Percutaneous transhepatic cholangioscopy for indeterminate biliary strictures using the SpyGlass system: a case series

Authors Lillian Du[1], Pernilla D'Souza[1], Aducio Thiesen[2], Safwat Girgis[2], Richard Owen[3], Dermot McNally[3], Philippe Sarlieve[3], Gurpal Sandha[1]

Institutions
[1] Division of Gastroenterology, University of Alberta Hospital, Edmonton, Alberta, Canada
[2] Department of Pathology, University of Alberta Hospital, Edmonton, Alberta, Canada
[3] Department of Radiology, University of Alberta Hospital, Edmonton, Alberta, Canada

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Corresponding author
Gurpal Sandha, MBBS
University of Alberta Faculty of Medicine
8540-112th Street
Zeidler Ledcor Centre
Edmonton, AB T6G 2X8
Canada
Fax: +1-780-492-1699
gsandha@ualberta.ca

Peroral cholangioscopy is useful in differentiating benign from malignant biliary strictures. However, when conventional biliary access via endoscopic retrograde cholangiopancreatography (ERCP) fails, percutaneous transhepatic cholangioscopy (PTCS) via the SpyGlass cholangioscopy system can be used to achieve a diagnosis. Four patients with biliary strictures in whom conventional ERCP was not possible and percutaneous brushings were either nondiagnostic or unsatisfactory were investigated with PTCS. The technique of PTCS involves insertion of the SpyGlass cholangioscope through a percutaneous transhepatic sheath, placed just prior to the procedure, to visualize the stricture and obtain biopsies with the SpyBite forceps. On the basis of our early observations, we conclude that PTCS using the SpyGlass cholangioscopy system for the assessment of biliary strictures is feasible, safe, and provides high diagnostic accuracy.

Introduction

The diagnostic accuracy of endoscopic retrograde cholangiopancreatography (ERCP)-guided brush cytology in the evaluation of biliary strictures is limited, with a sensitivity of 41 % and a negative predictive value of 58 % [1]. Peroral cholangioscopy has proven to be efficacious for the diagnosis of biliary strictures, not only because of direct visualization but also because of the ability to take tissue biopsies [2]. In recent years, the introduction of a single-operator direct-visualization system for peroral cholangioscopy (SpyGlass; Boston Scientific Inc., Natick, Massachusetts, USA) has improved access to the biliary system. Early reports suggest a technical success rate of more than 90 %, a sensitivity of 71 %, and a specificity of 100 % for diagnosing malignancy [2, 3].

However, there are limitations to biliary access with the peroral approach, particularly when the biliary – intestinal anatomy is altered or when a transpapillary attempt has failed. In these contexts, percutaneous access becomes necessary for diagnosis and management. Unfortunately, the diagnostic accuracy of percutaneous tissue acquisition via brush cytology is poor, with a sensitivity of 43 % and a rate of unsatisfactory specimens of 21 % [4]. In patients where a percutaneous approach is required for biliary access, direct cholangioscopy can be performed by introducing the cholangioscope through a percutaneous sheath to obtain direct visualization of the biliary pathology and to optimize tissue sampling with biopsy forceps [2, 5].

In this case series of four patients, we present our experience using percutaneous transhepatic cholangioscopy (PTCS) via the SpyGlass system for the assessment of indeterminate biliary strictures.

Case series and methods

This is a retrospective, observational, open-label, single-arm case series conducted at one tertiary care center. The cases are summarized in ○ **Table e1** (available online; ○ **Fig. 1** and **2**). PTCS with the Spyglass cholangioscope was performed to assess indeterminate biliary strictures. In each patient, conventional access to the biliary tree had not been possible (failed ERCP cannulation in the first patient and altered biliary-intestinal anatomy in the remaining three). An 8-Fr biliary drain (Boston Scientific Inc.) was placed via a percutaneous approach to obtain brushings for cytological analysis of the abnormal common bile duct. Because these brushings were nondiagnostic, PTCS was used. Prior to PTCS, the percutaneous drain was serially dilated over an Amplatz Super Stiff guidewire (Boston Scientific Inc.). A 12-Fr vascular Avanti sheath (Cook Inc., Bloo-

