The gastroenterology team at the University of Pennsylvania School of Medicine and Penn Medicine is nationally recognized for clinical research and superlative care for its patients. I am pleased to announce the following recent honors and awards accorded our faculty, as well as additions to our team:

KYONG-MI CHANG, MD, is the principal investigator at Penn for the NIH Hepatitis B Research Network; her lab serves as a national HBV immunology center. Readers are encouraged to contact her at kmchang@mail.med.upenn.edu for their patients with HBV.

RAJ REDDY, MD, director of Hepatology, Medical Director of Liver Transplantation, is chief investigator at Penn for the drug-induced idiosyncratic liver injury network (DILIN) of the National Institute of Diabetes and Digestive and Kidney Diseases. Readers are encouraged to contact him at rajender.reddy@uphs.upenn.edu for their patients with drug-induced liver disease.

JOHN G. LIEB, II, MD, has joined the Penn Division of Gastroenterology at Penn. Dr. Lieb completed medical school at the Johns Hopkins University School of Medicine and his residency at the Hospital of the University of Pennsylvania. He completed a fellowship in gastroenterology, hepatology and nutrition and an advanced endoscopy fellowship at the Shands Teaching Hospital of the University of Florida College of Medicine. His clinical interests include motility disorders of the esophagus and the treatment of chronic pancreatitis.

RESOURCES

- Penn GI division patient website: PennMedicine.org/GI
- Penn GI division academic website: www.med.upenn.edu/gastro
- Penn Abramson Cancer Center website: PennMedicine.org/abramson
- Cancer information: www.oncolink.org
- NCI program project on esophageal cancer at Penn: www.med.upenn.edu/gastro/nci

JOH N K . R USTGI, MD
T. Grier Miller Professor of Medicine and Genetics
Chief, Division of Gastroenterology

Anil K. Rustgi, MD
Cholangitis is marked by obstruction of the common bile duct, most often by gallstones (95%), with malignant growths and benign stenoses comprising the remainder.

Despite the advantage of permitting direct visualization of the biliary tree, conventional cholangioscopy was hampered by poor irrigation capabilities, fragile optical fibers and the requirement for two endoscopists—one to operate the duodenoscope, while a second steered the cholangioscope and operated its working channel. These difficulties impeded the use of cholangioscopy in the diagnosis of biliary disease, and eventually, the modality was supplanted by other technologies.

Long at the forefront of innovation in diagnostic and therapeutic technologies, the Division of Gastroenterology at Penn Medicine is employing the SpyGlass® Direct Visualization System (SDVS) for the treatment of acute obstructive cholangitis and other disorders of the biliary tree.

Conventional peroral cholangioscopy was developed in the early 1960s as a means to directly visualize the biliary tree during endoscopic retrograde cholangiopancreatography (ERCP). Indicators for cholangioscopy (when imaging from cholangiography alone is insufficient) include diagnosis of intraductal lesions, differentiation between malignant and benign biliary strictures, and assessment of the longitudinal extent of cholangiocarcinoma.

First described by Charcot in the 1870s, acute obstructive cholangitis is marked by obstruction of the common bile duct and supplicative infection of the biliary tree. The majority of obstructions are caused by gallstones (95%), with malignant growths and benign stenoses comprising the remainder. Most blockages are incomplete. Typical physical findings, as defined by Charcot, include fever, jaundice and right upper quadrant pain, usually severe, as a result of intraluminal pressure. Patients may also experience nausea, chills and vomiting.

Cholangitis is marked by obstruction of the common bile duct, most often by gallstones (95%), with malignant growths and benign stenoses comprising the remainder.

GREGORY GINSBERG, MD, DIRECTOR, ENDOSCOPIC SERVICES
Miniaturization technology was still twenty years away when the premise for a tiny, ingestible capsule containing a camera originated in the 1980s. Introduced in 2001, capsule endoscopy (CE) is now the procedure of choice for evaluation of the small bowel mucosa at Penn Medicine.

Contained in an indigestible pill-shaped plastic shell, current capsule endoscopes are approximately 11 mm in diameter and 26 mm in length. The capsule’s miniature imaging system is comprised of a metal oxide silicon chip camera, six light emitting diodes, two silver oxide batteries and a UHF-band radio telemetry transmitter. Patients wear an abdominal sensor array and a data recorder unit capable of processing two images a second.

Following a 12-hour fast, the capsule is swallowed with a glass of water and progresses through the GI system by natural peristalsis. As it travels, the camera takes thousands of pictures and transmits these to the recorder, which is worn around the waist. The images are then downloaded and viewed as a video using proprietary software. Acquired images have a 1:8 magnification, which is higher than that of conventional endoscopes. The capsule is disposable and is excreted naturally.

The Food and Drug Administration has also approved an esophageal capsule for screening and diagnosing esophageal varices and Barrett’s esophagus. This capsule has a role in diagnosing esophageal disorders in patients who are unable or unwilling to undergo endoscopy.

CAPSULE ENDOSCOPY AT PENN

Gastroenterologists David Jaffe, MD, and Nuzhat Ahmad, MD, currently employ capsule endoscopy at the Penn Diagastive & Liver Center as the modality of choice for obscure gastrointestinal bleeding when endoscopy and colonoscopy are unrevealing.

