

# UPPER ABDOMINAL PAIN

Year ONE

## HISTORY OF ABDOMINAL PAIN

### How is pain demonstrated by patient:--

- moving open palm
- open palm over area
- clenched fist over area
- points to specific area

### How long has the pain been present?

### Is the pain constant or intermittent?

### What is the nature of the pain?

- ache
- sharp,
- burning,
- dull

### Does the pain stay in one place or move?

### Does the pain wake the patient from sleep?

### Concomitants (other factors affecting pain) :-

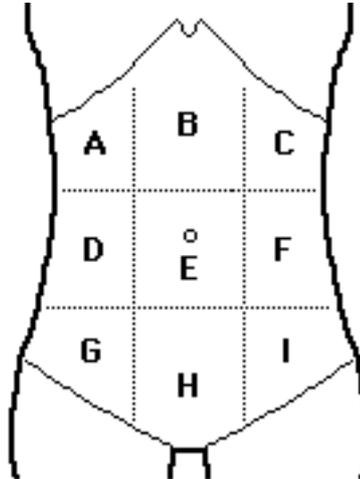
- what makes the pain worse?
- what makes the pain better?
- Is the pain eased or worsened by food?
- Is the pain eased or worsened by defaecation?
- Is the pain worsened or eased by urination?
- Is the pain eased by burping?

### Other symptoms:-

- is the patient burping excessively?
- does the patient feel bloated?
- does the patient have diarrhoea?
- does the patient have constipation?
- is the patient urinating more frequently?
- has the colour of the faeces changed?
- has the colour of the urine changed?

# COMMON CAUSES OF ABDOMINAL PAIN

A wide range of conditions, including conditions centered outside the abdomen, may cause upper abdominal pain.



## COMMON CAUSES OF PAIN IN VARIOUS REGIONS OF THE ABDOMEN

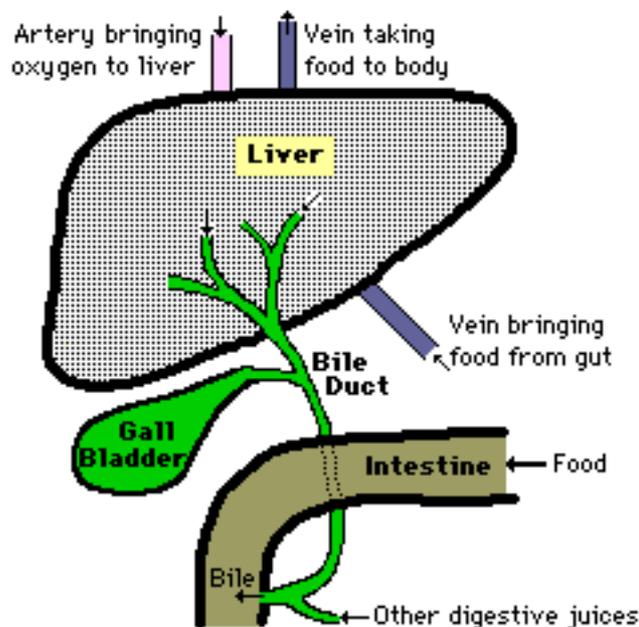
- A Right Upper Quadrant** : Acute cholecystitis, biliary colic, hepatitis, pneumonia
- B Epigastrium** : Peptic ulcer, gastritis, pancreatitis, Crohn's disease, heart disease
- C Left Upper Quadrant** : Splenomegaly (? cause), irritable bowel syndrome, basal pneumonia.
- D Right Loin** : Ureteric colic, pyelonephritis, duodenal ulcer.
- E Periumbilical** : Early appendicitis, small bowel obstruction, perforated peptic ulcer, ruptured aortic aneurysm, mesenteric artery occlusion, Crohn's disease, Meckel's diverticulitis.
- F Left Loin** : Ureteric colic, diverticulitis, irritable bowel syndrome, pyelonephritis.
- G Right Iliac Fossa** : Appendicitis, mesenteric adenitis, ureteric colic, unruptured ectopic pregnancy, ovarian cysts, Meckel's diverticulitis, salpingitis, inguinal and femoral hernia, testicular torsion
- H Hypogastrium** : Large bowel obstruction, ruptured ectopic pregnancy, cystitis, uterine cramps, endometriosis, pelvic inflammatory disease.
- I Left Iliac Fossa** : Gastroenteritis, colonic carcinoma, ureteric colic, diverticulitis, unruptured ectopic pregnancy, ovarian cysts, ulcerative colitis, constipation, salpingitis, inguinal or femoral hernia, testicular torsion

