

# The oesophagus

## **Surgical anatomy**

The oesophagus is a muscular tube, approximately 25 cm long, mainly occupying the posterior mediastinum and extending from the upper oesophageal sphincter (the cricopharyngeus muscle) in the neck to the junction with the cardia of the stomach. The musculature of the upper oesophagus, including the upper sphincter, is striated. This is followed by a transitional zone of both striated and smooth muscle with the proportion of the latter progressively increasing so that, in the lower half of the oesophagus, there is only smooth muscle.

It is lined throughout with squamous epithelium. The parasympathetic nerve supply is mediated by branches of the vagus nerve that has synaptic connections to the myenteric (Auerbach's) plexus. Meissner's submucosal plexus is sparse in the oesophagus.

The upper sphincter consists of powerful striated muscle. The lower sphincter is more subtle, and is created by the asymmetrical arrangement of muscle fibres in the distal oesophageal wall just above the oesophagogastric junction. It is helpful to remember the distances 15, 25 and 40 cm for anatomical location during endoscopy

## **Physiology**

The main function of the oesophagus is to transfer food from the mouth to the stomach in a coordinated fashion. The initial movement from the mouth is voluntary. The pharyngeal phase of swallowing involves sequential contraction of the oropharyngeal musculature, closure of the nasal and respiratory passages, cessation of breathing and opening of the upper oesophageal sphincter. Beyond this level, swallowing is involuntary. The body of the oesophagus propels the bolus through a relaxed lower oesophageal sphincter (LOS) into the stomach, taking air with it

This coordinated oesophageal wave that follows a conscious swallow is called **primary peristalsis**. It is under vagal control, although there are specific neurotransmitters that control the LOS. The upper oesophageal sphincter is normally closed at rest and serves as a protective mechanism against regurgitation of oesophageal contents into the respiratory passages. It also serves to stop air entering the oesophagus other than the small amount that enters during swallowing.

The LOS is a zone of relatively high pressure that prevents gastric contents from refluxing into the lower oesophagus. In addition to opening in response to a primary peristaltic wave, the sphincter also relaxes to allow air to escape from the stomach and at the time of vomiting. A variety of factors influence sphincter tone, notably food, gastric distension, gastrointestinal hormones, drugs and smoking. The arrangement of muscle fibers, their differential responses to specific neurotransmitters and the relationship to diaphragmatic contraction all contribute to the action of the LOS. The presence of the physiological sphincter was first demonstrated by Code using manometry with small balloons. Nowadays, LOS pressure is measured by perfused tubes or microtransducers. The normal LOS is 3–4 cm long



it has a pressure of 10–25 mmHg. Manometry is also used to assess the speed and amplitude of oesophageal body contractions and ensure that peristalsis is propagated down the entire length of the oesophagus .

**Secondary peristalsis** is the normal reflex response to a stubborn food bolus or refluxed material designed to clear the oesophagus by a contraction that is not preceded by a conscious swallow. It is worth remembering that the majority of clearance swallows to neutralise refluxed gastric acid are, however, achieved by primary peristalsis, which carries saliva with its high bicarbonate content down to the lower oesophagus. **Tertiary contractions** are non-peristaltic waves that are infrequent (<10 per cent) during laboratory-based manometry, although readily detected if manometry is undertaken while the patient eats a meal

# Symptoms of esophageal disease:

## *Dysphagia*

Dysphagia is used to describe difficulty with swallowing. Oesophageal dysphagia occurs in the involuntary phase and is characterised by a sensation of food sticking.

The nature of this type of dysphagia is often informative regarding a likely diagnosis.

Dysphagia may occur acutely or in a chronic fashion, can affect solids and/or fluids and be intermittent or progressive. While many patients point to a site of impaction, this is unreliable.

## *Odynophagia*

Odynophagia refers to pain on swallowing. Patients with reflux oesophagitis often feel retrosternal discomfort within a few seconds of swallowing hot beverages, citrus drinks or alcohol.

Odynophagia is also a feature of infective oesophagitis and may be particularly severe in chemical injury.



# *Regurgitation and reflux*

Regurgitation and reflux are often used synonymously. It is helpful to differentiate between them, although it is not always possible. Regurgitation should strictly refer to the return of oesophageal contents from above a functional or mechanical obstruction. Reflux is the passive return of gastroduodenal contents to the mouth as part of the symptomatology of gastrooesophageal reflux disease (GORD). **Loss of weight, anaemia, cachexia, change of voice** due to refluxed material irritating the vocal cords and cough or dyspnoea due to tracheal aspiration may all accompany regurgitation and/or reflux.

## *Chest pain*

Chest pain similar in character to angina pectoris may arise from an oesophageal cause, especially gastro-oesophageal reflux and motility disorders. Exercise-induced chest pain can be due to reflux

