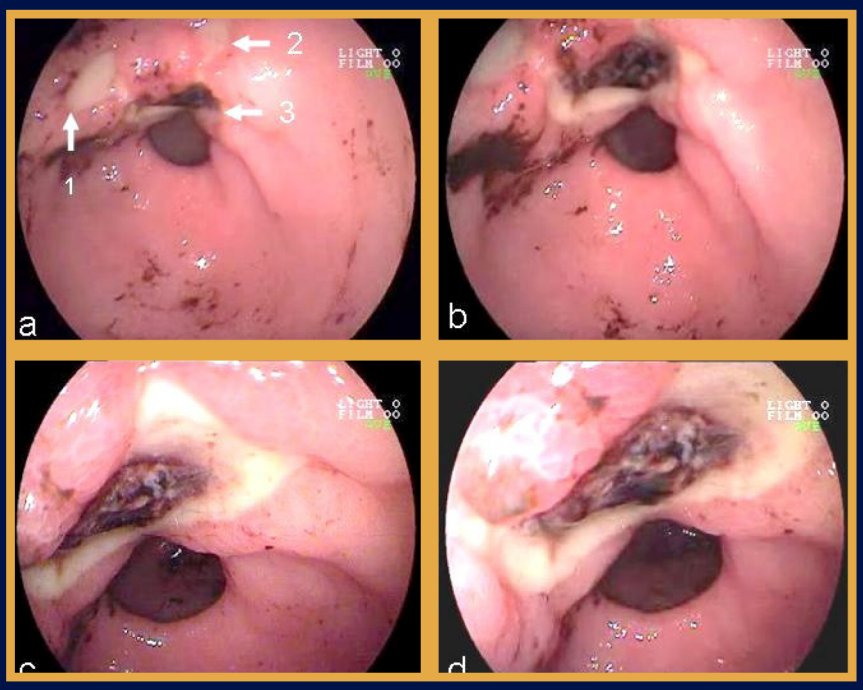
Atlas of Diagnostic Endoscopy

Third edition

Mohammad Ibrarullah



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List of abbreviations

ACG	American College of Gastroenterology
AGA	American Gastroenterological Association
ASGE	American Society for Gastrointestinal Endoscopy
CMV	Cytomegalovirus
CT	Computed tomography
D1	1st part of duodenum
D2	2nd part of duodenum
EVL	Endoscopic variceal band ligation
FB	Foreign body
GAVE	Gastric antral vascular ectasia
GI	Gastrointestinal
GE	Gastroesophageal
GERD	Gastroesophageal reflux disease
GIST	Gastrointestinal stromal tumor
GJ	Gastrojejunostomy
GOV	Gastroesophageal varix
HIV	Human immunodeficiency virus
HPF	High-power field
HSV	Herpes simplex virus
IGV	Isolated gastric varix
LES	Lower esophageal sphincter
LPF	Left pyriform fossa
NET	Neuroendocrine tumor
NSAID	Nonsteroidal anti-inflammatory drug
PEG	Percutaneous endoscopic gastrostomy
PHG	Portal hypertensive gastropathy
RPF	Right pyriform fossa
TEF	Tracheoesophageal fistula
UGI	Upper gastrointestinal

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Preface

Each passing year has seen tremendous advances in the field of both diagnostic and therapeutic endoscopy. While preparing the current edition of the atlas, I also felt tempted to add a few chapters on recent advances such as fluorescent endoscopy, magnification endoscopy, etc. However, on second thought I decided to restrict myself to basic endoscopy since my target readers, as I mentioned in the first edition of the atlas, are the "young doctors who wish to get initiated and practice endoscopy." The aim of this atlas is to provide them a strong foundation by familiarizing them with the basic concepts of endoscopy and aiding in correct interpretation of the pathology. Notwithstanding the number of similar atlases available online, it is always quick and easy to refer to a printed copy that is lying in the endoscopist's consultation chamber. Needless to say, printed images provide a longer-lasting impression as compared with those seen on the computer screen. Effort has been made to replace some poor quality and repetitive images of the previous edition with new ones, giving a fresh look to the current edition of the atlas. I sincerely hope that the atlas, in its current form, will find wide acceptance amongst endoscopy practitioners.

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1

Techniques of UGI endoscopy and normal anatomy

Preparation for endoscopy

Informed consent and counseling: The patient should be clearly informed about the procedure and the likely discomfort he may experience. It should be explained that his cooperation will make the procedure easier and quicker.

Overnight fasting: Routine endoscopy is usually performed in the morning hours after overnight fasting. Coating agents like antacids or colored medications should be clearly withheld. In case of obstructed stomach, prior nasogastric intubation and lavage should be performed to clear the gastric residue.

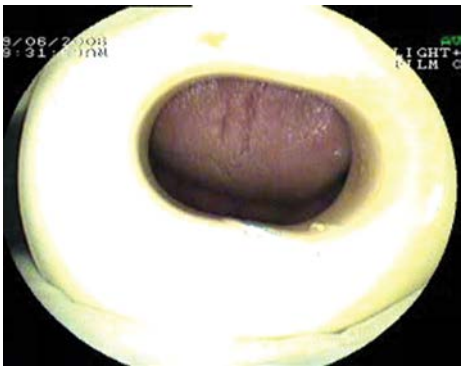
Sedation and anesthesia: For routine UGI endoscopy, we use only topical pharyngeal anesthetics such as lignocaine viscous or spray. Sedation, in the form of intravenous Midazolam, is occasionally used in children. For therapeutic endoscopy, such as foreign body removal, stent placement etc., it is our practice to use intravenous propofol anesthesia with or without endotracheal intubation.

Endotracheal intubation and monitoring: Endoscopy in a comatose or irritable patient is fraught with the risk of aspiration, hypoxia and "bite" damage to the endoscope. It is our practice to use prior endotracheal intubation and also monitor the vital parameters during the procedure.

Instrument check: Prior to endoscopy, it is good practice to check the instrument, including the light source, suction channel, airflow and display panel for any malfunction.

Position of the patient: Diagnostic endoscopy is always performed in the left lateral position. Occasionally, in a patient with upper GI bleeding, it may be necessary to examine the patient in the right lateral position. This is to displace the fundal blood pool that may obscure the bleeding lesion.

Antibiotic prophylaxis: Antibiotic prophylaxis is not indicated for diagnostic endoscopy. Current recommendations by the American Society for Gastrointestinal Endoscopy (ASGE) exclude even conditions such as valvular heart disease, prosthetic valves, synthetic vascular graft and prosthetic joints from the ambit of antibiotic prophylaxis. The few indications for antibiotic prophylaxis are therapeutic endoscopy for cirrhosis with acute variceal bleeding, cyst drainage and in patients with established GI tract infection who have the above listed cardiovascular status.



The mouth guard is held between the teeth. It is further supported by the index and middle finger of the endoscopy assistant. Alternatively, an elastic band attached to the mouth guard can be used to keep it steady.

Figure 1.1 The mouth guard.

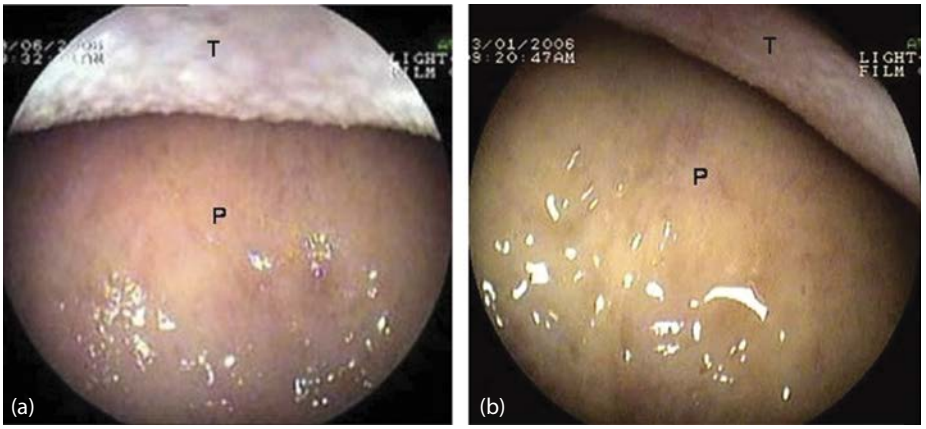


Figure 1.2 View as the endoscope enters the oral cavity. **(a, b)** Dorsum of the tongue (T) and hard palate (P).

