Innovations in Intraductal Endoscopy

Cholangioscopy and Pancreatoscopy

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KEYWORDS

• ERCP • Cholangioscopy • Pancreatoscopy • Cholangiocarcinoma • Bile duct stone • Pancreatic duct stone • Biliary stricture • IPMN

KEY POINTS

- Cholangiopancreatoscopy (CP) is an adjunct to endoscopic retrograde cholangiopancreatography (ERCP) and can be used for the clarification of indeterminate lesions and for guiding therapy of malignancy.
- CP is an established modality in successfully treating difficult pancreaticobiliary stones.
- CP imaging has both fiberoptic and digital technologies and is available in endoscope and catheter-based systems.
- CP is currently widely available, although its use should be limited to those endoscopists who are proficient in performing complex ERCP.

INTRODUCTION: NATURE OF THE PROBLEM

Miniature endoscopes and optical catheters permit direct visualization of the bile and pancreatic ducts. These are usually passed through the working channel of a standard therapeutic duodenoscope during endoscopic retrograde cholangiopancreatography (ERCP).

The first cholangioscope was described in 1941,[1] and the per-oral approach was subsequently introduced in the early 1970s.[2,3] Per-oral pancreatoscopy (POP) was first described in Japan in 1975.[4] Presently, the 10F platforms provide a working channel, tip deflection, and either fiberoptic or digital/video chips; slim gastroscopes are used without a duodenoscope for direct cholangioscopy.[5–9]

INDICATIONS/CONTRAINDICATIONS

For indications and contraindications to cholangiopancreatoscopy, see **Table 1**.

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Table 1
Indications and contraindications to cholangiopancreatoscopy

Indications	Contraindications
Established • Therapy of difficult pancreatic and biliary stones • Indeterminate biliary and pancreatic strictures • Evaluation of equivocal findings during cholangiopancreatography • Assessment of the extent of cholangiocarcinoma or main duct IPMN before surgery • Guiding selective wire access across strictures and the cystic duct/gallbladder Equivocal Evidence • Assess for residual stones in dilated bile or pancreatic ducts not seen on cholangiopancreatography • Evaluate dominant stenoses in primary sclerosing cholangitis • Delivery of biliary photodynamic therapy • Guiding treatment margins for biliary radiofrequency ablation	• Active cholangitis • Small duct (<5 mm) in diameter

TECHNIQUE/PROCEDURE PREPARATION

Sedation

General anesthesia is recommended. Intraductal irrigation can lead to reflux of fluids and pooling within the stomach, increasing the risk of aspiration.[10] For "mother-daughter" systems, trained secondary personnel (ie, a registered nurse, technician, or assisting endoscopist) handle the "daughter" scope.

Antibiotic Prophylaxis

Preprocedural broad-spectrum intravenous antibiotic prophylaxis is recommended due to a potentially higher rate of cholangitis when compared with those patients undergoing ERCP without cholangioscopy.[11,12]

Patient Positioning

We prefer the semiprone position.

Equipment

Systems available in the United States for cholangioscopy include endoscope-based dual-operator systems, commonly referred to as "mother-daughter" (Olympus America, Center Valley, PA, and Pentax, Montvale, NJ) and a catheter-based system, commonly referred to as "single-operator" cholangioscopy (SpyGlass DS Direct Visualization System, Boston Scientific Endoscopy, Marlboro, MA). In addition, cholangioscopy can be performed using a slim (4.9–5.9 mm outer diameter) gastroscope or even standard gastroscope in patients with a dilated common bile duct.[9]

Fiberoptic cholangioscopes range in diameter from 3.1 to 3.4 mm, with a working channel of 1.2 mm that permits passage of forceps and lithotripsy fibers, and have up/down tip deflection.[7,8] Video cholangioscopes are prototypes. The fully disposable single-operator catheter-based system is approved by the Food and Drug Administration for pancreatic duct inspection, has 4-way tip deflection, a 1.2-mm working channel diameter, and two 0.6-mm irrigation ports.[7,8,13] Pancreatoscopy is primarily performed with scopes and catheters designed for inspection of the bile duct. A detailed review of the available cholangiopancreatoscopes has been summarized in