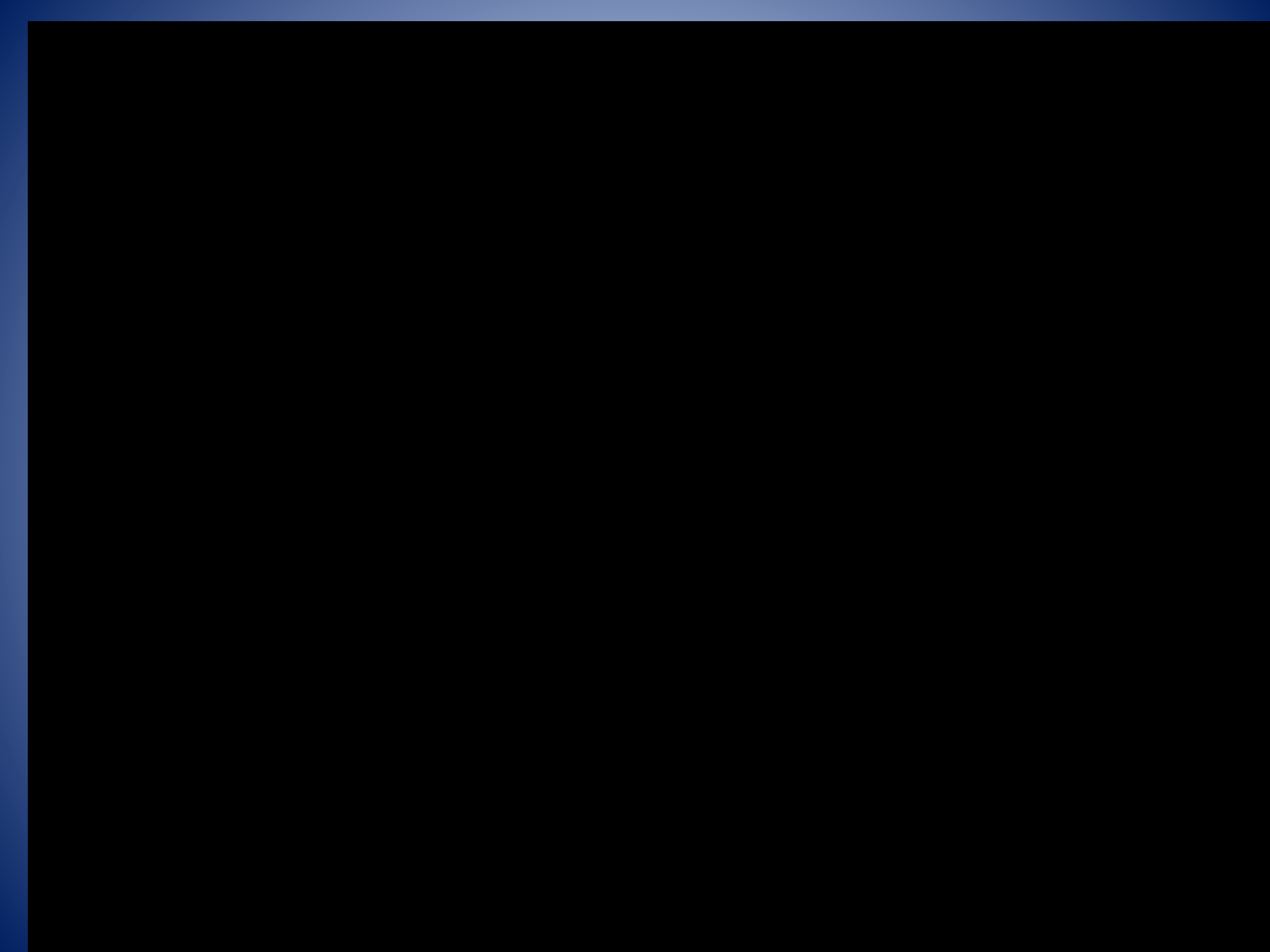
# Investigations

## *Radiography*

Contrast radiography has been somewhat overshadowed by endoscopy but remains a useful investigation for demonstrating narrowing, space-occupying lesions, anatomical distortion or abnormal motility. Barium radiology is, however, inaccurate in the diagnosis of gastro-oesophageal reflux, unless reflux is gross. Plain radiographs will show some foreign bodies. Cross-sectional imaging by computed tomography (CT) scanning is now an essential investigation in the assessment of neoplasms of the oesophagus and can be used in place of a contrast swallow to demonstrate perforation.

## *Endoscopy*

Endoscopy is necessary for the investigation of most oesophageal conditions. It is required to view the inside of the oesophagus and the oesophagogastric junction, to obtain a biopsy or cytology specimen, for the removal of foreign bodies and to dilate strictures. Traditionally, there are two types of instrument available, the rigid oesophagoscope and the flexible video endoscope, but the rigid instrument is now virtually obsolete. For flexible video gastroduodenoscopy, general anaesthesia is not required; most examinations can be done on an outpatient basis, and the quality of the magnified image is superb.





## *Endosonography*

Endoscopic ultrasonography relies on a high-frequency (5–30 MHz) transducer located at the tip of the endoscope to provide highly detailed images of the layers of the oesophageal wall and mediastinal structures close to the oesophagus.

## *Oesophageal manometry*

Manometry is now widely used to diagnose oesophageal motility disorders. Recordings are usually made by passing a multilumen catheter with three to eight recording orifices at different levels down the oesophagus and into the stomach.

## *Twenty-four hour pH and combined pH-impedance recording*

Prolonged measurement of pH is now accepted as the most accurate method for the diagnosis of gastro-oesophageal reflux. It is particularly useful in patients with atypical reflux symptoms, those without endoscopic oesophagitis and when patients respond poorly to intensive medical therapy. A small pH probe is passed into the distal oesophagus and positioned 5 cm above the upper margin of the LOS, as defined by manometry. The probe is connected to a miniature digital recorder that is worn on a belt and allows most normal activities. Patients mark symptomatic events such as heartburn.

# Therapeutic procedures

## *Dilatation of strictures*

- *ballon*
- *Thermal recanalisation*

# Foreign bodies

- The most common is a food bolus, which usually signifies underlying disease
- It is usually possible to remove foreign bodies by flexible endoscopy
- Beware of button batteries in the oesophagus
- Endoscopic retrieval is usually successful.





# PERFORATION

Perforation of the oesophagus is usually iatrogenic (at therapeutic endoscopy) or due to 'barotrauma' (spontaneous perforation).

Many instrumental perforations can be managed conservatively, but spontaneous perforation is often a life-threatening condition that regularly requires surgical intervention

## **Barotrauma (spontaneous perforation, Boerhaave syndrome)**

This occurs classically when a person vomits against a closed glottis. The pressure in the oesophagus increases rapidly, and the oesophagus bursts at its weakest point in the lower third, sending a stream of material into the mediastinum and often the pleural cavity as well. The condition was first reported by Boerhaave, who reported the case of a grand admiral of the Dutch fleet who was a glutton and practised autoemesis. Boerhaave syndrome is the most serious type of perforation because of the large volume of material that is released under pressure. This causes rapid chemical irritation in the mediastinum and pleura followed by infection if untreated. Barotrauma has also been described in relation to other pressure events when the patient strains against a closed glottis (e.g. defaecation, labour, weight-lifting).