## UPPER ABDOMINAL ORGANS

### LIVER

The liver is the largest gland and internal organ in the body. Wedge-shaped, smooth and rubbery, it lies behind the lower few ribs on the right side, weighs about 1.5 kg and has the same reddish brown colour as the animal livers we are familiar with in the butcher shop. The liver plays an integral part in the processing of food (metabolism).

The liver is body's **chemical processing plant**. It regulates the amount of blood sugar, assists in producing the blood clotting mechanisms, helps to **nourish new blood cells**, **destroys old blood cells**, **breaks down excess acids** to be eliminated as urine, **stores and modifies fats** so they can be more efficiently utilised by cells all over the body, **stores certain vitamins and minerals**, and **removes poisons** from harmful substances such as **alcohol** and **drugs**. The liver is also an important source of the **heat**, which is essential to maintain the body's temperature.



THE LIVER  
AND  
GALL  
BLADDER

The liver aids the digestive process by manufacturing **bile**, which mixes with the digestive juices in the duodenum. Bile is a thick **yellowy green liquid containing salts that breaks down fat** into small droplets so that it can more easily be digested. It is manufactured constantly, but because it may be required only a few times a day, it is carried from the liver through ducts to the gall bladder, a small pear-shaped bag lying just under the liver, where it is stored until it is needed.

Once bile salts are manufactured, the body makes the most of them. Having fulfilled their digestive purpose in the small intestine, they are not simply discarded but are recycled through the blood and back to the liver to be used again. It is estimated that this recycling process takes place about **18 times** with only about 5% of salts being eliminated in the faeces each time.

One of the functions of the liver is to remove a yellow pigment called bilirubin, produced by the destruction of old red blood cells, from the blood. If the liver becomes diseased and cannot function properly, this yellow pigment stays in the bloodstream and gives a yellowish tinge to the skin and whites of the eyes - the jaundice that is a striking symptom of liver diseases such as hepatitis.

The chemical processing capabilities of the liver are amazingly complex and wide-ranging. Substances that enter as one thing frequently leave as something else, depending on the body's needs. For example, most amino acids are converted into proteins, but if the body is

## UPPER ABDOMINAL PAIN

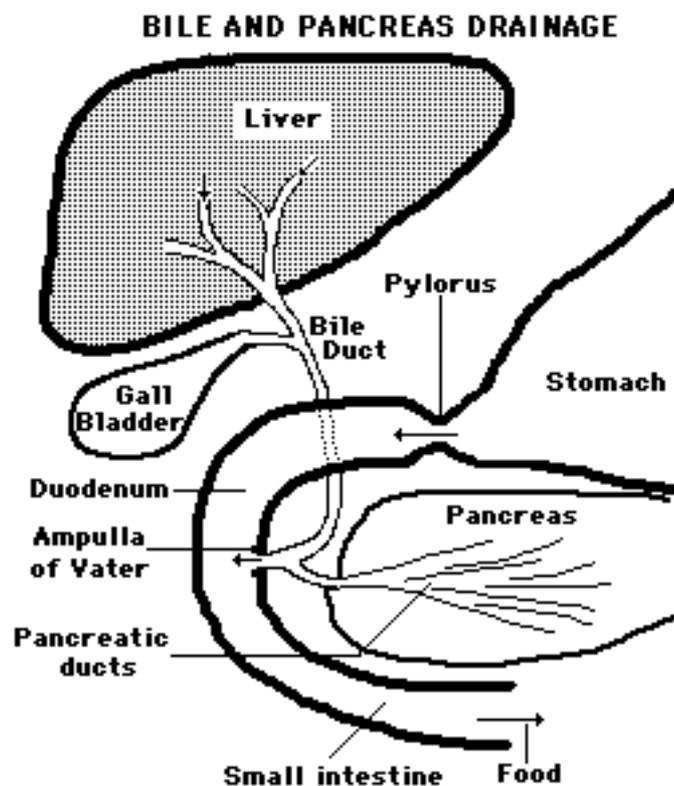
short of glucose, the liver will combine some of the amino acids with fat to make extra sugar. Similarly if the level of blood sugar is too high, glucose is converted into a substance that can be stored.

