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Surgical causes of upper abdominal pain

Background
In Australia, abdominal pain is a common presenting complaint in the general practice setting. Identifying a surgical cause is important and warrants prompt specialist referral.

Objective
This article outlines common surgical causes of upper abdominal pain. We include differential diagnoses, relevant investigations and approach to patient management.

Discussion
Gallstones and peptic disease are common surgical causes of upper abdominal pain. A diagnosis should be made with careful clinical assessment and appropriate investigations. However, a considerable proportion of patients will be investigated for 'surgical' causes and remain undiagnosed. Irritable bowel syndrome should be considered in these cases.

In Australia, abdominal pain is a common presentation in general practice. Patients present at a rate of 2.1 per 100 encounters (about 2 million Australian occasions per year).[1] Women (66.3%) are more likely to present than men, and children more than adults.

The two commonest surgical causes of upper abdominal pain are gallstone disease and peptic disease. There are a range of less common causes including pancreatic pathology (eg. chronic pancreatitis), liver pathology (eg. liver abscess), and musculoskeletal problems (eg. costochondritis) (*Table 1*). Most cases of surgical pain will be diagnosed with a thorough history and examination (*Table 2*), and the use of some relatively straightforward investigations (*Table 3*). A significant number of patients will be fully investigated for surgical causes with nothing found – in such cases, consider irritable bowel syndrome (IBS), with or without food intolerance.

Biliary colic

A classic case of biliary colic is one of episodic pain, felt in the epigastrium and radiating to the interscapular region. The pain is constant and attacks typically last between 30 minutes and 2 hours. Nausea is usually a prominent symptom. The patient will be well between the attacks. Tenderness is present in the epigastrium, but there is no peritoneal irritation.[2] The patient is afebrile, with no systemic disturbance. Episodes may be provoked by fatty foods. Ultrasound will show gallstones, with a normal gallbladder wall and biliary tree.

Acute cholecystitis

Acute cholecystitis is less likely to present in the primary care setting as the patient will usually attend a hospital emergency department. The patient has ongoing severe pain, is febrile, and has systemic symptoms. There is localised tenderness with peritoneal irritation in the right upper quadrant (RUQ).[2] The surface

marking of the gallbladder fundus is at the tip of the ninth costal cartilage, which is roughly where the lateral edge of the rectus abdominis meets the costal margin. Ultrasound will show a thickened and oedematous gallbladder wall, perhaps with some pericholecystic fluid.

Chronic cholecystitis

Some patients will present with symptoms that fall between the two 'extremes' of episodic biliary colic and acute cholecystitis. These patients will have symptoms most days, although this may be quite variable. Epigastric and/or RUQ tenderness will be present much of the time, but will be less impressive than in the case of acute cholecystitis. Ultrasound will often show some thickening of the gallbladder wall but typically no oedema or pericholecystic fluid.

Peptic diseases

Older texts make much of the clinical distinction between gastric and duodenal ulcers on the basis of the relationship between meals and pain. In modern practice, true ulcers are uncommon and the majority of patients with symptomatic peptic disease will have gastritis or reflux disease. Patients with gastritis may be taking nonsteroidal anti-inflammatory drugs (NSAIDs), may smoke, or take alcohol to excess. The typical history is of a burning epigastric pain, often worse after meals, and typically (at least) somewhat relieved by antacids. Most cases of reflux are clear on the history with the patient's description of typical heartburn. However, there are patients who describe episodic epigastric pain, perhaps postprandially, and this syndrome can easily merge into that of biliary colic, or gastroduodenal peptic ulcer disease.

Coeliac disease

Historically, coeliac disease has been recognised in patients with weight loss or anaemia, usually on the basis of biopsies done at gastroscopy. It is now recognised that the condition is more common than previously thought, and that many patients cope with their disease nutritionally (ie. they do not become anaemic or malnourished), but they suffer from a range of abdominal symptoms which may be variable. The presentation may suggest IBS.

Pancreatitis

Acute pancreatitis is usually a severe illness and the patient will typically present to a hospital emergency department. However, some patients will 'tough it out' at home for a few days and only present when they fail to get better. The typical complaint is of severe constant epigastric pain that seems to radiate 'straight through' to the back. Vomiting is often a prominent feature. There may be a history of known gallstones or recent alcohol consumption. Tenderness may be severe, but there is typically no peritoneal irritation.[3] The amylase and lipase levels may have already peaked and may have fallen below the diagnostic range – if the diagnosis seems likely, a computerised tomography (CT) scan will be highly sensitive and specific.