## ***Diagnosis of spontaneous perforation***

The clinical history is usually of severe pain in the chest or upper abdomen following an attack of vomiting following a meal or a bout of drinking. Associated shortness of breath is common

**Differential diagnosis:** myocardial infarction, perforated peptic ulcer or pancreatitis

if the pain is confined to the upper abdomen. There may be a surprising amount of rigidity on examination of the upper abdomen, even in the absence of any peritoneal contamination.

The diagnosis can usually be suspected from the history and associated clinical features. A **chest x-ray** is often confirmatory with air in the mediastinum, pleura or peritoneum. Pleural effusion occurs rapidly either as a result of free communication with the pleural space or as a reaction to adjacent inflammation in the mediastinum. A **contrast swallow or CT** is nearly always required to guide management .

## **Pathological perforation**

Free perforation of ulcers or tumours of the oesophagus into the pleural space is rare. Erosion into an adjacent structure with fistula formation is more common. Aerodigestive fistula is most common and usually encountered in primary malignant disease of the oesophagus or bronchus. Coughing on eating and signs of aspiration pneumonia may allow the problem to be recognised at a time when intervention may be appropriate and feasible. Covering the communication with a self-expanding metal stent is the usual solution.



## **Penetrating injury**

Perforation by knives and bullets is uncommon, even in war, as the oesophagus is a relatively small target surrounded by other vital organs.

## **Foreign bodies**

The oesophagus may be perforated during removal of a foreign body but, occasionally, an object that has been left in the oesophagus for several days will erode through the wall.

## **Instrumental perforation**

Instrumentation is by far the most common cause of perforation. Modern instrumentation is remarkably safe, but perforation remains a risk that should never be forgotten

## **Treatment of oesophageal perforations**

Perforation of the oesophagus usually leads to mediastinitis. The loose areolar tissues of the posterior mediastinum allow a rapid spread of gastrointestinal contents. The aim of treatment is to limit mediastinal contamination and prevent or deal with infection.

Operative repair deals with the injury directly, but imposes risks of its own; non-operative treatment aims to limit the effects of mediastinitis and provide an environment in which healing can take place. The decision between operative and non-operative management rests on four factors. These are:

- 1 the site of the perforation (cervical versus thoracoabdominal oesophagus);**
- 2 the event causing the perforation (spontaneous versus instrumental);**
- 3 underlying pathology (benign or malignant);**
- 4 the status of the oesophagus before the perforation (fasted and empty versus obstructed with a stagnant residue).**

## Factors that favour non-operative management



- Small septic load
- Minimal cardiovascular upset
- Perforation confined to mediastinum
- Perforation by flexible endoscope
- Perforation of cervical oesophagus

## Factors that favour -operative management



- Large septic load
- Septic shock
- Pleura breached
- Boerhaave's syndrome
- Perforation of abdominal oesophagus

## Guide lines of the non operative approach

- pain that is readily controlled with opiates;
- absence of crepitus, diffuse mediastinal gas, hydropneumothorax or pneumoperitoneum;
- mediastinal containment of the perforation with no evidence of widespread extravasation of contrast material;
- no evidence of ongoing luminal obstruction or a retained foreign body.

## Indication of surgery

- are unstable with sepsis or shock;
- have evidence of a heavily contaminated mediastinum, pleural space or peritoneum;
- have widespread intrapleural or intraperitoneal extravasation of contrast material.



## **MALLORY–WEISS SYNDROME**

Forceful vomiting may produce a mucosal tear at the cardia rather than a full perforation. The mechanism of injury is different. In Boerhaave's syndrome, vomiting occurs against a closed glottis, and pressure builds up in the oesophagus. In Mallory–Weiss syndrome, vigorous vomiting produces a vertical split in the gastric mucosa, immediately below the squamocolumnar junction at the cardia in 90 per cent of cases. In only 10 per cent is the tear in the oesophagus