The liver's storage capacity is equally attuned to the body's specific needs at any given time. If more vitamins are consumed than the body immediately needs, certain of them will be stored to be released if the supply falls off. A person could survive as long as 12 months without taking in any vitamin A, and for up to four months without new supplies of vitamins B12 and D.

## PANCREAS

The pancreas is a large gland situated almost exactly behind the navel in the belly. It is about 15 cm. long and lies horizontally across the abdomen and is surrounded by the duodenum and stomach.

The pancreas has two quite distinct roles to play in the functioning of our body.



**Insulin**, the chemical vital for the control of the body's use of sugar and the prevention of diabetes, is produced by special cells (islets of Langerhans) scattered throughout the tissue of the pancreas. The insulin is produced and released according to how much we eat, not only of sugar but also carbohydrate. The cells that produce the insulin have no ducts to take the chemical away, but discharge it directly into the blood vessels surrounding each cell. Once in the bloodstream, insulin controls the level of sugar inside the cells and in the blood. In diabetics, insulin is either not produced, or is made ineffective by other problems in the body.

Another hormone, **glucagon**, is also produced in the pancreas as a counter to insulin in controlling blood sugar levels.

The other function of the pancreas is to produce the main **digestive enzymes** (pancrelipase, chymotrypsin and other digestive enzymes) used in the digestion of food in our stomach. Millions of tiny glands produce powerful enzymes, which are taken through a maze of ducts finally joining into one main duct that in turn joins with the bile duct to empty into the duodenum. As food passes through the duodenum, the digestive juices produced in the pancreas are squirted onto it. The churning action produced by contractions of the intestine mix these juices

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into the food, where they break it down into its basic components so that it can be absorbed into the body.

The duct coming from the pancreas joins with the bile duct then this common duct open into the duodenum through a small hole in the side of the intestine called the ampulla of Vater. Thus stones coming down from the gall bladder can block off the pancreatic juices too. This can lead to a build-up of pressure in the pancreas, forcing the powerful pancreatic enzymes to leak into the abdominal cavity. When this happens the juices digest normal tissues instead of the food they are intended for. This causes the severe pain of acute pancreatitis, and serious illness and even death can result.

### Sphincter of Oddi

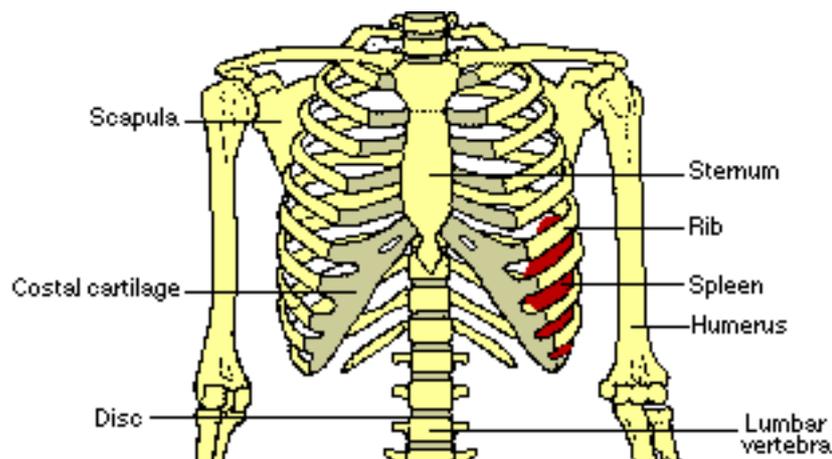
The sphincter of Oddi is a small muscle ring that surrounds the opening of the common bile and pancreatic duct (the ampulla of Vater) into the side of the duodenum. It may trap a gallstone at this point causing a back up of bile and pancreatic enzymes, and eventually pancreatitis. The sphincter may be cut during an ERCP (endoscopic retrograde cholecystopancreatography) procedure to allow a trapped gallstone to escape.

