1 Introduction to Endoscopy

1 Introduction to Gastrointestinal Endoscopy in the Cancer Patient

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Key points

- Gastrointestinal endoscopy is important in the diagnosis and management of gastrointestinal and some non-gastrointestinal cancers.
- There are many types of gastrointestinal endoscopes and many devices to assist in taking biopsies, performing resections, and palliating bleeding or obstruction.

Over the last decade, endoscopy has vastly improved the diagnosis, staging, and treatment of patients with cancer affecting the gastrointestinal tract. The complexity and range of procedures now available to manage these patients has led to the development of endoscopists with expertise covering specific conditions such as hepatobiliary or esophagogastric cancers. It is of great importance to ensure that patients receive the best care. In order to achieve this, it is important to ensure that the multidisciplinary team managing patients, with not only gastrointestinal cancers, but other malignancies as well, is fully informed of all available endoscopic procedures. This book demonstrates the current endoscopic procedures available in order to manage patients with malignant and premalignant conditions of the gastrontestinal tract. It will hopefully be of benefit to endoscopists, oncologists, gastroenterologists, and surgeons, as well as all those involved in cancer patient care, both as an informative read and as a reference guide.

The current practice of gastrointestinal endoscopy generally involves placing a flexible tube with a light source, video-chip capture, and a working channel within a luminal structure of the gastrointestinal tract (Figures 1.1, 1.2, and 1.3). The image lens can be in the front, on the side perpendicular to the long axis, or in an oblique orientation of the endoscope (Figures 1.3a–1.3c).

Figure 1.1 A cabinet of endoscopes.

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Figure 1.2 A radial array endoscope just before use.

Fiber optic endoscopy was first described by Hirschowitz *et al*. in 1957 (1). There have been many improvements in image quality since that report, and the resolution of the images obtained has been revolutionized by megapixel charged coupled devices (video-chip) and 1080p high-definition screens. This has enabled the endoscopist to visualize the mucosal architecture and vasculature in detail not imagined by the earlier investigators. Endoscopes that use different wavelengths of light or various computer-generated modifications have been developed, as seen with selected light wavelengths such as narrow band imaging (Figure 1.4) or various computer enhancements such as iScan and magnification (Figure 1.5). Further detail can be achieved with confocal laser endomicroscopy which utilizes blue laser light focused on a single horizontal level. Magnification on special instruments can be generated to 1000-fold, resulting in images at the cellular level mimicking histopathological sections. One can now appreciate changes suggesting early epithelial neoplasia.

Endoscopes with ultrasound probes in the tip have been developed (Figures 1.3c and 1.6a and 1.6b) which allow visualization through the intestinal wall. Ultrasound images can be created perpendicular to or parallel to the endoscope, and needles can be placed into lesions under endoscopic guidance (Figures 1.7a and 1.7b).

Gastrointestinal endoscopes are from 5 to 13 mm in diameter, and generally 100 to 180 cm in length. Some specialized endoscopes are shorter (such as the 60 cm endobronchial

