A barium meal examination includes a study of the oesophagus, stomach and duodenum. A routine examination is a double contrast study; a positive contrast (barium) is used in addition to gas-producing agents to distend the viscus. The patient is fasted for 6-8 hours prior to the examination. Essential drugs can usually be taken, but advice should be sought from the Radiologist. Sometimes a single contrast examination (dilute barium only) is used in patients with suspected gastric or duodenal obstruction or in very immobile patients. Barium is contra-indicated if there is a known or suspected perforation. In such cases, either a water-soluble iodinated contrast such as Gastrograffin, or a non-ionic agent is used. Gastrografin is very hyperosmolar and may cause pulmonary oedema if aspirated into the airways. If there is a perceived risk of aspiration, non-ionic contrast is used.

A barium swallow is an examination that focuses on the oesophagus. This tends, nowadays, to be a multiphasic examination with double and single contrast views. The study is usually tailored to the patient's symptoms and a good history is essential. Attention is paid during the examination to morphological abnormalities of the hypopharynx and oesophagus, evidence of gastro-oesophageal reflux and swallowing function - the hypopharyngeal phase and oesophageal motility. Solid boluses (e.g. bread, marshmallows) can be given to assess motility. The examination can be recorded on conventional film, rapid-sequence camera film or video (i.e. video-fluoroscopy).

A videofluoroscopic study of swallowing can be performed on patients with neuromuscular problems of deglutition and hypopharyngeal function. This examination is often performed in the company of a speech pathologist. Various consistencies of bolus can be tested using thin liquids, purees and solids. The study aids in both diagnosis and management of patients with these problems.

The small bowel is examined by a 'dedicated' small bowel barium study rather than a 'follow-through' after a barium meal. Radiologists will vary as to whether this is performed by giving the patient a large volume of dilute barium to drink or by a small bowel enema (intubated small bowel study or enteroclysis). Although more accurate for some pathology, the latter examination requires intubation of the jejunum. Unless contraindicated, some form of purgation is given prior to small bowel studies to clear the right side of the colon. Increasingly, small bowel barium studies are being replaced by dedicated CT (or less commonly, MRI) studies of the small intestine.

Most examinations of the large bowel are 'double-contrast' barium enemas (DCBE). Single contrast examinations may be performed on very elderly, immobile patients or on patients with unprepared bowel to determine the presence and site of obstruction. In the presence of a known or suspected perforation a water-soluble contrast agent is used instead of barium. For an accurate DCBE, thorough colon cleansing is imperative. A variety of cleansing regimes are in use. A barium enema should not be performed within 6 days of a prior rigid sigmoidoscopic biopsy or a polypectomy. However, following a superficial biopsy (ie through a flexible sigmoidoscope or colonoscope) a barium enema can be undertaken immediately. CT colonography ('virtual colonoscopy') is gradually replacing DCBE in the radiological investigation of colorectal neoplasms.

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