The tip of the endoscope is slightly bent to fit the contour of the tongue. It is gently advanced over the base of the tongue towards the pharynx.

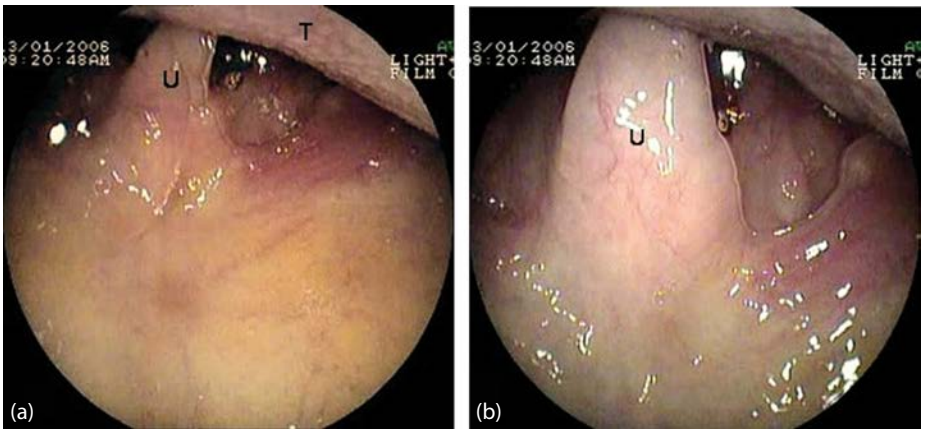


Figure 1.3 **(a, b)** Uvula (U) and the base of the tongue (T).

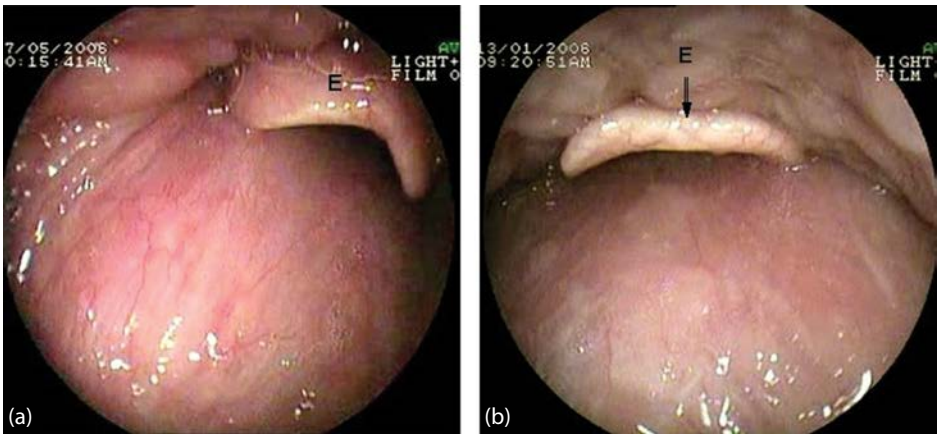


Figure 1.4 **(a, b)** Epiglottis (E).

The epiglottis (E) is seen as the pharynx is entered.

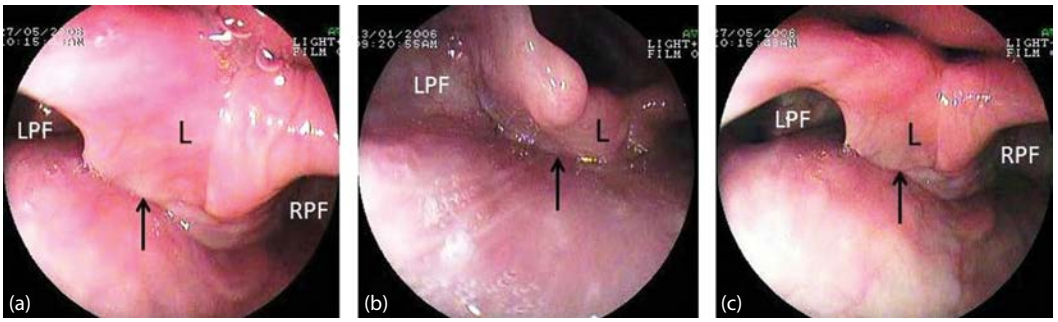


Figure 1.5 **(a–c)** The laryngo-pharynx. Larynx (L) and both pyriform fossae (RPF, LPF). The arrow points to the esophageal inlet.

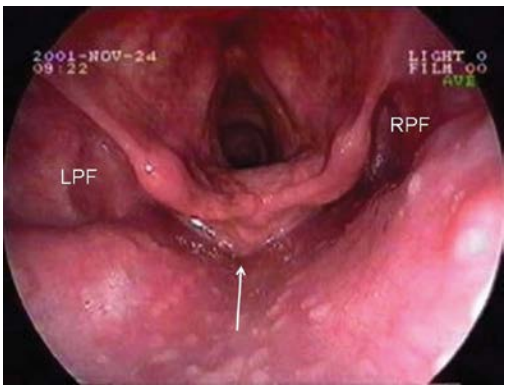


Figure 1.6 Larynx, right and left pyriform fossae (RPF & LPF, respectively) and the esophageal inlet (arrow).

As the scope passes below the epiglottis, the larynx and both pyriform fossae come into view. The scope is kept in the midline at the esophageal inlet (arrow in Figures 1.5 & 1.6) and the patient is asked to take swallows. No undue force should be applied at this stage. Entry into the esophagus should be a voluntary effort supplemented by a gentle push by the endoscopist.

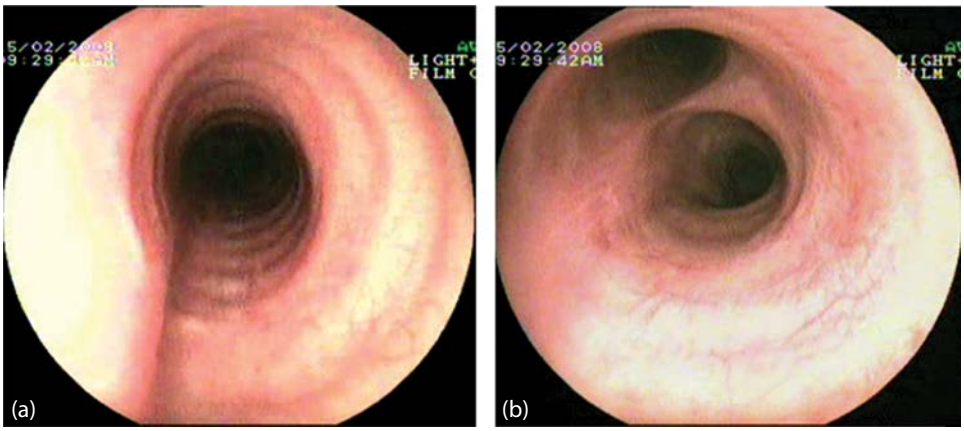


Figure 1.7 **(a)** Concentric rings of trachea. **(b)** Tracheal bifurcation.

While negotiating the esophageal inlet, such an appearance indicates passage of the endoscope into the trachea. The patient becomes restless and starts coughing violently. Withdraw the endoscope at once. Reassure the patient and retry entering the esophagus after a while.

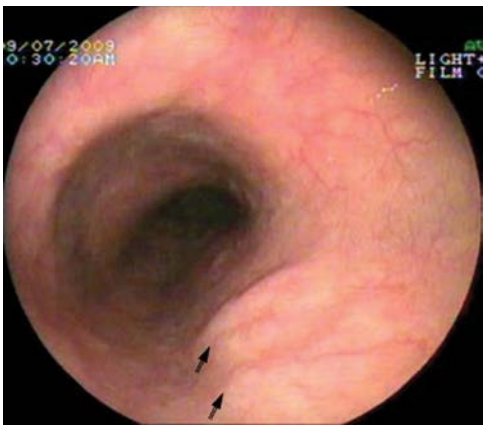


Figure 1.8 Tracheal impression (arrows) in the proximal esophagus.

Esophageal mucosa is essentially featureless. The tracheal impression can be seen in the proximal esophagus. Aortic impression and pulsation can be observed in the mid-esophagus.