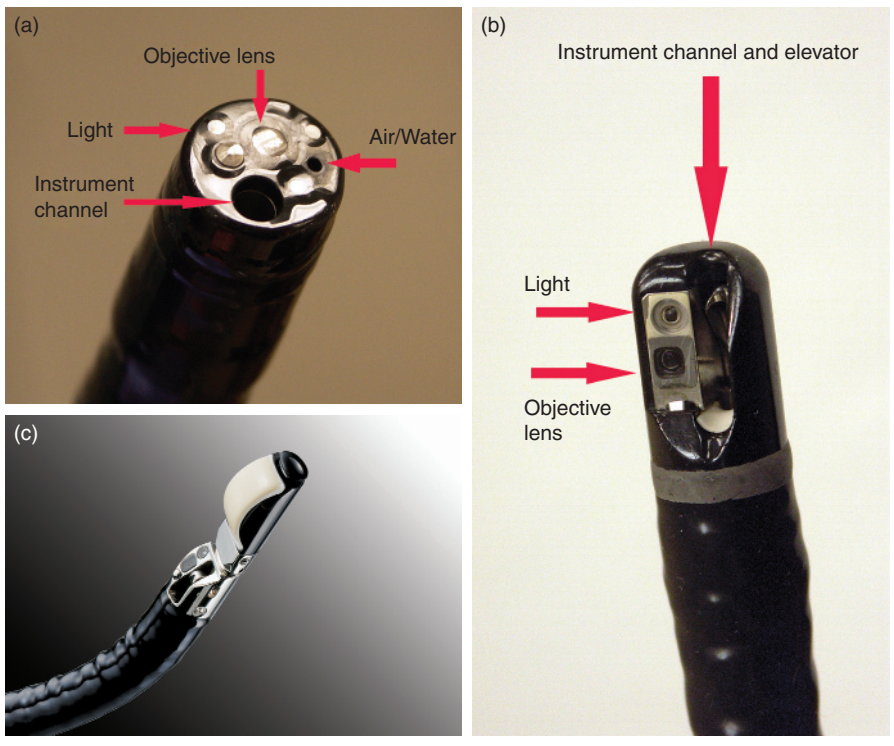

Figure 1.3 (a) The tip of a colonoscope with forward viewing optics. (b) The tip of a duodenoscope with side viewing optics. (c) The tip of a linear array echoendoscope. (Reproduced and used with permission from Pentax Medical Company.)

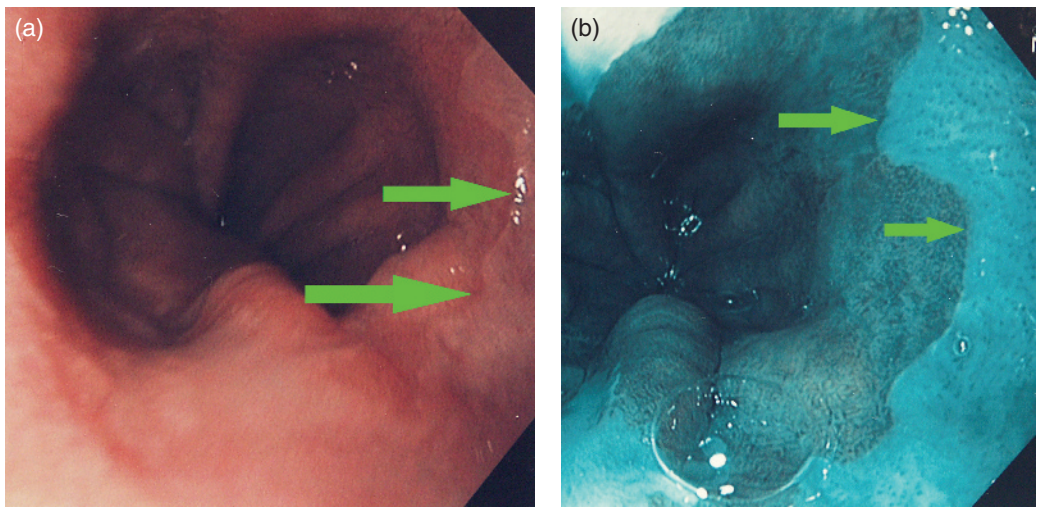

Figure 1.4 (a) Esophageal gastric junction by white light. (b) The same location using narrow band imaging.

ultrasound instrument that is also used in the esophagus) and some are longer (e.g., a 220 cm small bowel enteroscope). There are instruments that are narrower, such as a 2.8 mm diameter choledochoscope or a 2 mm ultrasound miniprobe. White light is commonly used with a curved lens that gives about a 10-fold magnification, depending on the distance of the endoscope tip from the image object. Endoscopes have a hollow channel (Figures 1.3a and 1.3b and 1.6a and 1.6b) to allow the passage of various tools such as biopsy forceps, snares, clips, needles, dilators, and hemostasis devices (Figures 1.8a–1.8f). This allows biopsy, snare, closure of defects, and control of bleeding. Devices that use the outside of the endoscope as well as the internal channel to allow resection while minimizing the risk of perforation are also available (Figures 1.9a and 1.9b). Palliative therapy such as stenting to open a stricture is commonly performed. There are several types of stents and delivery devices that are available (Figures 1.10a–1.10c). Stents can be passed either through the scope or positioned with endoscopic and fluoroscopic assistance.