## SPLEEN

The spleen is the largest and most sophisticated lymph node in the human body. It is a soft dark red organ that weighs about 100g and is roughly the same size as a clenched fist. Shaped rather like an inverted pudding bowl, it is in the abdominal cavity tucked under the lower ribs on the left side.

The spleen has three main functions:-

- it **filters blood**, removing damaged cells and extracting and storing reusable elements such as iron from these cells.
- it **stores antibodies** developed by the body during an infection, so that when a similar infection occurs in the future the antibodies can be called into play quickly.
- it helps to produce from stem cells, along with bone marrow, **new red and white blood cells**. White cells fight infection and red cells transport oxygen.



**SPLEEN BEHIND RIBS IN UPPER ABDOMEN**

The most frequent reason for medical attention is that the spleen is damaged in an accident. If the chest is squashed, in a car accident, the spleen may be pierced by a rib or ruptured by the pressure. Because it consists of a very large number of blood vessels, it bleeds freely, and the blood loss into the abdomen may be life threatening. It is difficult to repair surgically because it is a bit like trying to sew up sponge rubber - the stitches tear out very easily and every stitch

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hole bleeds. It is therefore sometimes necessary to remove it to save the victim's life. The removal of the spleen has remarkably little effect on an adult, because the bone marrow can take over most of its functions. In babies, the situation is rather different, as the spleen is essential for the early formation of blood cells, and it is removed from children only if there is no alternative.

If the spleen becomes overactive, it may destroy blood cells too rapidly so that the person becomes severely anaemic, susceptible to infection, and bleeds and bruises excessively.

## STOMACH

The process of digestion, which begins in the mouth, continues in the stomach. Chewed food is passed from the mouth down the oesophagus (gullet) to the stomach. The stomach is a J shaped bag that expands with the intake of food, and after a large meal may be 30cm. long and 12 cm. in diameter. It can hold up to 3 litres in a large person when full. It is soft and pliable when empty but becomes firm when filled with food. It is on the left side of the body, behind the lower ribs, high in the abdomen not far below the heart, and not down behind the navel as people often believe.

The stomach digests food and also stores food, which has usually been taken in quite quickly as a meal, and releases it slowly to be processed by the small intestine.

The outside layers of the stomach consist of muscle, while the inside lining is a mucous membrane, much the same as that lining the oesophagus. The membrane in the stomach, however, forms many folds, which allow it to expand as food is taken in. The muscles in the stomach wall grind and churn food so that it is pulverised and mixed with gastric juices. The semiliquid fairly acid product is called chyme (pronounced "kime").

The gastric juices contain **digestive enzymes** and concentrated **hydrochloric acid** with a pH between 1 and 1.5, but the stomach wall is protected from this by a **thick layer of alkaline mucus**. If acid does manage to eat into the stomach walls, an ulcer develops.

At each end of the stomach is a muscular ring, a sphincter. These rings are normally closed, opening only to allow food in from the oesophagus and out to the small intestine. The ring at the top is called the **lower oesophageal or cardiac sphincter** because it is close to the heart. Sometimes this sphincter does not open properly, which leads to a feeling of being unable to swallow past this point. If the sphincter opens too easily, reflux oesophagitis and heartburn occur as stomach acid comes up into the oesophagus.

