Medical causes of abdominal pain

Introduction

The majority of patients presenting with abdominal pain will have an intra-abdominal cause and, particularly in the emergency setting, surgery is usually required.

Abdominal pain is the admitting diagnosis in 1% of all hospital admissions. Approximately one third will require surgery, one third will settle with conservative management and one third will have no diagnosis given (Hawthorn, 1992).

It is important to identify those patients with a medical cause of the presenting symptoms. Delay in the diagnosis delays appropriate treatment and exclusion of surgical causes may require surgical intervention such as laparosocopy.

The commonest acute abdominal operation is appendicectomy and 70 000 are performed per year in the UK. Despite an improvement in non-invasive investigations such as ultrasound and computed tomography (CT), there is still a negative appendicectomy (i.e. the appendix is both macroscopically and microscopically normal) in 10–20% of operations. Laparoscopy in females of reproductive age is of benefit in obtaining a diagnosis, but does not reduce the rate of negative appendicectomy.

Demographics

Certain conditions are more common in certain populations. Some Maori families in New Zealand carry the E-cadherin gene mutation which predisposes them to familial multi-focal gastric cancer. Children in developing countries are prone to bilharzia (schistosomiasis) as a result of contamination of water supplies. Sickle cell trait is selected in malarial zones where it is protective. Tuberculosis and hepatitis are endemic in some communities. Likewise the prevalence of a disease is related to age, sex, and socioeconomic status.

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History

A good history is essential – 80% of the diagnosis is made on history. Examination and investigations should support or exclude the hypothesis made on history. Obtain the actual presenting symptoms (do not take for granted the referred symptoms) and a full history of the presenting complaint. Remember to obtain a full gynaecological history in females.

Medications including self-prescribed medications and drugs (alcohol, smoking and illegal substances) may be an iatrogenic cause of symptoms. Examples include non-steroidal anti-inflammatory drugs and gastritis, alcohol and pancreatitis, and smoking and cardiovascular disease.

Family history is important for genetically transferred risk factors. Remember that recessive genes may skip a generation and that incomplete penetrance may delay presentation of a condition.

Examination

Examination needs to be thorough and cover all parts of the body. For example in the paediatric age group, stand back to assess their breathing, look at their skin for a rash and palpate for lymphadenopathy. Remember to check for hernias and perform a testicular examination in post-pubertal males and breast examination in females. If you do not ask or examine you cannot exclude.

For example a young male is referred from the GP with left iliac fossa pain – ? diverticulitis. This is an unusual presentation in young males. History elicits night sweats and examination reveals a swollen left testicle with a supraclavicular lymph node. Chest X-ray shows multiple lung metastases. The diagnosis is metastatic testicular carcinoma.

Observations and investigations done in the emergency setting are shown in *Table 1*. They are chosen for their sensitivity in alerting the staff to potential deterioration, and also ruling out silent pathology.

Saturation monitors measure the percentage of red cells that are fully oxygenated. Saturations are reduced in both lung pathology and with poor peripheral perfusion.

Table 1. Investigations

Observations	Saturations
	Pulse
	Blood pressure
Routine	Urine dipstick
	Beta human chorionic gonadotropin (females)
	Electrocardiogram
X-rays	Erect chest X-ray
	Abdominal X-ray
Special tests	Ultrasound
	Computed tomography of kidneys, ureters and bladder

Tachycardia is a sensitive marker of a variety of pathology but pain and dehydration are two easily corrected stimuli.

A rough guide for systolic blood pressure is 100 mmHg + the patient's age. An elderly patient with a systolic blood pressure of 120 mmHg may be shocked. Observe the pulse pressure (difference between systolic and diastolic pressures). This is narrowed when the body is compensating for a low circulatory volume. Remember to look at the trend of the observations and the response to resuscitation rather than just isolated recordings.

The urine dipstick is a very useful screening test. Proteinuria is a poor prognostic marker in patients with diabetes, renal disease and hypertension. Microscopic blood on dipstick requires investigation for occult renal pathology and macroscopic haematuria may be caused by renal calculi.

Remember when investigating a possible infected urine the specimen has to be collected accurately with no contamination from the external genitalia which are usually colonized with bacteria. Asking the patient to repeat the test and explaining the use of a clean catch is much more important than a wrong diagnosis.