Capsule endoscopy is different from the usual endoscopic examination. With this method, a camera within a pill (Figure 1.11) is ingested and images are transmitted to recorders on the surface of the patient—up to 50,000 images are collected over 8 h and then reviewed as a video file.

With the wide array of instruments and peripherals, gastrointestinal endoscopy has evolved from primarily a luminal diagnostic procedure to a procedure in which luminal and extraluminal diagnostic and therapeutic interventions are routinely performed.

Figure 1.5 High-grade dysplasia and Barrett's mucosa using ISCAN 2.

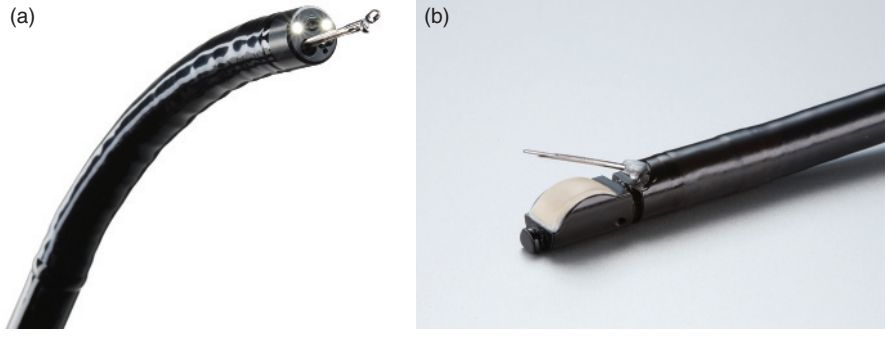

Figure 1.6 (a) A radial array EUS endoscope with a biopsy forceps in the working channel. (Reproduced and used with permission from Pentax Medical Company.) (b) An EBUS endoscope with a needle in the working channel. (Reproduced and used with permission from Pentax Medical Company.)

