



# A convenient and reliable method for endoscopic mapping biopsy of cholangiocarcinoma using a double-lumen cytology device

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## CASE PRESENTATION

A 65-year-old man had been treated for type 2 diabetes mellitus and rheumatoid arthritis at our hospital. He presented with jaundice and abdominal pain, and blood results showed abnormal liver function suggestive of obstructive jaundice. A contrast-enhanced CT scan showed a 20-mm-long circumferential wall thickening in the hilar bile duct, suggesting perihilar cholangiocarcinoma (Fig. 1A). To perform biliary drainage and determine the extent of resection and surgical approach, ERCP was performed. Fluoroscopic imaging showed bile duct stenosis around the hilar region (Fig. 1B).

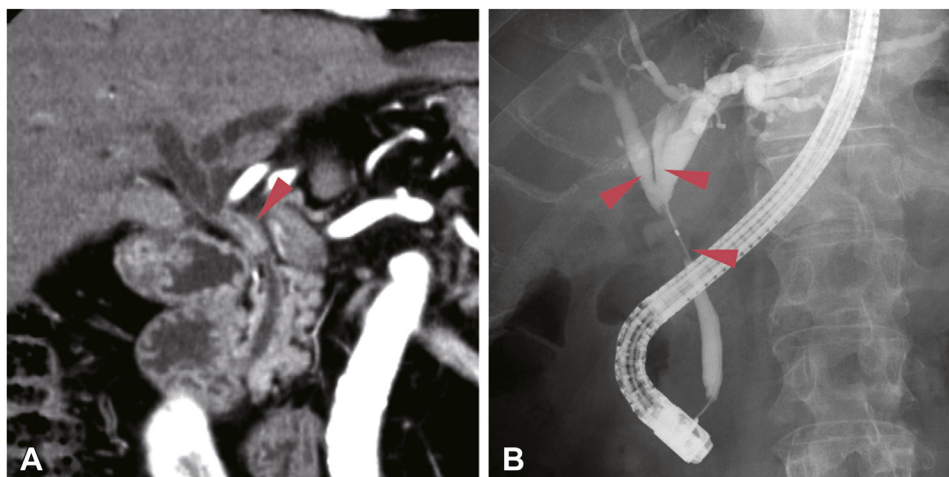
## PROCEDURE

Determination of the presence of cancer in the left and right hepatic ducts was considered important to plan for surgery. Therefore, we decided to use the external sheath of the CytomaxII double-lumen biliary cytology brush (Cook Medical, Bloomington, Ind, USA) to perform a reliable mapping biopsy. The brush and the connector were removed from the main lumen of the cytology device

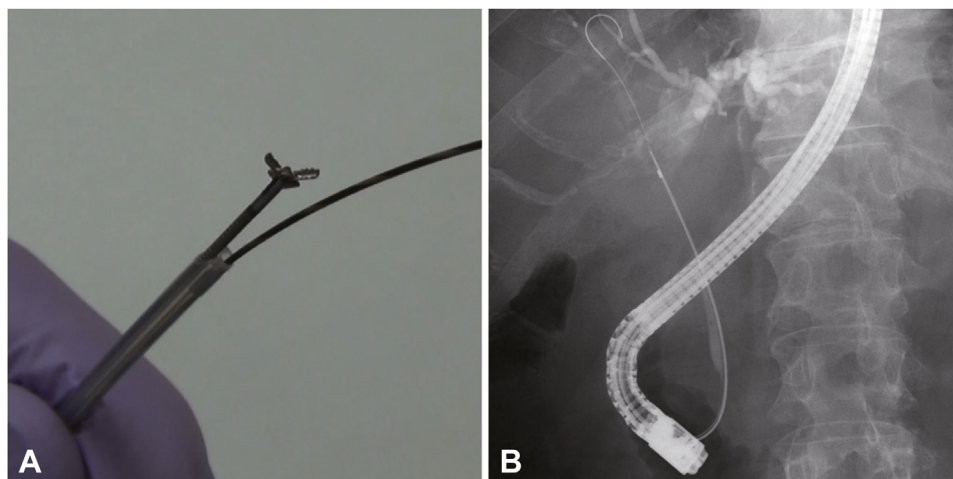
before SpyBite Max Biopsy Forceps (Boston Scientific, Natick, Mass, USA) were inserted into the lumen. The tail of the guidewire (Endoselector, Boston Scientific), with its tip placed in the bile duct of interest, was fed through the side lumen of the cytology device (Fig. 2A). The biopsy forceps were guided to the intended branch of the bile duct using the cytology device. Leaving the cytology device in place, the forceps could be easily removed for tissue collection and then reinserted. Moreover, by changing the position of the guidewire, biopsy could be easily taken from another intended branch (Fig. 2B; Video 1, available online at [www.giejournal.org](http://www.giejournal.org)).