Figure 1.9 Mid-esophagus.

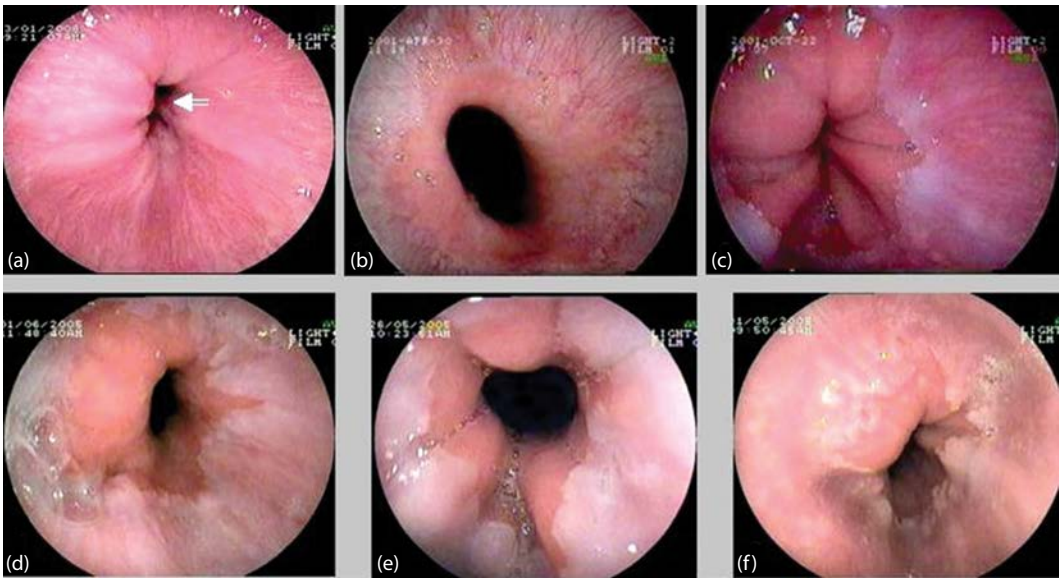


Figure 1.10 **(a–f)** Z line: The squamocolumnar (gastroesophageal) junction.

Z line represents the junction of pale squamous epithelium of the esophagus with the pink columnar epithelium of the stomach. This also marks the most proximal extent of the gastric folds. The junction may not be quite apparent when it lies at the level of diaphragmatic indentation (arrow in Figure 1.10a). In most cases, however, the junction can be made out clearly.

Figure 1.11 Gastric body.

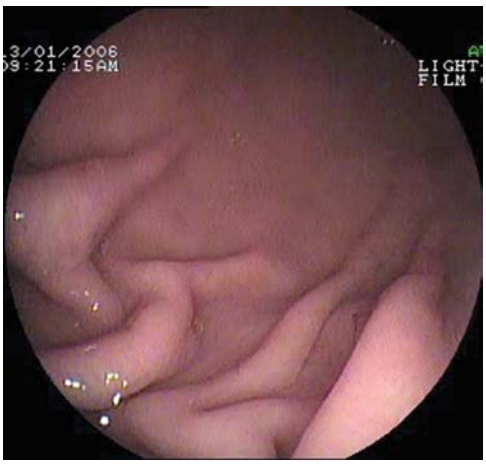


Figure 1.12 Junction of gastric body and antrum.

After crossing the GE junction, the tip of the endoscope is slightly angled up and to the right. As the stomach is inflated, a tunnel (Figure 1.11) becomes apparent. The roof and the base of the tunnel represent the lesser and greater curvatures, respectively. The endoscope is maintained close to the lesser curvature and gradually pushed forward. The mucosal rugosity in the gastric body turns flat marking the beginning of the antrum.

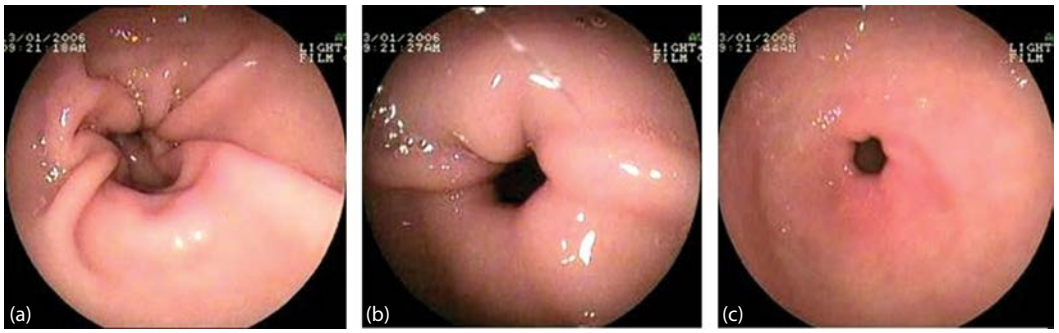
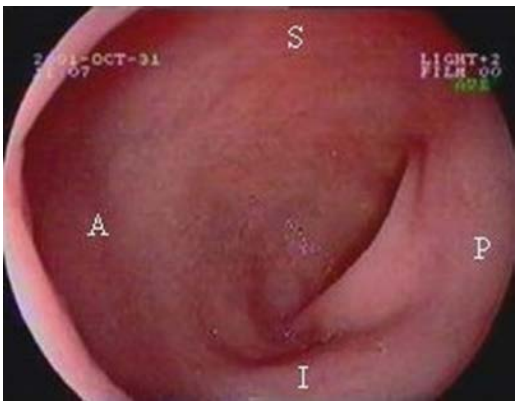


Figure 1.13 Pylorus. **(a)** Mucosal folds converging on the pylorus. **(b)** Mucosal folds around the pylorus partially flattened out. **(c)** Antral mucosa completely flattened out revealing the circular pylorus.

After inspecting the antrum, the endoscope is directed towards the pylorus. It is a common practice to cross the pylorus, examine D1, D2 and then come back to the antrum and complete examination of the remaining stomach. Crossing the pylorus is usually a frustrating experience for the beginner. In our practice, we advise the trainee endoscopist to use intravenous hyoscine bromide (Buscopan) to knock down gastric peristalsis, keep the pylorus in the center of vision, wait for the ring to open and then attempt to negotiate it. However, after a few endoscopies (usually 8–10), it ceases to be an issue and the endoscopist can cross the pylorus without much difficulty.



All the four walls of D1 are better visualized when the tip of the endoscope is placed at the pyloric ring (transpyloric view). Normally, the D1 mucosa is featureless.

Figure 1.14 Transpyloric view of the duodenal bulb (D1). The anterior wall (A), posterior wall (P), superior wall (S) and inferior wall (I).

Figure 1.15 **(a–c)** Duodenal bulb.

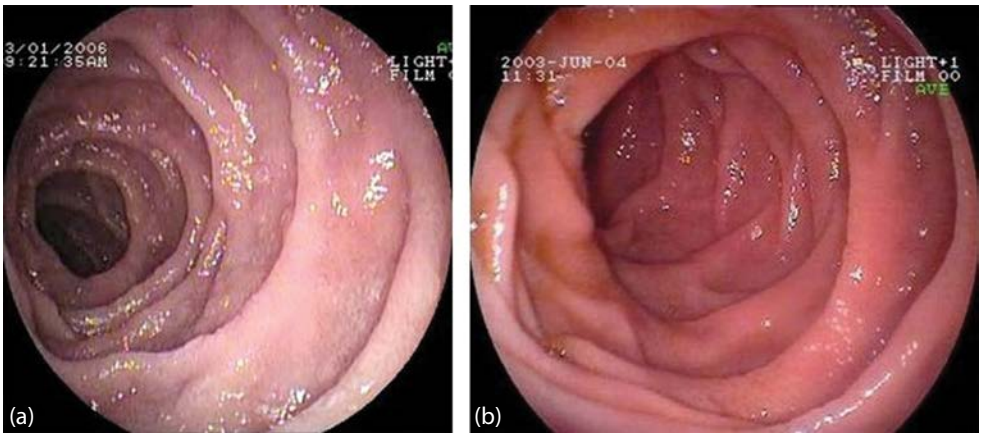


Figure 1.16 **(a, b)** The second part of the duodenum (D2) is marked by the circular mucosal folds.