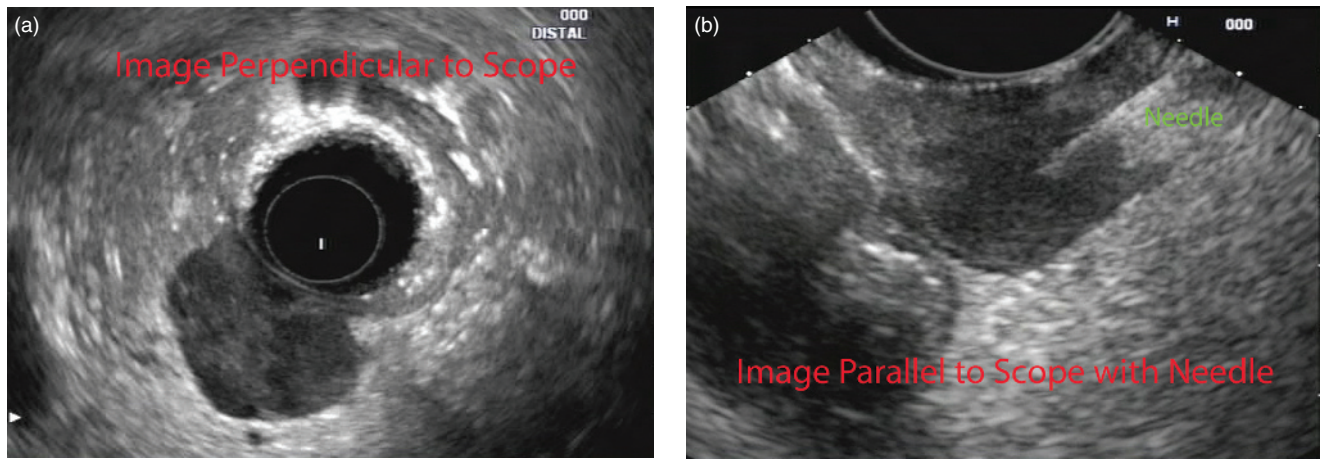

Figure 1.7 (a) A stromal tumor visualized with radial array EUS. (b) The same lesion seen with linear array EUS during needle aspiration.

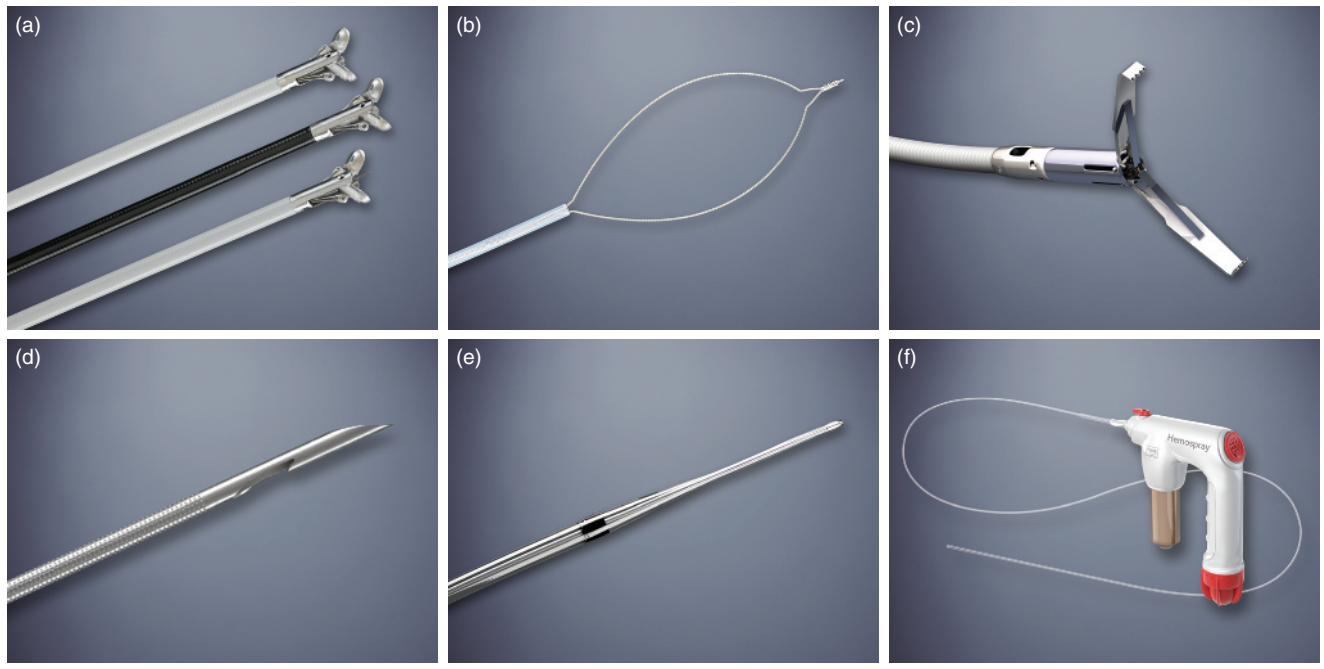

Figure 1.8 Some peripheral devices that can be used during endoscopy. (Images (a–e). Permission for use granted by Cook Medical Incorporated, Bloomington, IN.) (a) Biopsy forceps; (b) snare; (c) endoclip "Instinct Clip"; (d) EUS needle "ProCore"; (e) dilator; (f): hemospray coagulation device.