## OUTCOME

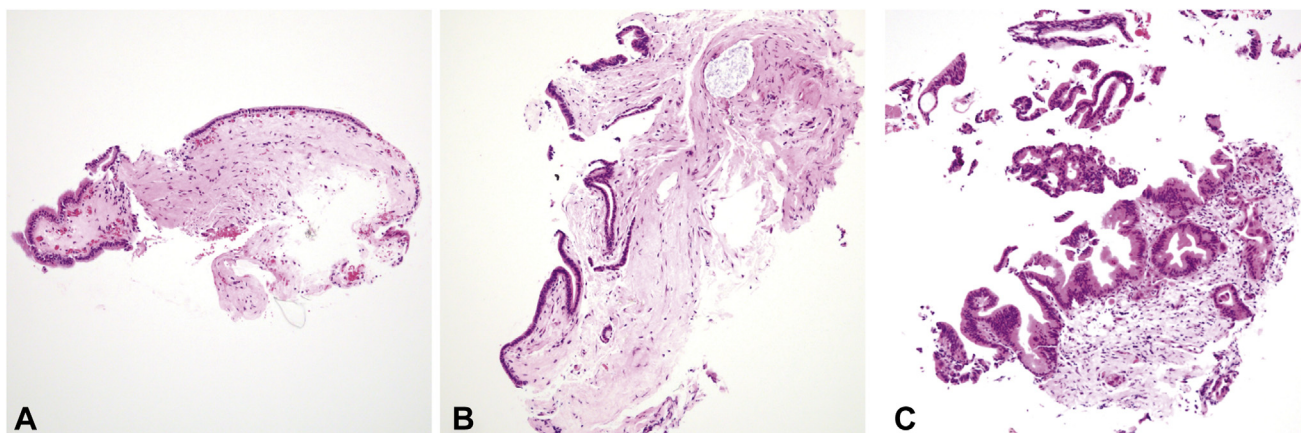
Pathology results for the biopsy specimen taken from the left hepatic duct showed only atypical epithelium equivalent to biliary intraepithelial neoplasia-1, and the specimen taken from the right hepatic duct showed normal bile duct epithelium. Extrahepatic bile duct resection was performed as a result (Fig. 3). The final pathology was consistent with the biopsy results. The



**Figure 1.** Images of perihilar cholangiocarcinoma. **A**, Contrast-enhanced CT showing a 20-mm-long wall thickening in the hilar region (red arrow), suggestive of perihilar cholangiocarcinoma. **B**, Endoscopic retrograde cholangiography finding of a 20-mm-long stenosis in the hilar region. Red arrows indicate the biopsy sites.



**Figure 2.** Mapping biopsy method using a double-lumen cytology device. **A**, Cytomax II double-lumen biliary cytology brush, with SpyBite Max Biopsy Forceps inserted in the main lumen, in preparation. **B**, Biopsy specimen is taken from the bile duct proximal to the tumor and held in place by the external sheath of the cytology device.



**Figure 3.** Histological images. Hematoxylin and eosin staining of tissue collected by using SpyBite Max Biopsy Forceps from **(A)** the right hepatic duct and **(B)** the left hepatic duct. A sufficient specimen was collected, and no malignant cells were found. **C**, Hematoxylin and eosin staining of tumor collected by conventional biopsy forceps (Radial Jaw 4 Pediatric Biopsy Forceps, Boston Scientific, Natick, Mass, USA).

postoperative course was unremarkable, and no recurrence or metastasis has been observed to date.

## DISCUSSION

Accurate diagnosis of the extent of perihilar cholangiocarcinoma is important in determining the surgical approach.<sup>1</sup> Per-oral cholangioscopy is expensive and may not be able to reach upstream of the tumor in cases of severe stenosis.<sup>2</sup> The method for conventional biopsy is to guide the biopsy forceps into the intended bile duct branch, which itself is technically difficult and may produce a false positive result because of tissue contamination from the forceps passing through the

tumor stenosis. Moreover, post-ERCP pancreatitis caused by frequent contact of the biopsy forceps with the papilla is also a concern. A mapping biopsy method using the pusher sheath of plastic stents to prevent the aforementioned drawbacks has been reported.<sup>3</sup> Although this method is also useful, the biopsy forceps cannot be inserted with the guidewire in place, and the forceps may be displaced from the intended branch during insertion. Furthermore, each time another branch is selected, there is the added step of recannulating the inner tube and the guidewire.

In our method, the presence of the guidewire, as well as the added stability of the external sheath, allowed for greater technical ease, and the sheath acted as a cover, preventing false positive results and post-ERCP pancreatitis.

Furthermore, it is a simpler method because the intended branch can be selected only by changing the position of the guidewire.

This method uses small biopsy forceps designed for peroral cholangioscopy, which may reduce the diagnostic accuracy. However, the amount of tissue collected is improved in the newest model, and a sufficient amount of tissue can be obtained.<sup>4</sup> Our novel method enables a convenient and accurate preoperative evaluation of cholangiocarcinoma.

## DISCLOSURE

*All authors disclosed no financial relationships.*

## ACKNOWLEDGMENT

We gratefully acknowledge Yoshiya Ishikawa (Department of Hepatobiliary and Pancreatic Surgery, Tokyo Medical and Dental University [TMDU], Tokyo, Japan), Shun Fujiwara (Department of Gastroenterology and Hepatology, TMDU, Tokyo, Japan), and Hiromune Katsuda (Department of Gastroenterology, Saitama Medical University International Medical Center, Saitama, Japan) for their support. We thank Ami Kawamoto (Department of Gastroenterology, TMDU) for English correction and Kouhei

Yamamoto (Department of Pathology, TMDU, Tokyo, Japan) for pathological findings.

## REFERENCES

1. Igami T, Nagino M, Oda K, et al. Clinicopathologic study of cholangiocarcinoma with superficial spread. *Ann Surg* 2009;249:296-302.
2. Nishikawa T, Tsuyuguchi T, Sakai Y, et al. Preoperative assessment of longitudinal extension of cholangiocarcinoma with peroral video-cholangioscopy: a prospective study. *Dig Endosc* 2014;26:450-7.
3. Okada H, Uza N, Matsumori T, et al. A novel technique for mapping biopsy of bile duct cancer. *Endoscopy* 2021;53:647-51.
4. Minami H, Mukai S, Sofuni A, et al. Clinical outcomes of digital cholangioscopy-guided procedures for the diagnosis of biliary strictures and treatment of difficult bile duct stones: a single-center large cohort study. *J Clin Med* 2021;10:1638.

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<https://doi.org/10.1016/j.vgie.2022.01.009>

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