Beta human chorionic gonadotropin (HCG) is a useful screening test. It will detect beta HCG levels as low as 20 mIU, giving an accurate positive result 10 days after ovulation. All female patients should not be X-rayed until a negative pregnancy test has been obtained.

A chest X-ray is a very good screening test for the emergency patient. Have a system for looking at X-rays. Ensure that the name matches and that there are no foreign bodies that cannot be explained. X-rays show clearly calcification and air. Soft tissues have intermediate density.

Pneumonia will show either as increased opacification of the lung parenchyma, loss of normal contours (e.g. heart border) or by increasing contrast such as air bronchograms.

An erect chest X-ray is a useful test to exclude free air. Sensitivity will be increased the longer that the patient is in the upright position. If the patient cannot stand then a lateral decubitus film with the right side up may also show air above the liver.

Ultrasound and CT of the kidneys, ureters and bladder (CT-KUB) are more often performed from the emergency department. Both of these tests are good in the right situations, but also have limitations. For example, 7% of the population have gallstones, but in the absence of symptoms they should be left alone. A finding of gallstones in a patient with abdominal pain does not necessarily mean that the gallstones are the cause of the symptoms.

Incidental findings on ultrasound or CT can be just that and can distract you from the actual presenting symptoms.

CT-KUB is a non-contrast scan and although it gives an image of the whole abdomen and is good for looking at renal pathology, other intra-abdominal pathology is not well shown. Free air can easily be missed and an aneurysm requires contrast to demonstrate the true lumen and any evidence of leaking.

The importance of following up on the investigations that have been done cannot be stressed enough. The nursing staff take time to do the recordings and it is the doctor's job to interpret them. If results are not followed up it may be considered negligent.

Do not let investigations blind you. The tests that are performed are only as useful as a provisional diagnosis. If there is a high pre-test probability of a particular diagnosis then a negative test may not rule out that diagnosis. No test is 100% sensitive or specific. If in doubt ask colleagues or ask for a second opinion.

Abdominal pain in patients of different ages

This article will now focus on the different age groups and discuss briefly some relevant points that may help the clinician come to the correct diagnosis. This is by no means exhaustive and is a guide only.

Paediatrics

Causes of abdominal pain in the paediatric age group are shown in *Table 2*. Infective causes of abdominal pain are the predominant presentation in children. The child or parents will usually report classical symptoms of fever and/or rigors, with symptoms of productive cough or diarrhoea indicating the likely site of infection. Particularly younger children may present with atypical symptoms including abdominal pain. Close observation is required as children can become very unwell very quickly.

Viral illnesses are usually associated with a very high fever and the child will appear pale and lethargic. Good response to fluid resuscitation is reassuring.

Now that lead has been taken out of most paints, lead poisoning is rare in children, but presents with non-specific abdominal pain, muscle ache and fatigue. Children under 12 years of age may present with sore throat, fever and abdominal complaints after use of salicylate-containing medications (Reye's syndrome).

Table 2. Causes of paediatric abdominal pain

Infective	Pneumonia
	Gastroenteritis
	Glandular fever
	Mesenteric lymphadenitis
Iatrogenic	Lead poisoning
	Reye's syndrome – aspirin
Idiopathic	Intussusception
Congenital	Cystic fibrosis
	Storage diseases – Wilson's disease
	Haemochromatosis
	Hirschsprung's disease – constipation
	Sickle cell anaemia
Autoimmune	Glomerulonephritis
	Henoch–Schönlein purpura
	Haemolytic uraemic syndrome

Intussusception shows a seasonal pattern, more commonly associated with gastroenteritis in the spring and viral respiratory infections in the winter, and presents with abdominal pain, bloating and obstruction. Bloody diarrhoea is a late sign. Diagnosis and treatment consists of an air enema (Reid et al, 2001).

Constipation is a common cause of abdominal pain in children. In some cases where constipation is reported from infancy Hirschsprung's disease resulting from failure of migration of Auerbach's plexus may be the cause. Later presentation is reported to be the result of short segment disease.