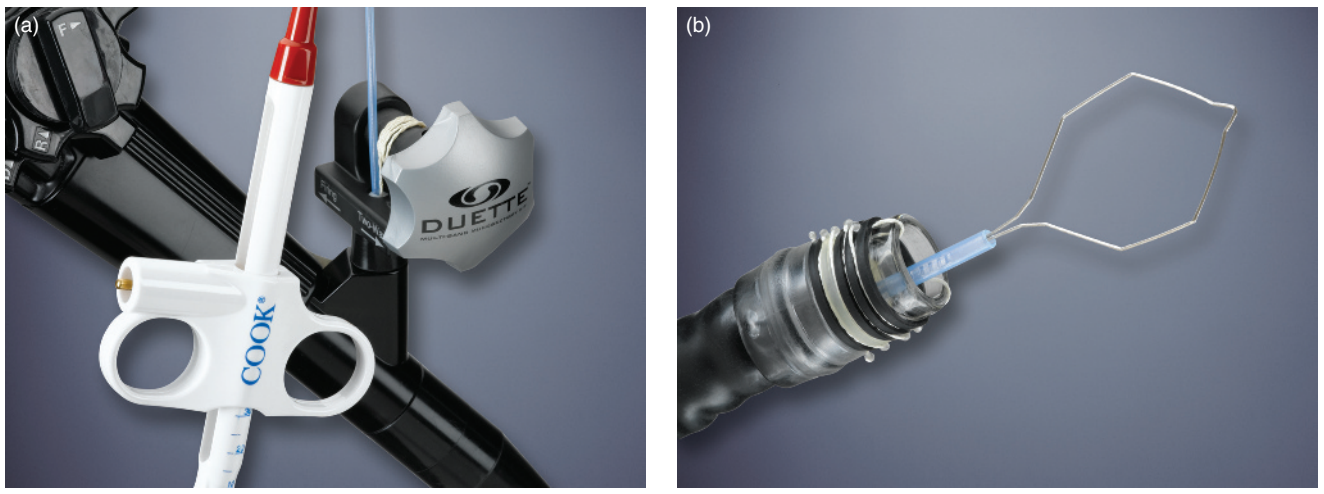

Figure 1.9 (a) The upper handle of a band ligation device with a snare in the working channel. "Duette Band Ligation Device." (b) The endoscope tip of a band ligation device. Small rubber bands on the end of the endoscope are placed around a lesion creating a pseudopolyp. A snare is used to remove the pseudopolyp. "Duette Band Ligation Device." (Images a–b. Permission for use granted by Cook Medical Incorporated, Bloomington, IN.)

