Investigation of the stomach and duodenum

Flexible endoscopy

Flexible endoscopy is now the ‘gold standard’.

Flexible endoscopy is more sensitive than conventional radiology in the assessment of the majority of gastroduodenal conditions. This is particularly the case with peptic ulceration, gastritis and duodenitis. In upper gastrointestinal bleeding endoscopy is far superior to any other investigation and in most circumstances is the only imaging required.

Careless and rough handling of the endoscope during intubation of a patient may result in perforations of the pharynx and oesophagus or any other part of the upper gastrointestinal tract may also be perforated. An inadequately performed endoscopy is also dangerous as a serious condition may be overlooked. This is particularly the case in respect of early and curable gastric cancer. In general, a more experienced endoscopist will have a higher index of suspicion for any mucosal abnormalities and will take more biopsies.

Upper gastrointestinal endoscopy is normally carried out under sedation usually with incremental doses of diazepam or midazolam until the patient is adequately sedated. Sedation is of particular concern in the case of gastrointestinal bleeding as it may have a more profound effect on the patient’s cardiovascular stability. It has now become the standard to use pulse oximetry to monitor patients during upper gastro-intestinal endoscopy, and nasal oxygen is often also administered. Opiates are not usually necessary, although they are commonly used for endoscopic retrograde cholangio-pancreatography (ERCP). Buscopan is useful to abolish duodenal motility for examinations of the second and third parts of the duodenum. Examinations of this type are best carried out using a side-viewing endoscope such as is used for ERCP

It is important that resuscitation facilities are available including agents that reverse the effects of benzodiazipenes, such as flumazenil.

Intervention via the endoscope is developing rapidly. A variety of haemostatic measures is used in the treatment of bleeding ulcers such as injection with various substances, diathermy, heater probes and lasers.

Contrast radiology

Upper gastrointestinal radiology is not used as much as in previous years as endoscopy is a more sensitive investigation for most gastric problems. There is, however, a number of circumstances where the barium meal is of great value and augments the value of endoscopy. These include large hiatus hernias of the rolling type and chronic gastric volvulus where it may be difficult

for the endoscopists to determine exactly the anatomy. Linitus plastica may be missed by even relatively experienced endoscopists as the mucosal aspect of the stomach may not look particularly abnormal. This condition may be diagnosed more easily by using contrast radiology.

Ultrasonography

- **Standard ultrasound imaging** can be used to investigate the stomach, particularly in patients with neoplasia. Thickening of the gastric wall can be seen in malignancy, some assessment made of local invasion, and liver and peritoneal disease is often detected.
- **Endoluminal ultrasound and laparoscopic ultrasound** are probably the most sensitive techniques available in the:

1) Preoperative staging of gastric cancer.
2) Five layers of the gastric wall may be identified on endoluminal ultrasound and the depth of invasion of a tumour can be assessed with 90 per cent accuracy for the 'T' component of the staging.
3) Enlarged lymph nodes can also be identified and the technique's accuracy in this situation is about 80 percent.
4) Laparoscopic ultrasound can identify liver metastases not seen on axial imaging.

(CT) scanning and MRI imaging

- The presence of gastric wall thickening associated with a carcinoma of any reasonable size can be easily detected by CT but the investigation lacks sensitivity in detecting smaller and curable lesions. It is much less accurate in 'T' staging than endoluminal ultrasound.
- Lymph node enlargement can be detected and, based on the size and shape of the nodes, it is possible to be reasonably accurate in detecting nodal involvement with tumour. However, as with all imaging techniques, it is limited. Microscopic tumour deposits in lymph nodes cannot be detected when the node is not enlarged and, by contrast, lymph nodes may undergo reactive enlargement but not contain tumour. These problems apply to all imaging techniques.
- The detection of small liver metastases is improving, although in general terms metastases from gastric cancer are less easy to detect using CT than those, for instance, from colorectal cancer. This is because metastases from gastric cancer may be of the same density as liver and may not handle the intravenous contrast any differently.
- **MRI** scanning does not at present offer any specific advantage in assessing the stomach, although it has a higher sensitivity for the detection of gastric cancer liver metastases than conventional CT imaging.

Laparoscopy

Its particular value is in the detection of peritoneal disease that is difficult by any other technique, unless the patient has ascites or bulky intraperitoneal disease. Its main limitation is in the evaluation of posterior extension but other techniques are available to evaluate posterior invasion, especially CT and endoluminal ultrasound. Usually laparoscopy is combined with peritoneal cytology unless laparotomy follows immediately.

Gastric emptying studies

These are useful in the study of gastric dysmótility problems, particularly those that follow gastric surgery. The principle of the examination is that radioisotope-labelled liquid and solid meals are ingested by the patient and the emptying of the stomach is followed on a gamma camera.

Tests of gastric acid secretion and of pH monitoring

Traditionally, basal and maximal acid output is measured. A nasogastric tube is passed into the stomach; the basal secretion collected over 1 hour and the acid output in millimoles calculated. To obtain the maximal acid output intramuscular injection of the gastrin analogue pentagastrin is given at a dose of 6 pg/kg body weight and the secretions are collected over one hour. The maximal acid output is calculated as the peak 15-minute collection multiplied by 4 or twice the peak 30-minute collection in two consecutive collections.

24-hour intragastric pH monitoring

The pH within the stomach is measured over a 24-hour period either by the passage of a nasogastric tube and regular aspiration or by placing a radiotelemetry capsule on a tether within the stomach and monitoring the pH with an externally worn aerial.

Measurement of plasma gastrin

The measurement of plasma gastrin by radioimmunoassay is of use in the diagnosis of gastrinoma (Zollinger—Ellison syndrome). In most assays the normal fasting gastrin level is about 50 ng/litre, but in gastrinomas very high levels, sometimes many thousands of ng/litre, can be found. However, the other common cause of hypergastrinaemia is hypochlorhydria associated with gastric atrophy and very high gastrin levels are found in pernicious anaemia. Antral gastrin is released to excess as a result of the negative feedback loop.

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