UNIVERSITY OF CHICAGO MEDICAL CENTER

Clinical Comment

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GASTROENTEROLOGY

Advances in Gastrointestinal Interventional Endoscopy

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Advances in endoscopic technology and devices have led to a wide variety of new and exciting applications for endoscopy and minimally invasive endoscopic surgical procedures. Endoscopic ultrasound (EUS) is now the most accurate imaging technology for staging tumors of the gastrointestinal (GI) tract, retroperitoneum, and mediastinum. Reorientation of the ultrasound transducer on the echoendoscope now allows for fine-needle aspiration capabilities, which has led to increased diagnostic accuracy in cancer staging. It is a less invasive option that may eliminate the need for staging surgery.

Self-expandable metal stents are now available for endoscopic palliation of GI obstruction due to cancer. Endoscopic mucosal resection (EMR) offers the potential for an exciting alternative to endoscopic treatment of early neoplastic lesions of the luminal GI tract as well as difficult colonic sessile lesions. In the

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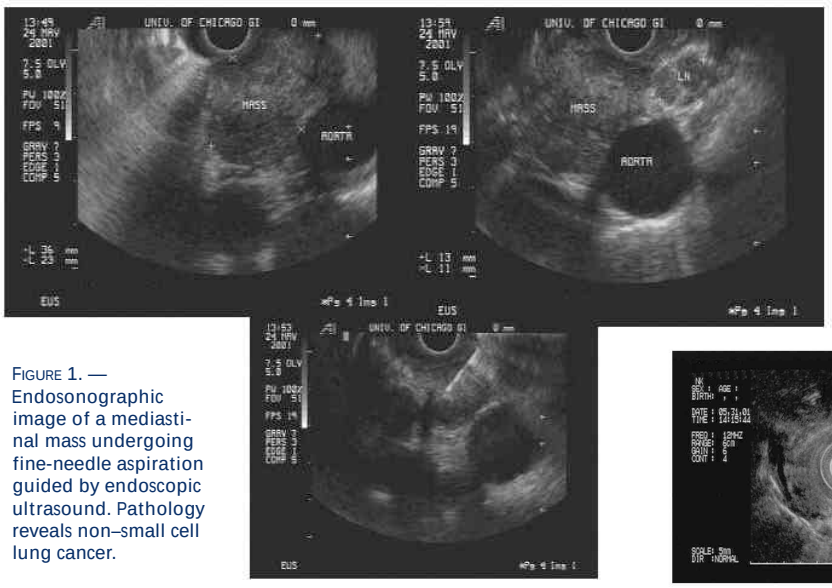

FIGURE 1. — Endosonographic image of a mediastinal mass undergoing fine-needle aspiration guided by endoscopic ultrasound. Pathology reveals non–small cell lung cancer.

FIGURE 2. — Endoscopic ultrasound for esophageal cancer staging reveals a stage T4 esophageal cancer. From the 7 o'clock to 9 o'clock positions there is invasion of the azygos vein.

pancreaticobiliary arena, EUS and magnetic resonance cholangiopancreatography offer noninvasive, minimal-risk alternatives to diagnostic endoscopic retrograde cholangiopancreatography.

Advances in charge couple device technology have led to high-resolution and high-magnification endoscopes with the hope that improved imaging in combination with chromoendoscopy will allow earlier cancer detection and ideally serve as optical biopsy devices by identifying mucosal patterns consistent with dysplasia.

RECENTLY, THE U.S. FOOD AND DRUG ADMINISTRATION APPROVED SELF-EXPANDABLE METAL STENTS FOR THE PALLIATION OF MALIGNANT BILIARY AND ENTERAL OBSTRUCTION.

ENDOSCOPIC ULTRASONOGRAPHY

EUS is now the most accurate locoregional imaging modality for staging GI, retroperitoneal, and mediastinal malignancies (Figure 1). With EUS-guided fine-needle aspiration capabilities for tissue diagnosis, endosonographers can provide the oncology team with accuracies of greater than 90 percent across the board in nodal staging. Data are emerging on its clinical impact in esophageal, rectal, and non–small cell lung cancer (Figure 2). It is proving to be a less costly and less invasive method for diagnosis. Its improved accuracy in staging leads to more effective and efficient medical and surgical management.

Real-time EUS-guided fine-needle aspiration is approaching a new frontier, fine-needle injection, which has led to such applications as minimally invasive EUS-guided celiac plexus block for patients with intra-abdominal cancer and refractory pain. Pilot studies with EUS-guided fine-needle injection immunotherapy and antitumor agents for unresectable pancreatic and esophageal cancers will soon start at the University of Chicago.