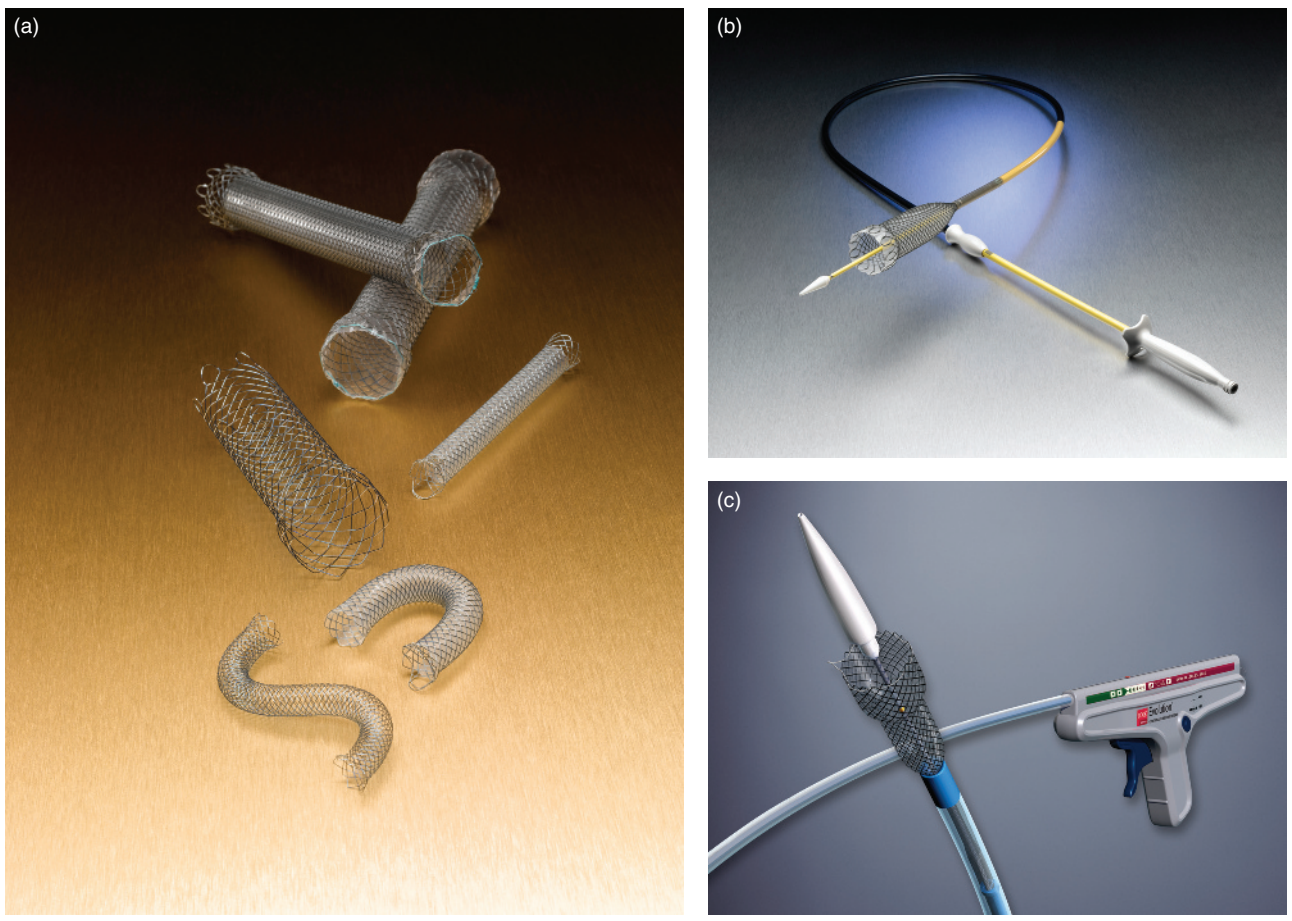

Figure 1.10 (a) Various types of stents. (Reproduced and used with permission from Boston Scientific.) "Wallstents." (b) Example of a stent deployment devices. (Reproduced and used with permission from Boston Scientific.) (c) Example of a stent deployment device. (Permission for use granted by Cook Medical Incorporated, Bloomington, IN.)

Figure 1.11 Pill CAM device in package prior to use.

Endoscopy is very important in the management of patients with premalignant and malignant conditions. Pathological diagnosis using direct visualization biopsy or by endoscopic ultrasonography-guided needle aspiration, evaluation for secondary tumor effects (bleeding, obstruction), curative therapy (endoscopic resection, thermal ablation), and palliative therapy (biliary stents, celiac block) are all part of what an endoscopist can do (Video 1.1).

The following chapters describe what endoscopists can offer in the management of patients with oncologic conditions, as well as an oncologic perspective in the management of various tumor types.

Chapter video clip

Video 1.1 The video shows a dysplastic esophageal lesion as seen under white light and then under ISCAN2.

Reference

1 Hirschowitz BI, Peters CW, Curtiss LE. Preliminary report on a long fiberscope for examination of stomach and duodenum. *Med Bull (Ann Arbor)*. 1957;23:178–180.