The tip of the endoscope is impacted at the apex of D1 and rotated up and right. This maneuver facilitates entry into D2. As the endoscope is withdrawn slightly, its tip slips further down into D3. The ampulla of Vater can be seen on the medial wall of D2. This is the distal extent of examination for routine UGI endoscopy.

Figure 1.17 **(a–c)** Ampulla of Vater (arrow) seen on the medial wall of D2.

The endoscope is now gradually withdrawn, carefully examining all four walls of D2. The junction of D1-D2 is better inspected at this stage as the tip of the endoscope has a tendency to slip down during forward examination.

Figure 1.18 Junction of D1 and D2.

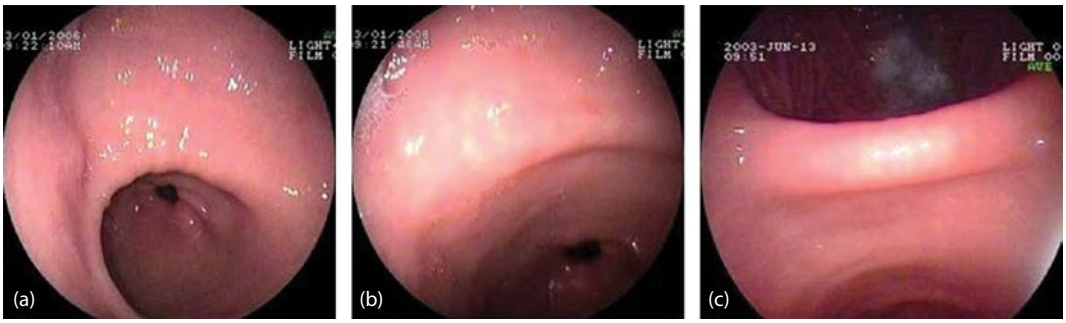


Figure 1.19 **(a, b)** Antrum and pylorus. **(c)** Incisura angularis.

The endoscope is withdrawn into the antrum for examination of the remaining part of stomach. The tip of the endoscope is flexed up, bringing into view the incisura angularis. In this position, the endoscope is gradually withdrawn maintaining constant insufflation and slight rotation to the left. By this retroflexion, or "J" maneuver, the entire lesser curvature can be inspected as the fundus is approached.

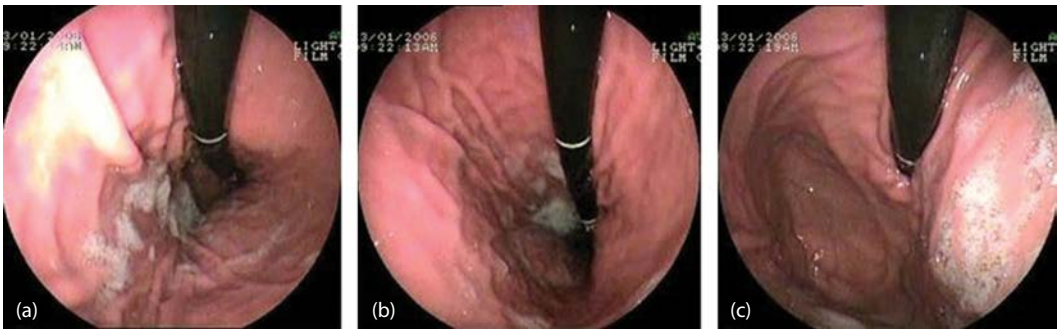


Figure 1.20 **(a–c)** The gastric fundus, as it appears during retroflexion ("J" maneuver).

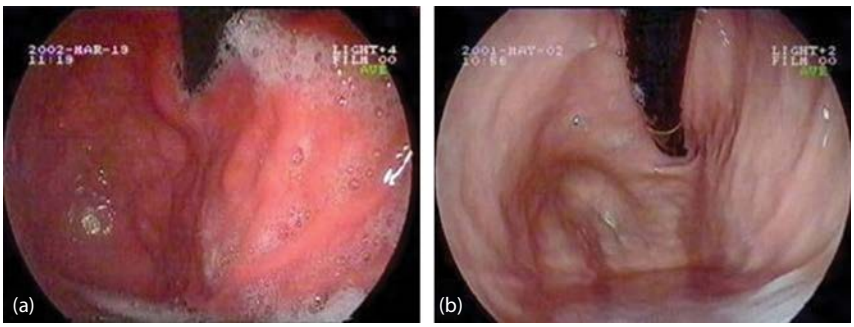


Figure 1.21 **(a, b)** The gastric fundus and the GE junction.

Fluid tends to accumulate in the fundus as this is the most dependent part of the stomach during endoscopy. This "fundic pool" needs to be sucked out to have a clear view of the mucosa. The GE junction can be inspected from a close proximity by withdrawing and rotating the endoscope further. Normally, the GE junction should appear snug around the shaft of the endoscope. This completes the examination of the upper GI tract. The tip of the endoscope is rotated to the normal position, air in the stomach is sucked out and the instrument is withdrawn.

2

Esophageal webs, rings and strictures

Webs and rings commonly present with dysphagia. Their appearance ranges from a thin, fibrous membrane partially occluding the lumen, to well-formed, concentric, fleshy rings having all three layers (i.e., mucosa, submucosa and muscles).

ETIOLOGY

- Congenital
- Iron-deficiency anemia (Plummer–Vinson syndrome, Paterson–Kelly syndrome)
- Eosinophilic gastroenteritis
- GERD
- Tropical sprue
- Autoimmune disorders
- Idiopathic

Diagnosis of postcricoid webs/strictures may be technically difficult as these are obscured by the cricopharyngeus. In such a situation, failure to intubate beyond the cricopharyngeus is often attributed by an inexperienced endoscopist to his own inefficiency or an uncooperative patient. When suspected, the tip of the endoscope should be placed at the esophageal inlet and the patient is asked to take swallows. The obstruction will be apparent when the cricopharyngeus opens transiently during deglutition.

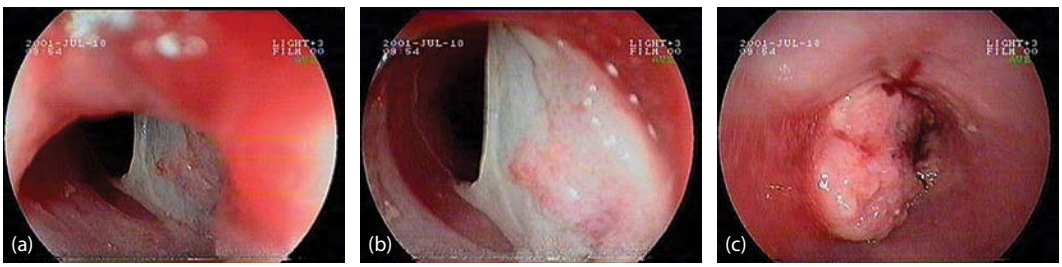


Figure 2.1 **(a, b)** Postcricoid web. The membrane occluding nearly two-thirds of the lumen was evident just below the cricopharyngeal sphincter. The patient presented with anemia and worsening of long-standing dysphagia. This could be explained as the endoscope was advanced further. **(c)** Squamous cell carcinoma in the distal esophagus in the same patient.