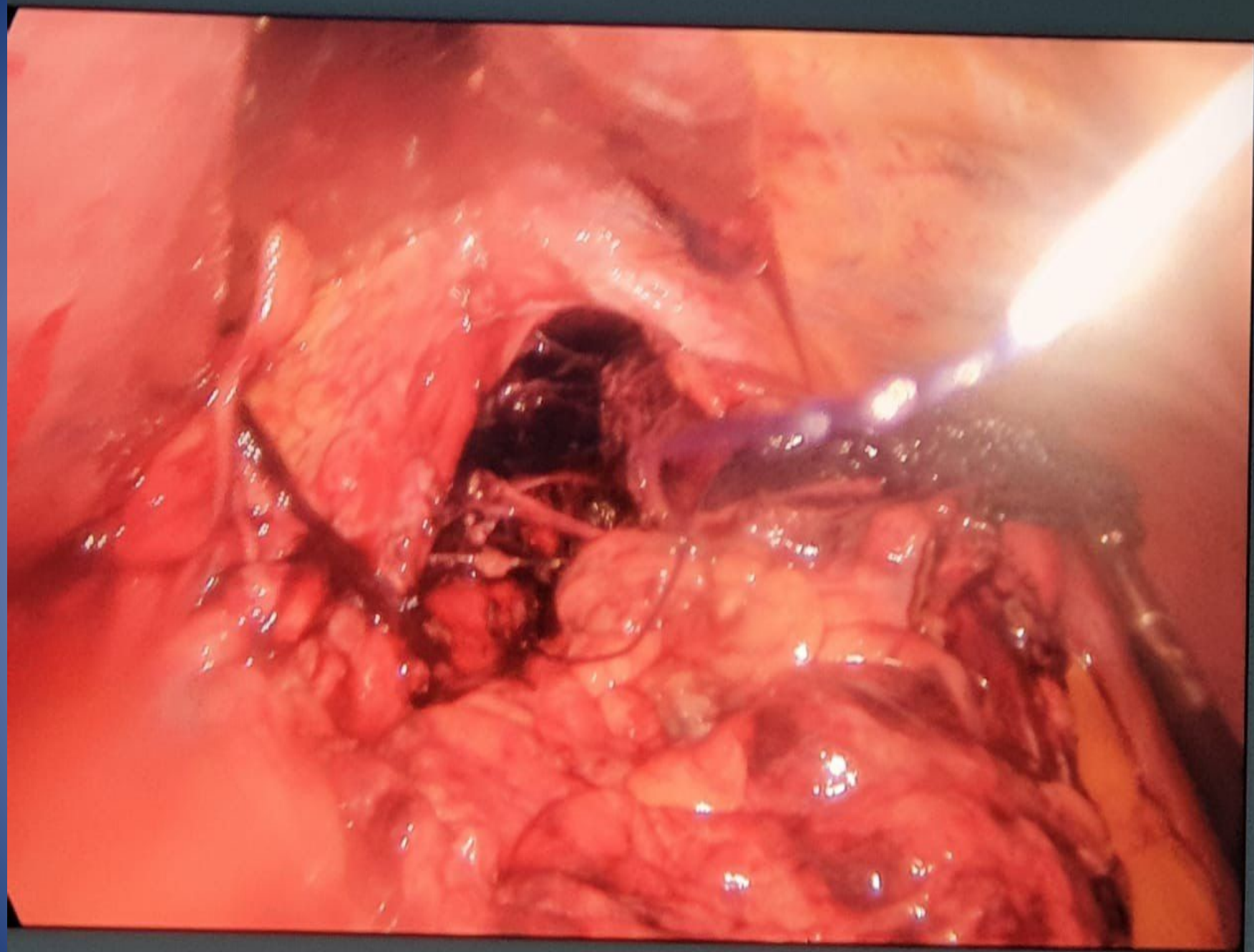
The condition presents with haematemesis. Usually, the bleeding is not severe, but endoscopic injection therapy may be required for the occasional, severe case. Surgery is rarely required.