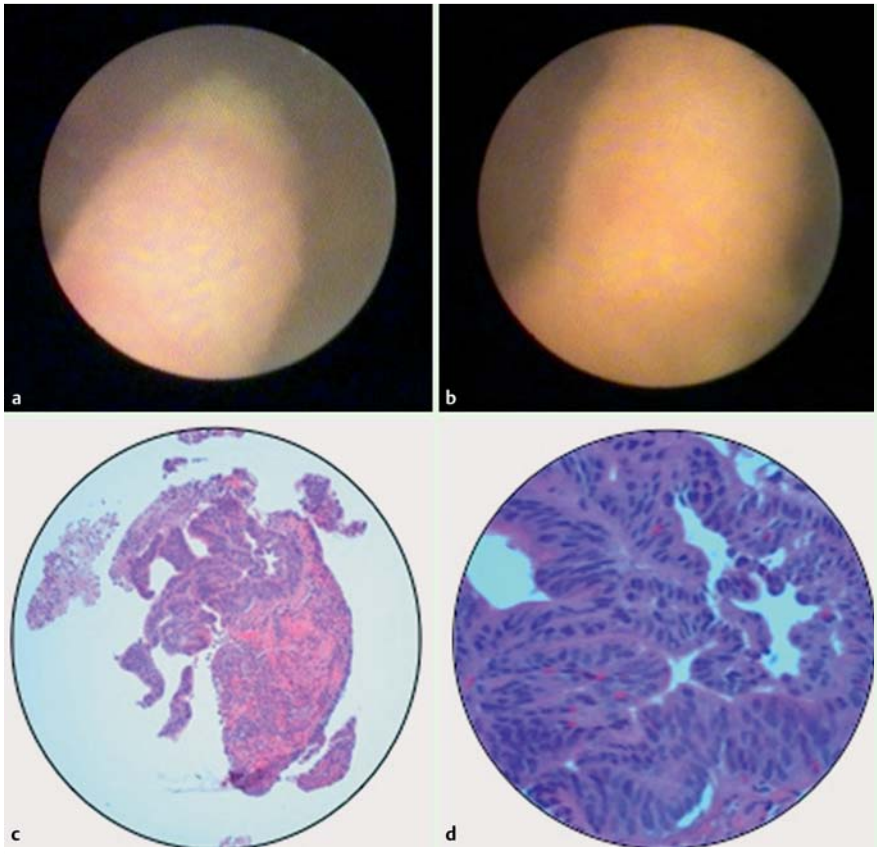

Fig. 1 Findings in patient #1 who had a cystic lesion near the porta hepatis but nondiagnostic brushings. **a, b** Views during percutaneous transhepatic cholangioscopy (PTCS) showing a nodular mass lesion in the dilated distal common bile duct. **c, d** Biopsies taken from the lesion showing glandular epithelium associated with architectural distortion and high grade dysplastic changes at: **c** magnification × 20; **d** magnification × 400.