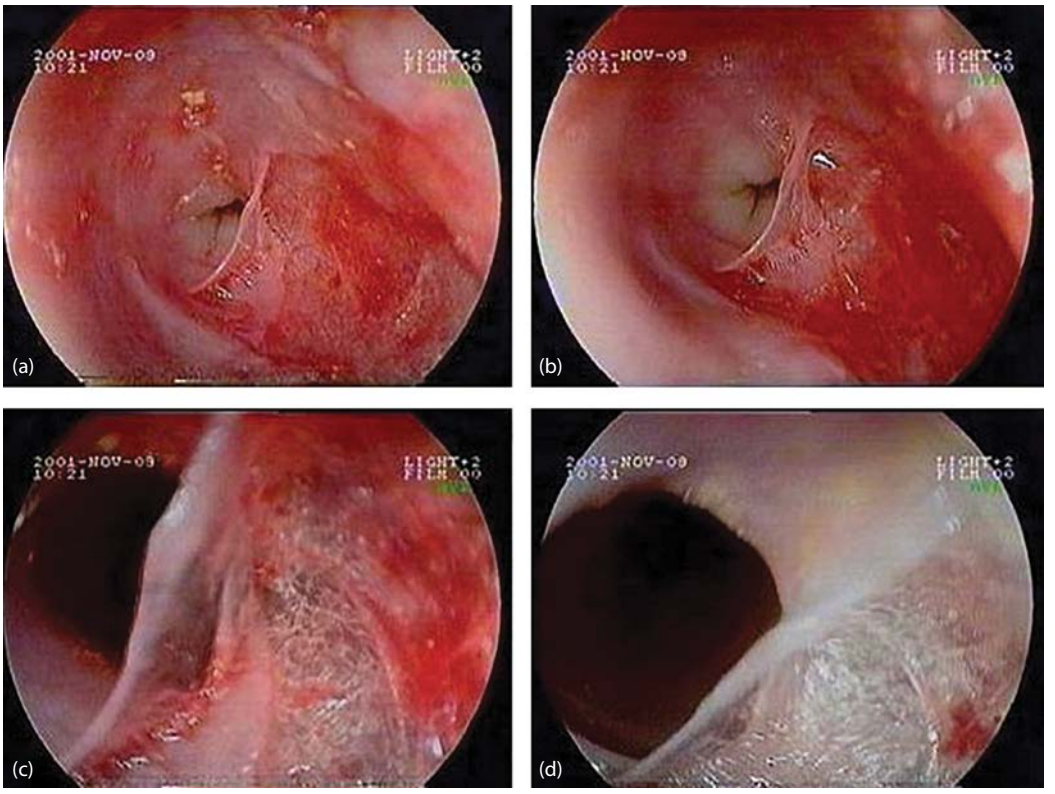


Figure 2.2 **(a–d)** Postcricoid web. A thin, semitransparent membrane below the cricopharyngeal sphincter. The membrane could be ruptured by gentle pushing with the tip of the endoscope.

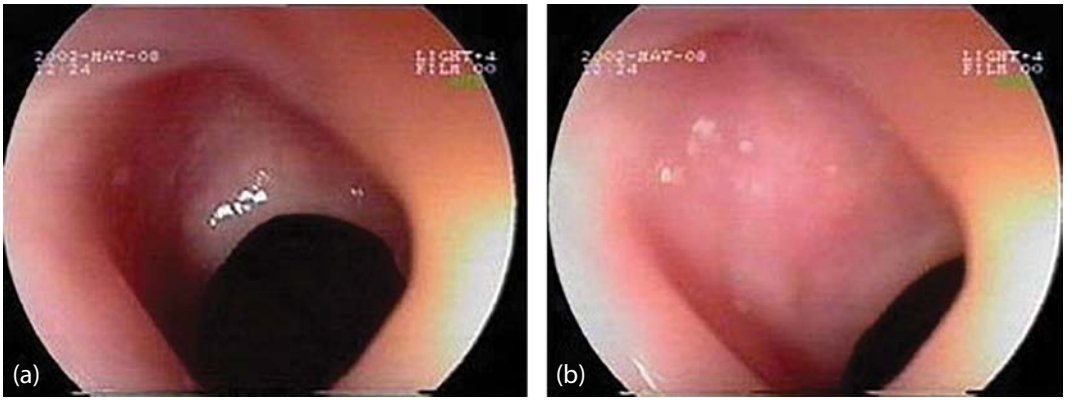


Figure 2.3 **(a, b)** Postcricoid web. A fleshy, concentric ring just below the cricopharyngeal sphincter in an elderly woman who presented with anemia and mild dysphagia.

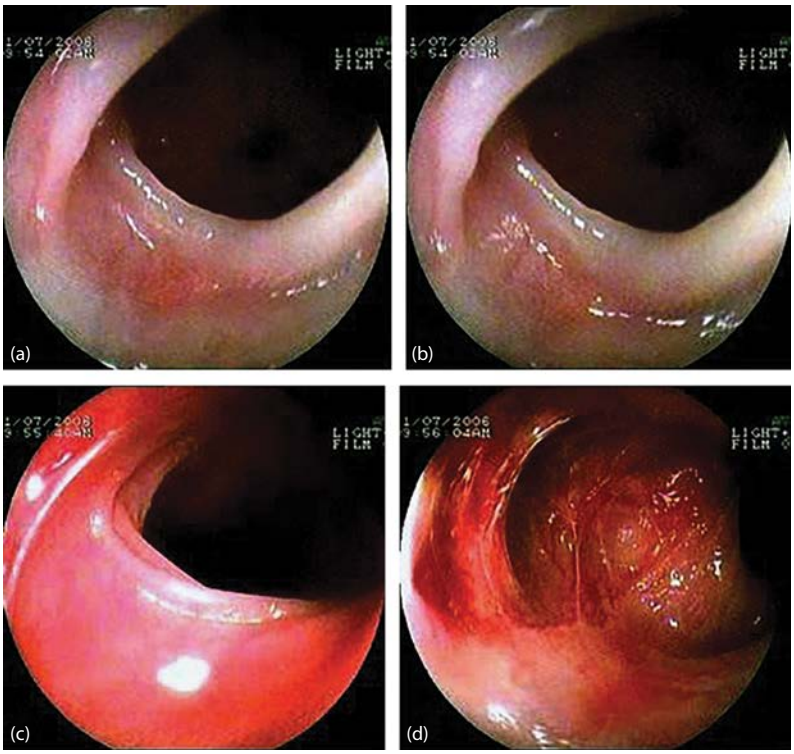


Figure 2.4 **(a–c)** Postcricoid rings. Multiple semicircular rings just below the cricopharyngeal sphincter in a middle-aged man who presented with dysphagia. **(d)** Mucosal tear following dilatation of the segment.

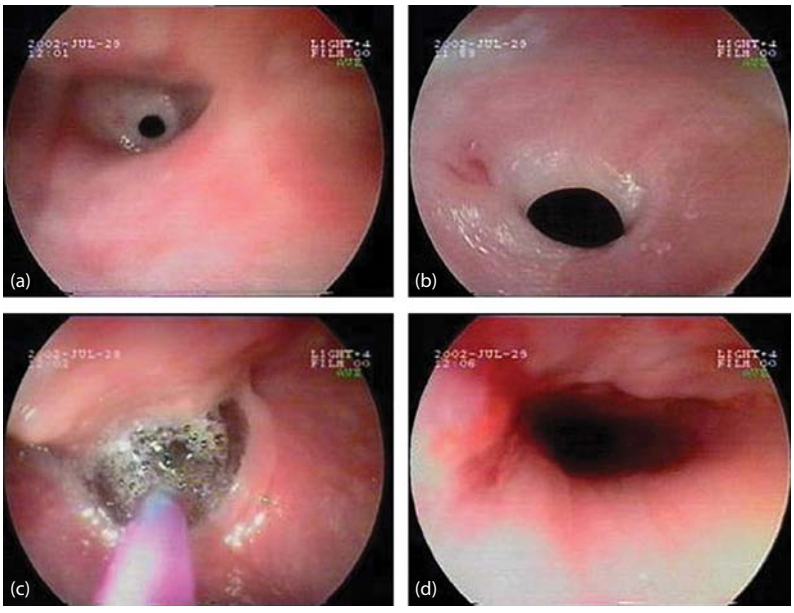


Figure 2.5 **(a, b)** Postcricoid ring. A fleshy, concentric ring just below the cricopharyngeal sphincter in a middle-aged woman who presented with mild dysphagia. **(c, d)** The ring was dilated with an endoscopic balloon.