The sphincter at the bottom of the stomach, which leads into the duodenum of the small intestine, is the pylorus (**pyloric sphincter**). This sphincter occasionally malfunctions in newborn babies, leading to projectile vomiting in which food is brought up in a forceful spurt. Males are more often affected than females. It can be successfully corrected by surgery. Ulcers (pyloric ulcer) can also develop at this point.

The action of the stomach consists of a series of waves propelling the contents along it towards the pylorus, which relaxes as each wave reaches it to allow some of the softened mass to pass through into the duodenum. The waves also separate out any remaining lumps and ensure that these remain in the upper part of the stomach for further digestion. Each wave takes about half a minute. Usually a person is quite unaware of these wavelike movements, but if the stomach is irritated so that the digestive process is upset, it may give rise to irregular spasms causing indigestion. If the stomach is empty, it is these waves that give a rumbling noise (borborygmi). Under some circumstances, (eg. if the stomach is irritated by consumption of too much alcohol), the waves will work in reverse and the cardiac sphincter will open to allow the contents of the stomach to be ejected back up the oesophagus, causing vomiting. Milder reverse action causes belching.

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The first amounts of semiliquid food will begin to leave the stomach about half an hour after a meal, with the whole process usually taking about two to six hours, depending on what has been eaten. Different types of food stay in the stomach for different periods of time. For example, **fatty foods stay longer than carbohydrates** - hence the ability of a meal rich in carbohydrates to provide a quick source of energy. Obviously a heavy meal will take longer to digest than a light meal.

**Alcohol and some drugs are absorbed directly into the bloodstream from the stomach.**

The passage of food through the stomach is also affected by temperature so that cold food such as ice cream slow it down. The natural inclination to relax after a meal and perhaps go to sleep is to enable the body to concentrate its resources on digesting food as quickly as possible, whereas strenuous exercise diverts the blood to the heart and muscles and therefore slows down the digestive process.

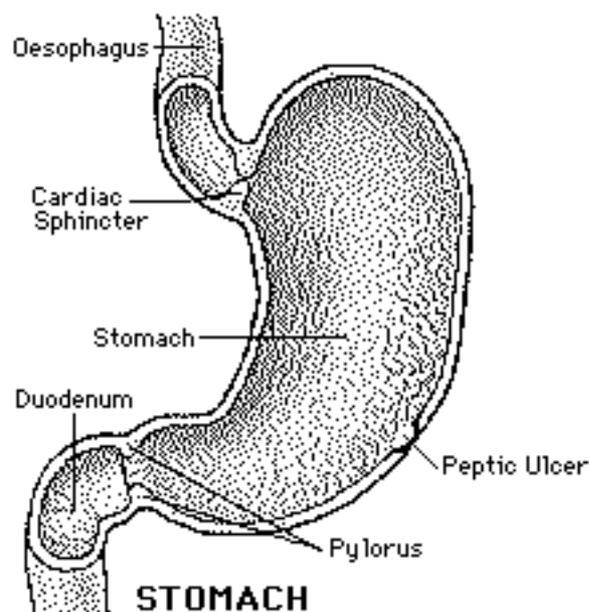
Diseases involving the stomach tend to start with the prefix gastric (eg. gastric ulcer, gastritis, gastroenteritis).

## COMMON CAUSES OF UPPER ABDOMINAL PAIN

### PEPTIC ULCER

Ulcers of the duodenum (first part of the small intestine), stomach or pylorus (muscle ring separating the stomach and duodenum) are known as peptic ulcers. A gastric ulcer is an ulcer of the stomach.