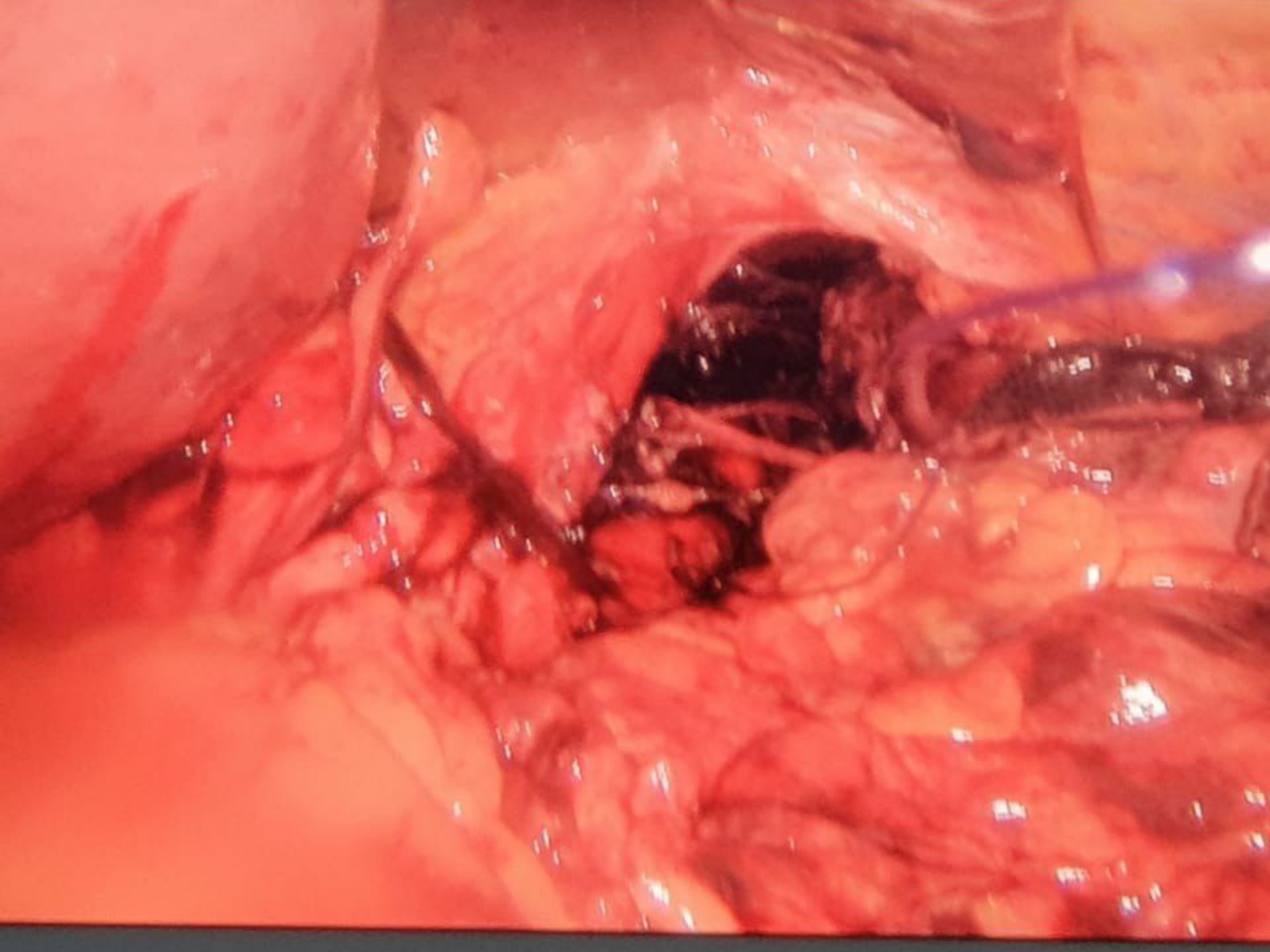
## **CORROSIVE INJURY**

Corrosives such as sodium hydroxide (lye, caustic soda) or sulphuric acid may be taken in attempted suicide. Accidental ingestion occurs in children and when corrosives are stored in bottles labelled as beverages. All can cause severe damage to the mouth, pharynx, larynx, oesophagus and stomach. The type of agent, its concentration and the volume ingested largely determine the extent of damage. In general, alkalis are relatively odourless and tasteless, making them more likely to be ingested in large volume. Alkalis cause liquefaction, saponification of fats, dehydration and thrombosis of blood vessels that usually leads to fibrous scarring. Acids cause coagulative necrosis with eschar formation, and this coagulant may limit penetration to deeper layers of the oesophageal wall. Acids also cause more gastric damage than alkalis because of the induction of intense pylorospasm with pooling in the antrum.

Symptoms and signs are notoriously unreliable in predicting the severity of injury. The key to management is early endoscopy by an experienced endoscopist to inspect the whole of the oesophagus and stomach. Deep ulcers and the recognition of a grey or black eschar signify the most severe lesions with the greatest risk of perforation. With more severe injuries, a feeding jejunostomy may be appropriate until the patient can swallow saliva satisfactorily. Regular endoscopic examinations are the best way to assess stricture development. Significant stricture formation occurs in about 50 per cent of patients with extensive mucosal damage











# GASTRO-OESOPHAGEAL REFLUX DISEASE

## Aetiology

Normal competence of the gastro-oesophageal junction is maintained by the LOS. This is influenced by both its physiological function and its anatomical location relative to the diaphragm and the oesophageal hiatus. In normal circumstances, the LOS transiently relaxes as a coordinated part of swallowing, as a means of allowing vomiting to occur and in response to stretching of the gastric fundus, particularly after a meal to allow swallowed air to be vented. Most episodes of physiological reflux occur during postprandial transient lower oesophageal sphincter relaxations (TLOSRS). In the early stages of GORD, most pathological reflux occurs as a result of an increased number of

TLOSRS rather than a persistent fall in overall sphincter pressure. In more severe GORD, LOS pressure tends to be generally low, and this loss of sphincter function seems to be made worse if there is loss of an adequate length of intra-abdominal oesophagus.

The absence of an intra-abdominal length of oesophagus results in a sliding hiatus hernia.

The loss of the normal anatomical configuration exacerbates reflux, although sliding hiatus hernia alone should not be viewed as the cause of reflux. Sliding hiatus hernia is associated with GERD and may make it worse but, as long as the LOS remains competent, pathological GERD does not occur.

Many GERD sufferers do not have a hernia, and many of those with a hernia do not have GORD. It should be noted that rolling or paraoesophageal hiatus hernia is a quite different and potentially dangerous condition.

Reflux oesophagitis that is visible endoscopically is a complication of GERD and occurs in a minority of sufferers overall, but in around 40 per cent of patients referred to hospital.

In Western societies, GERD is the most common condition affecting the upper gastrointestinal tract. This is partly due to the declining incidence of peptic ulcer as the incidence of infection with *Helicobacter pylori* has reduced as a result of improved socioeconomic conditions along with a rising incidence of GERD in the last 20–30 years. The cause of the increase is unclear, but may be due in part to increasing obesity. The strong association between GERD, obesity and the parallel rise in the incidence of adenocarcinoma of the oesophagus represents a major health challenge for most Western countries.

## Clinical features

The classical triad of symptoms is retrosternal burning pain (heartburn), epigastric pain (sometimes radiating through to the back) and regurgitation. Most patients do not experience all three. Symptoms are often provoked by food, particularly those that delay gastric emptying (e.g. fats, spicy foods). As the condition becomes more severe, gastric juice may reflux to the mouth and produce an unpleasant taste often described as 'acid' or 'bitter'. Heartburn and regurgitation can be brought on by stooping or exercise.

Proportion of patients have odynophagia with hot beverages, citrus drinks or alcohol. Patients with nocturnal reflux and those who reflux food to the mouth nearly always have severe GERD. Some patients present with less typical symptoms such as angina-like chest pain, pulmonary or laryngeal symptoms. Dysphagia is usually a sign that a stricture has occurred, but may be caused by an associated motility disorder.



# Diagnosis

In most cases, the diagnosis is assumed rather than proven, and treatment is empirical. Investigation is only required when the diagnosis is in doubt, when the patient does not respond to a proton pump inhibitor (PPI) or if dysphagia is present .

most appropriate examination is endoscopy with biopsy. If the typical appearance of reflux oesophagitis, peptic stricture or Barrett's oesophagus is seen, the diagnosis is clinched, but visible oesophagitis is not always present,. This is compounded in clinical practice by the widespread use of PPIs, which cause rapid healing of early mucosal lesions. Many patients will have received such treatment before referral. It is worth remembering that the correlation between symptoms and endoscopic appearances is poor. On the other hand, there is a strong correlation between worsening endoscopic appearances and the duration of oesophageal acidification on pH testing. In patients with atypical or persistent symptoms despite therapy, oesophageal manometry and 24-hour oesophageal pH recording (ideally with impedance measurement) may be justified to establish the diagnosis and guide management

## **Diagnostic measurement in GORD**

24-hour pH recording is the 'gold standard' for diagnosis of GORD

TLOSRS are the most important manometric findings in GORD

The length and pressure of the LOS are also important

pH recording are essential in patients being considered for antireflux surgery.

Barium swallow and meal examination gives the best appreciation of gastro-oesophageal anatomy .This may be important in the context of surgery for rolling or mixed hiatus hernias, but it is unimportant in most patients with GORD.