The retroperitoneal organs can be the cause of abdominal pain. Pyelonephritis is a common presentation and should raise the possibility of reflux. Ultrasound and/or DMSA (dimercaptosuccinic acid) can be appropriate.

Glomerulonephritis presents with proteinuria and occasionally with abdominal pain (Nakamoto et al, 1978).

Cystic fibrosis, haemochromatosis and sickle cell anaemia all should be considered if there is a family history of these conditions. Although the first two are rare, it is unusual for them to present primarily with abdominal pain.

Cystic fibrosis causes obstruction of the pancreatic duct and chronic pancreatitis. Haemochromatosis, although rare, presents in childhood with abdominal pain, joint pain and lethargy (Adams et al, 1991).

Sickle cell anaemia as a result of homozygous carriage of haemoglobin S is more common in populations from the malarial zone and presents with abdominal pain in a third of cases. Although more common in adults presentation may be at any age. Precipitation may be brought on by cold, stress, exertion and illness (Sergeant et al, 1994).

Use of some drugs may be associated with abdominal pain as a side effect (aspirin, steroids, some antibiotics, imipramine, sodium valproate, phenytoin, iron).

Adults

Table 3 gives a differential diagnosis of abdominal pain in adults. The most important differential in adults with abdominal pain is pain of vascular origin. Cardiac causes such as myocardial infarc-

tion should be excluded with electrocardiogram (ECG) and cardiac enzymes. Creatine phosphokinase (CK) is the most sensitive of the cardiac enzymes and will be raised within 3 hours of the event whereas the more specific markers such as the troponins will only be raised 10–12 hours following the event. It is important therefore to visualize the ECG that has been taken in the emergency room.

Aortic dissection usually starts at either the root of the aorta or at the left carotid/brachiocephalic origin. As the dissection progresses in a spiral fashion distally it occludes the lumen of branching vessels causing distal ischaemia. The sudden tearing pain of the dissection is therefore followed by a variety of symptoms including cerebral, spinal, abdominal and peripheral neuropathic symptoms.

Other cardiothoracic causes to consider are pneumonia, pulmonary embolism, pericarditis and pleurisy. A history of prolonged travel, previous deep venous thrombosis or a procoagulant state will be helpful in diagnosis of a pulmonary embolus. D-dimer is a very sensitive test of thrombolysis and if negative excludes pulmonary embolus. In the presence of other inflammatory conditions D-dimer will be raised and therefore further investigations will be required. If the chest X-ray is clear ventilation perfusion (VQ) is a very sensitive and specific test, but CT pulmonary angiogram is better at differentiating clot from consolidation.

Viral infections such as the hepatitis viruses, Coxsackie B, herpes simplex and varicella risk factors for exposure should be sought including previous exposure, contact with known carriers, blood transfusion, intravenous drug use and a sexual history.

Infections such as pneumonia and gastroenteritis are common and usually easily diagnosed. Special cases are the immunocompromised patient whereby the illness may be out of proportion to the findings and the chest X-ray appearances subtle.

In patients with diarrhoea it is important to note whether blood is present as this implies mucosal ulceration and therefore invasion of the bowel wall rather than colonization. The differential diagnosis of bloody diarrhoea is colitis (ulcerative colitis) and ischaemic colitis.

Hepatitis causes pain from expansion of the liver capsule as a result of inflammation of the hepatocytes. This also occurs in sickle cell crisis (along with sickling causing occlusion of the gut microvasculature).

Gastro-oesophageal reflux, and its more severe variant, nutcracker oesophagus, presents with epigastric pain that may radiate to the back. The pain usually shows a strong correlation to eating and in the reflux patient is more notable lying down. Exacerbating factors are coffee, alcohol and peppermint. Proton pump inhibitors such as omeprazole will reduce the acid content of the refluxate, but not reflux itself. Helpful measures are eating smaller meals at night, avoiding tea or coffee before going to bed and/or raising the head of the bed.

Gut ischaemia is probably the cause of pain in the vasculitidies (e.g. primary polyarteritis nodosa and secondary systemic lupus erythematosis, scleroderma), porphyria, sickle cell crisis and spherocytosis. The small bowel is more prone in conditions that involve the smaller vessels. The arcades of the small bowel are further away from the bowel wall compared to the colon where the arcade of Drummond allows collateral supply.