Ulcers are caused by hydrochloric acid, which is a potent acid naturally produced in the stomach to aid food digestion. The stomach protects itself with a layer of thick mucus. If there is excess acid or insufficient mucus present, the acid may eat into the stomach wall. The most common causes for excess acid or reduced mucus are **smoking, stress, anxiety, alcohol, aspirin** and the **nonsteroidal anti-inflammatory drugs** used to treat arthritis. The bacterium *Helicobacter pylori* may damage the mucus lining of the stomach to allow an ulcer to form.



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An ulcer may penetrate into a blood vessel to cause bleeding, anaemia and weakness before any pain is felt. Most ulcers cause **pain** high up in the abdomen, which is often worst just before a meal and **relieved by eating**. Other symptoms include a feeling of fullness, excess burping and indigestion.

The diagnosis can be proved by a barium meal x-ray or gastroscopy. During gastroscopy a biopsy can be taken of an ulcer to exclude cancer, and a test can be performed to identify the presence *Helicobacter pylori*. The bacteria can also be detected by a test on a sample of breath (**carbon-14 urea breath test**) that is collected in an airtight container, and there is also a blood test, but this is less accurate.

A sensible diet, stopping smoking and relaxation can all help. If *Helicobacter pylori* is detected, a specific course of antibiotics and anti-ulcer medication (**triple therapy**) can be given to eradicate it, heal the ulcer, and prevent a recurrence. Numerous medications (eg. **antacids, H2 inhibitors, proton pump inhibitors**) are available to control and often cure peptic ulcers, and because of the effectiveness of these medications, surgery for peptic ulcers is now rarely required.

Excessive bleeding from an ulcer can cause serious anaemia, and a very small percentage of ulcers can be **cancerous**.

### Parietal Cells

The parietal cells are located deep in the wall of the stomach at the base of gastric glands and are responsible for producing hydrochloric acid which is released into the stomach through the fine duct of the gastric gland.

### *Helicobacter pylori*

The bacteria *Helicobacter pylori* (*H. pylori*) are implicated in causing a large percentage of peptic ulcers and can be eradicated by appropriate antibiotic treatment (eg. amoxicillin and clarithromycin with a PPI such as esomeprazole). An antibody test can be performed on a blood sample to prove its presence. Other tests that can be done include a carbon-14 urea breath test and a CLO test (test done on a stomach biopsy).

## GASTRITIS

Gastritis is an inflammation of the stomach that may be caused by many factors including stress, gut infections, drugs (particularly aspirin and anti-arthritis drugs), alcohol excess, overindulgence in food, stomach cancer and allergies.

Patients develop intermittent symptoms of **nausea, vomiting, loss of appetite, a feeling of fullness, upper abdominal discomfort or pain**, and possibly **indigestion** for a few hours or days, or constant discomfort for weeks or months. Sometimes it can progress to a peptic ulcer and rarely stomach cancer. Gastroscopy reveals the inflamed red stomach lining.

The treatment depends upon the cause. Antacids or anti-ulcer drugs (eg. H2 receptor antagonists, proton pump inhibitors) will ease the inflammation, and anti-anxiety drugs may be used when appropriate. Drug-induced gastritis will require the removal of the drugs, substituting other drugs, or if the medication is essential, adding anti-ulcer or antacid medications to control the continuing symptoms.

## CHOLECYSTITIS

Cholecystitis is an infection or inflammation of the gall bladder that almost always occurs in the presence of gallstones. Many different bacteria can be responsible for the infection.

## UPPER ABDOMINAL PAIN

Patients develop **pain in the upper right abdomen** and behind the lower right ribs that often goes through to the back. They also have a **fever, indigestion, nausea** and sometimes **irregular bowel habits**. The pain is often made worse by eating.

Ultrasound scans can detect gallstones, and sometimes thickening of the wall of the gall bladder, which is characteristic of infection. Rarely there may be spread of the infection to the liver and other surrounding tissues, and sometimes an abscess forms in or around the gall bladder. Blood tests are often normal, but sometimes show non-specific signs of infection or liver stress.

Antibiotics are used to settle the gall bladder infection, then surgery is necessary to remove the stones (cholecystectomy).