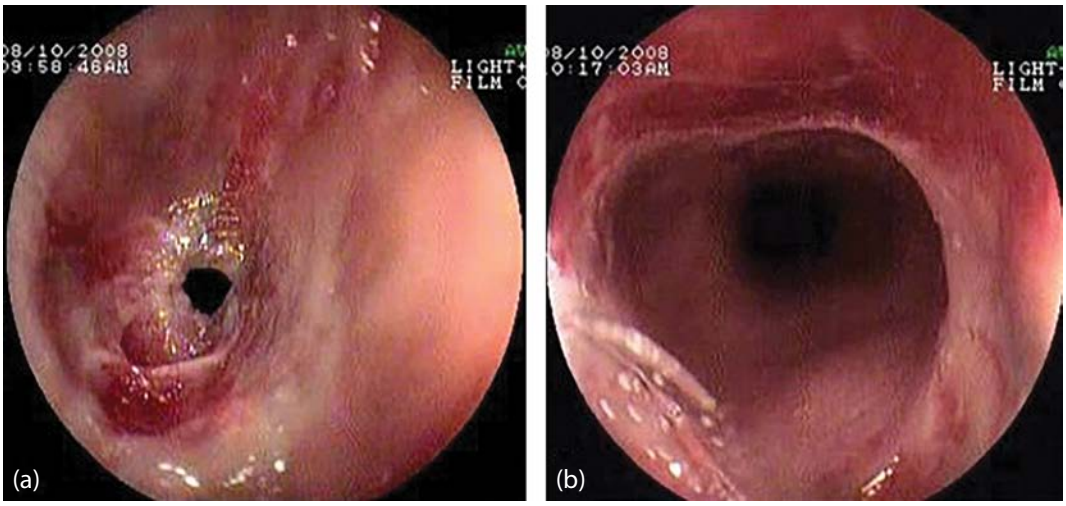


Figure 2.6 **(a)** Postcricoid membranous stricture in a middle-aged woman who presented with long-standing dysphagia. **(b)** The affected segment after dilatation.

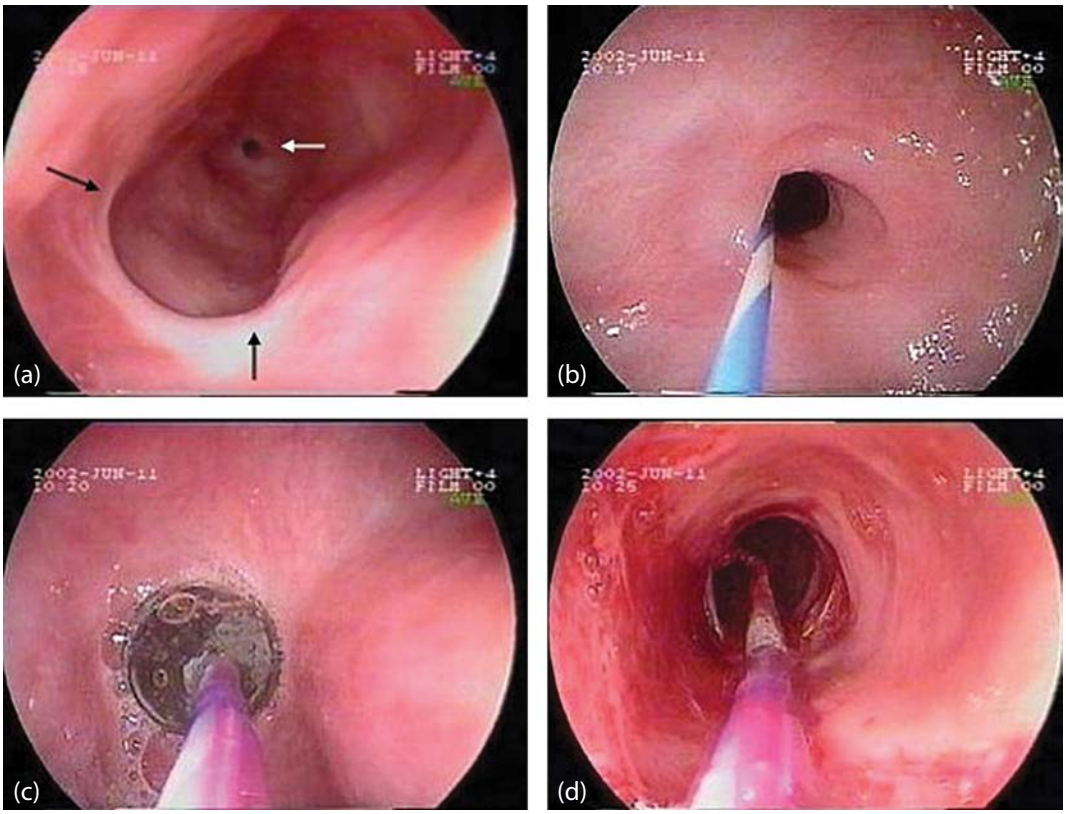


Figure 2.7 **(a)** Benign stricture in a young woman. Note the proximal one (black arrows) in the mid-esophagus is wider and passable; the distal one (white arrow) is tighter. **(b)** A guidewire across the distal stricture. **(c)** The distal stricture is being dilated with a balloon. **(d)** The same after dilatation.

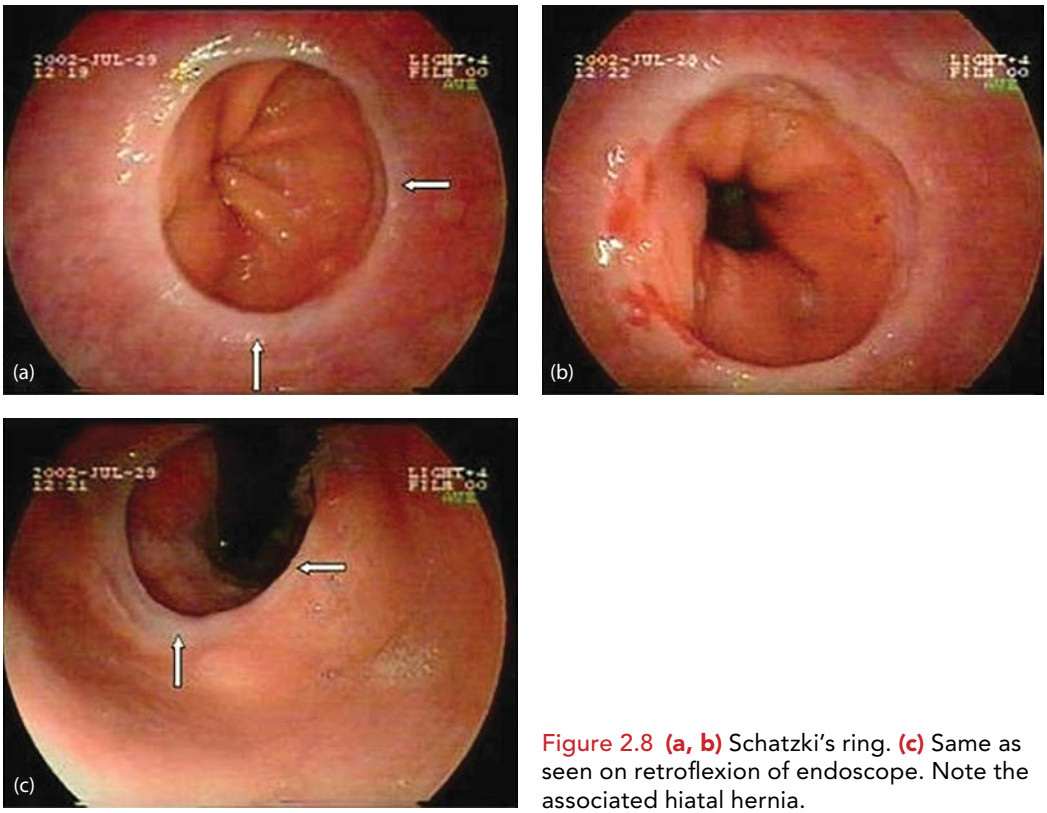


Figure 2.8 **(a, b)** Schatzki's ring. **(c)** Same as seen on retroflexion of endoscope. Note the associated hiatal hernia.

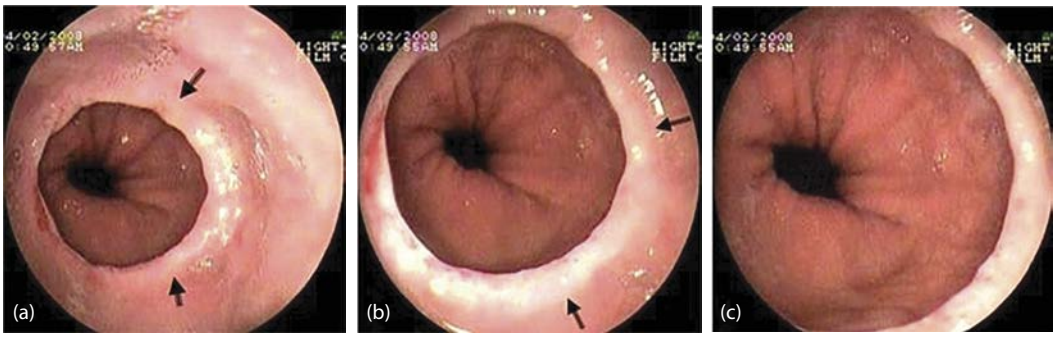


Figure 2.9 **(a–c)** Schatzki's ring (arrows) with sliding hiatal hernia.

