin Pharmacol* 1992; **34**: 509-512.
11. Gugler R, Jensen J C. Omeprazole inhibits elimination of diazepam. *Lancet* 1984; **i**: 969.