Table 1. Causes of upper abdominal pain[11,12]

Cause	Possible diagnoses
Biliary	Biliary colic
	Cholecystitis
	Choledocholithiasis
	Cholangitis
Peptic	Peptic/duodenal ulcer
	Reflux oesophagitis
	Gastritis
Pancreatic	Acute pancreatitis
	Chronic pancreatitis
	Neoplasm
Liver	Hepatitis
	Abscess
	Congestion (right heart failure)
	Neoplasm
Renal	Calculi
	Pyelonephritis
	Perinephric abscess
Splenic	Splenic rupture
	Splenic Infarct
Colonic	Inflammatory bowel disease (IBD)
	Colitis
	Irritable bowel syndrome (IBS)
Intestinal	Coeliac disease
	Gastroenteritis
	Small bowel obstruction
Vascular	Aortic dissection
	Aortic aneurysm (AAA) rupture
	Mesenteric ischaemia
Abdominal wall	Costochondritis/muscular strain
	Herpes zoster
Lung	Pneumonia
	Pulmonary embolism
	Pneumothorax
	Subphrenic abscess
Cardiac	Myocardial ischaemia/infarction
	Pericarditis

Approach to the patient

In general practice, the majority of patients will have either gallstone or peptic disease. If the symptoms are suggestive, then the first investigation is an upper abdominal ultrasound or gastroscopy as appropriate (*Figure 1*). If the test is positive, then treatment or referral will follow as appropriate. If the symptoms are atypical, then ultrasound is the first choice investigation as it is noninvasive.

Gallstones and atypical pain

Are gallstones truly symptomatic in a patient with atypical pain? This is a difficult question and there is no entirely satisfactory answer. A nuclear medicine biliary (HIDA) scan with a fatty meal challenge can be useful. The literature is complicated by the question of how 'atypical' the pain must be, but in general, a patient with atypical pain and abnormal gallbladder function (no filling or no emptying) on HIDA scan will have around a 90% chance of improving with cholecystectomy.[4–8]

In patients with normal gallbladder function, about 40% (still a not inconsiderable fraction) will improve with surgery. Many surgeons perform the less invasive gastroscopy before cholecystectomy in these patients, and give a trial of treatment for any peptic disease that is found before confirming plans for surgery.

No gallstones on ultrasound

If ultrasound is unremarkable – ie. no gallstones, normal gallbladder wall, no biliary dilatation – then gastroscopy is indicated. Many cases will be diagnosed on macroscopic appearance, but it is essential that certain biopsies be performed even if macroscopic appearances are normal. Biopsies should be taken from the second part of duodenum to exclude coeliac disease, from the gastric antrum for gastritis (including testing for *Helicobacter pylori*), and from the distal oesophagus (for microscopic changes of reflux). Fundic gland polyps are commonly seen, and are increasingly prevalent as they are associated with proton pump inhibitor (PPI) therapy[9] and have a typical appearance. However, the authors feel representative polyps should be biopsied when initially seen to absolutely confirm the diagnosis.

Table 2. Important points on history taking[13]

- Abdominal pain
  - location
  - character
  - relieving/aggravating factors
- Anorexia/weight loss
- Nausea/vomiting
- Change in bowel habit
- Bleeding (haematemesis/malaena)
- Acid reflux/heartburn
- Bloating
- Jaundice
- Dark urine/pale stools
- Pruritus
- Fever

Ultrasound and gastroscopy both unrevealing

If both ultrasound and gastroscopy are unrevealing, the patient's history should be reviewed to see whether something becomes evident that points to a specific diagnosis. If nothing 'jumps out' and the patient's symptoms are significant and ongoing, then a CT scan with intravenous and oral contrast is indicated. A CT scan will potentially reveal a wide range of abdominal pathologies, particularly of the solid organs. Further investigation will be determined by the findings.

Historically, CT scanning has been seen as less useful to look at the intestines, however, the latest generation of scanners do offer reasonably good utility. If there is concern over potential colonic pathology, then colonoscopy is the next step. The small intestine may be investigated with a small bowel series, a dedicated CT small bowel enteroclysis,[10] enteroscopy from either (or both) ends, or a 'pill cam' examination.