Schatzki's ring is a well-demarcated circumferential stricture located at the squamocolumnar junction comprising mucosa and submucosa. This ring is more often an incidental finding, and hiatal hernia is a universal accompaniment. Dysphagia, if present (when the ring is critically narrowed), responds well to dilatation.

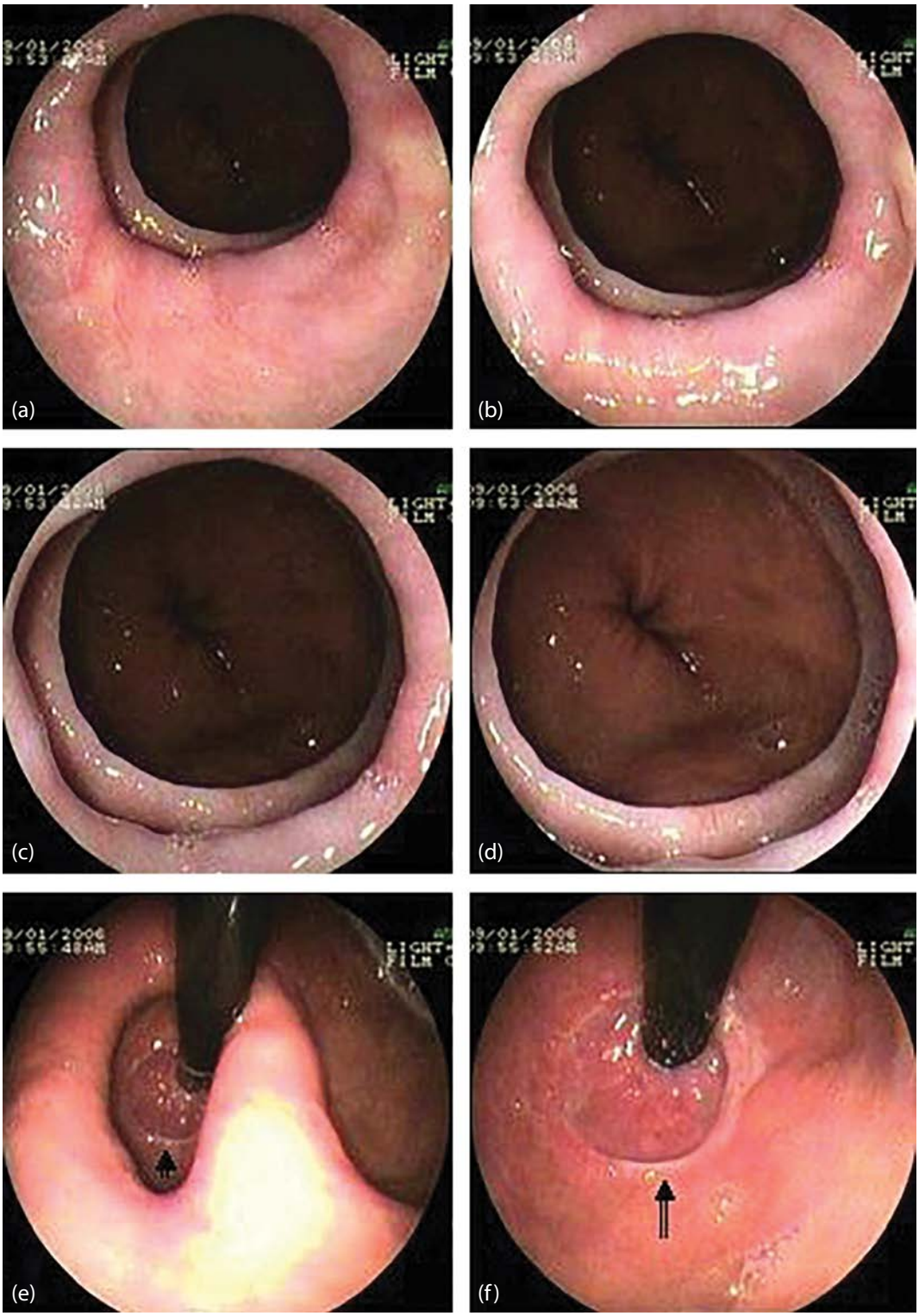


Figure 2.10 **(a–d)** Schatzki's ring at various stages of its appearance during endoscopy. **(e, f)** The ring (arrow) inside the hiatal sac as seen on retroflexion.

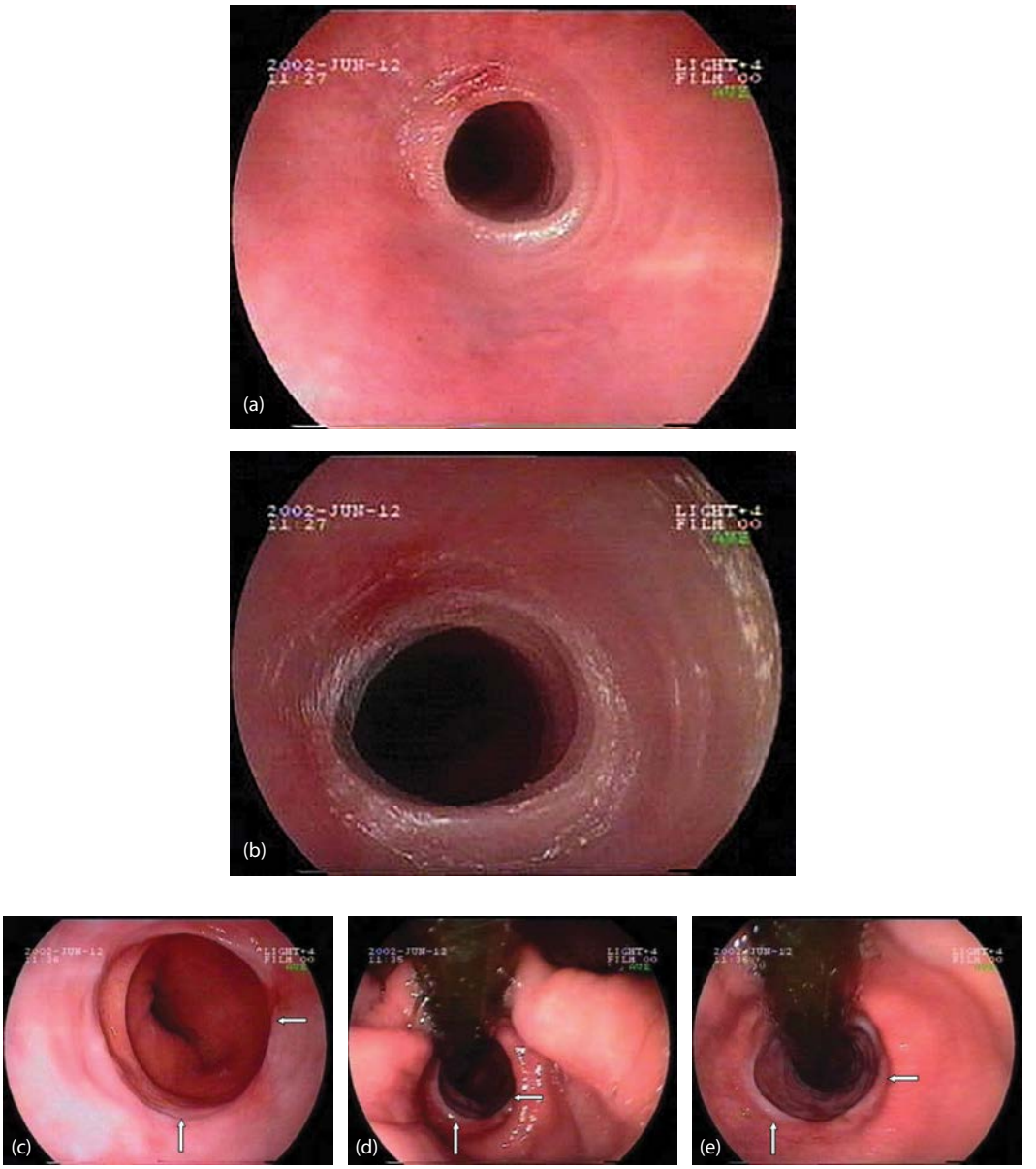


Figure 2.11 Postcricoid ring and Schatzki's ring. **(a)** Postcricoid ring in an elderly woman presenting with mild dysphagia. **(b)** Close-up view of the same. **(c)** Schatzki's ring (arrow) with hiatal hernia in the same patient. **(d)** The ring (arrow) as seen through the hiatal sac on retroflexion of the endoscope. **(e)** Close-up view of the same.