Cholelithiasis is the medical term for the presence of gallstones in the bile ducts or gall bladder. Cholecystolithiasis is their presence only in the gall bladder.

### Murphy's Sign

With the examiner's fingers pressed firmly over the patient's abdomen over the liver, just below the ribs on the right side, the patient inhales slowly and deeply. If a momentary interruption of inhalation occurs due to pain, Murphy's sign is positive, which indicates the probability of an inflamed gall bladder due to gallstones (cholecystitis). The inflamed gall bladder is pressed against the examiner's fingers by the descending diaphragm, thus causing momentary pain.

## SPLENOMEGALY

The spleen cannot normally be felt, but if enlarged (splenomegaly), may be found as a firm area below the bottom edge of the left side ribs.

The most common causes for enlargement of the spleen are **viral infections** such as glandular fever (**infectious mononucleosis**) and **brucellosis** (from cattle), **bacterial infections** of the blood (eg. septicaemia) and serious generalised infections (eg. **tuberculosis**).

The spleen can be **injured** and bleed in severe accidents that involve a blow to the lower ribs on the left side. If the bleeding is inside the fibrous capsule that surrounds the organ, it will enlarge and become painful.

**Malaria** kills millions of people in developing countries every year. The malarial parasite is injected into a patient by a mosquito, and then invades red blood cells, destroying them and releasing their haemoglobin, which then degenerates to bilirubin to give the characteristic jaundice (yellow skin). The spleen will enlarge as it tries to produce new red blood cells and remove the damaged ones.

Other causes of splenomegaly include **haemolytic anaemia** (the body rapidly destroys its own blood cells), **cancer in the spleen** (either as the primary site, or more commonly because the cancer has spread from other area), **Hodgkin's disease** (cancer of the lymph nodes), **leukaemia** (cancer of the white blood cells), **portal hypertension** (increase in the blood pressure in the veins of the abdomen), **sarcoidosis** (inflammation of a wide range of organs), **thalassaemia major** (inherited condition of fragile red blood cells), **AIDS** and **sickle cell anaemia** (found only in Negroes).

Rarer causes include Gaucher disease (inherited condition that causes fat to accumulate in cells throughout the body), Wilson disease (excess copper in the body), Felty syndrome (complication of rheumatoid arthritis), Scheie syndrome, Letterer-Siwe syndrome and Niemann-Pick (excess storage of certain fats).

There are many other very rare conditions that may be responsible.

## **UNCOMMON CAUSES OF UPPER ABDOMINAL PAIN**

### **CROHN'S DISEASE**

Crohn's disease (regional enteritis) is a chronic inflammation and thickening of the wall of the intestine that usually occurs in the lower part of the small intestine (ileum), but may occur anywhere between the stomach and the anus. It usually affects young adults, and despite treatment, often continues for the rest of the patient's life. When the intestine of these patients is examined at operation, segments of bowel from a few centimetres to a metre or more in length are found to have a wall that is several times thicker and much firmer than normal. It may vary from a minor irritation to being a very serious disease as patients have episodes of relatively good health for months or years, then become acutely ill again. The cause is unknown.

The symptoms include moderate to severe intermittent lower abdominal pain (colic), alternating diarrhoea and constipation (with the diarrhoea being more common), intermittent fever, loss of appetite, passing excess wind and weight loss. In severe cases the bowel may rupture into the bladder, vagina or through the skin around the anus, bowel obstruction may occur, as may bowel perforation and, in rare cases, death.

The diagnosis is confirmed by a barium meal X-ray and follow through, or if the lower intestine (colon) is involved, a barium enema or colonoscopy. Treatment involves surgically removing the worst affected segments of intestine, and controlling diarrhoea and pain with medication, followed by a high-calorie, high-vitamin, low-residue diet with calcium supplements. Vitamin injections are sometimes necessary if food absorption is very poor. Anaemia, dehydration and diarrhoea are signs of a poorly maintained diet. Antibiotics are given to treat bowel infections, and steroids to control flare-ups of the disease.