Amylase is a useful biochemical marker of pancreatic injury and therefore in the diagnosis of pancreatitis. Assays are now available which are more specific for pancreatic amylase as compared to older assays

Table 3. Causes of abdominal pain in adults

Vascular	Myocardial infarction
	Aortic dissection
	Pulmonary embolism
	Haemophilia
Inflammatory	Pericarditis
	Pleurisy
Infective	Pneumonia syndrome
	Coxsackie B
	Hepatitis
	Primary peritonitis – bacterial, tuberculosis, candida
	Yersinia
	Pyelonephritis
	Herpes zoster
Neoplastic	Lymphoma
	Leukaemia
Neurological	Nutcracker oesophagus
Degenerative	Spinal pathology
Idiopathic	Porphyria
Iatrogenic	Heavy metal poisoning
Congenital	Haemochromatosis
	Sickle cell
	Spherocytosis
	Porphyria
Auto-immune	Polyarteritis nodosa
	Systemic lupus erythematosis
Trauma	Rectus sheath haematoma
Endocrine	Diabetic ketoacidosis
	Addison's
	Hypercalcaemia (hyperparathyroidism)

which also measure salivary amylase. *Table 4* lists the differential diagnosis of a raised amylase level.

Lymphoma and leukaemia may cause abdominal pain by splenic enlargement but also retroperitoneal nodes in lymphoma that cause both pain and also vague gastric symptoms such as early satiety and diarrhoea as a result of stretching of the parasympathetic nerves.

In diabetic ketoacidosis and hyperglycaemic hyperosmolar non-ketotic states the abdominal pain correlates with the severity of the acidosis rather than the glucose levels. Underlying pathology is the cause of both the abdominal pain and the metabolic decompensation in approximately a third of cases and those presenting with abdominal pain are more likely to have a history of substance abuse (Umpierrez and Freire, 2002).

Addison's disease and hypercalcaemia also cause colicky abdominal pain, nausea and vomiting for unknown reasons.

Treatment of these conditions involves correction of the metabolic state and exclusion of an underlying pathology in those with ongoing abdominal symptoms following resuscitation.

Table 4. Differential of hyperamylasaemia

Acute cholecystitis
Perforated viscus
Intestinal obstruction
Mesenteric occlusion
Ruptured ectopic pregnancy
Amylase-secreting tumour
Salivary pathology

Gynaecological

In the female of reproductive age a full sexual history should be taken. This should include a history of normal periods but also whether the patient is sexually active and the use of contraceptives.

Table 5 lists a variety of gynaecological conditions that should be considered in females presenting with abdominal pain. Sexually transmitted diseases may be the cause of both abdominal pain acutely and infertility in the longer term. Barrier contraception is more effective in prevention of contraction of sexually transmitted diseases than oral contraceptives. Indwelling devices such as a coil may be a focus for infection that will not be relieved until this is removed.

Table 5. Gynaecological causes of abdominal pain

Pregnancy
Ectopic pregnancy
Uterine disorders (fibroids)
Ovarian disorders
Salpingitis
Fitz-Hugh–Curtis syndrome
Chlamydia → right upper quadrant pain

Fitz-Hugh–Curtis syndrome is right upper quadrant pain associated with gonorrhoea and inflammatory bands over the liver.

A pregnancy test should be taken in all females of reproductive age with their consent and should be done before X-ray imaging. Ectopic pregnancy is a gynaecological emergency and should be thought of in lateralizing lower abdominal pain with a positive pregnancy test. It is more common in patients having had previous sexually transmitted diseases, those with endometriosis and those who have had a previous ectopic pregnancy. **BJHM**

Conflict of interest: none.

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KEY POINTS

- The majority of patients presenting with abdominal pain will have an intra-abdominal cause and, particularly in the emergency setting, surgery is usually required.
- It is important to identify those patients whose presenting symptoms have a medical cause.
- A good history is essential – 80% of the diagnosis is made on history.
- The differential diagnosis in children is different to that in adults.
- The tests that are performed are only as useful as a provisional diagnosis – do not let investigations blind you.

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