Pancreaticobiliary Diseases

Advances in imaging modalities provide new approaches for evaluating pancreaticobiliary disorders, both benign and malignant (Figure 3). Magnetic resonance cholangiopancreatography is a realistic alternative to endoscopic retrograde cholangiopancreatography for interrogating the biliary tree without any of the complications associated with ductal cannulation. It is especially useful when evaluating dominant strictures or demonstrating choledocholithiasis. EUS, as discussed above, has become the procedure of choice in some European centers for the evaluation of choledocholithiasis, with endoscopic retrograde cholangiopancreatography used only in therapeutic cases. EUS-guided fine-needle aspiration capabilities have also significantly helped to differentiate benign from malignant pancreatic masses, and recently have been shown to be the procedure of choice when endoscopic retrograde cholangiopancreatography or tissue acquisition guided by computed tomography fails.

FIGURE 3. — Magnetic resonance cholangiopancreatography (MRCP) of a patient with metastatic breast cancer, intermittent icterus, and cholelithiasis. MRCP reveals a distal common bile duct stenosis likely from a metastasis.

Enteral Stenting

Recently, the U.S. Food and Drug Administration approved self-expandable metal stents for the palliation of malignant biliary and enteral obstruction (Figure 4). Although prospective randomized data are still being collected on enteral stenting, it has become apparent that in selected cases it offers a minimally invasive option for the treatment of esophageal, gastroduodenal, and colonic malignant obstruction and is the modality of choice for malignant tracheoesophageal fistulas.

FIGURE 4. — Biliodigestive endoscopic bypass is achieved with double self-expandable metal stents in the bile duct and duodenum in a patient with unresectable pancreatic cancer.

Endoscopic Hemostasis

New endoscopic accessories and coagulation devices are available to address complex GI bleeding. Endoscopic clips and loops are now commercially available, which increases the number of hemostatic tools when managing visible vessels, postpolypectomy bleeding, or mucosal gap defects that are spontaneous or secondary to resections (Figure 5, p.4). Hemostatic devices available only for surgical use, such as the Argon Plasma Coagulation Unit (ERBE, Tübingen, Germany), have become part of the day-to-day endoscopic tools for the management of diffuse GI bleeding disorders like arteriovenous malformations or radiation-induced proctitis. Push enteroscopy has become a routine procedure in the evaluation of small-bowel bleeding disorders and their treatment.

Endoscopic Mucosal Resection

In the last 2 years, EMR has become a familiar term for American endoscopists. Although it has been a well-established

technique in Japan for more than 10 years as an endoscopic treatment alternative for early esophageal and gastric cancers, endoscopists in this country initially dismissed it as interesting but still a technique without an indication. However, we and other investigators from the United States and Europe have recently reported our experiences using EMR for superficial neoplasia in Barrett's esophagus and the GI tract (Figure 6). These reports have led to a renewed interest in the technique, which now has become standard curriculum for postgraduate courses and was a forum topic during Digestive Diseases Week 2000, held in San Diego, Calif., during May 2000.

FIGURE 5. — Endo-clipping of an endoscopic mucosal resection site to close the mucosal defect after resection.

EMR has come a long way from the initial work of Rosenberg in 1955 that described creating a "submucosal saline wheal" for treatment of colorectal polyps. We believe current EMR techniques and devices are only the beginning of a new age in interventional endoscopy, the age of endosurgery, the next frontier.