There is no permanent cure. Even after extensive surgery, 60% of patients develop new affected segments of intestine. Although the mortality rate of patients is slightly increased, most live relatively normal and long lives.

### **IRRITABLE BOWEL SYNDROME**

The irritable bowel syndrome (IBS or functional indigestion) has many other names including functional indigestion, mucus colitis, nervous dyspepsia and spastic colon. It causes abnormal spasms of the muscles in the wall of the large intestine.

The gut is a long tube with bands of muscle running along and around it. The movement of the food from one end to the other is the result of rhythmic contractions of these muscles, which send waves and ripples along the gut to push food along. Nutrients are removed from the gut, and only non-absorbable fibre and roughage remains to be passed out through the anus. Up to 20% of adults have symptoms of the irritable bowel syndrome at some time, but only a fraction of these people require medical treatment.

If the diet consists of large amounts of refined foods with little fibre content, the bulk of the faeces is reduced. When the muscles in the large intestine contract, they may have very little to push along, and this may lead to spasms of the gut. People with tense personalities or continuing stress will find that their intestine acts more rapidly than normal due to over stimulation. Over a number of years, the combination of a low-fibre diet, anxiety, stress and hereditary factors may lead to the development of this syndrome which is more common in women.

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Abdominal pain occurs due to intense spasms of the bowel muscle, and patients experience alternating constipation and diarrhoea, excess passage of wind by mouth and anus, nausea, loss of appetite and mucus on the stools. Once established, the pattern may be very difficult to break, as the symptoms cause further anxiety in the victim, which in turn exacerbates the original symptoms.

No definite tests can prove the diagnosis, but all other causes must be excluded by exhaustive investigations such as an X-ray of the large intestine (barium enema) or colonoscopy.

Treatment requires a diet high in fibre and low in dairy products and processed foods, plus high-fibre dietary supplements in some cases. Regular meal and toilet habits should be established, and tobacco and alcohol intake should be restricted. Reassurance is very important, and anti-anxiety drugs, antidepressants and psychotherapy may all prove useful. In severe cases, antispasmodic drugs are used to alter the activity of gut muscles, and occasionally painkillers are also necessary. IBS usually persists intermittently for many years.

## OTHER CAUSES OF UPPER ABDOMINAL PAIN

Drugs (eg. NSAIDs)  
Hepatitis (RUQ pain, malaise)  
Reflux oesophagitis (pain radiates retrosternally)  
Infantile colic (4 to 16 weeks of age)  
Intestinal perforation (usually after trauma)  
Pancreatic carcinoma (symptoms vary with site)  
Cirrhosis (usually RUQ, fatigue, nausea)  
Protozoal or metazoal intestinal infections  
Viral, bacterial and toxic enteritis  
Muscular strain  
Peritonitis (acutely tender, ileus)  
Depression (insomnia, changed mood)  
Adhesions (colic)  
Omental torsion  
Shincter of Oddi syndrome

### **DON'T FORGET**

Basal pneumonia  
Pleurisy  
Heart disease  
Vertebral lesions and nerve root compression  
may cause upper abdominal pain.

## ***CURIOSITY***

*The liver is the largest gland in the body.*

## ***TOTALLY, COMPLETELY AND UTTERLY USELESS INFORMATION***

*Bruising around the belly button (Cullen's sign) may indicate conditions as varied as a ruptured ectopic pregnancy and cancer of the pancreas.*

Any student who would like a copy of a textbook called "Rationale for the Abdomen - a guide to the diagnosis of diseases that may cause abdominal symptoms", can download the book for free from:

[http://www.medwords.com.au/MW\\_Rationales.html](http://www.medwords.com.au/MW_Rationales.html)

### ADVERTISEMENT

"Carter's Encyclopaedia of Health and Medicine" is available as an app for iPod, iPhone and iPad from Apple's iTunes store.

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