Irritable bowel syndrome

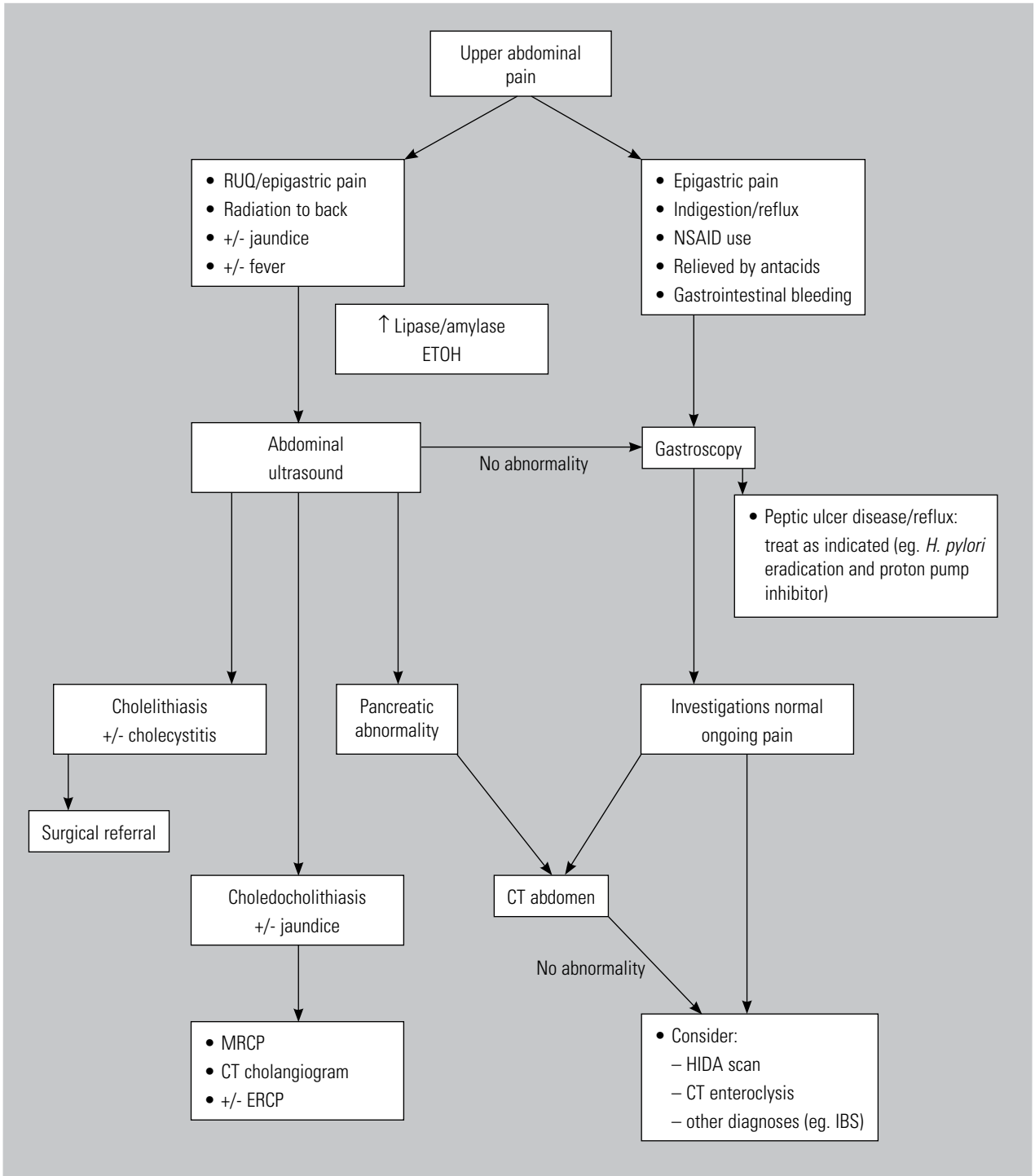
Irritable bowel syndrome consists of the triad of abdominal pain or discomfort associated with defecation or a change in bowel habit (intermittent diarrhoea, constipation), in the absence of structural or biochemical disorder. It is part of a spectrum of functional