## Management of uncomplicated GORD

### *Medical management*

Most sufferers from GORD do not consult a doctor and do not need to do so. They self-medicate with over-the-counter medicines such as **simple antacids, antacid–alginate preparations and H<sub>2</sub>-receptor antagonists**. Consultation is more likely when symptoms are severe, prolonged and unresponsive to the above treatments. Simple measures that are often neglected include advice about **weight loss, smoking, excessive consumption of alcohol, tea or coffee, the avoidance of large meals late at night and a modest degree of head-up tilt of the bed**. Tilting the bed has been shown to have an effect that is similar to **taking an H<sub>2</sub>-receptor antagonist**. The common practice of using additional pillows has no significant effect. **PPIs** are the most effective drug treatment for GORD. Indeed, they are so effective that, once started, patients are very reluctant to stop taking them. Given an adequate dose for **8 weeks**, most patients have a rapid improvement in symptoms (within a few days), and more than 90 per cent can expect full mucosal healing at the end of this time

## *Surgery*

Strictly speaking, the need for surgery should have been reduced as medication has improved so much. Paradoxically, the number of antireflux operations has remained relatively constant and may even be increasing. This is probably due partly to increased patient expectations and partly to the advent of minimal access surgery, which has improved the acceptability of procedures.



## *Surgical treatments*

The indication for surgery in uncomplicated GORD is essentially patient choice. The risks and possible benefits need to be discussed in detail. Risks include a small mortality rate (0.1–0.5 per cent, depending on patient selection), failed operation (5–10 per cent) and side effects such as dysphagia, gas bloat or abdominal discomfort (10 per cent). With current operative techniques, 85–90 per cent of patients should be satisfied with the result of an antireflux operation. Patients who are asymptomatic on a PPI need a careful discussion of the risk side of the equation. Those who are symptomatic on a PPI need a careful clinical review to make sure that they will benefit from an operation. Reasons for failure on a PPI include ‘volume’ reflux (a good indication for surgery), a ‘hermit’ lifestyle in which the least deviation from lifestyle rules leads to symptoms (a good indication), psychological distress with intolerance of minor symptoms (a poor indication; these patients are likely to be dissatisfied with surgery), poor compliance (a good indication if the reason for poor compliance is the side effects of treatment, otherwise a bad indication) and misdiagnosis of GORD.

## Complications of gastro-oesophageal reflux disease

*Stricture* It is important to distinguish a benign reflux-induced stricture from a carcinoma.

Peptic strictures generally respond well to dilatation and long-term treatment with a PPI.

### *Oesophageal shortening*

**Barrett's oesophagus (columnar-lined lower oesophagus)** Barrett's oesophagus is a metaplastic change in the lining mucosa of the oesophagus in response to chronic gastrooesophageal reflux .

The hallmark of 'specialised' Barrett's epithelium is the presence of mucus secreting goblet cells (intestinal metaplasia). One of the great mysteries of GORD is why some people develop oesophagitis and others develop Barrett's oesophagus, often without significant oesophagitis. In Barrett's oesophagus, the junction between squamous oesophageal mucosa and gastric mucosa moves proximally. It may be difficult to distinguish a Barrett's oesophagus from a tubular, sliding hiatus hernia during endoscopy, as the two often coexist

When intestinal metaplasia occurs, there is an increased risk of adenocarcinoma of the oesophagus, which is about 25 times that of the general population so a regular surveillance endoscopy with multiple biopsies in the hope of finding dysplasia or *in situ cancer rather than* allowing invasive cancer to develop and cause symptoms

When Barrett's oesophagus is discovered, the treatment is that of the underlying GORD. There has been considerable interest in recent years in endoscopic methods of ablating Barrett's mucosa in the hope of eliminating the risk of cancer development.

Laser, photodynamic therapy, argon-beam plasma coagulation and endoscopic mucosal resection (EMR) have all been used. In conjunction with high-dose PPI treatment or an antireflux operation, these endoscopic methods can result in a neosquamous lining.

# **PARAOESOPHAGEAL ('ROLLING') HIATUS HERNIA**

True paraoesophageal hernias in which the cardia remains in its normal anatomical position are rare. The vast majority of rolling hernias are mixed hernias in which the cardia is displaced into the chest and the greater curve of the stomach rolls into the mediastinum. Sometimes, the whole of the stomach lies in the chest. Colon or small intestine may sometimes lie in the hernia sac. The hernia is most common in the elderly, but may occur in young fit people. As the stomach rolls up into the chest, there is always an element of rotation (volvulus)



The symptoms of rolling hernia are mostly due to twisting and distortion of the oesophagus and stomach. Dysphagia is common. Chest pain may occur from distension of an obstructed stomach. Classically, the pain is relieved by a loud belch. Symptoms of GORD are variable. Strangulation, gastric perforation and gangrene can occur. Emergency presentation with any of these complications carries high mortality on account of a combination of late diagnosis, generally elderly patients with comorbid diseases and the complexity of surgery involved.



The hernia may be visible on a plain radiograph of the chest as a gas bubble, often with a fluid level behind the heart. A barium meal is the best method of diagnosis. The endoscopic appearances may be confusing, especially in large hernias when it is easy to become disorientated.

Symptomatic rolling hernias nearly always require surgical repair as they are potentially dangerous. The risk of an asymptomatic patient developing a significant problem when a rolling hiatus hernia is discovered incidentally has probably been overestimated in the past. The annual risk is probably no more than 1 per cent. Patients who present as an emergency with acute chest pain may be treated initially by nasogastric tube to relieve the distension that causes the pain, followed by operative repair. If the pain is not relieved or perforation is suspected, immediate operation is mandatory.

Emergency surgery needs to be tailored to the problem encountered and the fitness of the patient. Elective surgery involves reduction of the hernia, excision of the sac, reducing the crural defect and some form of retention of the stomach in the abdomen. Some surgeons perform a fundoplication, arguing that this is a very effective means of maintaining reduction and that it deals with the associated GORD. Laparoscopic repair has recently become popular. Full anatomical repair of a large rolling hernia can be difficult by this approach and requires considerable expertise. Secure closure of the hiatal defect can be a problem, and some surgeons advocate mesh to reinforce the repair.