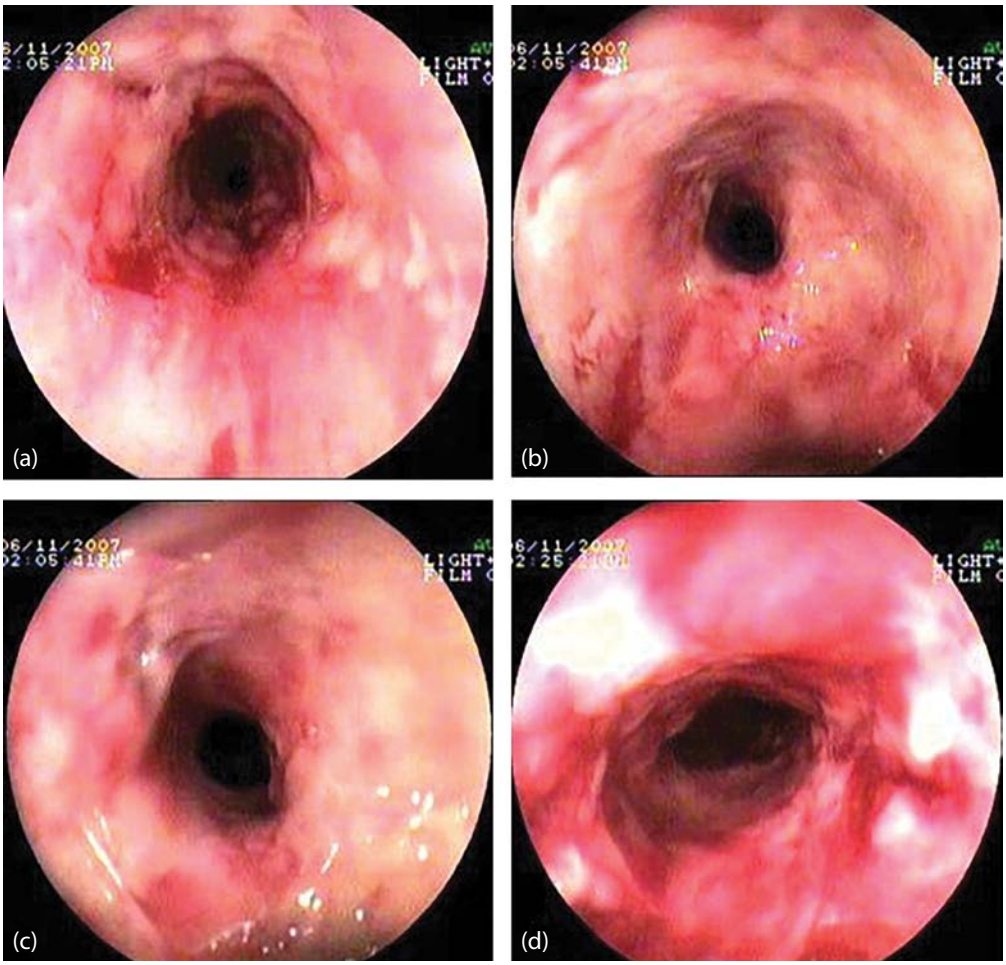


Figure 2.12 **(a–c)** Post-radiotherapy esophageal stricture in a patient with mid 1/3 squamous cell carcinoma. **(d)** Same after dilatation.

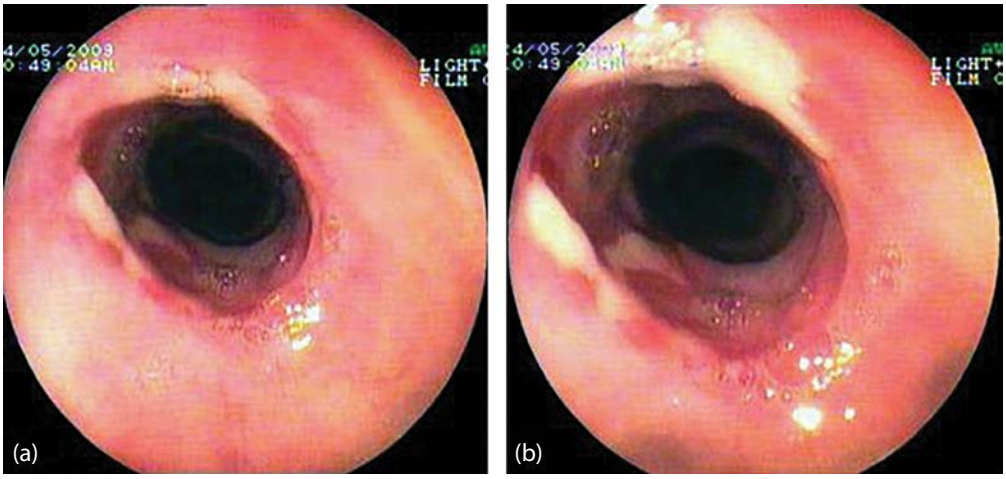


Figure 2.13 **(a, b)** Post-radiotherapy stricture in the mid-esophagus.

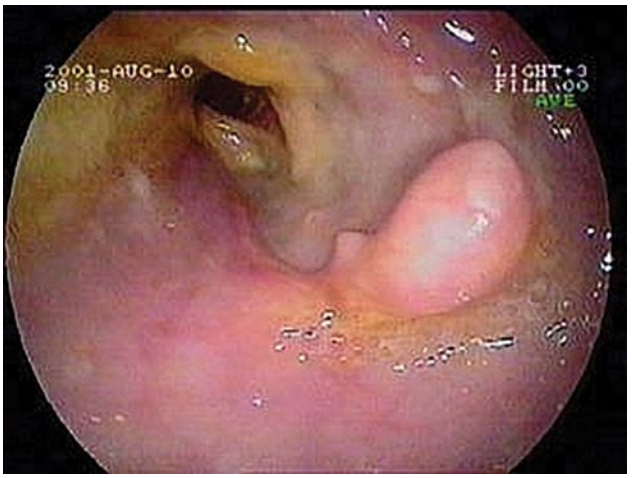


Figure 2.14 Post-sclerotherapy stricture at the lower end of esophagus. Esophageal varices were treated with intra- and paravariceal alcohol injection. Obliterated varix appear as mucosal tag.

Alcohol, in comparison with other sclerosants, has been associated with a higher incidence of stricture formation.

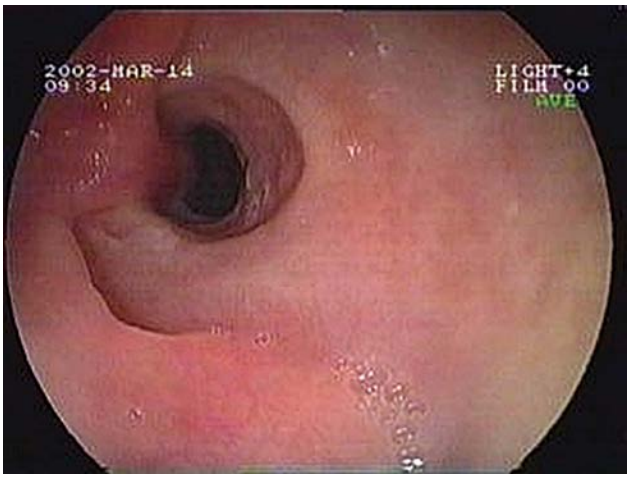


Figure 2.15 Post-sclerotherapy stricture at the lower end of esophagus.

Esophageal strictures following corrosive injury and peptic esophagitis have been presented elsewhere.

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