Peroral cholangioscopy for the diagnosis and treatment of biliary diseases

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Abstract
Peroral cholangioscopy with duodenoscopic assistance can allow direct visualization of the bile duct. Several clinical studies suggest the utility of peroral cholangioscopy for the management of various bile duct lesions. Although direct visual observation may be a useful adjunct to endoscopic retrograde cholangiopancreatography (ERCP) for distinguishing malignant from benign bile duct lesions, the assessment of diagnostic accuracy needs further controlled clinical studies. Intracorporeal lithotripsy with the use of a peroral cholangioscope may be a safe and effective method for difficult-to-treat bile duct stones, including intrahepatic stones. At present, however, the fragility of the fiberscope equipment and technical difficulties hold back its popularity. Preliminary data obtained by using a new videoscope, which provides excellent quality images, are encouraging. Furthermore, it is expected that this videoscope will have longer durability of optical images and better manipulation than previous fiberscopes.

Key words Peroral cholangioscopy · Bile duct stricture · Bile duct stones · Lithotripsy

Introduction
Peroral cholangioscopy performed with duodenoscopic assistance allows direct visualization of the bile duct. Electrohydraulic lithotripsy (EHL) or laser lithotripsy with peroral cholangioscopic guidance (peroral cholangioscopic lithotripsy, POCSL), which is less invasive than percutaneous transhepatic cholangioscopic lithotripsy (PTCSL), may provide a safe and effective method for difficult-to-treat bile duct stones, including intrahepatic stones. Although peroral cholangioscopy was initially described in the mid-1970s, few studies have addressed its diagnostic role in biliary disease, because the early prototype cholangioscopes were difficult to use and the optical fibers were easily fractured during passage over the elevator of the duodenoscope. Images obtained through the use of video adapters may be less than optimal. In recent years, the development of small charge-coupled devices (CCDs) has made it possible to produce video cholangioscopes, which have provided excellent quality images. Preliminary data obtained by using a new videoscope are encouraging. Furthermore, it is expected that this videoscope will have longer durability of optical images and better manipulation than previous fiberscopes.

Diagnostic role of peroral cholangioscopy
Little is known about the diagnostic utility of peroral cholangioscopy. Direct visualization of the bile ducts may be a useful adjunct to endoscopic retrograde cholangiopancreatography (ERCP) for distinguishing malignant from benign biliary lesions (Fig. 1). Intraductal tumors may mimic large stones, and immobile stones may imitate polypoid tumors. Benign-appearing biliary strictures may be malignant, and strictures thought to be malignant may be benign. Although the peroral cholangiographic characteristics of biliary strictures have not been vigorously studied, there are several reports of percutaneous transhepatic cholangioscopy (PTCS), most of which come from Asia. A study from Korea reviewed 236 PTCS procedures and assessed the cholangioscopic characteristics of benign and malignant biliary lesions. In this series, the most difficult bile duct tumor to diagnose was the infiltrative type, because this type of carcinoma exhibits intramural spread of tumor cells and there may not be any prominent changes in the surface of the bile duct. Previous studies of PTCS suggested that the appearance
of the vasculature within biliary strictures may be helpful in differentiating benign from malignant lesions; however, all these studies were retrospective, and now prospective investigation is required.

When the diagnostic accuracy of peroral cholangioscopy is assessed, consideration should be given to the small numbers of reported cases, and the lack of control groups. Siddique et al. reported their experience of the diagnostic ability of POCS with 59 patients. They found that peroral cholangioscopy confirmed the suspected diagnoses in 59% of the patients and suggested new or unsuspected diagnoses in 29.5% of the patients. Many of their indications for cholangioscopy were suspicions of benign disease, but they needed confirmation of the diagnoses. Recently, we presented our experience of the diagnostic utility of POCS with 97 patients who had diagnoses of unknown biliary diseases (46 malignant, 51 benign lesions). To our knowledge, this is the largest series reporting on diagnostic peroral cholangioscopy. On the basis of our ERCP findings, there were 76 strictures and 21 filling defects. Based on previous PTCS studies, our diagnostic criteria for malignant strictures were as follows: (1) irregularly dilated and tortuous vessels (so-called tumor vessels), (2) easy oozing, and (3) an irregular surface. In our report, we revealed that there were no specific cholangioscopic characteristics in malignant biliary strictures, because we found that some characteristics, which had been previously described, were also seen in benign inflammatory diseases such as primary sclerosing cholangitis and chronic pancreatitis. The diagnostic sensitivity, specificity, and accuracy for strictures in our study were 100%, 86.8% and 93%, respectively (Fig. 2), while our diagnostic accuracy for filling defects was 100% (21/21), because direct cholangioscopic visualization revealed at a glance whether the filling defect was a tumor or a stone. Similarly, a case report of the use of a peroral video cholangioscope revealed that an immobile filling defect in the common bile duct was biliary stones. ERCP findings such as filling defects of unclear causes are one of the good indications for peroral cholangioscopy. If the filling defect proves to be biliary stones, peroral cholangioscopy also allows EHL or laser lithotripsy to be performed for stones under direct guidance.

With the exception of biliary strictures that clearly follow surgery or trauma, in adults these strictures always raise a concern for malignancy. Cytologic brushing of bile duct strictures has a low yield for malignancy, of 50%–60% by adjunctive techniques, such as combination brushing and forceps biopsy. Directed tissue acquisition in biliary strictures, achieved by using PTCS,