“In the presence of bleeding following negative upper endoscopy and colonoscopy, capsule endoscopy can often preclude more invasive procedures,” says Dr. Jaffe.

CE is also used at Penn in patients with suspected Crohn’s disease and in selected patients with suspected small bowel disease in whom other imaging studies are equivocal.

CLINICAL STUDIES

Efficacy studies of CE indicate that the technology demonstrates a substantial diagnostic yield in about two thirds or more of patients. A meta-analysis of comparative studies performed in 2006 found CE to be comparable to intraoperative endoscopy and superior to push enteroscopy and small bowel radiography for diagnosing small bowel pathology in patients with obscure gastrointestinal bleeding. In this study, CE was also found to be superior to colonoscopy with ileoscopy, CT enterography and push enteroscopy for diagnosing nonstricturing small bowel Crohn’s Disease.

ISSUES

Many of the concerns linked to first generation capsule endoscopes have been resolved by improved practice standards and clinical trial findings. At one time, for example, the risks identified with CE included delayed transit in patients with gastroparesis—a concern now addressed by endoscopically placing the capsule beyond the stomach. Other complications, including small bowel obstruction and pseudo-obstruction (~1% incidence in published series) are now typically ruled out by radiography prior to the procedure. Contraindications to capsule endoscopy include dementia, esophageal stricture, swallowing disorders, small bowel obstruction and defibrillators or pacemakers.
“Capsule endoscopy is a giant step forward in the visualization of small bowel mucosa. It enables us to identify diseases and conditions that may not be readily identifiable using conventional endoscopy and radiology.”
Nuzhat Ahmad, MD
Associate Director, Endoscopic Services, HUP

THE FUTURE

Though not approved for use in the U.S., a capsule designed to examine the colon is now commercially available in Europe, Asia, Latin America, Canada and Australia. A recent study from Europe demonstrates that while the capsule provides good visualization of the colon, it is not as effective in detecting pre-cancerous colon lesions and cancer as conventional colonoscopy. While at this point, capsule colonoscopy is not ready for prime time, it may eventually provide a safe, non-invasive and effective alternative to conventional colonoscopy in a selected patient population.

Inside the Pillcam

1 | Optical dome
2 | Lens holder
3 | Lens
4 | Illuminating LEDs (Light Emitting Diode)
5 | CMOS (Complementary Metal Oxide Semiconductor) Imager
6 | Battery
7 | ASIC (Application Specific Integrated Circuit) transmitter
8 | Antenna

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INNOVATIVE SINGLE OPERATOR CHOLANGIOSCOPE

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MANAGEMENT OF CHOLANGITIS

A number of modalities have been applied to the diagnosis of ductal obstruction with varying degrees of sensitivity and specificity. These include abdominal and endoscopic ultrasound, nuclear scintigraphy, computed tomography, magnetic resonance cholangiopancreatography (MRCP), ERCP and percutaneous transhepatic cholangiography (THC). ERCP is currently the surgery of choice for the management of cholangitis despite a significant risk of pancreatitis and/or cholangitis in 5% to 38% of patients as a result of insufficient drainage of contrast material from the ducts during the procedure.1

SPYGLASS® DIRECT VISUALIZATION SYSTEM

Interest in peroral cholangioscopy was recently renewed with the development of the SpyGlass Direct Visualization System,* a single operator system with improved fiberoptic capacity. The SpyGlass System permits optical viewing and optically guided biopsies and has been shown to be compatible with electrohydraulic lithotripsy (EHL). Therapeutic interventions are possible with SDVS, as well.

The SDVS was the subject of a recent case report by Yasser M. Bhat, MD, and Michael L. Kochman, MD, FASGE, of the Division of Gastroenterology at Penn Medicine.2 Neither author is involved in the development or promotion of the SpyGlass System, or has a financial relationship with its manufacturer.

The case involved a 60-year-old man with jaundice and ERCP- and MRCP-documented evidence of a hilar (Bismuth IV) stricture at the confluence of the right and left hepatic ducts. A decision was made to use the SpyGlass System to further evaluate the stricture following the failure of repeated attempts to place guidewires in the left hepatic duct during a repeat ERCP. With the successful insertion of a guidewire into the common hepatic duct and the introduction of an access catheter, friable, erythematous tissue was observed with the SpyGlass at the confluence of the common hepatic duct. Following the retrieval of intraductal biopsies, plastic endoprosthetics were successfully placed into both affected ducts under fluoroscopy. This effectively resolved the strictures, and the patient experienced complete resolution of his jaundice.

Direct visualization allows noncontrast-guided access to the intrahepatic ducts and may decrease the risk of post-ERCP cholangitis. Thus, according to the authors, the theoretical advantages of the SpyGlass System in the setting of difficult hilar strictures, include an increase in the success rate of placement of bilateral hilar endoprosthetics, and a decrease in the potential infectious complications after ERCP.

The SpyGlass System joins a number of technological advances recently introduced at Penn’s Division of Gastroenterology, including high definition electronically enhanced endoscopic imaging, balloon-assisted deep enteroscopy and radiofrequency ablation. Members of Penn’s Interventional Endoscopy team employing the SDVS include Nuzhat Ahmad, MD, Gregory Ginsberg, MD, David Jaffe, MD, Michael Kochman, MD, John G. Lieb, II, MD, William Long, MD and Kashyap Panganamula, MD.

References


*Boston Scientific (Natick, MA).