# NEOPLASMS OF THE OESOPHAGUS

## Benign tumours

Benign tumours of the oesophagus are relatively rare. True papillomas, adenomas and hyperplastic polyps do occur, but the majority of 'benign' tumours are not epithelial in origin and arise from other layers of the oesophageal wall (gastrointestinal stromal tumour (GIST), lipoma, granular cell tumour). Most benign oesophageal tumours are small and asymptomatic, and even a large benign tumour may cause only mild symptoms. The most important point in their management is usually to carry out an adequate number of biopsies to prove beyond reasonable doubt that the lesion is not malignant.

## **Carcinoma of the oesophagus**

Cancer of the oesophagus is the sixth most common cancer in the world. In general, it is a disease of mid to late adulthood, with a poor survival rate. Only 5–10 per cent of those diagnosed will survive for five years

### *Pathology and aetiology*

Squamous cell cancer and adenocarcinoma are the most common types.

Squamous cell carcinoma generally affects the upper two-thirds of the oesophagus and adenocarcinoma the lower one-third. Worldwide, squamous cell cancer is most common, but adenocarcinoma predominates in the West and is increasing in incidence.



## • **Carcinoma of the oesophagus**

- Squamous cell usually affects the upper two-thirds;
- adenocarcinoma usually affects the lower-third
- Common aetiological factors are tobacco and alcohol
- (squamous cell) and GORD (adenocarcinoma)
- The incidence of adenocarcinoma is increasing
- Lymph node involvement is a bad prognostic factor
- Dysphagia is the most common presenting symptom, but is a late feature
- Accurate pretreatment staging is essential in patients thought to be fit to undergo 'curative' treatment



## *Geographical variation in oesophageal cancer*

The incidence of oesophageal cancer varies more than that of any other cancer.

Squamous cell cancer is endemic in Asia and South Africa

1. The cause of the disease in the endemic areas is not known, but it is probably due to a combination of fungal contamination of food and nutritional deficiencies.

2. Away from the endemic areas, tobacco and alcohol are major factors in the occurrence of squamous cancer.

In many Western countries, the incidence of squamous cell cancer has fallen or remained static, but the incidence of adenocarcinoma of the oesophagus has increased dramatically since the mid-1970s at a rate of 5–10 per cent per annum. The change is greater than that of any other neoplasm in this time. Adenocarcinoma now accounts for 60–75 per cent of all oesophageal cancers in several countries. The reason for this change is not understood. A similar rate of increase in GORD over the same period, which mirrors an increase in obesity in the West, is likely to be an important factor, particularly through the link to Barrett's oesophagus.

There has been a similar increase in the incidence of carcinoma of the cardia of the stomach, which suggests that cancer of the cardia and adenocarcinoma of the oesophagus may share common aetiological factors. With a falling incidence of cancer in the rest of the stomach, more than 60 per cent of all upper gastrointestinal cancers in the West involve the cardia or distal oesophagus.

Tumours can spread in three ways: invasion directly through the oesophageal wall, via lymphatics or in the bloodstream. Direct spread occurs both laterally, through the component layers of the oesophageal wall, and longitudinally within the oesophageal wall. Longitudinal spread is mainly via the submucosal lymphatic channels of the oesophagus. The pattern of lymphatic drainage is therefore not segmental, as in other parts of the gastrointestinal tract. Consequently, the length of oesophagus involved by tumour is frequently much longer than the macroscopic length of the malignancy at the epithelial surface. Lymph node spread occurs commonly. Although the direction of spread to regional lymphatics is predominantly caudal, the involvement of lymph nodes is potentially widespread and can also occur in a cranial direction. Any regional lymph node from the superior mediastinum to the coeliac axis and lesser curve of the stomach may be involved regardless of the location of the primary lesion within the oesophagus.



Haematogenous spread may involve a variety of different organs including the liver, lungs, brain and bones. Tumours arising from the intra-abdominal portion of the oesophagus may also disseminate transperitoneally.

## *Clinical features*

Most oesophageal neoplasms present with mechanical symptoms, principally **dysphagia**, but sometimes also **regurgitation, vomiting, odynophagia and weight loss**. Clinical findings suggestive of advanced malignancy include **recurrent laryngeal nerve palsy, Horner's syndrome, chronic spinal pain and diaphragmatic paralysis**. Other factors making surgical cure unlikely include weight loss of more than 20 per cent and loss of appetite. Cutaneous tumour metastases or enlarged supraclavicular lymph nodes may be seen on clinical examination and indicate disseminated disease. Hoarseness due to recurrent laryngeal nerve palsy is a sign of advanced and incurable disease. Palpable lymphadenopathy in the neck is likewise a sign of advanced disease. Patients with early disease may have non-specific dyspeptic symptoms or a vague feeling of 'something that is not quite right' during swallowing. Some are diagnosed during endoscopic surveillance of patients with Barrett's oesophagus and, while this does identify patients with the earliest stages of disease

The widespread use of endoscopy as a diagnostic tool does, nevertheless, provide an opportunity for early diagnosis .Biopsies should be taken of all lesions in the oesophagus no matter how trivial they appear and irrespective of the indication for the examination.

## *Investigation*

Endoscopy is the first-line investigation for most patients. It provides an unrivalled direct view of the oesophageal mucosa and any lesion allowing its site and size to be documented. Cytology and/or histology specimens taken via the endoscope are crucial for accurate diagnosis. The combination of histology and cytology increases the diagnostic accuracy to more than 95 per cent.

## 1. General assessment and staging

Fitness of the patient and tumor resectability

## 2. Blood tests

## 3. ultrasound

It is difficult to visualise mediastinal structures with transcutaneous ultrasound.

4. Bronchoscopy .Many middle- and upper-third oesophageal carcinomas (and therefore usually squamous carcinomas) are sufficiently advanced at the time of diagnosis that the trachea or bronchi are already involved

## 5. Laparoscopy

This is a useful technique for the diagnosis of intra-abdominal and hepatic metastases.