Table 3. Relevant investigations for upper abdominal pain

Investigation	Disease suspected
• Laboratory tests	
– liver function tests	Cholecystitis, cholangitis, choledocholithiasis, hepatitis, pancreatitis (in particular bilirubin for obstructive cause)
– amylase/lipase	Pancreatitis
– white cell count, C-reactive protein	Nonspecific for infective/inflammatory causes
– ß-HCGH	Essential in females of reproductive age
	– exclude ectopic pregnancy
	– assess safety of further investigations
• Ultrasound	Biliary colic, cholecystitis, choledocholithiasis, pancreatitis
• MRCP	Choledocholithiasis, cholangitis, pancreatitis
• Upper gastrointestinal endoscopy	Peptic ulcer disease, neoplasm, gastrointestinal bleeding
• CT abdomen	Pancreatitis, solid organ disease (liver, spleen, kidney), intestinal causes (oral/IV contrast or enteroclysis), mesenteric ischaemia/AAA (CT angiogram)
• CT cholangiogram	Choledocholithiasis

MRCP = magnetic resonance cholangiopancreatography; HCGH = human chorionic gonadotropin hormone

Figure 1. Diagnostic algorithm



gastrointestinal disorders: nonulcer dyspepsia and functional bloating/constipation/diarrhoea/abdominal pain.

Symptom onset is usually gradual and extra-intestinal symptoms such as headache and fatigue are common. The pathophysiology of IBS is not completely understood. Symptoms arise from complex interaction of physiological determinants (increased motor reactivity, increased visceral hypersensitivity), altered mucosal immune and inflammatory function, central nervous system/enteric nervous system dysregulation, and psychosocial and external factors. However, there is a group of patients whose pain is upper or mid-abdominal and who have minimal bowel symptoms. This group of patients still ultimately fall into the IBS spectrum. In this context, there is increasing interest in food intolerance. *Table 4* details an approach to patients with IBS.

Table 4. Approach to the patient with irritable bowel syndrome[14,15]

Diagnosis

- Diagnosis is based on clinical assessment, with symptoms consistent with IBS criteria and exclusion of organic disease
- Warning signs suggestive of organic disease not due to IBS (the presence of these alarm symptoms warrant further evaluation with colonoscopy):
  - rectal bleeding
  - anaemia
  - weight loss
  - fever
  - family history of colon cancer
  - onset of symptoms >50 years of age
  - progressive or worsening symptoms

ROME criteria for diagnosis

- Recurrent abdominal pain or discomfort at least 3 days per month in the past 3 months associated with two or more of the following:
  - relieved by defaecation
  - onset associated with a change in stool frequency
  - onset associated with a change in form or stool
  - criteria fulfilled for the past 3 months with symptom onset at least 6 months before diagnosis
- Absence of structural or biochemical disorders

Differential diagnosis

- Diarrhoea predominant
  - diet: sorbitol, medications
  - gastrointestinal infection
  - inflammatory bowel disease/microscopic colitis
  - malabsorption: coeliac disease, lactose/fructose intolerance
  - hyperthyroidism
  - pancreatic/small bowel disease
  - colorectal cancer
- Constipation predominant
  - diet, medications
  - bowel obstruction
  - hypothyroidism
  - hypercalcemia
  - colorectal cancer
- Diagnostic testing should be guided by the patient's age and primary symptom characteristics
- Recommended baseline tests: FBE, ESR, TFT, coeliac serology, colonoscopy (>40 years of age)
- Consider hydrogen breath test for diagnosis of lactose and fructose intolerance in patients with abdominal pain, bloating or diarrhoea

Management

- Explanation and reassurance is important
- Lifestyle and dietary modification: reduce fat, alcohol, caffeine, low fructose/lactose diet; stress management
- Treat symptoms
- Pain management
- Antispasmodics (eg. mebeverine hydrochloride, hyoscine butylbromide)
- Antidepressants (eg. amitriptyline)

Conclusion

Abdominal pain is a common presentation in general practice and there is a wide range of aetiologies. Some patients will potentially have a surgical cause of pain, and, again, the list of differentials is quite wide. However, the majority of cases will be either gallstone or peptic disease. Ultrasound and/or gastroscopy will assist with the diagnosis of most patients. A nuclear medicine biliary scan may be useful in certain cases, and a CT scan in others. Some patients will fit into the irritable bowel/food intolerance spectrum.

Conflict of interest: none declared.

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