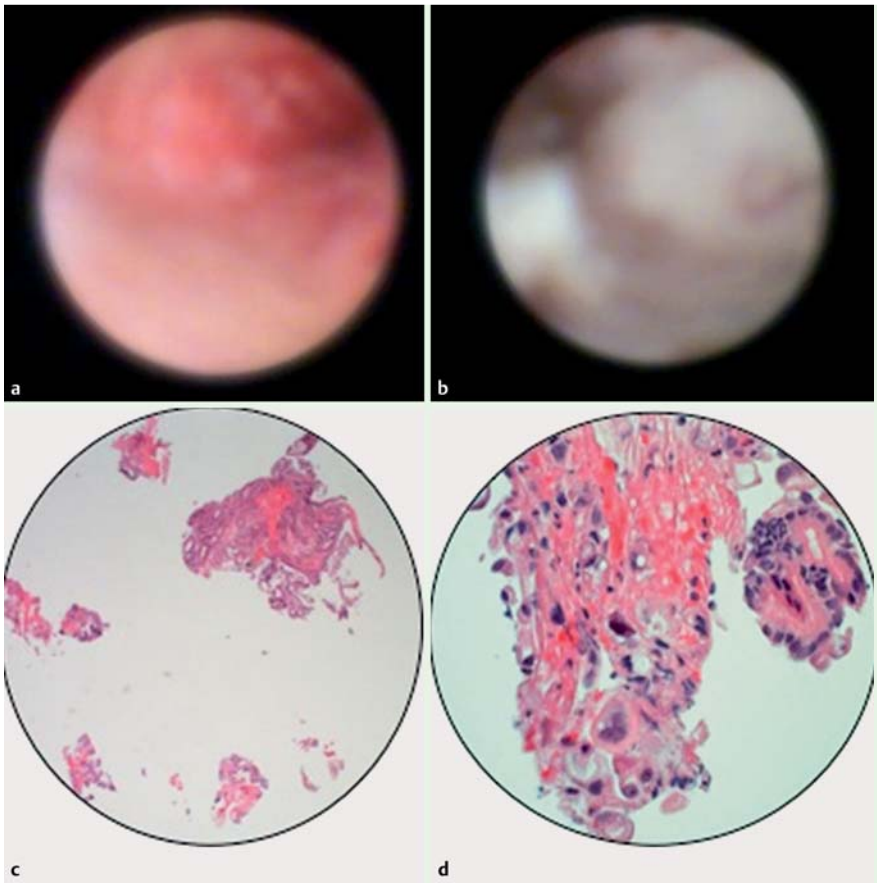

Fig. 2 Findings in patient #2 who had dilated bile ducts and a soft-tissue mass at the porta hepatis but nondiagnostic brushings. **a, b** Views during percutaneous transhepatic cholangioscopy (PTCS) showing: **a** a distal common bile duct stricture; **b** a mass lesion exhibiting the classic "tumor vessel" sign. **c, d** Biopsies taken from the lesion showing highly atypical disrupted glands, consistent with adenocarcinoma, at: **c** magnification × 20; **d** magnification × 100.

mington, Indiana, USA) was then inserted and sutured to the skin. During PTCS, an endoscopist experienced in the use of the SpyGlass system operated the cholangioscope. Specifically, this endoscopist provided directional maneuvering of the cholangioscope, as well as irrigation, suctioning, and the taking of tissue samples with the SpyBite forceps (Boston Scientific Inc.). An assisting endoscopist (our advanced endoscopy fellow) had responsibility for anchoring the 12-Fr sheath with one hand, while providing insertion, withdrawal, and torque of the cholangioscope with the other.

At the end of each PTCS procedure, patients returned to the interventional radiology suite, where the 12-Fr access sheath was changed to a 12-Fr internal drain. After two further visits to the suite over 2 days, the 12-Fr drain was downsized to a 10-Fr and then an 8-Fr drain, before being removed completely.

In all four patients, a diagnosis was achieved and no complications were encountered.

Discussion

Our case series demonstrates the safety, feasibility, and diagnostic success of PTCS, using the SpyGlass cholangioscope system, in assessing indeterminate biliary strictures. In each patient, percutaneous access to the biliary anatomy was required after conventional access was not possible. Where percutaneous brushings for cytological analysis failed to yield a diagnosis, PTCS using SpyGlass-directed biopsies was successful at obtaining a tissue diagnosis.

Although the feasibility of direct cholangioscopy with an ultraslim gastroscope has been demonstrated previously, its major limitation results from its large diameter, which requires the dilation of a percutaneous access tract to a greater degree [5 – 8]. In this regard, SpyGlass cholangioscopy is advantageous because there are no issues with tract dilation for access. With advance scheduling, our procedures were timed such that the vascular sheath was placed just prior to PTCS.

Even though the SpyGlass system is designed to be a single-operator platform for peroral cholangioscopy, our experiences with PTCS suggest that two operators improve the steering of the cholangioscope. Specifically, as the cholangioscope was passed through the sheath, an assistant held the catheter at the percutaneous entry port using torque while the primary operator performed the endoscopy and tissue acquisition with SpyBite forceps.

In conclusion, where conventional access has been unsuccessful, either because of failed ERCP or as a result of altered biliary-intestinal anatomy, percutaneous transhepatic SpyGlass cholangioscopy is useful in the diagnosis of indeterminate biliary strictures. We found that PTCS with the SpyGlass system is technically feasible and safe. However, maneuverability during PTCS is more challenging compared with peroral cholangioscopy, so a second endoscopist provided assistance in the completion of our procedures. While further studies should be performed to outline the clinical indications and potential complications of PTCS, our preliminary experiences support its feasibility and utility in complex biliary conditions.

Competing interests: Dr. Gurpal Sandha is a consultant for Boston Scientific Inc. and is a member of their biliary medical advisory board. However, this study was investigator initiated and there has been no involvement by Boston Scientific Inc. in any way, monetary or otherwise.

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Table e1

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