## 6. Computed tomography

Computed tomography scanning is the modality most used to identify haematogenous metastases. Distant organs are easily seen and metastases within them visualised with high accuracy (94–100 per cent). The normal thoracic oesophagus is easily demonstrated by CT scanning.

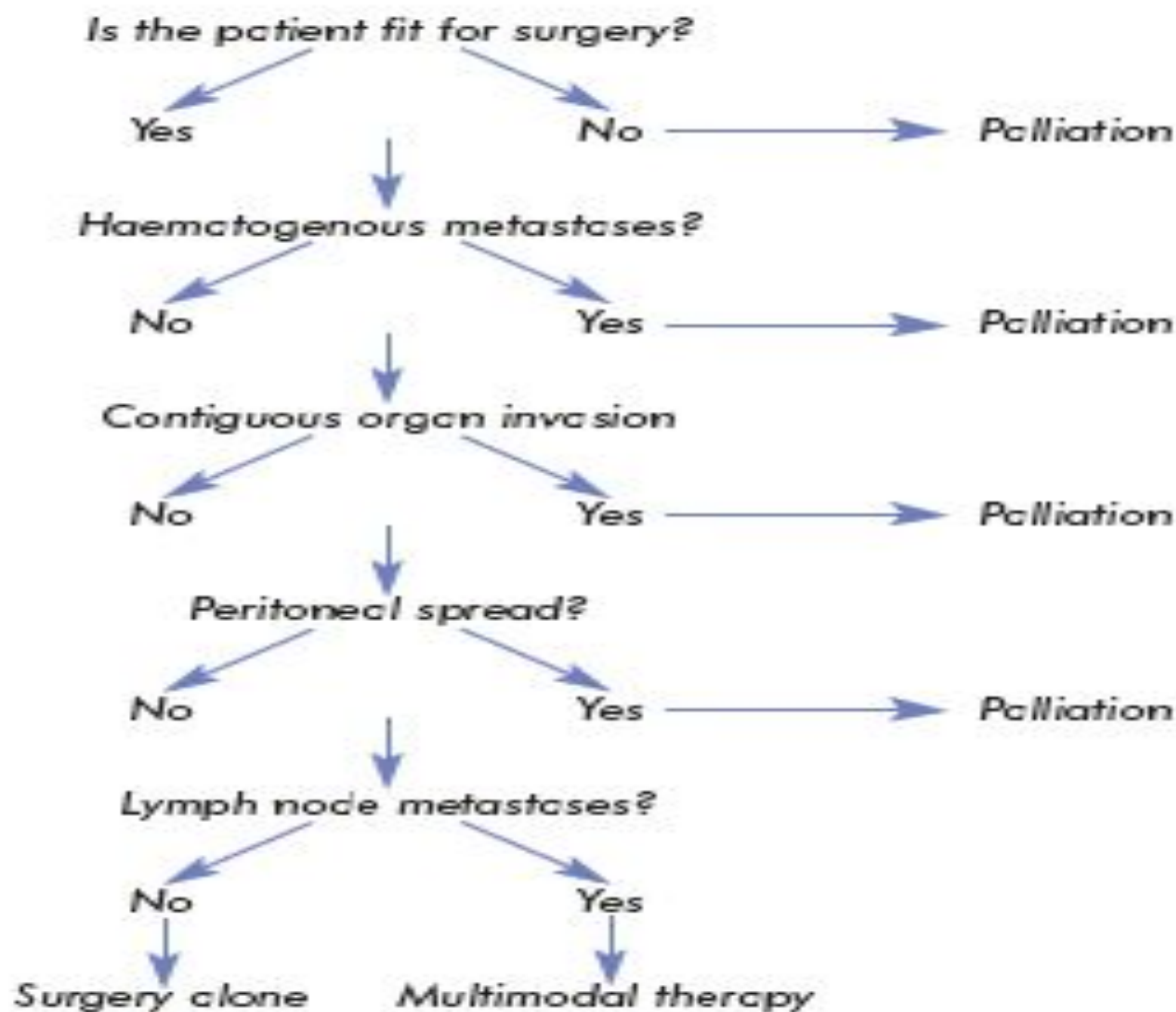
## 7. Magnetic resonance imaging

## 8. Endoscopic ultrasound

After haematogenous spread, the two principal prognostic factors for oesophageal cancer are the depth of tumour penetration through the oesophageal wall and regional lymph node spread.

## 8. Positron emission tomography/computed tomography scanning

Tis	High-grade dysplasia
T1	Tumour invading lamina propria or submucosa
T2	Tumour invading muscularis propria
T3	Tumour invading beyond muscularis propria
T4a	Tumour invading adjacent structures (pleura, pericardium, diaphragm)
T4b	Tumour invading adjacent structures (trachea, bone, aorta)
N0	No lymph node metastases
N1	Lymph node metastases in 1–2 nodes
N2	Lymph nodes metastases in 3–6 nodes
N3	Lymph node metastases in 7 or more lymph nodes
M0	No distant metastases
M1	All other distant metastases
Stage	1A: T1N0M0; 1B: T2N0M0; 2A: T3N0M0; 2B: T1/2N0M0; 3A: T4aN0M0, T3N1M0, T1/2N2M0; 3B: T3N2M0; 3C: T4aN1/2M0, T4bN0-3M0, T1-4N3M0; 4: T1-4N1-3M1



## *Palliative treatment*

Surgical resection and external beam radiotherapy may be used for palliation, but are not suitable when the expected survival is short, as most of the remainder of life will be spent recovering from the 'treatment'. Surgical bypass is likewise too major a procedure for use in a patient with limited life expectancy. A variety of relatively simple methods of palliation are now available that will produce worthwhile relief of dysphagia with minimal disturbance to the patient

- **Intubation expanding metal stent**
- **Endoscopic laser**
- **Brachytherapy is a method of delivering intraluminal radiation with a short penetration distance**