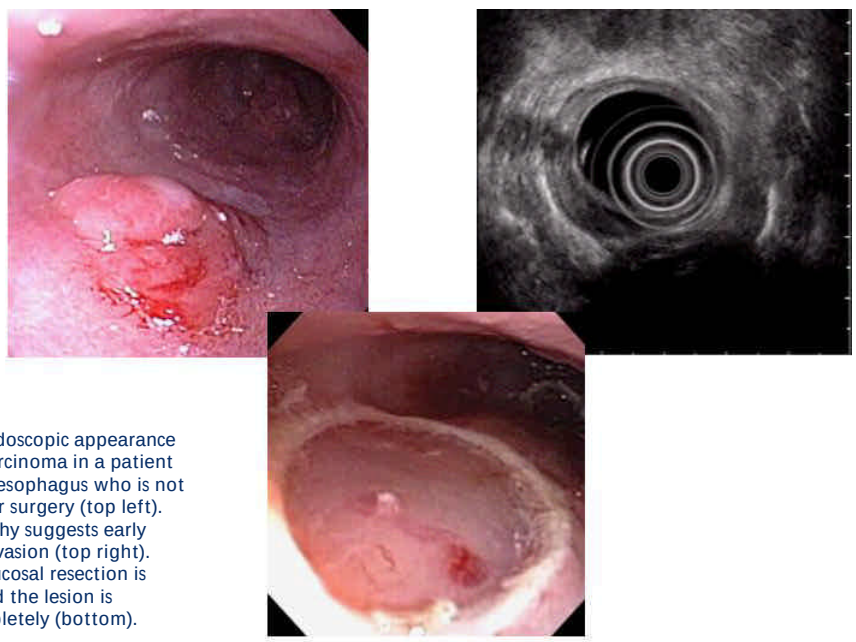

FIGURE 6. — Endoscopic appearance of an adenocarcinoma in a patient with Barrett's esophagus who is not a candidate for surgery (top left). Endosonography suggests early submucosal invasion (top right). Endoscopic mucosal resection is performed and the lesion is removed completely (bottom).

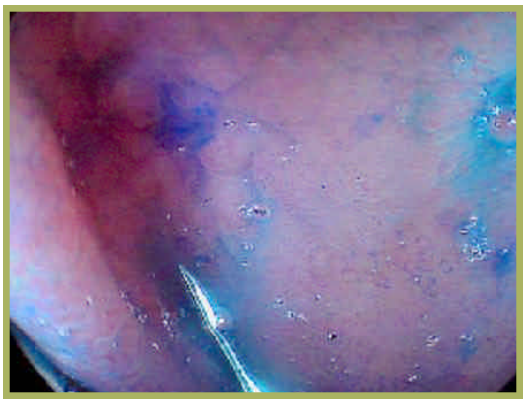

FIGURE 7. — High-resolution, high-magnification endoscopy and chromoendoscopy of Barrett's esophagus. Notice the villous mucosal features suggestive of specialized intestinal metaplasia.

CONCLUSION

Miniaturization of charge couple devices for endoscopic use and new endoscopic imaging technologies offer exciting avenues for research in the early detection of GI cancers and precancerous mucosal events like dysplasia. High-resolution magnification endoscopy is already a reality and is currently being tested by our group and others in evaluating patients with Barrett's esophagus and in looking for aberrant crypt foci and other dysplastic markers in the colon (Figure 7). We have never been so close to an optical biopsy device as we are now. The next 5 years will bring new minimally invasive endoscopic alternatives for early cancer resections and palliation of malignant GI disorders (Figure 6).

Indeed, the 21st century looks bright and exciting in the field of GI endoscopy. Interventional endoscopy is evolving into its own subspecialty. As an academic program, we are committed to offering these new advances to you and providing any support you may need as you care for your patients.

FOR FURTHER READING

1. Inoue H, Endo M. Endoscopic esophageal mucosal resection using a transparent tube. *Surg Endosc.* 1990;4:198-201.

2. Tada M, Murakamai A, Karita M, et al. Endoscopic resection of early gastric cancer. *Endoscopy.* 1993;25:445-450.

3. Takemoto T, Tada M, Karita M, Yanai H. Significance of strip biopsy, with particular reference to endoscopic mucosectomy. *Dig Endosc*. 1989;1:4-9.

4. Waxman I, Saitoh Y. Clinical outcome of endoscopic mucosal resection for superficial GI lesions and the role of high-frequency US probe sonography in an American population. *Gastrointest Endosc*. 2000;52(3):322-327.

5. Nijhawan PK, Wang KK. Endoscopic mucosal resection for lesions with endoscopic features suggestive of malignancy and high-grade dysplasia within Barrett's esophagus. *Gastrointest Endosc*. 2000;52(3):328-332.

6. Ell C, May A, Gossner L, et al. Endoscopic mucosal resection of early cancer and high-grade dysplasia in Barrett's esophagus. *Gastroenterology.* 2000;118:670-677.

7. Fleischer D. Endoscopic mucosal resection: (not) made in the USA (so commonly). A dissection of the definition, technique, utilization, and controversies. *Gastrointest Endosc.* 2000;52(3):440-444. Editorial.

8. Rosenberg N. Submucosal saline wheal as a safety factor in fulguration of rectal and sigmoid polyps. *Arch Surg.* 1955;70:120-123.